ACC	Acceding countries
CCN	EU candidate countries + Norway + Switzerland
CEEC	Central and east European countries
CHP	Combined heat and power
CIS	Commonwealth of Independent States
DG	Directorate-General
EU	European Union
GDP	Gross domestic product
GIC	Gross inland consumption
Gpkm	Gigapassenger-kilometre or 10^9 passenger-kilometre
Gtkm	Gigatonne-kilometre or 10^9 tonne-kilometre
GW	Gigawatt, or 10^9 watt
GWh	Gigawatt-hour or 10^9 watt-hour
IEA	International Energy Agency
kgoe	Kilogramme of oil equivalent
km	Kilometre
ktoe	Thousand toe
kWh	Kilowatt-hour
MEuro	Million euro
Mt	Million metric tonnes
Mtoe	Million toe
OECD	Organisation for Economic Cooperation and Development
pkm	Passenger-kilometre (one passenger transported a distance of one kilometre)
pps	Purchasing power standard
Eurostat	Statistical Office of the European Communities
t	Metric tonne, or 1 000 kilogrammes
tkm	Tonne-kilometre (one tonne transported a distance of one kilometre)
toe	Tonne of oil equivalent, or 10^7 kilocalories, or 41.86 GJ (Gigajoule)
TWh	Terawatt-hour, or 10^{12} watt-hour
UN	United Nations

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It can be accessed through the Europa server (http://europa.eu.int).

Any comments and questions on this publication may be sent to: *tren-projections@cec.eu.int*

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FOREWORD BY MRS DE PALACIO, VICE-PRESIDENT OF THE EUROPEAN COMMISSION (RELATIONS WITH THE EUROPEAN PARLIAMENT, TRANSPORT AND ENERGY)

The European Council held in Copenhagen in December 2002 concluded the accession negotiations with ten candidate countries for their membership of the EU from May 2004. With the largest ever enlargement of the Union now decided, it is important to have an up to date view on long term European energy and transport developments for an enlarged Union.

This publication on European Energy and Transport Trends to 2030 extends the analysis presented in previous editions of the Annual Energy Review. In addition to a statistical analysis of the last ten years, this publication gives detailed projections on energy and transport for the current EU and the enlarged Union of 25. It addresses also the wider European and world developments.

Following the broad debate launched with the Green Paper on the security of energy supplies, the European Union has now developed a new approach to energy policy recognising the clear link between energy supply and management of demand. The projections presented in this outlook to 2030 are built upon an integrated approach encompassing both supply and demand. The projections show how the future may develop in which policy makers will have to act in order to contribute towards sustainable development. In terms of energy policy this implies reconciling energy security with reduced environmental impacts of energy production and use while ensuring simultaneously that our economies remain competitive and growing.

The completion of the internal market is a key element for improving competitiveness. The Commission has therefore proposed to extend the market opening to all

FOREWORD

customers in energy and transport, which should lead to significant reductions in consumer prices. The economic reform agenda launched at the Lisbon summit encompasses this market opening with due regard to public service obligations and energy security as confirmed by the Seville European Council of June 2002. The Energy Council of November 2002 has finally reached agreement on a complete market opening.

Energy and transport represent services that are essential for the functioning and growth of our economy. Energy and transport are, however, also sources for environmental concerns. In fact, policies in both areas have a key role to play for sustainable development. Moreover, energy and transport investments have long lead-times, while the infrastructure is operated over several decades. A long-term view is therefore required in particular for dealing with issues such as climate change and the nuclear option.

The projected CO_2 emission growth is driven by developments in the transport and power generation sectors. This publication gives a detailed view on how energy demand and emissions from transport might develop over the next three decades. The White Paper on the Common Transport Policy sets out various policy actions that are also relevant for energy demand and ensuing environmental emissions.

Total CO_2 emissions have been stable over the last decade while emissions from power generation have even decreased. About half of our electricity has been generated on the basis of non-fossil fuels. With the current pace of renewables penetration and the phase-out of nuclear decided by certain Member states the share of zero carbon fuels is projected to decrease to less than 40% by 2030. CO_2 emissions will rise accordingly. These results hold for both the current EU and the enlarged Union, although in terms of carbon free electricity generation the enlarged Union does have a somewhat less favourable position.

Two years after the launching of the Energy Green paper, this forward analysis provides an updated look at key indicators. It turns out that some of the indicators (import dependency, share of zero carbon fuels and CO_2 emissions) are slightly less alarming than previously projected, which reflects among other things the policy

FOREWORD

initiatives undertaken since 2000. In the new projections, zero carbon fuels for the current EU are expected to reach a share in total energy demand of 22 % in 2010, of which renewables account for 8 %, while the Green Paper had shares of 21% for zero carbon fuels and of 7% for renewables in 2010. These changes have contributed towards a somewhat lower CO_2 emission growth (+ 4%) for energy related emissions including transport and international aviation (instead of 5% in the Green Paper). On energy security, the prospects are now slightly better with an import dependency projected at 68% in 2030 instead of 71% in the Green Paper. In any case, more policy effort is needed.

The forthcoming enlargement to a Union of 25 Member states will modify the picture without changing significantly the challenges and opportunities. Zero carbon fuels for EU-25 are expected to contribute 21% in 2010 and import dependency would reach 68% in 2030. CO_2 emissions in the enlarged EU would stay about 1% below their 1990 level in 2010 following the deep restructuring that many acceding countries have undergone. However, energy and transport policies will have to further contribute to fulfilling the international obligation of the Kyoto protocol, which includes a minus 8% target for the European Community.

European energy and transport policies are now committed to pursue further the objectives set out in the Green and White papers. A forthcoming publication by the Directorate-General for Energy and Transport on scenario analysis will explore several issues addressed in these two policy documents. This publication serves the purpose of informing the reader in depth about the baseline on which this further analysis is being built.

I would like to repeat my invitation of previous years regarding your comments and suggestions. Our electronic letterbox (tren-projections@cec.eu.int) remains at your service, and our internet site (http://europa.eu.int/comm/dgs/energy_transport/index_en.html) provides you with detailed information on energy and transport policies and market developments. Finally, I hope that the projections set out in this publication give interesting and constructive insights in how the energy future may unfold.

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CD CONTENTS

The attached CD includes in pdf format:

- The present publication in electronic format (Trends to 2030.pdf),
- The two appendixes of the publication (Appendix1.pdf and Appendix2.pdf),
- A background study on global energy developments (World Energy Scenarios.pdf) prepared by IEPE (Institut d'Economie et de Politique de l'Energie/CNRS-UPMF Grenoble),
- A study on the environmental implications of the energy developments of this baseline in a format similar to the statistical publication on Energy – Environment Indicators (Energy and Environment indicators.pdf) prepared by E3M-Lab/NTUA.

Detailed tables on energy, transport and environment developments for all countries and groups of countries can be found under the directory **Detailed Reports**.

Under the **Energy Balances** directory the user can find detailed energy balances by sector and fuel following EUROSTAT nomenclature. The corresponding figures as regards CO_2 emissions can be found in the **CO_2 Emissions Balances** directory.

Finally, under the directory **Model Description** summary descriptions of both the PRIMES and the ACE model can be found.

DEFINITIONS & UNITS

ACC	Acceding Countries
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CEEC	Central and east European countries
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TWh	Terawatt-hour, or 10^{12} watt-hour
UN	United Nations

INTRODUCTION AND PURPOSE

This report reviews the key issues arising from an assessment of likely economic, energy, transport and CO_2 trends over the period to 2030 for current EU Member States, and EU candidate and neighbouring countries. The results and conclusions are presented here in the context of the "Long Range Energy Modelling" framework contract. They are based on quantitative analysis, with the use of the PRIMES and ACE mathematical models, and on a process of communication with and feedback from a number of energy experts and organisations.

A major focus of the study is to assess the impacts following the accession negotiations with ten candidate countries for EU membership concluded at the Copenhagen Council in December 2002 on the enlarged EU energy system. These countries are Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.

Part I reviews the international context, focusing in particular on the demographic and macro-economic framework; the outlook for primary energy prices; the likely evolution of the world energy system; and the prospects for CO_2 emissions to 2030. Part II examines the EU energy and transport outlook to 2030. Part III addresses these issues for a group of 15 countries comprising the ten acceding states, three other candidate countries for EU membership (Bulgaria, Romania and Turkey), and two close neighbours of the EU (Norway and Switzerland). Finally Part IV provides an analysis of the energy and transport outlook to 2030 for the enlarged EU of 25 Member States embracing the current EU-15 and the ten acceding states.

The report utilises material provided by a number of organisations, including several European Commission Directorates-General, especially EUROSTAT, the UN-HABITAT Global Urban Observatory and Statistics Unit, and modelling work by DRI-WEFA, ESAP SA (EPIC database, benchmarking of results), IEPE-CNRS (the POLES model), IFP (the PRIMES-refinery model) and NTUA (the GEM-E3 models). A thorough benchmarking of technological data used in the PRIMES and ACE models was performed for this study by ERM (technical and economic data both for the demand and supply sides) and ECN (focusing on renewable energy forms and co-generation technical and economic characteristics and potentials).

PART I: THE INTERNATIONAL FRAMEWORK

This provides an overview of the international context and examines likely trends in international energy prices. The POLES model is used and a continuation of existing trends is assumed. The key points for the period to 2030 include:

Assumptions

- World population grows by 1% pa to more than 8 billion people in 2030. Population growth remains particularly high in Africa, Asia and Latin America.
- World GDP grows by nearly 3% pa, significantly faster than population. Economic growth is projected to be faster in Asia, Africa, Latin America and also the former centrally planned economies compared with traditional OECD countries.
- World GDP per capita increases by 1.9% pa.

World energy prices

Assuming the continuation of current world energy market structures and taking a conventional view on fossil fuel reserves, world energy prices develop moderately as no supply constraints are likely to be experienced over the next 30 years under Baseline conditions.

- Oil prices decline from their high 2000 levels over the next few years, but they then gradually increase to reach a level in 2030 no higher than that in 2000 (and 1990). The long-term increase in oil prices results from the increased dependence upon Gulf region output and the higher production costs for unconventional oil supplies.
- Gas prices broadly follow oil prices as these fuels compete for many end uses. Gas prices are influenced by two contrasting trends: the cleanliness and high use efficiency cause gas prices to rise faster than for oil; but factors such as more intense gas-to-gas competition and greater integration of regional gas markets (with more LNG) exert downward pressure on gas prices. Gas import prices in Europe stay well below the oil price.
- Coal prices remain flat and well below those of oil and gas especially in the long run.

World energy consumption

Given sustained economic growth, especially in Asia, energy demand increases substantially (by 1.8% pa) over the projection period, while energy intensity (energy demand/GDP) of the world economy falls by just over 1% pa - a continuation of the long-term trend. The global energy system will become increasingly dominated by fossil fuels. Dependence on fossil fuels is expected to reach 88% by 2030 compared to 81% in 2000.

- Oil remains the most important fuel, its share rising slightly to 37%. Beyond 2010, as world production exceeds additional discoveries, world oil reserves decline slowly.
- Gas is the fastest growing fuel and global demand doubles by 2030. Incremental production is concentrated in the CIS and Middle East.
- Solid fuels use also grows substantially, by some 90% to 2030,

especially in coal rich countries like China and India.

- Nuclear's contribution grows up to 2010 but stabilises thereafter, a break from the rising production trend in recent decades.
- The global share of renewable sources declines in the Baseline case. Hydropower production rises almost two-thirds and production from other renewables doubles by 2030. But traditional renewables use (mainly biomass, often consumed at unsustainable rates) declines and is replaced by commercial fuels. As a result, overall global use of renewables does not increase to 2030. With strong growth of total energy demand, the share of renewables declines.

World CO_2 developments

Given these trends global CO_2 emissions increase substantially in the Baseline case - by 87% from 2000 to 2030. Compared with 1990 (the Kyoto Protocol base year) global CO_2 emissions rise by 41% in 2010, and in 2030 they are over twice those emitted in 1990.

CO_2 emissions grow more slowly than GDP but slightly faster than energy demand. The world energy system departs from the long-established trend of decarbonisation given growing reliance upon fossil fuels, especially coal, and the falling share of carbon-free sources - renewables and nuclear. Global carbon intensity (CO_2/energy demand) thus deteriorates.

The EU in the world context

EU energy demand and CO_2 emissions grow much more slowly than at the world level, and thus the EU's share of world energy consumption and of CO_2 emissions falls further.

These trends also apply for the EU after the imminent enlargement to 25 Member States. The EU-25 share of world energy consumption falls from some 17% in 2000 to about 12% in 2030. By then the EU-25 could account for approximately 10% of global CO_2 emissions, from some 16% in 2000.

PART II: EU-15 ENERGY AND TRANSPORT OUTLOOK TO 2030

This presents a Baseline projection of the EU energy and transport outlook to 2030 on the basis of current market trends and existing policies. In future this Baseline will be used as a reference for additional policy-relevant scenario analyses addressing issues such as renewables, nuclear, energy efficiency, energy import prices, alternative GDP growth, and Kyoto targets. This Baseline case projects EU energy demand and supply on the basis of assumptions of economic activity, world energy prices and of the broad framework conditions for economic actors (e.g. discount rates for investment).

Key Assumptions

- Energy import prices follow the world developments reviewed in Part I.
- Baseline assumptions include continued economic modernisation, substantial technological progress, and completion of the internal market. Existing policies on energy efficiency and renewables continue; the fuel efficiency agreement with the car industry is implemented; and decisions on nuclear phase-out in certain Member States are fully incorporated.
- For analytical purposes the Baseline case does not include any new policies to reduce greenhouse gas emissions. This is to assist in identifying any remaining policy gaps in the energy and transport sectors with respect to the EU's Kyoto commitments.
- The Baseline macro-economic scenario assumes continued GDP growth of 2.3% pa on average over the projection period, similar to that over the past 30 years. The assumed growth rates are modest compared with the ambitions of the Lisbon strategy but also high compared with the current weak state of the EU economy.

Primary energy demand and supply

GDP doubles between 2000 and 2030 (at 2.3% pa), but primary energy demand grows by only 18% (0.6% pa). Energy intensity (energy demand/GDP) improves considerably, by 1.7% pa, mainly due to further structural shifts towards services and less energy-intensive industrial production.

- Renewables, especially wind, are the fastest growing energy source to 2030 (+74%). Even so, under present market and policy conditions, the share of renewables is only 8% in 2010 and 9% in 2030 - compared with 6% in 2000.
- Natural gas grows next fastest (+64%), satisfying the bulk of incremental EU energy demand (some 80% of additional energy needs in 2030). The natural gas share rises to 32% of total energy consumption.
- Oil demand grows by only 3%. But oil remains the largest single fuel with a share of 40% in 2000 and 35% in 2030, just ahead of natural gas.
- Nuclear output declines by 19% between 2000 and 2030, especially given the phase-out decisions in certain Member States.
- Solid fuels use declines to 2015 but it then increases again to slightly exceed the 2000 level in 2030 (+ 5%) mainly as a replacement fuel for nuclear in the power sector.

Final energy demand

Final energy demand rises 0.8% pa, and the energy intensity of final demand improves by 1.4% pa over the next 30 years.

- The tertiary sector is the fastest growing energy demand sector (+1.1% pa) given the increased importance of services in the EU economy.
- Transport was the fastest growing EU energy demand sector in the 1990s. Passenger and freight transport activity continues to grow strongly. Freight transport activity is projected to rise by 2.1% pa and passenger transport by 1.4% pa in 2000-2030. With GDP growing by 2.3% pa this means some decoupling of transport activity from economic growth in particular for passenger transport.
- But overall transport demand is projected to grow by 0.9% pa to 2030, much slower than in the recent past, due to fuel efficiency improvements following the environmental agreement with the car industry. This result is even more impressive given modal shifts towards more air and road transport, i.e. towards less energy efficient modes, exerting upward pressure on both energy demand and emissions.
- Industrial energy demand increases by 0.8% pa in 2000-2030, despite shifts towards less energy intensive industries and faster growth of less energy consuming activities within the main sectors (e.g. high value-added pharmaceuticals grow faster than petrochemicals).
- Household energy demand also increases (+0.6% pa). Given limited population growth this is mainly due to the rising number of households (+ 40 million between 2000 and 2030), resulting from changes in age structure, lifestyles and smaller household size. There are saturation effects in some end-use applications, especially in space heating.

The fuel mix on the demand side undergoes limited but still important changes over the projection period.

- Electricity and steam use continue to grow strongly and their share in final energy demand increases. Natural gas also grows faster than average. Consequently, energy demand is increasingly met by network based fuels (their combined share rising from 48% in 2000 to 55% in 2030). These fuels are clean and convenient for final consumers but they allow little or no flexibility in terms of storage near point of use.
- Biomass/waste use in final demand rises only moderately and the role of new renewables, such as solar, remains marginal despite strong growth in relative terms especially towards the end of the projection period.
- With slower growth of transport demand and fuel switching away from oil in other sectors, oil loses importance in final demand. Solid fuels become marginal in final use and are consumed mainly in heavy industries (e.g. cement, iron and steel).

Power generation

- Over the projection period, natural gas becomes the most important source for power generation; solid fuels, oil and nuclear all lose market shares.
- Renewables become much more important for power generation, almost matching nuclear's share by 2030. But, under Baseline conditions with strong electricity demand growth, the renewables share in power generation falls well short of the indicative 22% target for 2010 - despite rapid growth in wind generation.
- Approximately half of the EU electricity is generated from carbon free energy sources (renewables and nuclear). Given the nuclear phase-out decided in certain Member States, and despite the projected strong penetration of renewables, this share will fall to 38% by 2030.
- The CHP share increases only moderately, despite its key role in the efficient use of fossil fuels.
- Investment requirements in electricity generation are substantial because capacity increases from 580 GW at present to about 950 GW in 2030. Growth in generating capacity exceeds that for electricity production given the rising share of renewables with lower annual capacity utilisation (given fluctuating water availability and intermittent generation).
- Despite these heavy investment requirements and rising fuel input costs, especially for natural gas, electricity prices fall over time reflecting efficiency gains derived from technological progress, fuel switching and completion of the internal market.

Indigenous energy production and imports

Indigenous energy production peaks around 2005. Its decline stems from lower fossil fuel production (especially coal, and North Sea oil and gas) and the progressive nuclear phase-out. This decline is not offset by rapidly expanding production of renewables, despite renewables becoming the second largest indigenous source after nuclear by 2030.

Net imports of fossil fuels consequently rise by about two-thirds in 2000-2030. Natural gas imports account for the bulk of this increase. Oil imports also increase, by nearly a quarter, over this period.

- Given the combination of rising energy demand and falling indigenous energy production, EU energy import dependency reaches 68% in 2030 compared with just under 50% in 2000.
- Dependency on imported oil rises from 75% in 2000 to nearly 90% in 2030. For both natural gas and solid fuels import dependence increases even faster to reach some 80% in 2030, from

about 45% for gas and 50% for solids in 2000.

CO_2 emissions

Energy related CO_2 emissions are projected to exceed the 1990 level by 4% in 2010 and by 19% in 2030 in the absence of additional policies to curb emissions.

This rise in CO_2 emissions stems from several factors: only modest improvements in carbon intensity (CO_2 emissions/energy demand) to 2015 with a deterioration thereafter following the phase-out of nuclear power in certain Member States; and limited fuel switching to renewables under Baseline conditions.

Policy challenges

To meet these challenges concerning energy security and climate change more extensive policy measures will be required, as set out in the Commission's Green Paper on Energy Security and the White Paper on the Common Transport Policy. However, some of the indicators such as import dependency, CO_2 emissions and the share of renewables are slightly less alarming now compared with the analysis two years ago for the Green Paper. Import dependency is now seen to rise to 68% instead of 71% in the Green Paper; CO_2 emissions are projected to exceed the 1990 level in 2010 by 4% rather than 5% in the Green Paper; and the share of renewables in 2010 is expected now to amount to 8% in 2010 (instead of 7%).

PART III: CANDIDATE AND NEIGHBOURING COUNTRIES' ENERGY AND TRANSPORT OUTLOOK TO 2030 WITH A VIEW TO EUROPE-30

This part examines the 13 candidate countries and the EU's direct neighbours, Norway and Switzerland, with which it has close economic relations. It also includes a summary of results for Europe-30, comprising the present EU-15, the 13 candidate countries, and the two neighbours.

Key Assumptions

Energy import prices correspond with those for the current EU. The policy assumptions are also similar to those for the EU given the gradual accession of many of these countries and continuation of close economic and political relations with the others.
The group is rather diverse – comprising rich countries (Norway and Switzerland) and those with much lower per capita incomes, such as Bulgaria, Romania and Turkey. GDP growth in the candidate countries is projected to exceed that in EU-15 to 2030.

Primary energy demand and supply

For the combined group of candidate and neighbouring countries, primary energy demand rises by 50% in 2000-2030. As GDP increases much faster (by 165%) over this period, energy intensity improves considerably (by 1.9% pa). This projected growth of energy consumption follows a decade of decreasing energy use in the 1990s due to massive restructuring in the former centrally planned economies.

- Natural gas is the fastest growing fuel, soaring almost 160% to 2030; gas meets nearly 60% of total incremental energy consumption and its share rises from 19% to 33% between 2000 and 2030.
- Oil becomes the most important fuel, replacing solids from 2010 onwards. Rapid growth in transport activity (especially cars and road freight) is the main cause of higher oil use.
- Solid fuels, still heavily used in many central and eastern European countries, are steadily replaced with cleaner, more convenient fuels such as natural gas.
- Nuclear power output declines, given closure of unsafe nuclear reactors in some countries and limited investment in new capacity.
- Renewables grow in line with overall energy consumption, so their share remains at 11% to 2030.

Final energy demand

Final energy demand grows at 1.6% pa, while energy intensity at the level of end users improves by 1.6% pa over the projection period.

- Transport was the only final demand sector to grow during the massive economic transitions of the 1990s. Transport energy demand is expected to continue rising at 3.0% pa, only slightly below GDP growth, reflecting the large projected rise in passenger and freight transport and modal shifts to road and air transport.
- Industrial energy demand grows moderately, following the large decline in the 1990s. Exploitation of energy intensity improvement potential allows industry in candidate countries to expand with limited additional energy consumption.
- Tertiary sector energy demand rises rapidly (+1.9% pa), given fast economic growth in the service sector.
- Household energy demand rises 1.5% pa to 2030 reflecting growth in household numbers and higher living standards, stimulating use of electric appliances.

Natural gas is the fastest growing fuel in final use, followed closely by electricity. Heat demand grows less quickly given the historic high use of district heating in the former centrally planned countries. Solid fuels and biomass lose importance in final demand but oil consumption increases because of rising transport demand.

Power generation

The power sector gradually shifts away from heavy use of solid fuels towards natural gas, which, as in EU-15, becomes the major source for electricity generation in 2030. The share of non-fossil fuels in power generation declines from 47% in 2000 to 31% in 2030, causing much higher CO_2 emissions.

Indigenous energy production and imports

Indigenous energy production rises to 2010 given higher Norwegian gas production and further deployment of renewables. Natural gas and renewables production continue to grow to 2030; but production of solid fuels, oil and nuclear falls.

The group of candidate and neighbouring countries remains a net energy exporter until 2010. After then the region becomes a net importer with imports increasing substantially, as indigenous production declines and energy demand rises.

CO_2 emissions

CO_2 emissions fell 17% in the 1990s due to economic restructuring in formerly centrally planned economies. Even in 2010 CO_2 emissions are projected to be well below the 1990 level. With strong economic growth and the gradual exploitation of large parts of the low-cost fuel switching and energy efficiency potential over time, CO_2 emissions rise quickly from about 2015 to be 21% above 1990 levels in 2030. Nevertheless, with large energy intensity improvements, one unit of GDP in 2030 is produced with only 55% of the CO_2 emitted in 2000.

Europe-30: an overview

Given the economic weight of the current EU, energy developments in Europe-30 are dominated by energy trends in EU-15.

- Primary energy demand in Europe-30 grows 0.8% pa to 2030, considerably slower than GDP growth (2.4% pa), so that energy intensity improves by 1.6% pa.
- Natural gas expands its share of the Europe-30 energy system (from 22% in 2000 to 32% in 2030). Oil remains the largest single fuel contributing 35% in 2030, but both solid fuels and nuclear lose shares. The renewables share rises from 7% in 2000 to nearly 8.5% in 2010 and 9.5% in 2030.
- Transport and tertiary use are the fastest growing final demand sectors to 2030. Energy demand growth in industry is limited because of the substantial potential for improved energy intensity. Rising living standards and smaller household size cause household energy demand to increase moderately: the large energy efficiency potential is exploited, but will be offset by higher appliance ownership and use.
- Import dependency in Europe-30 increases from 36% in 2000 to 60% in 2030. Import dependency in Europe-30 is significantly lower than in EU-15, mainly due to Norwegian oil and gas output. But dependency rises as primary energy demand increases throughout the projection period and indigenous production falls from 2005. Import dependency is highest for oil (from 55% in 2000 to 80% in 2030); for natural gas this rises from 39% in 2000 to 68% in 2030; and for solids from 32% to 65% in the same period.
- CO_2 emissions in Europe-30 return to their 1990 level in 2010 after falling in the 1990s. By 2030 CO_2 emissions exceed their 1990 level by 20%.

Thus, in many respects, energy developments in Europe-30 resemble those in EU-15, especially as regards long-term growth in both CO_2 emissions and import dependency.

Part IV: EU-25 ENERGY AND TRANSPORT OUTLOOK TO 2030

This part examines energy, transport and CO_2 emission developments to 2030 under Baseline conditions in the enlarged Union with 25 Member States (EU-25). As in the case of EU-15, it is planned to use the baseline as a reference for scenario work at the EU-25 level.

Key Assumptions

Energy import prices correspond to those for EU-15. Policy assumptions follow closely those for EU-15 given that the acquis communautaire will be implemented in the 10 acceding countries.

Economic growth in EU-25 will be somewhat higher than in EU-15 because acceding countries grow faster, from lower levels in the past. EU-25 GDP is projected to grow 2.4% pa, slightly more than doubling to 2030.

Primary energy demand and supply

EU-25 primary energy demand is projected to be 19% higher in 2030 than in 2000 (0.6% pa), with GDP twice that in 2000. Energy intensity develops favourably, falling by 1.7% pa.

- Some 80% of incremental energy consumption to 2030 will be met by natural gas, demand for which grows by two thirds in 2000-2030. In 2030, natural gas is the second largest fuel, with a 32% share of total EU-25 primary demand.
- Oil remains the largest fuel, although consumption grows by only 8% between 2000 and 2030. In 2030, oil meets 35% of primary energy demand (down from 38% in 2000).
- Renewables are the fastest growing energy source, expanding 75% over the next 30 years. But their share in primary energy demand rises from only almost 6% in 2000 to 7.4% in 2010 and

8.6% in 2030 under Baseline conditions.

- The nuclear contribution increases marginally (+3% in total) to 2010 given higher utilisation of existing capacity and some limited capacity additions, which together offset closure of reactors with safety concerns in some acceding countries. However, in 2030, nuclear output is 22% lower than in 2000; and its share drops from 14.4% to 9.4% in 2000-2030. This results from the nuclear phase-out in certain Member States.
- Solid fuels consumption declines steeply in the medium term but regains its 2000 level by 2030, as a replacement for nuclear and given coal's enhanced competitiveness against higher gas prices in the long term.

Final energy demand

The tertiary sector is the fastest growing final energy market in EU-25, followed by transport - both sectors growing more rapidly than overall final energy demand.

Transport energy demand growth derives from rising transport activity to 2030, and by modal shifts towards road and air transport under Baseline conditions.

- Road gains market share but fuel efficiency improvements, especially in private cars following the fuel efficiency agreement with the car industry, constrain energy demand growth.
- The rail share of both passenger and freight transport falls considerably given large substitution away from rail in the transport system of acceding countries, which are now more reliant on rail transport (e.g. 43% share for rail freight in acceding countries compared with 13% in EU-15[1] in 2000). Road gains market shares accordingly, and with increasing per capita incomes there is a strongly increasing demand for air travel.
- Transport demand per capita in the acceding countries rises strongly as disposable incomes grow, and km travelled per person doubles in 2000-2030. Total km travelled per capita in EU-25 increase by nearly 50% over the same period. Yet passenger transport in EU-25 grows more slowly than GDP (1.5% pa compared with 2.4% pa) leading to considerable decoupling of passenger transport from GDP (with intensity gains of 0.9% pa up to 2030).
- Freight transport intensity in the EU-25 decreases to 2030 but by only 0.2% pa, leading to only limited decoupling of freight transport activity from GDP in the Baseline.

The strong energy demand growth in tertiary activities (1.2% pa) arises mainly in services; tertiary sector value added increases much faster than energy demand (by 2.5% pa up to 2030). Agriculture, also included in this sector, grows much more slowly.

Industrial energy demand is projected to grow by 0.7% pa to 2030, having fallen in the 1990s because of the restructuring in the acceding countries and the former GDR.

- Exploitation of the large potential for energy intensity improvements permits industry in acceding countries to expand activity with only limited additional energy consumption, in turn also restraining EU-25 industrial energy demand growth.
- Further structural change away from heavy industries towards less energy-intensive activities leads to significant energy intensity improvements, limiting industrial energy demand growth.

Household energy demand increases by 0.6% pa by 2030 in EU-25, reflecting higher living standards and more widespread use of electric appliances in acceding countries, but also some saturation effects especially in EU-15 space heating. But demand growth derives from rising household numbers due to demographic changes and lifestyles.

Total final energy demand is projected to grow by 0.9% pa to 2030. This is faster than growth of primary energy demand (0.6% pa), and reflects the significant efficiency gains in the energy transformation sector – especially in power generation.

- Electricity is the fastest growing fuel in final use, growing by 1.6% pa to 2030. Heat from CHP and district heating plants comes next, rising 1.4% pa. Gas also grows above average (by 1.1% pa) but oil use increases more slowly. Despite increasing transport demand, the low oil growth reflects fuel switching away from oil in other final demand sectors. Final demand for solid fuels falls by nearly 50% by 2030 as heavy industries lose their importance and households in acceding countries shift to more convenient means of space heating.
- Electricity provides 40% of the incremental final energy demand to 2030, and natural gas and oil each account for approximately 30%. The role of renewables in final demand increases quite slowly over the period by 0.2% pa.

Power generation

Electricity production increases 54% in 2000-2030.

- Gas-based electricity grows particularly quickly - by over 150% in this period - and in 2030 gas is the most important fuel input for electricity (accounting for 36% of power generation, from 16% in 2000).
- The power station sector gradually shifts away from solid fuels and nuclear, which each had a 32% share in 2000: i.e. nearly two thirds of electricity production is presently based on nuclear and solid fuels, both with favourable characteristics as regards security of supply. But, by 2030, the nuclear share falls to 17%,

1 These shares reflect EUROSTAT energy statistics that treat energy consumption for maritime transport as bunkers, which are not included in inland energy consumption; consequently these shares do not take account of coastal sea shipping.

and that of solid fuels to 27%.

- Electricity from renewables rises nearly 90% by 2030. Under Baseline conditions the renewables share in electricity generation is projected to be 17% in 2030, compared with 14% in 2000.
- The net effect of greater use of renewables, but lower nuclear output, is that the share of carbon free sources for EU-25 electricity generation falls from 46% in 2000 to 34% in 2030. The share of carbon free electricity generation is higher in EU-15 (49% in 2000), but also decreases to 38% in 2030. The lower shares in EU-25 reflect the rather unfavourable position of acceding countries in terms of zero carbon fuels. Given these trends CO_2 emissions from power generation increase in the Baseline case.

Indigenous energy production and imports

Indigenous energy production decreases slowly until 2010 (-4%). After 2010 the decline accelerates and in 2030 production is 27% lower than in 2000.

- Solid fuels production falls some 50% over 2000-2030; the decline is substantial in both EU-15 and the acceding countries. Oil production also falls by nearly 50% but this happens nearly entirely in EU-15, as the acceding countries produce little oil. Natural gas production drops by 40% to 2030, also largely in the current EU. Nuclear output is projected to fall by 22% over the same period, decreasing both in EU-15 and the acceding countries.
- Only the production of renewables rises: by 37% over 2000-2010 and by 74% over the whole projection period. Most of the increase comes from biomass/waste, while wind grows fastest in relative terms: by 2030 wind production is 14 times higher than in 2000. Renewables output expands in both EU-15 and the acceding countries.
- The acceding countries are less dependent on energy imports than the current EU. In 2000, import dependency was 30% in the acceding countries but close to 50% in EU-15. Over time the acceding countries converge with the current EU, with higher growth of energy demand (compared with EU-15) and a bigger decline of indigenous production. In 2030, import dependency in the acceding countries is expected to reach 65%, while that in EU-15 reaches 68%. Overall EU-25 import dependency increases from 47% in 2000 to 67.5% in 2030.
- By fuel the highest import dependency will continue to be for oil, rising from 76% in 2000 to 88% in 2030. For natural gas this dependency grows from 50% in 2000 to 81% in 2030. Import dependency for solid fuels more than doubles, from 30% in 2000 to 66% in 2030.

CO_2 emissions

CO_2 emissions for the enlarged Union are expected to be 1% lower in 2010 than in 1990; but to increase by 4% in the EU-15 over the same period. This more favourable situation concerning CO_2 in EU-25 derives from trends in the central and eastern European acceding countries. CO_2 emissions in acceding countries fall 23% in 2010 compared with 1990 levels.

In the longer term, EU-25 CO_2 emissions rise. In the EU-15 this is due to upward pressure on CO_2 stemming from growing economic activity and the assumed absence of new policies and measures on climate change in the Baseline case. In addition more rapid GDP growth in acceding countries leads to rising CO_2 emissions from 2005. By 2030 CO_2 emissions in EU-25 exceed the 1990 level by 14%. This overall increase stems from the projected 19% rise in these emissions in EU-15 between 1990 and 2030, but a 9% fall in the acceding countries (i.e. CO_2 emissions from the acceding countries are expected to remain well below their 1990 even in 2030).

- The carbon intensity of the EU-25 energy system falls slightly to 2015 given greater use of renewables and especially natural gas. In the Baseline case this intensity trend is reversed after 2015 given the nuclear phase-out in several Member States, insufficient renewables growth to compensate for this lost nuclear output, and thus replacement of much nuclear generation by fossil fuels.
- In 2000 CO_2 emissions per unit of GDP were higher in EU-25 than in the current EU due to the higher carbon intensity of the EU-25 energy system and the latter's much higher energy intensity stemming from energy inefficient practices inherited from the formerly centrally planned economies.
- The CO_2/GDP ratio is expected to decline in EU-25 throughout the projection period so that in 2030 one unit of GDP is produced with 42% less CO_2 emissions. CO_2 emissions per unit of GDP fall even more quickly in the acceding countries (by 58% between 2000 and 2030). Clearly, with additional policies following ratification of the Kyoto Protocol, even greater reductions are possible but such further policy responses are excluded from the Baseline case.

Policy challenges

In conclusion, energy developments in EU-25 are in many respects similar to those in the current EU - especially as regards the key long-term challenges associated with the growth in CO_2 emissions, the penetration of renewables and rising energy import dependency.

INTRODUCTION

The scope of "European Energy and Transport Trends to 2030" is to explore possible energy and transport developments over the next three decades on the basis of an in depth modelling analysis of the European energy system and its driving forces carried out mainly at the E3M-Laboratory of National Technical University of Athens. The study addresses in particular transport developments and their impact on energy demand. Energy and transport demand in Europe depend on a large number of factors ultimately reflecting decisions made at the level of individual consumers. Within a modelling framework these are naturally grouped into analytically meaningful categories.

Looking thirty years ahead we need to recognise that many uncertainties exist in future developments including in the overall geopolitical environment. Nevertheless, on certain issues there is now a large degree of consensus. The trend toward globalisation appears to be well established, the internal market in energy and transport is progressing towards completion, technology is improving quickly, and environmental issues remain at the heart of energy and transport policy – especially as regards climate change. Similarly, energy security as discussed in the "Green Paper on the security of energy supply" remains a major issue.

This volume explores in considerable detail a baseline describing how the future may unfold if current trends and policies are continued into the future. In this sense the baseline can contribute towards identifying challenges and opportunities implicit in the continuation of existing trends. The indicators shown in this study can help policy makers to evaluate existing trends in relation to policy objectives such as security of energy supply, competitiveness and environmental protection. Furthermore it can be used as a starting point for further scenario analysis of policy relevant cases. Work on such policy relevant cases on the basis of this baseline is underway. It is planned to publish the most interesting results of the scenario analyses upon completion later this year in the same series on European Energy and Transport.

The trends shown in this publication are based on the in-depth quantitative analysis of energy developments including their economic, transport and environmental aspects. The modelling results reflect the dynamic development of technologies against the background of the completion of the internal market. In this respect, the study is comparable to the previous publication on "European Union Energy Outlook to 2020" of 1999.

However, in addition to extending the projection horizon form 2020 to 2030, these Trends to 2030 extend the geographical scope of the detailed analysis, beyond the current EU. With the imminent enlargement to 25 Member states and in the perspective of further enlargement, this study deals with the wider Europe of 30 countries. These 30 European countries include, in addition to the current EU of 15 Member states, the ten acceding countries, the three remaining candidate countries and the two direct neighbours Norway and Switzerland.

Trends to 2030 include a global view that puts European developments into the world context. The international framework to 2030, described in part I, deals with global demographic, economic, energy and CO_2 developments. This study addresses the international framework, in which globalisation takes place against the background of increasing population and a moderate expansion of the global economy. This in turn has substantial impacts on global energy and environment developments.

The second part focuses on EU-15. It gives detailed projections of current trends to 2030 with a focus on the present EU given that:

- better modelling facilities exist for the present Member States, developed over many years, that allow a more in depth analysis of the driving forces of energy, transport and environmental developments;
- this allows an up-date of the scenario analysis undertaken in preparation of the Green paper on the security of energy supplies so as to evaluate key issues of policy concern in comparison with the scenario analysis undertaken more than two years ago.

The third part addresses the candidate countries and direct neighbours as a group in some detail and provides a view on Europe-30. This allows a comparison with the analysis on Europe-30 that was undertaken in preparation of the Green paper. In addition part III enables the reader to follow in detail how energy developments outside the current EU would influence the energy picture of the wider Europe of 30 countries.

The final part of the study deals with the EU of 25 Member states following enlargement in 2004, i.e. the framework for future policy making in the EU. The baseline projections in this part give, for the first time, a comprehensive picture of energy developments including transport and environment issues related to energy for EU-25.

The modelling of EU-25 is somewhat less detailed than the modelling for EU-15, which was undertaken with the PRIMES model. The ten acceding countries, as well as the other European countries in this study, were modelled with the ACE model, which is somewhat less sophisticated and detailed than the PRIMES model that has been developed for EU-15 since 1993. Work is underway to base the modelling analysis of the acceding countries also on the PRIMES model. Given that the transition to the PRIMES model will require some more time, it was deemed preferable to show the development of current trends using the modelling facilities

that are available at present. This allows for a view on the EU in its likely shape from 2004 shortly after the accession negotiations have been successfully concluded in Copenhagen in December 2002 and in advance of the signature of the accession treaties scheduled for April 2003 in Athens.

The CD included in this publication gives background material, such as detailed tables on energy, transport and environment developments for all countries and groups of countries, a background study on global energy developments, a short description of the PRIMES and ACE models, and a study on the environmental implications of the energy developments of this baseline in a format similar to the statistical publication on Energy – Environment Indicators.

This volume has been prepared within the "Long Range Energy Modelling" framework contract which was financed by the Directorate-General for Energy and Transport and co-ordinated by Hugh Rees (Head of Unit B/1), Manfred Decker and other officials of the unit. A special acknowledgement is due to EUROSTAT, the main source for energy and economic data that has been used in this volume. The study benefited from the support related to data and information by P. Tavoularidis, N. Roubanis and other officials of EUROSTAT and by M. Lecloux of the Directorate General for Energy and Transport. Member States' energy experts and European Commission officials have contributed through a process of comments and feedback towards the finalisation of this work.

Prof. Pantelis Capros, Nikos Kouvaritakis, Dr. Leonidas Mantzos and Maria Zeka-Paschou of the National Technical University of Athens (NTUA) are responsible for the projections of the "European Energy and Transport Trends to 2030". They are also responsible for the construction and maintenance of the PRIMES and ACE models, on which the quantitative work reported here is based. J-F Guilmot contributed to the maintenance of PRIMES and ACE models databases and in the analysis of the power generation sector. Dr. Leonidas Mantzos is the main author of this report with contributions from Prof. Capros and other members of the NTUA, while Prof. John Chesshire has edited it. The views expressed in this report, although discussed with European Commission officials, do not engage the Commission and are not necessarily shared by the Energy and Transport DG. The responsibility rests solely with the authors.

THE INTERNATIONAL FRAMEWORK

PART I

This presentation of the international framework puts the following analysis for the current EU, the enlarged EU of 25, candidate countries and the wider Europe in the global context. Moreover, it explains how energy import prices for Europe are derived. Taking into account historic developments and the remaining structural differences, the following presentation distinguishes between traditional developed market economies (OECD regions); countries that started their transition to market economies in the early 1990s and completed it more or less successfully (Central and Eastern European countries - CEEC, CIS) and developing countries in Africa, Asia, the Middle East and Latin America.

In the context of the study an analysis was performed focusing on the examination of world market trends and resulting international fuel price trajectories. For this purpose the POLES model, which is a global model for the world energy system, has been used.[2] The work with the POLES model has been undertaken by IEPE (Institut d'Economie et de Politique de l'Energie/CNRS-UPMF Grenoble). The analysis examined different assumptions as regards the availability of fuel resources, as well as issues related to economic growth for the different world regions.[3] Besides the Baseline scenario, three additional scenarios were defined to obtain insights into the effects of differences in economic growth and resource availability. The Baseline scenario presented here describes a world of abundant oil and gas resources and relatively moderate economic growth over the period to 2030.

1.1. Demographic and macroeconomic framework

1.1.1. Demographic assumptions

World population is expected to expand by 1.0% pa on average over the next 30 years (see Table 1-1). There are significant regional differences. The population in central and eastern European countries (CEEC) is projected to decline slightly, while population in the CIS and in OECD Pacific and OECD Europe is forecast to be stable over the projection period. Population is rising in North America, but at rates below the world average. Major increases will occur in Africa (+2.1% pa) and in the Middle East (+1.6% pa), while Latin America (+1.1% pa) and Asia (+0.9% pa) will be in line with the world population growth rate.

1.1.2. Macroeconomic development

World GDP (expressed in purchasing power standards) is expected to grow by 2.9% pa on average between 2000 and 2030, but with a progressive slowdown over the period: +3.3% pa between 2000 and 2010, +3.0% pa between 2010 and 2020, falling to only +2.5% pa between 2020 and 2030 (see Table 1-2). In the OECD region as a whole GDP growth will be limited to 1.9% pa up to 2030, the evolution expected in the OECD Pacific region being a little less favorable than in North America or in Europe as a result of the situation now prevailing in Japan. GDP is expected to grow by 2.9% pa in CEEC and by 3.2% pa in the CIS. In CEEC, growth rates are expected to be highest between 2000 and 2010, while in the CIS the peak in growth rates will materialise ten years later. In the rest of the world economic growth is expected to reach 4.0% pa on average with limited differences between regions: +4.4% in Asia, +3.5% in the Middle East, +3.1% in Africa and +3.0% pa in Latin America.

Table 1-1: World population trends, 1990 to 2030

	Million inhabitants					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
North America	277	304	327	348	365	0.9	0.7	0.6	0.5	0.6
Europe OECD	434	456	467	470	468	0.5	0.2	0.1	0.0	0.1
OECD Pacific	150	158	162	162	159	0.5	0.3	0.0	-0.2	0.0
CEEC	120	122	122	120	116	0.1	0.0	-0.2	-0.3	-0.2
CIS	289	303	306	307	306	0.5	0.1	0.0	0.0	0.0
Latin America	435	514	589	658	717	1.7	1.4	1.1	0.9	1.1
Middle East	247	319	389	458	522	2.6	2.0	1.7	1.3	1.6
Africa	504	664	836	1032	1234	2.8	2.3	2.1	1.8	2.1
Asia	2793	3261	3658	4003	4278	1.6	1.2	0.9	0.7	0.9
World	**5248**	**6102**	**6855**	**7558**	**8164**	**1.5**	**1.2**	**1.0**	**0.8**	**1.0**

Source: POLES

2 The POLES model is a global sectoral model of the world energy system. The development of the POLES model has been partially funded under the JOULE II and JOULE III programmes of Research DG (DG-XII) of the European Commission. Since 1997 the model has been fully operational and can produce detailed long term (2030) world energy and CO_2 emission outlooks with demand, supply and price projections by main region. The model splits the world in 26 regions. For the model design see the model reference manual: *"POLES 2.2. European Commission, DG XII, December 1996".*

3 IEPE-CNRS (2002) *World Energy Scenarios and International Energy Prices*. Final Report to NTUA in the context of the Long-Range Energy Modelling project, March 2002 (the report is included in the enclosed CD).

Table 1-2: Annualised percent change for GDP in the different world regions, 1990 to 2030

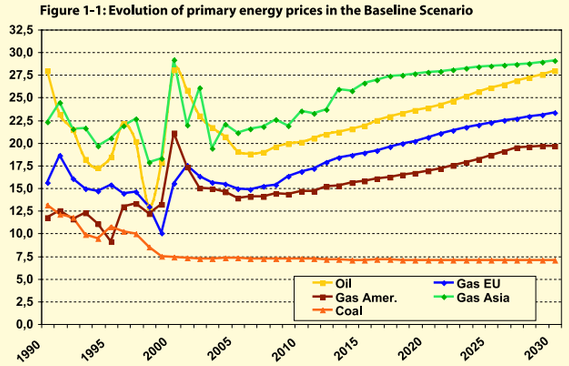
	annual growth rate				
	90/00	**00/10**	**10/20**	**20/30**	**00/30**
North America	3.1	2.3	1.9	1.6	1.9
Europe OECD	2.0	2.1	2.0	1.5	1.9
OECD Pacific	1.6	1.6	1.9	1.7	1.7
CEEC	0.9	3.7	2.6	2.3	2.9
CIS	-5.0	3.3	3.7	2.7	3.2
Latin America	3.3	3.5	3.1	2.5	3.0
Middle East	3.5	3.8	3.5	3.1	3.5
Africa	2.4	3.1	3.2	3.1	3.1
Asia	7.1	5.5	4.3	3.4	4.4
World	**3.0**	**3.3**	**3.0**	**2.5**	**2.9**

Source: POLES

1.2. The primary energy prices outlook

The primary energy prices resulting from the Baseline scenario are illustrated in Figure 1.1. They reflect a situation in which no serious supply constraints are likely to be felt in the period to 2030. The decline in the oil price to 18.8 $00/boe until 2006 reflects a situation of relative oversupply due to lower economic growth and competition among key producers. After 2006, when the production of the Gulf and OPEC regions expands more rapidly, the oil price increases steadily - attaining in 2030 a level (27.9 $00/boe) that corresponds to that in 2000[4].

Figure 1-1: Evolution of primary energy prices in the Baseline Scenario



Source: PRIMES

The oil market is fairly integrated at the world level. This is not the case for gas, which still has a strong regional basis. The main reason for this regional fragmentation is the high cost of transportation of gas relative to its production costs. The Asian market, with the highest proportion of LNG supply, has the highest price level. The American market, which is mostly continental in character, has the lowest, while Europe is in an intermediate position for both features. The gas price dynamics in Europe are driven by a number of contradictory factors. The increasing economic value of gas (due to its high efficiency and the relative low carbon content) act in favour of a faster growth of gas prices compared to that of oil and consequently a narrowing of the gap between oil and gas prices. Such a trend can be clearly identified as regards the projected prices in the horizon to 2015. However, beyond 2015 the shift from regional gas markets towards a more global market for gas generates increasing gas-to-gas competition, which in turn leads to a decoupling of gas from oil prices. Consequently, the gap widens with a lower increase for the gas price. Throughout the projection period, Europe remains in the middle of the gas price range between those of the American and Asian markets.

The coal market comes in between, with major trade flows either within the Atlantic or Pacific regions. Coal import prices by region show much less divergence than gas prices. These market structures are not expected to change dramatically over the next 30 years under Baseline assumptions. With a different profile in the past, coal import prices for different regions converge towards the end of the period at a level of 7 $00/boe, which corresponds to about a quarter of the oil price.

1.3. The world energy system

In the Baseline case, world primary energy consumption is projected to reach 17041 Mtoe in 2030, which is an increase of 71% from 2000 levels (see Table 1-3). GDP is expected to grow almost twice as fast (+136%), while population is likely to increase by 34% up to 2030. This means that average per capita energy consumption will increase from the current 1.63 toe/cap to 2.09 toe/cap in 2030, while the average energy intensity of world GDP will continue to decrease significantly, from 242 to 175 toe/M$95.

The average annual growth in world energy consumption between 2000 and 2030 (+1.8% pa) arises from the combined effects of: increasing population (+1.0% pa on average) and income (world GDP per capita rising by 1.9% pa) and declining energy intensity (-1.1% pa). The decrease in energy intensity results mainly from structural change and the continuing improvement in the best available technologies and their wider deployment in developing countries.

4 These changes reflect the built-in dynamic processes in the POLES model: in the short run, oil prices depend on changes in global oil demand and on the productive capacities in Gulf countries, considered as the "swing producers" in the oil market. In the longer run, oil prices are likely to be influenced to a greater extent by the "fundamentals", i.e. the level of oil demand and the level of available reserves.

Table 1-3: Key indicators for the World energy system - Baseline scenario

						annual growth rate				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Population (Million)	5248	6102	6855	7558	8164	1.5	1.2	1.0	0.8	1.0
GDP (000 M$95-pps)	30793	41211	57057	76378	97490	3.0	3.3	3.0	2.5	2.9
Per capita GDP ($95/cap)	5867	6754	8324	10106	11941	1.4	2.1	2.0	1.7	1.9
Gross Inland Consumption (Mtoe)	8753	9954	12055	14551	17041	1.3	1.9	1.9	1.6	1.8
Gross Inl Cons / GDP (toe/M$95)	284	242	211	191	175	-1.6	-1.3	-1.0	-0.9	-1.1
Gross Inland Cons./Capita (kgoe/cap)	1668	1631	1759	1925	2087	-0.2	0.8	0.9	0.8	0.8
CO_2 Emissions (Mtn CO_2)	20822	23549	29302	36667	44048	1.2	2.2	2.3	1.9	2.1
CO_2 Emissions / Capita (t of CO2/capita)	3.97	3.86	4.27	4.85	5.40	-0.3	1.0	1.3	1.1	1.1

Source: POLES

World CO_2 emissions are projected to grow by 2.1% pa up to 2030 and therefore faster than energy consumption (+1.8% pa). In 2030, world CO_2 emissions would exceed the current level by 87%. This increase is also faster than population growth, so that per capita emissions rise by 1.1% pa.

1.3.1. Primary energy demand by region

Global gross inland energy consumption increased at 1.3% pa on average between 1990 and 2000. While the OECD area continued to increase its energy needs by 1.6% pa on average since 1990, driven by the NAFTA and OECD Pacific regions, the non-OECD world had a slower growth in demand - limited on average to 0.7% annually. This lower non-OECD demand resulted from the significant decreases in Central and Eastern Europe (-1.5% pa on average) and the former USSR (-4.3% pa on average). Energy demand in developing countries was much more buoyant with growth rates of 4.6% pa in the Middle East, 3.3% pa in Latin America and 3.1% pa in Asia.

The European Union represented about 15% of world energy consumption in 2000, a stable share since 1985. Global energy demand is projected to increase by 1.8% pa between 2000 and 2030 compared with only 0.6% pa for the EU. As clearly illustrated in Table 1-4 developing countries (growing at rates above 2% pa in 2000 to 2030) and to a less extent economies in transition are the main drivers as regards world primary energy growth in the horizon to 2030. In contrast, some saturation effects become evident in developed world regions with primary energy needs growing at rates below 1% pa in 2000 to 2030. Consequently, the share of OECD regions in world primary energy needs declines from some 48% in 2000 (16% for OECD-Europe) to 35% in 2030 (11.5% for OECD-Europe). By 2030, Asia becomes the largest energy consuming region, accounting for almost 37% of world primary energy needs (compared to 26% in 2000). The growth of primary energy needs in this region (some 3700 Mtoe between 2000 and 2030) accounts for more than half of the global increase in energy demand and is more than 3 times higher than the corresponding demand growth in all OECD countries.

Table 1-4: Gross inland consumption by region - Baseline scenario

	Mtoe					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
North America	2143	2522	2771	2977	3147	1,6	0.9	0.7	0.6	0.7
Europe OECD	1430	1603	1715	1861	1963	1.1	0.7	0.8	0.5	0.7
OECD Pacific	531	638	696	757	817	1.9	0.9	0.8	0.8	0.8
CEEC	330	285	318	354	384	-1.5	1.1	1.1	0.8	1.0
CIS	1376	888	997	1266	1468	-4.3	1.2	2.4	1.5	1.7
Latin America	443	613	787	1021	1246	3.3	2.5	2.6	2.0	2.4
Middle East	318	497	611	814	1054	4.6	2.1	2.9	2.6	2.5
Africa	301	343	423	551	700	1.3	2.1	2.7	2.4	2.4
Asia	1882	2565	3737	4950	6262	3.1	3.8	2.9	2.4	3.0
World	**8753**	**9954**	**12055**	**14551**	**17041**	**1.3**	**1.9**	**1.9**	**1.6**	**1.8**

Source: POLES

Table 1-5: Gross inland consumption by fuel - Baseline scenario

	Mtoe					annual growth rate				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
Solids	2168	2286	2802	3482	4253	0.5	2.1	2.2	2.0	2.1
Liquids	3104	3556	4412	5395	6261	1.4	2.2	2.0	1.5	1.9
Gas	1747	2221	2835	3706	4535	2.4	2.5	2.7	2.0	2.4
Nuclear	509	663	798	765	783	2.7	1.9	-0.4	0.2	0.6
Hydro+Geothermal	193	238	289	340	390	2.1	2.0	1.6	1.4	1.7
Biomass	909	820	682	569	477	-1.0	-1.8	-1.8	-1.7	-1.8
Other Renewables	123	170	237	294	343	3.3	3.4	2.2	1.5	2.4
Total	**8753**	**9954**	**12055**	**14551**	**17041**	**1.3**	**1.9**	**1.9**	**1.6**	**1.8**

Source: POLES

1.3.2. Primary energy demand by fuel

In 2000, oil was still the most important single fuel with 36% of world primary energy demand, a stable share since 1990 (compared with 43% in 1980). Oil production and consumption growth since 1980 reached only 40% of total incremental global energy demand; but oil growth accelerated significantly since 1990 to evolve in line with total gross inland energy consumption. The second most important fuel remained solid fuels with a share of 23% - slowly declining since 1985 from a peak of 25.9% and losing about 1% market share every four years. Natural gas ranked third in meeting world energy needs with 22% in 2000 (17% in 1980). Gas experienced accelerating growth since 1980, excluding a relative slowdown between 1990 and 1995 due to the particular economic situation in the CIS. Renewable energy sources (hydro, geothermal, biomass, wind and solar) come fourth in satisfying world energy consumption with a share of over 12% in 2000, a marginal increase compared to 1980, growing globally by 1.9% pa on average. Finally, nuclear energy grew significantly in the 1990s after a period of even faster growth in the 1980s. But its rate of growth has slowed down progressively in particular in recent years given a 'de facto' nuclear moratorium prevailing in many OECD countries. Nuclear has therefore been losing market share. Similarly, the progressive reduction of biomass use as a primary energy form - caused by increasing living standards in developing countries - led to a smaller share for this renewable energy source (that is, however, used partly in an unsustainable manner).

In the Baseline scenario, over the next 30 years the global energy system will become even more dominated by fossil fuels. As can be seen from Table 1-5, dependence on fossil fuels is expected to reach 88% by 2030 compared to 81% in 2000. The projected relatively low energy prices throughout the projection period allow fossil fuel energy forms to maintain their competitiveness, which limits the faster penetration of renewable energy forms in the world energy system, while concern about nuclear energy further increases the use of fossil fuels.

1.3.2.1. Oil

Oil consumption increases by 1.9% pa on average between 2000 and 2030. While it grows by only 0.3% pa in the OECD countries, it increases by 3.1% pa in the non-OECD region, with a progressive slowdown of growth (3.8% pa between 2000 and 2010, 3.0% pa

Table 1-6: Oil consumption by region - Baseline scenario

	Mtoe					annual growth rate				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
North America	850	973	1041	1082	1105	1.4	0.7	0.4	0.2	0.4
Europe OECD	615	664	717	759	770	0.8	0.8	0.6	0.1	0.5
OECD Pacific	291	296	282	300	314	0.2	-0.5	0.6	0.4	0.2
CEEC	82	66	78	86	92	-2.2	1.7	1.1	0.6	1.1
CIS	415	197	255	320	343	-7.2	2.6	2.3	0.7	1.9
Latin America	239	332	405	514	616	3.3	2.0	2.4	1.8	2.1
Middle East	199	269	335	410	509	3.0	2.2	2.0	2.2	2.1
Africa	42	54	109	177	238	2.7	7.2	5.0	3.0	5.1
Asia	371	705	1191	1746	2275	6.6	5.4	3.9	2.7	4.0
World	**3104**	**3556**	**4412**	**5395**	**6261**	**1.4**	**2.2**	**2.0**	**1.5**	**1.9**

Source: POLES

Table 1-7: World oil reserves and production by region - Baseline scenario

	Reserves (000 Mtoe)					Production (Mtoe)				
	1990	2000	2010	2020	2030	1990	2000	2010	2020	2030
World conventional	132.5	147.3	162.5	155.4	139.1	3241	3486	4289	5250	5970
Gulf	81.2	93.6	108.4	104.9	91.3	813	932	1346	2038	2365
OECD	9.1	8.5	6.7	5.5	5.5	755	830	854	818	927
Other	42.3	45.3	47.5	45.0	42.3	1673	1724	2089	2394	2678
Non conventional	6.6	17.6	17.3	21.7	30.2	17	33	123	145	291
Total	139.1	164.9	179.8	177.1	169.2	3258	3519	4412	5395	6261
World R/P ratio						**42.7**	**46.9**	**40.8**	**32.8**	**27.0**

Source: POLES

between 2010 and 2020, and 2.4% pa between 2020 and 2030). The share of Asia in world oil consumption increases from 20% in 2000 to 36% in 2030, making Asia the major consuming region in 2030. At the same time the share of the OECD region declines from 55% to 35%. In developing countries the driving forces are continuing industrialisation, the improvement of living standards and the surging demand for transport.

After 2000, the development of oil production is mainly located in the non-OECD region. The share of the OECD region in world oil production declines from 23.6% in 2000 to only 14.8% in 2030 (see Table 1-7). As a consequence the oil import dependence of industrialised countries will increase significantly during the next 30 years. World oil reserves will continue to expand slowly between 2000 and 2010, mainly in the Gulf region. Beyond 2010, as the world production level exceeds the rate of additional discoveries, world reserves will decline slowly. As a consequence the reserves/production ratio will fall significantly over the next 30 years: from 47 years in 2000 to only 27 years in 2030.

1.3.2.2. Gas

In the Baseline scenario gas consumption increases by 2.4% pa on average between 2000 and 2030, the fastest growth for all energy sources, including renewable energy forms, over this period. This means that about one third of additional energy consumption between 2000 and 2030 is met by natural gas, the share of which in global energy supplies increases from 22% in 2000 to 27% in 2030. The growth of gas consumption is limited to 1.2% pa on average in the OECD region as gas distribution networks are already largely developed. It increases by 3.4% pa in the non-OECD region driven by the on-going industrialisation and the rapid development of electricity production based on gas technologies, such as combined cycle gas turbines. Asia, Africa and Latin America are the regions where gas consumption expands more rapidly - by over 4% pa: gas consumption in Asia in 2030 soars to 4.5 times its level in 2000.

World gas reserves will continue to grow significantly between 2000 and 2010 (+30%) but to slow down thereafter (see Table 1-9). It is only in the long run that annual production levels exceed additional discoveries and consequently gas reserves exhibit a limited decline. However, given the rapid expansion of global gas

Table 1-8: Gas consumption by region - Baseline scenario

	Mtoe					*annual growth rate*				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
North America	571	700	778	890	936	2.1	1.1	1.4	0.5	1.0
Europe OECD	227	375	440	502	548	5.1	1.6	1.3	0.9	1.3
OECD Pacific	61	91	141	174	202	4.1	4.5	2.1	1.5	2.7
CEEC	69	66	100	124	144	-0.4	4.2	2.2	1.5	2.6
CIS	560	464	527	710	884	-1.8	1.3	3.0	2.2	2.2
Latin America	76	102	163	257	340	3.0	4.8	4.6	2.9	4.1
Middle East	106	209	254	381	521	7.0	2.0	4.1	3.2	3.1
Africa	4	3	5	8	11	-3.1	6.2	5.0	2.9	4.7
Asia	74	211	427	660	949	11.1	7.3	4.5	3.7	5.1
World	**1747**	**2221**	**2835**	**3706**	**4535**	**2.4**	**2.5**	**2.7**	**2.0**	**2.4**

Source: POLES

Table 1-9: Gas reserves and production by region - Baseline scenario

	Reserves (000 Mtoe)					Production (Mtoe)				
	1990	2000	2010	2020	2030	1990	2000	2010	2020	2030
OECD	15.6	22.6	31.8	30.6	25.1	700	1001	1042	1201	1226
of which N.America	7.4	8.5	12.4	10.9	6.9	494	705	716	854	889
Economies in transition	43.8	62.7	68.9	73.0	73.3	706	583	703	1039	1461
Latin America	6.7	11.4	15.3	17.1	18.8	74	165	247	507	846
Asia	7.5	14.9	18.9	17.3	14.3	108	258	441	484	421
Other	44.7	73.6	104.6	116.3	116.4	166	227	402	480	600
Total	125.8	193.7	251.8	265.2	254.8	1754	2232	2836	3712	4554
World R/P ratio						**71.7**	**86.8**	**88.8**	**71.4**	**56.0**

Source: POLES

consumption the reserves/production ratio will be reduced by about 35% between 2000 and 2030 to reach 56 years in 2030. After 2000, the development of gas production is mainly located in two regions: the CIS with an increase of 3.1% pa on average between 2000 and 2030, and the Middle East which grows by 5.6% pa. The concentration of world gas production in these two regions will reinforce the need for long distance transport infrastructures to satisfy an ever more dispersed global demand. The share of the OECD region in world gas production declines from 45% in 2000 to only 27% in 2030, reinforcing the gas import dependence of industrialised countries over the next 30 years. However, the OECD remains the largest gas producer to 2020 beyond which the CIS region again becomes the largest world producer, a situation prevailing prior to 1990. The gas dependence of Asia will also change rapidly: whilst still a net exporter of natural gas in 2000, Asia will broadly balance its supply and demand in 2010, but import respectively 27% and 55% of its consumption in 2020 and 2030.

1.3.2.3. Solid fuels

Solids consumption increases by 2.1% pa on average between 2000 and 2030 (see Table 1-10), the bulk of this growth being located in Asia and - in particular - in China. By 2030 Asia will represent 58% of world consumption against 45% in 2000. China alone will represent 35% (32% in 2000). In developed countries the use of solids will become more concentrated upon large users, in particular for electricity production. However, the growth of solids consumption remains limited to 0.9% pa on average in the OECD region with growth reaching 1.2% pa on average in North America and a small increase in the European Union, mainly at the end of the projection period.

1.3.2.4. Nuclear

The nuclear contribution to global primary energy requirements will continue to increase between 2000 and 2010 by about 1.9% pa on average. This results from increasing capacity in Japan and the developing countries, but a slow decline of installed capacity in other industrialised countries. After 2010, development of new nuclear capacity in developing countries will only stabilise installed capacity at the global level given the significant decline in

Table 1-10: Solids consumption by region - Baseline scenario

	Mtoe					*annual growth rate*				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
North America	484	512	606	661	743	0.6	1.7	0.9	1.2	1.2
Europe OECD	320	252	231	272	308	-2.4	-0.8	1.6	1.3	0.7
OECD Pacific	111	136	126	128	136	2.0	-0.7	0.1	0.6	0.0
CEEC	157	116	99	106	112	-2.9	-1.6	0.7	0.5	-0.1
CIS	289	119	83	115	126	-8.5	-3.5	3.3	0.9	0.2
Latin America	20	33	33	39	54	5.0	-0.1	1.7	3.2	1.6
Middle East	6	11	9	9	10	5.6	-1.8	-0.1	1.3	-0.2
Africa	72	71	123	204	305	-0.1	5.7	5.1	4.1	5.0
Asia	709	1035	1491	1947	2459	3.9	3.7	2.7	2.4	2.9
World	**2168**	**2286**	**2802**	**3482**	**4253**	**0.5**	**2.1**	**2.2**	**2.0**	**2.1**

Source: POLES

capacity (resulting from decommissioning) expected in the European Union and the United States. This means that nuclear, which now represents 10.5% of total installed capacity, will comprise only about 5% of world generating capacity in 2030. Given the high utilisation of this capacity, the share of nuclear production in total global electricity production will decline from 18% in 2000 to 10% in 2030.

1.3.2.5. Renewables

Considering the large potential for further exploitation which still exists for hydro, mainly in developing countries, both capacity and production will grow by 1.7% pa on average between 2000 and 2030 with a more rapid expansion in the first decade, in line with developments observed between 1980 and 2000. But the expansion will slow down as a result of the progressive reduction of available sites for further development. By 2030 hydro capacity accounts for less than 16% of total installed capacity compared to 22% in 2000. Similarly, the share of hydro in global electricity generation declines from 19% in 2000 to 14% in 2030.

The increasing living standards in developing countries and the concentration of population in urban areas, where the use of commercial energy forms will predominate, lead to a significant decline in the traditional use of biomass. Primary energy demand for biomass declines by -1.8% pa in 2000 to 2030 and consequently its share in world energy demand diminishes from 8% in 2000 to 3% in 2030.

On the other hand, and despite the unfavourable economic environment (i.e. relatively low fossil fuel prices) other renewable energy forms are projected to make some significant inroads in the world energy system (+2.4% pa in 2000-2030). Wind energy is the main driver for this growth whilst solar energy also contributes but to a smaller extent. However, the share of other renewable energy forms increases only marginally from 2000 levels (2% in 2030 compared to 1.7% in 2000).

Overall, under Baseline conditions the share of renewable energy forms in world energy consumption will not increase. Given the replacement of traditional biomass in developing countries by commercial energies there is actually a tendency for a decline. The overall renewables share in world energy supplies of 12.3% in 2000 will fall to only 7.1% in 2030. It is clear from the above that strong policy action will be needed to achieve an increasing share of renewable energy forms in the world energy system.

1.3.3. CO_2 emissions

Given the above Baseline energy developments, global CO_2 emissions will increase by 2.1% pa on average between 2000 and 2030. In 2030, CO_2 emissions will be more than twice as high as in 1990 (an increase of 112% over the 1990 level). CO_2 emissions grow more rapidly than primary energy consumption, due to changes in the fuel mix of primary energy supply towards more carbon intensive fuels. This increase in the carbon intensity (+0.3% pa in 2000-2030) of the global energy system is one key feature of the Baseline scenario. It is mainly due to the strong growth in the use of coal in Asian regions and the low growth of nuclear and renewable energy at the world level. It represents a structural change away from the historic trend towards 'decarbonisation', that is the reduction in the carbon content of the global energy system.

As clearly illustrated in Table 1-11, emissions grow at very high rates in developing countries, both because of the higher energy requirements but also as a result of the extensive use of solid fuels in these regions. By 2030 additional CO_2 emissions in Asia reach 11650 Mt CO_2 (more than 55% of global CO_2 emissions growth in 2000-2030). This clearly reflects the strong dependence of the regional energy system on solid fuels, the only energy form that is abundant in this area and the most carbon intensive of fossil fuels. The share of Asia in global emissions reaches 41% in 2030 compared to 27% in 2000. Other developing countries are also projected to exhibit a significant growth of CO_2 emissions accounting by

Table 1-11: CO_2 emissions by region - Baseline scenario

	Mt CO_2					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
North America	5314	6170	6884	7466	7970	1.5	1.1	0.8	0.7	0.9
Europe OECD	3394	3604	3795	4202	4484	0.6	0.5	1.0	0.7	0.7
OECD Pacific	1364	1516	1548	1671	1800	1.1	0.2	0.8	0.7	0.6
CEEC	1005	780	819	925	1013	-2.5	0.5	1.2	0.9	0.9
CIS	3522	2077	2219	2936	3434	-5.1	0.7	2.8	1.6	1.7
Latin America	919	1298	1642	2186	2723	3.5	2.4	2.9	2.2	2.5
Middle East	800	1264	1550	2047	2643	4.7	2.1	2.8	2.6	2.5
Africa	417	439	816	1346	1934	0.5	6.4	5.1	3.7	5.1
Asia	4086	6401	10030	13889	18048	4.6	4.6	3.3	2.7	3.5
World	**20822**	**23549**	**29302**	**36667**	**44048**	**1.2**	**2.2**	**2.3**	**1.9**	**2.1**

Source: POLES

2030 for 17% of global emissions (13% in 2000). The restructuring of the energy systems in the economies in transition led to a sharp decline of emissions in these countries in the last decade. With the completion of the transition period emissions are projected to increase again, but it is only in 2030 that absolute CO_2 emissions levels in transition countries reach the levels observed in 1990. Finally, in OECD countries CO_2 emissions grow at rates well below average, representing just 14.5% of additional emissions in the world energy system by 2030.

EU-15 ENERGY AND TRANSPORT OUTLOOK TO 2030

PART II

2.1. Main assumptions of the Baseline Scenario

The Baseline scenario is a projection of energy supply and demand in the European Union for the short, medium and long term (up to 2030). It was developed with the use of the PRIMES[5] model.

The definition of the Baseline scenario is important because it constitutes the basis for further policy analysis in addition to its function as a projection on the basis of current trends and policies. For this purpose, this scenario is conceived as the most likely development of the energy system in the future in the context of current knowledge, policy objectives and means.

The Baseline scenario includes existing trends and the effects of policies in place and of those in the process of being implemented by the end of 2001, whereas tax rates reflect the situation of July 2002 in the EU Member States. For analytical reasons the Baseline scenario excludes all additional policies and measures that aim at further reductions of CO_2 emissions to comply with the Kyoto emission commitments. The main assumptions underlying the Baseline scenario are presented below.

2.1.1. Demographic and climate assumptions

2.1.1.1. Demographic issues

Population is an important determinant both of overall economic performance and of energy trends, especially in the transportation, household and services sectors. EUROSTAT figures have been used in the PRIMES Baseline scenario both as regards historical data and projections for the evolution of population in the EU Member States.

As can be seen in Table 2-1, which shows the population levels and growth rates for the EU Member States for 1990-2030 total EU population is assumed to rise modestly between 2000 and 2010 by some 9 million people. The divergence in population growth rates among individual Member States varies from +0.03% pa for Italy to +0.98% pa for Ireland.

A further increase of the EU population by some 2.62 million people is projected between 2010 and 2020. Only Ireland, Luxembourg and the Netherlands show growth rates of more than 0.3% pa in the period 2010-20 while Germany, Italy and Spain experience small declines in population over this period. Beyond 2020 the EU population is assumed to decline slightly (-0.04% pa) to reach 389 million in 2030. However, the population in Belgium, Denmark, France, Ireland, Luxembourg, the Netherlands, Portugal, Sweden and the United Kingdom is projected to experience a slight increase.

Another key demographic factor that plays an important role as regards the growth of energy demand in households is the hou-

Table 2-1: Population trends in the EU, 1990 to 2030

	Million inhabitants					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Austria	7.73	8.11	8.19	8.22	8.16	0.48	0.10	0.03	-0.07	0.02
Belgium	9.97	10.25	10.44	10.57	10.63	0.28	0.19	0.13	0.05	0.12
Denmark	5.14	5.34	5.49	5.56	5.65	0.38	0.28	0.14	0.16	0.19
Finland	4.99	5.18	5.27	5.31	5.29	0.37	0.18	0.09	-0.04	0.07
France	58.17	60.59	63.05	64.56	65.42	0.41	0.40	0.24	0.13	0.26
Germany	79.43	82.19	83.20	83.06	81.75	0.34	0.12	-0.02	-0.16	-0.02
Greece	10.16	10.56	11.15	11.18	11.09	0.38	0.54	0.03	-0.09	0.16
Ireland	3.51	3.79	4.18	4.46	4.66	0.77	0.98	0.67	0.42	0.69
Italy	56.72	57.76	57.92	56.61	54.65	0.18	0.03	-0.23	-0.35	-0.18
Luxemburg	0.38	0.44	0.48	0.51	0.54	1.45	0.92	0.59	0.57	0.70
The Netherlands	14.95	15.92	16.82	17.40	17.86	0.63	0.55	0.34	0.26	0.38
Portugal	9.90	10.01	10.33	10.55	10.70	0.11	0.31	0.21	0.15	0.22
Spain	38.85	39.93	41.12	40.78	39.83	0.27	0.29	-0.08	-0.24	-0.01
Sweden	8.56	8.87	8.99	9.15	9.30	0.36	0.13	0.18	0.16	0.16
United Kingdom	57.56	59.76	61.21	62.50	63.51	0.37	0.24	0.21	0.16	0.20
EU 15	**366.01**	**378.69**	**387.83**	**390.45**	**389.02**	**0.34**	**0.24**	**0.07**	**-0.04**	**0.09**

Source: EUROSTAT. PRIMES [6]

5 PRIMES is a partial equilibrium model for the European Union energy system developed by, and maintained at, the National Technical University of Athens, E3M-Laboratory led by Prof. Capros. The most recent version of the model used in this study covers all EU Member States, uses EUROSTAT as the main data source and is updated with 2000 being the base year. PRIMES is the result of collaborative research under a series of projects supported by the Joule programme of the Directorate General for Research of the European Commission.

sehold size (i.e. number of inhabitants per household). In the EU household size has declined from 3.2 persons per household in 1970 to 2.6 persons in 1990 and 2.4 persons in 2000 (UN statistics). As can be seen in Table 2-2, following UN projections,[7] household size is assumed to decrease further to reach 2.23 persons per household in 2010 (ranging between 2.84 for Ireland and 1.99 for Sweden) and 1.97 persons per household in 2030 (with Austria, Belgium, Greece, Ireland, Luxembourg, Portugal and Spain still having more than 2 persons per household in that year).

This trend of declining household size is largely due to the changing age structure of the population, as well as to changes in lifestyles. Thus, the rising life expectancy in developed countries is increasingly leading to a rising number of old age pensioner households, often comprising only one person. Similarly, declining birth rates and the tendency for more divorces, together with the rising frequency of single parents and the increasing occurrence of adult "singles", all lead to a greater proportion of households consisting of one to three persons than has been the case historically.

Despite the modest population increase in the period to 2030, the declining size of the average EU household will lead to a significant increase in the number of households. Thus, between 2000 and 2030, the number of households is projected to increase by nearly 40 million, whereas the population increases by just 10.3 million. This trend, together with rising household incomes, is likely to prove the major factor behind a significant increase in the number of appliances and in the total floor area that will have to be heated and cooled.

Population characteristics, in combination with income levels, are also of great importance as regards the evolution of energy requirements in the services sector. A key determinant of energy use in the services sector is the total floor space in the various sub- sectors. This determines the volume of space that needs to be heated, illuminated etc. A number of factors determine floor space, including density of the population, the degree of urbanisation and the level of income. In PRIMES total floor space in services is computed as a function of square metres per capita per sub-sector. Overall floor space in services is projected to increase by 1.7% pa in 2000-30 at the EU level. However, this growth is not uniform across the different services sectors. Floor space in market services is projected to increase at an annual rate of 2.0% between 2000 and 2030, and in the trade sector by 1.9% pa, whereas the increase in non-market services will be limited to 0.8% pa. On a country specific level Greece and Portugal, both because of the process of the convergence of the EU economies but also through the fur-

Table 2-2: Average size of households in the EU, 1990 to 2030

	Inhabitants per household					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Austria	2.58	2.50	2.37	2.27	2.19	-0.31	-0.53	-0.43	-0.35	-0.44
Belgium	2.56	2.42	2.28	2.16	2.08	-0.56	-0.59	-0.54	-0.37	-0.50
Denmark	2.30	2.22	2.09	1.98	1.90	-0.35	-0.60	-0.54	-0.41	-0.52
Finland	2.48	2.28	2.11	1.97	1.85	-0.84	-0.77	-0.68	-0.62	-0.69
France	2.59	2.38	2.20	2.05	1.93	-0.84	-0.78	-0.70	-0.59	-0.69
Germany	2.35	2.24	2.09	2.00	1.92	-0.48	-0.69	-0.44	-0.40	-0.51
Greece	3.04	2.82	2.72	2.63	2.55	-0.75	-0.36	-0.34	-0.31	-0.33
Ireland	3.43	3.01	2.84	2.65	2.43	-1.30	-0.58	-0.69	-0.84	-0.70
Italy	2.64	2.37	2.16	1.97	1.83	-1.07	-0.92	-0.92	-0.72	-0.85
Luxemburg	2.66	2.50	2.36	2.21	2.11	-0.62	-0.57	-0.65	-0.46	-0.56
The Netherlands	2.49	2.35	2.17	2.02	1.92	-0.58	-0.79	-0.71	-0.50	-0.67
Portugal	3.03	2.77	2.61	2.45	2.33	-0.89	-0.59	-0.63	-0.49	-0.57
Spain	3.17	2.86	2.71	2.55	2.41	-1.02	-0.54	-0.61	-0.56	-0.57
Sweden	2.22	2.14	1.99	1.87	1.79	-0.37	-0.72	-0.62	-0.43	-0.59
United Kingdom	2.56	2.36	2.14	1.98	1.86	-0.81	-0.97	-0.77	-0.61	-0.79
EU 15	**2.59**	**2.40**	**2.23**	**2.08**	**1.97**	**-0.76**	**-0.76**	**-0.66**	**-0.54**	**-0.65**

Source: Global Urban Observatory and Statistics Unit of UN-HABITAT

6 More specifically the growth rates of the base case projections of EUROSTAT for the EU Member States have been applied to historical data for the population in 2000 to construct the population growth projection used in the PRIMES baseline. This approach was adopted in order to cope with inconsistencies between EUROSTAT data for the year 2000 and the corresponding figures in EUROSTAT projections, which were first produced in 1995 and revised in 1999. The numbers for France do not include the overseas territories.

7 United Nations Global Urban Observatory and Statistics Unit of UN-HABITAT (UN Centre for Human Settlements): Data and forecasts of population, number of households and household size (http://www.unchs.org/habrdd/CONTENTS.html)

ther development of their tourist industry, are assumed to have the highest growth rates (+2.9% pa and +2.8% pa respectively in 2000-2030) in terms of services floor space; whereas some degree of saturation is expected to occur in countries like Denmark and Belgium, leading to growth rates below 1% pa.

2.1.1.2. Climate assumptions

Weather can play an important role in determining both the intensity and the overall pattern of energy use, especially for the domestic sector (households, services and agriculture). This is because it affects the needs for space heating and cooling, which account for most of the energy needs in the domestic sector. Furthermore, the relationship between the severity of the weather and energy consumption by the sector is highly non-linear. In other words, a small decrease in the winter temperature can lead to a significant increase in space heating energy requirements. Thus countries at a similar level of development have quite different patterns of energy consumption simply because of the differences in their climate.

For the purposes of measuring the severity of the winter, which influences heating energy requirements, the weather is measured in terms of "heating degree days". These are defined as the sum of the differences during wintertime of average day temperatures from a benchmark temperature, usually 18 degrees Celsius.[8] There have been quite significant weather changes over the past 30 years with strong apparent indications that the global climate is becoming warmer. Given the length of climatic cycles, there is some debate as to whether the recent trend reflects the initial impact of global warming or whether it is simply a random event within a longer-term cycle.

The approach taken here was to assume that the degree-days parameter during the outlook period would be constant at 2000 levels. Assuming a future level of degree-days closer to its historical average would ignore the evidence that the degree-days are falling reflecting warmer weather and therefore lower heating requirements. Adopting a more scientific approach to climate forecasting for the period to 2030 would clearly be beyond the scope of this study. The approach adopted is somewhat simplistic but it clearly reflects the genuine uncertainty that results from the difficulties discussed above. It is important to note, however, that should the weather beyond 2000 be closer to its historical average than to its level in 2000, the demand for energy for heating purposes will be above that projected and vice-versa. In any case, assuming the degree-days of 2000 for the whole projection period offers the advantage that there is no disturbing influence from unknown weather variations between the latest statistical year (2000) and the projected years from 2005 onwards.

2.1.2. Macroeconomic assumptions

The economic outlook presented below is based on a number of underlying assumptions. For example, the recent economic slowdown - including the impacts of the terrorist attack of 11 September 2001 - is assumed to be transitory and the longer-term global economic climate is assumed to remain generally positive. In addition, the EU is projected to benefit from economic and monetary unification as well as from a continued increase in world trade, as barriers continue to fall. Increases in commodity prices and inflation are assumed to remain modest.

The present Baseline scenario draws on the macroeconomic and sectoral projections from several different sources, including the European Commission's Directorate-General for Economic and Financial Affairs, Member States' stability programmes and long-term projections, the results of a study performed under contract by WEFA[9] , and the results of GEM-E3 model.[10] However, it should be noted that the sources of long-term projections on sectoral trends for individual European countries, which are essential for the discussion of detailed energy projections, are rather limited. As past experience has shown, changes in these can often be dramatic and can move in different directions in different countries. No study is available at the level of disaggregation needed for long-term energy models. Thus, an attempt has been made here to build a separate "story" describing the evolution in each EU country. Valuable information, both on the evolution of sector specific value added and on industrial production related issues, was obtained in consultation with the industrial experts who attended a workshop on "business-as-usual in energy intensive sectors" organised by the Environment Directorate-General together with the Energy and Transport Directorate-General in March 2001.

8 corresponding measure for cooling energy requirements during the summer can be defined, namely the "cooling degree days", but unfortunately reliable data on this variable are still very limited for EU countries.

9 WEFA (now integrated into DRI-WEFA) is an economic consultancy company which, in the context of the Long Run Energy Modelling framework contract, was subcontracted by NTUA to deliver a consistent macro-economic and sectoral forecast over the horizon to 2020 for the EU Member States and, at a more aggregate level, for candidate countries and EU neighbouring countries (Norway and Switzerland). This projection was delivered in March 2001 and has been used as a benchmark in the context of this study.

10 The GEM-E3 model has been constructed under the co-ordination of NTUA within collaborative projects supported by Research DG involving CES-KULeuven and ZEW.

The projections were made in three steps:

- First, gradual convergence of the EU economies by 2030 in terms of rising per capita income was assumed.
- Second, the starting situation of each country, together with clearly identifiable trends and the identifiable driving forces of growth for each economy, were used to determine the growth rates in the individual industrial sectors.
- Third, the GEM-E3 general equilibrium model of the EU economy has been used to ensure consistency of sectoral and macroeconomic projections.

The Baseline macroeconomic scenario[11] simulates a dynamic path of the EU economy up to 2030. It is derived from exogenous assumptions about the evolution of technological progress associated with production factors, changes in the global economic and environment context, and the continuation of the current pattern of public finance policy.

The observed increase of gross domestic product in the EU for 1990-1995 was 1.4% pa, while growth for 1995-2000 reached 2.63% pa. In April 2002, Economic and Financial Affairs DG published its new forecast as regards economic growth of the EU Member States for the short term (2001-2003) taking into account the latest trends in the world economy (including the impact of the terrorist activity of 11 September 2001).[12] These forecasts have been incorporated in the PRIMES Baseline scenario for the short term.

As can be seen in Table 2-3 according to the projections of the Economic and Financial Affairs DG of spring 2002 the current slowdown is not assumed to be a prolonged one; and all EU economies are assumed to rebound beyond 2003. This trend is assumed to continue over the horizon to 2010, resulting in an overall growth rate for 2000-2010 of 2.4% pa (2.5% in 2005-2010). Beyond 2010 economic growth in the EU is assumed to decelerate to levels that are consistent with long-run historical trends. In the period 2010-2020 the annual economic expansion is projected to be around 2.3% and in 2020-2030 around 2.2%.

These economic growth assumptions have been chosen in order to evaluate the energy, transport and environmental consequences of an economic development that accommodates policy

Table 2-3: Annualised percent change for GDP in the Baseline scenario

annual growth rate

	1990-1995	1995-2000	2000-2001	2001-2002	2002-2003	2003-2005	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025	2025-2030
Austria	2,05	2,57	1,02	1,23	2,54	2,72	2,05	2,15	2,10	2,03	1,95	1,90
Belgium	1,60	2,81	0,99	1,10	2,83	2,95	2,16	2,20	1,85	1,70	1,65	1,62
Denmark	1,97	2,66	0,95	1,72	2,51	2,20	1,91	2,40	1,90	1,82	1,78	1,70
Finland	-0,67	5,05	0,74	1,59	3,27	3,35	2,45	2,55	1,70	1,60	1,55	1,50
France	1,06	2,68	1,83	1,64	2,84	2,95	2,44	2,31	2,27	2,20	2,12	2,06
Germany	1,35	1,79	0,56	0,84	2,72	2,87	1,97	2,24	2,14	2,05	1,98	1,92
Greece	1,24	3,40	4,10	3,70	4,21	5,05	4,42	3,52	3,27	3,21	3,10	2,95
Ireland	4,70	9,89	5,90	3,47	6,11	6,25	5,59	3,62	2,52	2,17	2,09	2,05
Italy	1,27	1,87	1,78	1,37	2,72	2,92	2,34	2,38	2,29	2,20	2,14	2,08
Luxemburg	3,88	6,36	3,46	2,87	5,21	5,85	4,64	4,15	3,20	2,65	2,40	2,15
The Netherlands	2,12	3,68	1,13	1,51	2,70	2,80	2,18	2,40	2,31	2,25	2,19	2,12
Portugal	1,70	3,81	1,65	1,46	2,20	3,00	2,26	3,82	3,67	3,60	3,55	3,42
Spain	1,51	3,80	2,76	2,13	3,15	3,35	2,95	3,02	2,92	2,83	2,70	2,56
Sweden	0,59	2,96	1,21	1,67	2,83	2,50	2,14	2,41	2,15	2,11	2,07	2,01
United Kingdom	1,76	2,90	1,93	1,96	2,96	2,72	2,46	2,55	2,50	2,45	2,40	2,40
EU	**1,42**	**2,66**	**1,50**	**1,49**	**2,87**	**2,97**	**2,38**	**2,47**	**2,35**	**2,27**	**2,20**	**2,15**

Source: EUROSTAT, Economic and Financial Affairs DG, PRIMES[13]

11 The Baseline scenario presented here is an extension and refinement of previous versions previously prepared for the European Commission. See Capros, P., Mantzos, L., Petrellis, D., Panos, V. and Delkis, K. (1999): European Union Energy Outlook to 2020. European Commission – Directorate General for Energy (DG-XVII), Special issue of 'Energy in Europe', catalogue number CS-24-99-130-EN-C, ISBN 92-828-7533-4, Office for Official Publications of the European Communities, Luxembourg, November 1999.

12 European Commission Economic forecasts, Spring 2002 (EUROPEAN ECONOMY. No. 2. 2002. Office for Official Publications of the EC. ISBN92-894-3357-4; ISSN0379-0991). Also available at: http://europa.eu.int/comm/economy_finance/publications/europeaneconomy_en.htm.

13 Incorporating results obtained from the WEFA study and GEM-E3 model runs (this applies to all macroeconomic assumptions).

Table 2-4: Per capita GDP for EU member states

	Euro'00 per capita					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Austria	21089	25258	30767	37649	45874	1.82	1.99	2.04	2.00	2.01
Belgium	20039	24237	29513	34752	40655	1.92	1.99	1.65	1.58	1.74
Denmark	26926	32576	39228	46506	54397	1.92	1.88	1.72	1.58	1.72
Finland	21264	25337	31873	37214	43473	1.77	2.32	1.56	1.57	1.82
France	20246	23385	28419	34619	42020	1.45	1.97	1.99	1.96	1.97
Germany	21825	24643	29984	36954	45544	1.22	1.98	2.11	2.11	2.07
Greece	9616	11639	16272	22305	30317	1.93	3.41	3.20	3.12	3.24
Ireland	14637	27323	38846	45813	53926	6.44	3.58	1.66	1.64	2.29
Italy	17570	20165	25395	32439	41408	1.39	2.33	2.48	2.47	2.43
Luxemburg	32546	46401	65087	81862	96815	3.61	3.44	2.32	1.69	2.48
The Netherlands	20167	25191	29913	36218	43692	2.25	1.73	1.93	1.89	1.85
Portugal	8861	11494	15026	21029	29194	2.64	2.72	3.42	3.33	3.16
Spain	12066	15248	19867	26596	35303	2.37	2.68	2.96	2.87	2.84
Sweden	24363	28010	34605	41959	50558	1.40	2.14	1.95	1.88	1.99
United Kingdom	21528	26096	32628	40802	50902	1.94	2.26	2.26	2.24	2.25
EU 15	**19076**	**22565**	**28000**	**34937**	**43494**	**1.69**	**2.18**	**2.24**	**2.21**	**2.21**

Source: EUROSTAT. Economic and Financial Affairs DG. PRIMES

efforts to reduce unemployment and to cope with an ageing population. Still higher economic growth might materialise if the Lisbon economic reform agenda is successfully implemented. On the other hand, with the present weak state of the economy lower growth rates than those shown in the baseline are also possible. The energy, transport and environmental consequences of these two alternative cases will be shown as part of a forthcoming publication on energy scenarios.

As already indicated, one of the fundamental assumptions made for the purposes of the Baseline scenario is that the process of convergence among European economies will continue throughout the projection period. This implies that the cohesion countries grow at rates well above average, while the reverse is the case for the advanced EU Member States.

However, as clearly illustrated in Table 2-4, the assumed degree of divergence from the average per capita GDP at the EU level remains significant and, even in 2030, the convergence process is far from complete. Thus, despite the progress made by cohesion countries, in 2030 per capita GDP in Portugal and Greece remains 33% and 30% respectively below the EU average.

The Baseline assumptions as regards the economic growth of EU Member States also reflect the long established trend of structural changes in developed economies, like those of the EU. International trade, technological change and dematerialization are some of the interrelated factors behind these developments.

The relocation of many industries (especially those that tend to be labour- or energy-intensive) away from developed regions, such as the EU, and towards developing countries is one of the most important factors that needs to be taken into account when discussing future long-term industrial trends. Even in sectors that appear to be fast growing within the EU, relocation has been taking place in the sense that the EU has been losing world market shares.

Dematerialization of developed economies is partly responsible for the declining share of industry in GDP and the increasing use of higher quality materials. Technological progress is of critical importance in the process of dematerialization. For example, it is only because technological advances produce compounds of lighter materials, without compromising the strength required for safety purposes, that the average weight of cars could decline. Similarly, the process of miniaturisation of many appliances and machines, which also leads to lower energy requirements, is due to technological innovations.

Technological progress has an even broader impact on the economy as it generates an alteration of the relative prices between the different production factors. This alteration, in turn, leads to changes in the optimal mixture of capital, labour, energy and other materials and affects the choice of location of new economic activities.

The macroeconomic assumptions of the Baseline scenario reflect the above-discussed issues. The long established trend of the restructuring of EU economies away from the primary and secondary sectors and towards services is assumed to continue, although the pace is expected to decelerate. Industrial value added increases at rates slightly below those of gross value added

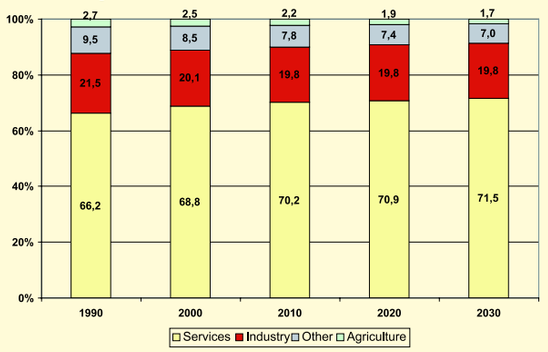
Table 2-5: Evolution of sectoral value added in the EU economy

	000 MEuro'00					annual growth rate				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
Gross Value added	6538	8003	10283	12993	16174	2.04	2.54	2.37	2.21	2.37
Industry	1407	1610	2036	2574	3204	1.35	2.38	2.37	2.22	2.32
Energy intensive	412	472	586	723	871	1.37	2.18	2.13	1.88	2.06
Non Energy intensive	995	1137	1450	1850	2333	1.34	2.46	2.47	2.35	2.42
Construction	408	418	501	608	723	0.25	1.83	1.95	1.75	1.84
Services	4331	5509	7220	9207	11565	2.44	2.74	2.46	2.31	2.50
Agriculture	179	202	224	248	269	1.18	1.07	1.01	0.79	0.96
Energy branch	213	265	302	356	414	2.21	1.33	1.66	1.51	1.50

Source: EUROSTAT. Economic and Financial Affairs DG. PRIMES

(+2.3% pa in 2000-2030 compared to +2.4% pa for gross value added, see Table 2-5). The further dematerialization of EU industry is more clearly reflected if one focuses on the growth of energy intensive versus non-energy intensive sectors in industry (growing at +2.1% pa and 2.4% pa respectively). The services sector exhibits the highest growth among all sectors over the projection period (+2.5% pa in 2000-2030) experiencing, however, a decelerating pace in the long run. On the contrary, value added in agriculture is projected to exhibit only a small increase in the period to 2030 (+1.0% pa).

Figure 2-1: Structure of the EU economy, shares in gross value added 1990-2030



Source: PRIMES

As a result of these trends the share of industrial value added in the EU economy declines modestly from 20.1% in 2000 to 19.8% in 2010, remaining at this level thereafter. This trend is driven by the increasing importance of new industrial activities with high value added and a lower material base (for example pharmaceuticals and cosmetics, computer equipment etc.) in most countries. Services value added share in the economy is projected to reach 70.2% in 2010 and 71.5% in 2030. This growth, in terms of market shares, occurs to the detriment of the remaining sectors of the economy, namely, agriculture, construction and the energy branch. The agricultural value added share declines over the projection period to reach just 1.7% of total value added by 2030 from 2.5% in 2000. Similar declines, in terms of market shares, are also experienced in construction (from 5.2% in 2000 to 4.5% in 2030) and in the energy branch (from 3.3% in 2000 to 2.6% in 2030).

Considerable differences are assumed in the evolution of the economic structure in different EU countries, as some further specialisation is taking place. In Denmark, France, Greece, Luxembourg, the Netherlands and the United Kingdom the service sector will reach or even exceed 73% of total value added by 2030. Agricultural value added declines in almost all countries and, by 2030, it accounts for more than 3% of GDP only in Greece and Spain. [14]

2.1.3. Price assumptions

2.1.3.1. International fuel prices

Even in the short period since the completion of The European Energy Outlook to 2020 (Summer 1999), there have been sharp changes in primary energy prices. The most extreme case is that of the price of crude oil, which in 2000 doubled from its level at the beginning of 1999 - clearly illustrating the great uncertainties underlying the evolution of world energy prices.

The Baseline projections presented here, as regards the evolution of international fuel prices, are based on the important assumption that global energy markets will remain well supplied at a relative modest cost throughout the projection period. These projections derive from the output of the POLES model.[15] Thus, in comparison to the "ups and downs" of the past 30 years, the primary energy prices assumed here reflect the current consensus view that no major supply constraints are likely to be felt, at least in the period to 2030. These assumptions on primary energy prices fol-

14 Detailed economic growth, as well as demographic assumptions by Member State and for the EU as a whole can be found in Appendix 1.

15 Idem 2.

Table 2-6: International price assumptions

	Average border prices in the EU ($00/boe)					annual growth rate			
	1990	2000	2010	2020	2030	1990-2000	2000-2010	2010-2020	2020-2030
Crude oil	27.9	28.0	20.1	23.8	27.9	0.03	-3.27	1.74	1.59
Natural gas	15.6	15.5	16.8	20.6	23.3	-0.06	0.80	2.06	1.25
Hard coal	13.1	7.4	7.2	7.0	7.0	-5.60	-0.25	-0.22	-0.01

Source: POLES

low an optimistic view of future discoveries of new oil and gas fields and on further advances in extraction technologies.

While the oil market is fairly integrated at a global level, this is not the case for gas - the market of which still retains a strong regional basis. The primary reason for this regional fragmentation is the high transport cost of gas by pipeline and ship.

The crude oil price decreases from its high 2000 levels to reach 20.1 $/bbl in 2010. The reason for the gradual increase of oil prices beyond 2010 to 27.9$/bbl in 2030 is the higher marginal costs of exploiting new sources of oil. The slightly falling coal prices up to 2020 reflect decreasing marginal costs in mining outside the EU. The gas price is driven by a number of counteracting factors. On the one hand, there is the increasing economic value of gas due to its relative cleanliness and the high efficiency of gas using equipment. This means a narrowing of the gap between oil and gas prices. Similarly, competition between gas and oil suggests that gas and oil prices move in the same broad direction. On the other hand, with increasing gas-to-gas competition, brought about by the internal market and by more gas sources becoming available, gas prices might decouple somewhat from oil prices. This would be reinforced by a move from regional gas markets towards a more global market for gas. The gas price trajectory reflects both of these influences. The driving forces for a narrowing of the oil–to-gas gap prevail up to 2015. After this point in time, the increased gas-to-gas competition (in an environment of increasing oil prices) gradually leads to a decoupling of gas from oil prices. Further justification of these price trajectories is provided in the related report by IEPE-CNRS.[16] This report also contains alternative price trajectories under different assumptions of GDP growth by region, energy resources and availability of gas from certain regions. The energy consequences for Europe of these alternative price trajectories are being investigated and will be published soon.

2.1.3.2. Taxation and Subsidies

In general, for the purposes of the Baseline scenario, energy taxes are assumed to remain unchanged in real terms as determined by legislation that was in place in July 2002. Fuel prices in nominal terms increase therefore according to the development of import prices and other cost components in nominal terms plus the tax component of the different fuels augmented by the rate of inflation.

2.1.4. Policy assumptions

The Baseline scenario assumes that agreed policies in the Member States, as known by the end of 2001, will continue. It presumes that all current policies and those in the process of being implemented at the end of 2001 will continue in the future. No additional policies to reduce greenhouse gases (e.g. in view of the Kyoto targets) are included in the Baseline. In particular, no attempt has been made to forecast how Member States might endeavour to fulfil their Kyoto commitments.

This approach allows the Baseline scenario to be considered as the benchmark against which a number of alternative policies can be measured, assisting policy analysts in the evaluation of alternative measures. The Baseline scenario includes:

- Dynamic trends in technological progress improving the efficiency of the energy system.
- Restructuring of the sectoral pattern of economic growth of the European Union that shifts away from traditional energy intensive sectors and concentrates on high value added activities, thereby reducing energy intensity.
- Continuation of energy efficiency policies in the Member States and at EU level.
- The effects from restructuring of markets through the liberalisation of electricity and gas in the EU, which proceeds in line with EC directives; liberalisation is assumed to be fully implemented in the period to 2010. [17]

16 Idem 3.

17 This country-by-country modelling has focused on the dynamics of the energy system within a country, while considering trade in fuels between countries. An in-depth study of trade developments in electricity and gas would necessitate further work on the PRIMES model, which goes beyond the scope of this study.

- The restructuring in power and steam generation, which is enabled by mature gas-based power generation technologies that are efficient, involve low capital costs and are flexible regarding plant size, co-generation and independent power production.

- Energy policies that aim to promote renewable energy (wind, small hydro, solar energy, biomass and waste) are assumed to continue, involving subsidies on capital costs and preferential electricity selling prices. Rather than imposing the indicative targets of the EC renewables electricity Directive[18] for each Member State, the Baseline includes the policy measures in place for such targets in the Member States.

- Ongoing infrastructure projects in some Member States involving the introduction of natural gas. These are assumed to gain full maturity in the first half of the first decade of the projection period.

- Differences in current policies of EU Member States as regards nuclear capacity. Countries like Austria, Denmark, Greece, Ireland, Italy and Portugal remain non-nuclear throughout the projection period. Expansion of nuclear capacity, based on economic criteria, remains unconstrained for Finland, France, Spain and the United Kingdom. On the other hand, taking into account policy decisions on nuclear, Belgium, Germany, and Sweden are assumed to abandon the use of nuclear. It is worth noting that nuclear power ceases to be exploited in The Netherlands beyond 2010. Decommissioning of existing nuclear capacity occurs on the basis of a lifetime of 40 years with the exception of Sweden and Germany for which a stricter decommissioning programme (based on political decisions on a nuclear phase-out) is adopted. Retrofitting generally remains an option (expansion of lifetime by 10 years at higher operation and maintenance costs) when a nuclear plant comes up for decommissioning.

- The effects from the ACEA/KAMA/JAMA negotiated agreements. In 1998 a voluntary agreement was reached between the European Commission and the European automobile industry (followed in 1999 by similar agreements with Korean and Japanese car manufacturers) under the terms of which the industry is committed to reduce the average CO_2 emission figure for all new cars to 140 g/km by 2008.[19] This compares with a level of emissions of about 185.4 g/km in 1995 (estimated at 180.3 g/km in 2000). An intermediate target was set for 2003 at 170g/km. The industry has also undertaken to make available to the market cars that emit 120 g/km by 2000 and to undertake further improvements beyond 2008 (an initial target for the average of new cars was set at 120g/km for 2012). Of course, the agreement does not prevent the EU from using market-based instruments and information campaigns in order to reduce emissions further.

- In November 2001, and in line with the European Commission's White Paper on Transport,[20] a Directive was proposed including targets for biofuel consumption in EU countries, starting from 2% of total gasoline and diesel consumption for transport purposes in 2005, reaching almost 6% in 2010.[21] Most of this share is expected to be achieved through blends of bio-diesel and bio-ethanol with conventional diesel and gasoline. The Baseline scenario does not assume the full implementation of this Directive within the period to 2010. However, even under Baseline assumptions, action in Member States allows for some use of biofuels in transport, but at levels significantly lower than those envisaged in the Directive. The impact on final consumer prices, due to the blending of gasoline and diesel with biofuels, was assumed to be negligible, since higher fuel production costs will probably be offset by tax reductions scheduled to be implemented on these fuel blends.

2.1.5. Environmental Policy

In line with the Baseline philosophy, policy initiatives related to climate change are included only to the extent that they are agreed policy measures. For the purposes of the study it is assumed that no specific new policies and measures aimed at meeting Kyoto targets in 2008-2012, and possible more severe ones in the future, are implemented over the projection period. This assumption may be judged somewhat unrealistic; it does however help maintain the benchmark character of the reference case, allowing it to serve as a Baseline for comparisons with CO_2 abatement policy scenarios.

18 European Commission Directive 2001/77/EC of the European Parliament and of the Council on the Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market. Brussels, 27 September 2001.

19 European Commission (2000) Commission recommendations on the reduction of CO_2 emissions from passenger cars, Official Journal of the European Communities, Nos L 40/49-13.2.99, L 100/57-20.4.2000 and L 100/55-20.4.2000. Also available at: http://europa.eu.int/comm/environment/co$_2$/co$_2$_agreements.htm.

20 European Commission White Paper on European Transport Policy up to 2010: Time to Decide, Brussels, Belgium. Also at http://europa.eu.int/comm/energy_transport/en/lb_en.html.

21 European Commission Communication COM(2001) 547 of the European Commission of 07/11/01 on an action plan and two proposals for Directives to foster the use of alternative fuels for transport, starting with the regulatory and fiscal promotion of biofuels. Also at http://europa.eu.int/comm/energy/library/comm2001-547-en.pdf.

However, it is assumed that stringent regulation for acid rain pollutants continues, especially for large combustion plants. Similarly, other clean air policies are assumed to continue.

2.1.6. Other Assumptions

The discount rate plays an important role within the PRIMES model. It is a crucial element in the determination of investment decisions by economic agents regarding energy using equipment. Three rates are currently used within the model. The first, used mostly for large utilities, is set at 8%; the second, used for large industrial and commercial entities, is set at 12%; the third, used for households in determining their spending on transportation and household equipment, is set at 17.5%.

2.1.7. Committed investment and decommissioning in power generation

The Baseline scenario assumes that all capacity expansion, and decommissioning plans, in power generation already decided will take place as indicated in the latest EURPROG report of EURELECTRIC and other statistical sources (e.g. EPIC).[22] Beyond 2010 plant decommissioning occurs on the basis of technical lifetimes and agreed policies on nuclear phase-out.

2.1.8. Technology assumptions and mechanisms

Some of the biggest "surprises" in energy trends over the recent past were due to technological innovation. For example, the rapid adoption of combined cycle gas turbines for power generation has led to a fundamental change in the economics of electricity production and has altered dramatically the relative prospects of demand for gas and coal. We are now faced with the prospect of a similar technological breakthrough as regards wind turbines in power generation. Similarly, advances in 3-D seismic techniques and the application of horizontal drilling have contributed significantly to the upgrading of the recoverable resource base for oil and gas and are, to a large extent, responsible for the modest energy prices that are now projected over the next 30 years.

Technological assumptions play a very important role in the derivation of the energy demand trends, especially as we move further into the future. This is mostly because of the longevity of the energy using capital stock.

In supplying each energy use (e.g. space heating, energy for specific industrial processes), technologies compete against each other. Their technical-economic characteristics, such as costs and energy performance, evolve over time. In the PRIMES model, the technologies are categorised in stylised clusters that include three generations in terms of the energy features of each technology:

- Ordinary technologies, including traditional technologies and new techniques that are already mature in the market.
- Improved technologies, including technologies that are now beginning to be deployed in the market and are considered when investment decisions are to be taken.
- Advanced technologies, including best available technologies that may be judged commercially immature or experimental at present.

The progress of these technology generations over time drives the dynamics of technology improvement. In sectors or scenarios that involve accelerated capital turnover, or a high level of investment in new equipment, there is a tendency for a higher proportion of advanced technology to be embedded in the operating capital stock.

Energy savings are defined at the level of specific energy uses. They correspond to direct measures, such as insulation, heat recovery, control systems, etc. Energy savings follow a highly, non-linear cost supply curve and their potential is higher when ordinary technology prevails in the operating capital stock.

Fuels used by a technology to meet energy demand requirements have various degrees of substitutability. In some cases fuels may be complementary to each other while, in other cases they may compete against each other. The complete list of fuels (final energy forms) used by PRIMES is as follows: solid fuels, oil products, natural gas, electricity, steam, renewable energy forms, new fuels, etc.

2.2. Baseline scenario results [23]

2.2.1. Main findings

The results of the Baseline scenario show that, despite the evidence of some saturation for some energy uses in the EU, energy demand is expected to continue to grow, albeit at rates significantly lower than those experienced in recent history. Primary energy demand in the EU is projected to increase at an annual rate of 0.6% in 2000 to 2030 compared to an annual growth rate of 2.3% for GDP, implying that the energy intensity of the EU energy system (expressed as primary energy demand per unit of GDP) will improve at a rate of 1.7% pa in 2000-2030. This compares to an improvement of 1.4% pa in 1995-2000 and of 0.8% pa in 1990-1995. The main reasons that justify this significant gain in energy intensity under the Baseline scenario include improvements in energy efficiency (both on the demand and the supply side),

22 The Epic database, developed by ESAP SA, gives a technical description, unit by unit, of power generation capacity. For EU-15 it contains more than 26,500 units above 100 kW. More information is available at www.esap.be.

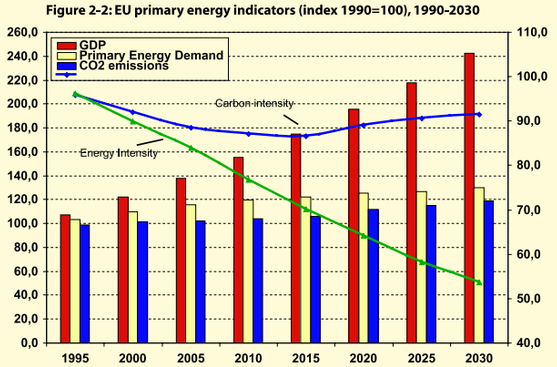
23 Detailed results for the EU and aggregate results by Member States can be found in Appendix 2.

changes in the structure of EU industry, saturation in demand for some important energy needs, and the policies already in place under Baseline assumptions (such as the negotiated EU-ACEA/JAMA/KAMA agreement, promoting policies for renewable energy forms, and nuclear phase-out policies). [24]

Between 1990 and 2000 CO_2 emissions in the EU[25] increased by 1.0% whereas the corresponding primary energy needs grew by 10%, implying a significant improvement in the carbon intensity (-0.8% pa in 1990-2000) of the EU energy system. The changes in the fuel mix during this decade were the key driver for this improvement.

In the Baseline scenario CO_2 emissions are foreseen to grow throughout the projection period, but at lower rates than the corresponding ones for primary energy demand. In 2010, CO_2 emissions are projected to be 4.0% higher than 1990 levels (whereas the corresponding growth for primary energy demand reaches +19.3%). In 2020 CO_2 emissions exceed the 1990 level by 11.7% (+25.5% for primary energy demand); and, in 2030, CO_2 emissions are 19.0% higher than in 1990 (while primary energy demand grows by +30.2%). The strong decoupling between EU energy demand and CO_2 emissions, which occurred between 1990 and 2000, is not projected to continue in the long run. Figure 2-2 illustrates the links between GDP, energy use and CO_2 emissions growth from 1990 to 2030 (with energy and carbon intensity plotted against the secondary axis).

Figure 2-2: EU primary energy indicators (index 1990=100), 1990-2030



Source: PRIMES

Carbon intensity for the EU energy system is projected to improve at a rate of 0.4% pa between 2000 and 2015. However, beyond 2015 the EU energy system is projected to become more carbon intensive (carbon intensity worsens at a rate of 0.4% pa). There are two main reasons for this result:

- The opportunities for CO_2 emissions reductions through fossil fuel switching (mainly on the demand but also on the supply side) become progressively more exhausted due to technological constraints on the extent that each sector is able to switch further to lower carbon content fuels; and
- Nuclear decommissioning in the EU energy system beyond 2015, combined with declared nuclear phase out policies in certain EU Member States (namely Belgium, Germany and Sweden), generates a gap in power generation that cannot be satisfied, to the full extent, by other carbon free fuels.

2.2.2. Primary energy needs

After a continuous decrease from the mid-eighties to the early nineties **indigenous production of primary energy** in the EU rebounded sharply with an accelerating growth rate driven by higher production levels for crude oil, natural gas and nuclear; while solid fuels production continued to decline as a consequence of the important restructuring of the mining industry. A small decline was observed in 1997 and 1998, driven by a reduction in solid fuels and natural gas production, to be followed by a strong increase in 1999, in which indigenous production in the EU reached a new peak since 1985 of 770 Mtoe. In 2000, a decline of -1.5% was observed, marked by a reduction in solid fuels production by -12.3%. However, indigenous production of primary energy in the EU in 2000 was some 7.5% higher than the 1990 level.

As can be seen in Table 2-7 indigenous production of all primary fuels in the EU is projected to exhibit a significant decline over the period to 2030, except for renewable energy sources. Primary production of solid fuels is projected to decline by more than 55% between 2000 and 2030. Indigenous coal production (projected

24 Nuclear power plants operate with a conventionally attributed efficiency rate of some 33-35%. Consequently the replacement of nuclear by thermal plants and renewable energy forms (which have higher efficiencies – even 100% for some renewable energy forms) leads to a significant a significant improvement of power generation efficiency and reduction of energy requirements for the production of the same quantity of electricity.

25 It should be noted here that, within the PRIMES model, aviation includes both national and international flights from the EU, without distinguishing between the two (data on the split between domestic and international aviation is not currently available) following the corresponding EUROSTAT convention as regards energy consumption in aviation. Consequently total CO2 emissions from aviation are accounted for at the level of each Member State. However, consumption of international maritime bunkers is excluded from the analysis according to EUROSTAT conventions; consequently it is not accounted for in national CO_2 emissions. According to the Guidelines for National Greenhouse Gas Inventories of the Intergovernmental Panel on Climate Change (IPCC), both emissions based upon fuel sold to aircraft engaged in international transport and to international maritime fleets should not be included in national totals, but reported separately.

Table 2-7: Primary production of fuels in EU

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	209.9	99.4	70.3	56.1	43.0	-7.2	-3.4	-2.2	-2.6	-2.8
Hard coal	120.0	51.6	24.6	14.7	9.4	-8.1	-7.1	-5.0	-4.4	-5.5
Lignite	89.8	47.8	45.7	41.3	33.6	-6.1	-0.4	-1.0	-2.1	-1.2
Liquid Fuels	117.7	160.4	129.2	99.6	84.2	3.2	-2.1	-2.6	-1.7	-2.1
Natural Gas	132.9	190.6	191.0	142.1	112.2	3.7	0.0	-2.9	-2.3	-1.8
Nuclear	181.4	222.8	230.3	198.7	180.0	2.1	0.3	-1.5	-1.0	-0.7
Renewable En. Sources	66.3	88.1	122.2	138.9	153.6	2.9	3.3	1.3	1.0	1.9
Total	**708**	**761**	**743**	**635**	**573**	**0.7**	**-0.2**	**-1.6**	**-1.0**	**-0.9**

Source: PRIMES

at less than 10 Mtoe in 2030, -82% below 2000 levels) will face increasing pressure due to competition from imported coal. Lignite production is also expected to decline (-30% in 2030 from 2000 levels) due to increasing competition from natural gas or imported coal in the power generation sector. The decline of EU primary production of oil and natural gas is also noticeable, with oil production projected to decline by 48% and gas by 41% in the period 2000 to 2030.

Production of nuclear energy is projected to exhibit a limited growth in the horizon to 2010 and then to decline by some 20% from 2000 levels over the period to 2030. The massive decommissioning of existing nuclear plants that is not fully compensated by new nuclear investment in 2010-2030 in some Member States, combined with the nuclear phase out policies decided in other Member States, are the key explanations for this result.

In contrast, renewable energy sources are expected to receive a significant boost as a result of policy measures and technological progress. The average annual growth rate in primary production of renewable energy forms is expected to be close to 1.9% pa between 2000 and 2030. Renewable energy forms are projected to become the second most significant indigenous energy source (after nuclear) in the EU by 2030. However, their growth is not sufficient to offset the decline in production of fossil fuels and nuclear energy. Consequently, by 2030, primary energy production in the EU is projected to decrease by some 25% from its 2000 levels.

Primary energy demand increased by 10% between 1990 and 2000, notwithstanding a relative stabilisation between 1990-1994 as a consequence of the economic recession in 1992-1993. The pattern of energy consumption has changed significantly since 1990. Solid fuels have experienced a continuous decrease by about -3.5% pa resulting from a marked fall in consumption both by final users and in power generation. Their share fell from 22.9% in 1990 to only 14.6% in 2000. Oil products, driven by increasing consumption for transportation purposes, showed an average yearly increase of 0.7% since 1990. Natural gas consumption increased on average by 4.3% pa since 1990. Consequently its share grew to 23.3% in 2000 against only 16.8% in 1990. Since 1995, power generation absorbed about 55% of the additional gas consumption, increasing its gas use by more than 10% pa. Nuclear consumption increased by 2.1% on average since 1990 benefiting from the commissioning of the latest units under construction and a continuous rise in the utilisation rate of nuclear capacity. Finally, renewable energy forms increased at a rate of 2.9% pa.

Between 2000 and 2010 primary energy demand is projected to increase by 8.5% (compared to 10% in 1990 to 2000), slowing down to 5.2% in 2010 to 2020 and 3.8% in 2020 to 2030 (see Table

Table 2-8: Primary Energy Demand in EU

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	302.8	212.4	167.4	179.5	222.5	-3.5	-2.4	0.7	2.2	0.2
Liquid Fuels	545.8	586.9	596.5	607.1	604.7	0.7	0.2	0.2	0.0	0.1
Natural Gas	222.1	338.7	456.0	529.6	555.6	4.3	3.0	1.5	0.5	1.7
Nuclear	181.4	222.8	230.3	198.7	180.0	2.1	0.3	-1.5	-1.0	-0.7
Renewable En. Sources	66.3	88.1	122.2	138.9	153.6	2.9	3.3	1.3	1.0	1.9
Total	**1321**	**1453**	**1576**	**1657**	**1719**	**1.0**	**0.8**	**0.5**	**0.4**	**0.6**

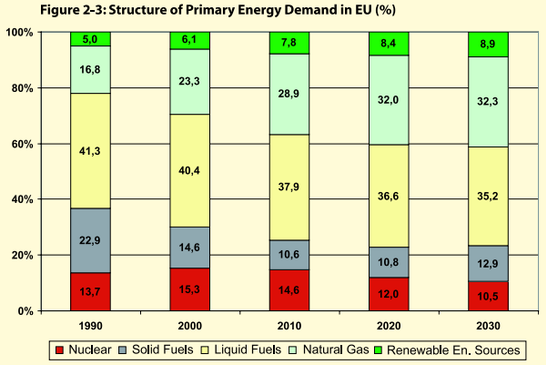
Source: PRIMES

2-8). Natural gas and renewable energy forms are the fastest growing fuels in the EU energy system. In the short run (2000-2010) they both grow at rates 4 times faster than total primary energy needs, decelerating to 3 times faster in 2010-2020. In 2020-2030 natural gas demand increases at rates slightly above overall primary energy needs (+0.5 pa compared to +0.4% pa), whereas demand for renewable energy forms continues increasing at a much faster pace (+1.0% pa). The use of solid fuels is expected to continue to fall until 2010 both in absolute terms and as a proportion of total energy demand. However, the decommissioning of nuclear plants at the end of their assumed 40 year lifetime and the nuclear phase-out in certain Member States, combined with some loss of competitiveness of gas based generation due to higher natural gas import prices, lead to an increase in demand for solid fuels beyond 2015. As a result primary energy demand for solid fuels in 2030 is slightly above its 2000 level. Finally, demand for liquid fuels increases moderately over the projection period, but at a rate well below average (+3% in 2000-2030). Under Baseline technology assumptions, novel energy forms, such as hydrogen and methanol, do not make significant inroads, primarily due to cost considerations.

The dependence of the EU energy system on fossil fuels is projected to increase in the long run. More specifically the share of fossil fuels increases from 78.3% in 2000 to 80.4% in 2030. However, as already discussed, the fossil fuel mix undergoes significant changes (see Figure 2-3). Natural gas reaches 32.3% of primary energy needs by 2030 (compared to 23.3% in 2000). The share of oil in primary consumption is projected to exhibit a moderate decline over the period to 2030 (-5.2 percentage points in 2030 from 2000 levels to reach 35.2%) still remaining, however, the most important fuel in the EU energy system. Solids lose market share up to 2015 (reaching no more than 10.6% of primary energy needs) but, driven by nuclear decommissioning and greater competitiveness against gas in the long run, exhibit a strong resurgence afterwards to reach 12.9% in 2030.

As regards non fossil fuels, nuclear energy accounts for 10.5% of primary energy demand in 2030 (compared to 14.6% in 2000), whereas the significant boost of renewable energy sources (including waste) under Baseline conditions leads to a share of 8.9% in 2030 compared to 6.1% in 2000. However, the EU energy system remains far from achieving the target of 12% from renewable energy sources[26] in 2010 under Baseline conditions and, even in the long run, renewable energy forms gain only a little in terms of market share. Wind energy and biomass are the key drivers for the increase of primary energy needs for renewable energy sources (see Table 2.9)

Figure 2-3: Structure of Primary Energy Demand in EU (%)



Source: PRIMES

Wind energy exhibits the highest increase among all renewable energy forms in terms of relative growth (increasing more than 12 times in 2000-2030). The bulk of this increase occurs in the period to 2010 (+21.3% pa) whereas beyond that period, and having already achieved a significant penetration of the EU energy system, wind energy grows at a more moderate pace (+3.2% pa in 2010-2020 and +2.6% pa in 2020-2030). Growth for hydro energy and geothermal heat is projected to be rather limited in 2000-2030 due to a number of obstacles including resource constraints and envi-

Table 2-9: Primary energy demand of renewable energy forms in EU

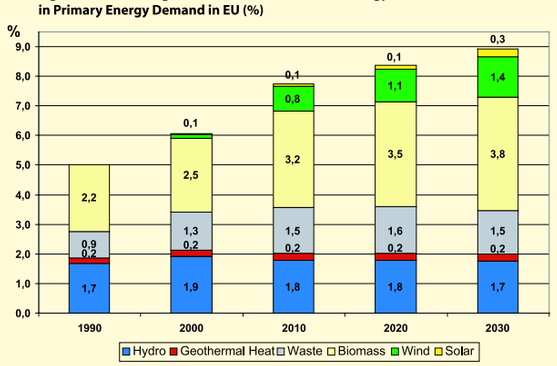
	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Hydro	22.3	27.6	28.1	29.5	30.1	2.2	0.2	0.5	0.2	0.3
Wind	0.1	1.9	13.3	18.2	23.6	40.0	21.3	3.2	2.6	8.7
Solar	0.1	0.3	1.4	2.4	4.5	9.5	15.1	5.6	6.3	8.9
Biomass	29.7	36.1	51.2	58.6	65.7	2.0	3.6	1.4	1.2	2.0
Waste	11.9	18.7	24.3	26.2	25.4	4.7	2.6	0.8	-0.3	1.0
Geothermal Heat	2.2	3.3	3.8	4.0	4.2	4.2	1.2	0.5	0.7	0.8
Total	66	88	122	139	154	2.9	3.3	1.3	1.0	1.9

Source: PRIMES

26 Directive 2001/77/EC of The European Parliament and of The Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market. See also the chapter on policy assumptions.

ronmental considerations. Especially in the case of hydro most of the available large sites in the EU have already been exploited. Solar energy increases significantly in the long run due to maturity gained for solar photovoltaic technologies in power generation. Biomass is projected to grow at rates slightly above average over the projection period, driven both by increasing use in power generation and the production of biofuels for use in the transport sector. But the growth of waste use is less pronounced and even negative in the long run. It should be noted that, in absolute terms, biomass is the fastest growing segment amongst renewable energy forms (+15.1 Mtoe in 2000-2010, +7.4 Mtoe in 2010-2020 and +7.2 Mtoe in 2020-2030). The evolution of the market shares of renewable energy forms in the EU energy system is illustrated in Figure 2-4.

Figure 2-4: Percentage contribution of renewable energy forms in Primary Energy Demand in EU (%)



Source: PRIMES

To close the gap between primary energy supply and demand the EU imported 49.4% of its total energy needs (excluding bunkers) from third countries in 2000 compared to 41.6% in 1985 (with a peak of 49.6% in 1992, close to the 2000 level). The **net import of energy** in the EU reached 738 Mtoe in 2000 and has increased in absolute terms by 1.3% pa on average since 1990 with a marked acceleration in 1998 (+4.5%) and 2000 (+5.0%). Whilst the EU as a whole remains the largest net energy importer in the world, import dependency varies considerably between Member States. In view of the findings on the evolution of primary energy supply and demand under Baseline scenario assumptions, it is not surprising that the EU's energy import dependency is projected to rise substantially over the next 30 years (see Table 2-10). More specifically, import dependency of the EU energy system is projected to increase by 18.5 percentage points in 2000-2030 with more than two thirds of overall energy requirements coming from imports by 2030.

In 2000 50.5% of primary energy needs for solid fuels were met by imports from external suppliers (compared to 29.7% in 1990 and 39.7% in 1995). Imports came from several different sources (Australia, the United States, Poland, Colombia and South Africa), with their shares varying on a year-by-year basis, depending on market conditions and long-term contracts. Coal imports are well diversified and come largely from politically stable regions. Following the substantial reduction of coal subsidies (coal is the only solid fuel that is internationally traded) and the consequent increase in the volume of cheap coal imports, solid fuels import dependency is projected to exhibit a sharp increase exceeding 80% of their primary energy needs by 2030.

Table 2-10: Import dependency in EU

	%				
	1990	**2000**	**2010**	**2020**	**2030**
Solid fuels	29.7	50.5	58.0	68.8	80.7
Liquid fuels	79.5	75.1	80.0	85.0	87.4
Natural gas	41.6	45.7	58.1	73.2	79.8
Total	**47.6**	**49.4**	**54.3**	**62.9**	**67.8**

Source: PRIMES

In terms of oil, the EU depended on external supplies for as much as 75% in 2000 (79.5% in 1990 and 73.2% in 1995), excluding requirements for marine bunkers. Oil imports consisted mainly of crude oil, as net imports of oil products remained marginal. Of these external supplies, about 48% came from OPEC. Since the mid-1980s OPEC has regained some of the share it lost to new non-OPEC producers following the earlier oil price shocks. However, in recent years, technology and cost reducing advances in oil exploration and production, notably in the North Sea, have resulted in OPEC taking a lower than expected share of the growing demand for oil. Since 1990 EU oil imports have varied within the range 445-490 Mtoe. However, the expected decline in North Sea production after 2000 leads to an 87.3% dependence on imports for EU oil requirements by 2030.

The EU's external dependency for natural gas was 45.7% in 2000 (41.6% in 1990 and 39.7% in 1995) with only three major suppliers: CIS, Algeria and Norway. Driven by the high growth in energy requirements, import dependency for natural gas is projected to rise sharply to reach 79.8% in 2030. This is despite the better position of the EU in terms of available indigenous gas reserves compared to those of oil.

It is clear from the above that in the long run, and particularly beyond 2020, energy import dependency issues will become ever more crucial. This is especially the case for natural gas, given the limited diversification of suppliers and geographical constraints such as the increasingly distant places (in Russia and the Middle East) from which imports will have to be obtained.

2.2.3. Final energy demand projections

EU final energy demand has undergone significant changes in recent years including the rapid growth of a wide range of service sectors and the shift to less energy-intensive manufacturing industries. Rising personal incomes have permitted higher standards of living, associated with widespread ownership of private cars and domestic appliances. Increasing comfort levels in space heating and cooling, influenced by the varied climatic conditions in the EU, contributed to higher final energy demand. These factors have influenced the broad evolution of EU energy demand and will continue to do so in future. More recently, they have been accompanied by fuel substitution away from coal and oil products towards gas and electricity uses in final demand sectors other than transport.

Since 1990, final energy demand has increased on average by 1.1% pa and GDP by 2.0% pa implying an elasticity of about 0.55. This resulted mainly from the stabilisation of final energy consumption in Germany since 1990 given improved energy efficiency in the new Länder. Final energy consumption increased in the EU excluding Germany at 1.5% pa since 1990 while GDP grew at 2.1%.

Under Baseline assumptions final energy demand is expected to grow by 28.5% between 2000 and 2030 compared to 19.2% for primary energy demand. This differential between primary and final energy demand reflects the improved conversion efficiency in power generation.

2.2.3.1. Final energy demand by sector

Table 2-11 illustrates the evolution of energy demand sectors under Baseline scenario assumptions. Masked by its apparent stability since 1990, energy consumption in **industry** has shown a varied evolution. Between 1990 and 1993 energy consumption declined by -2.4% pa, influenced by saving measures and depressed industrial production that fell by about 5.4% in three years. Between 1994 and 1997, energy consumption grew at 1.5% pa while industrial production increased by 2.6% on average. Between 1997 and 1999, benefiting from energy savings associated with the increasing use of electric arc furnaces in the iron and steel sector, energy consumption in industry remained stable while industrial production increased by 2.8% on average. But in 2000 energy demand in industry surged by 3.1%.

Besides the fluctuation in industrial demand described above, another significant factor was the major restructuring over the last decade in German industry following unification in the early 1990s. This resulted in a decrease of final energy demand in German industry by -1.8% pa in 1990 to 2000 (-2.8% in 1990-1995). Whereas overall energy demand in industry in the EU increased at a rate of 0.24% in 1990 to 2000, the picture is quite different if Germany is excluded. For the remaining Member States energy demand in industry between 1990 and 2000 increased at a rate of 0.9% pa.

As a result of much more pronounced growth of economic activity in EU industry in 2000-2010 (+2.4% pa) compared to the last decade (+1.4% pa), energy demand in the sector is projected to increase much faster - at an annual growth rate of 1.2% pa in 2000-2010. Intensity gains in the sector remain as significant as in the last decade (+1.1% pa both in 1990-2000 and in 2000-2010) reflecting further restructuring in EU industry. Energy demand growth in industry is projected to decelerate beyond 2010 (+0.8% pa in 2010-2020, +0.5% pa in 2020-2030) with marked intensity gains of some 1.5% pa driven both by structural changes but also by the exploitation of energy saving options, especially as regards changes in the fuel mix.

In 2000, the building sector (households and tertiary) represented around 39.5% of final energy demand compared to 40% in 1990 with similar climatic conditions, increasing at a rate of 0.9% pa. Energy demand growth in the **tertiary sector** (services and agriculture) reached 1.4% pa in the period 1990-2000, growing however at a significantly lower pace than the corresponding econo-

Table 2-11: Final Energy Demand by Sector in EU

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Industry	262.2	268.7	299.4	325.3	344.6	0.2	1.1	0.8	0.6	0.8
Domestic	343.4	377.4	420.0	450.1	477.7	0.9	1.1	0.7	0.6	0.8
Tertiary	115.3	132.7	149.2	165.7	186.6	1.4	1.2	1.1	1.2	1.1
Households	228.1	244.7	270.9	284.4	291.0	0.7	1.0	0.5	0.2	0.6
Transport	253.8	309.1	357.2	389.4	406.7	2.0	1.5	0.9	0.4	0.9
Total	**859**	**955**	**1077**	**1165**	**1229**	**1.1**	**1.2**	**0.8**	**0.5**	**0.8**

Source: PRIMES

mic growth (+2.4% pa in 1990-2000).[27] Despite the expected continuation of restructuring of the EU economy towards services, energy demand growth in the tertiary sector is projected to slow down between 2000 and 2010 (+1.2% pa) compared to the last decade. This trend reflects saturation effects, changes in the fuel mix and the significant improvements in terms of equipment efficiency that are projected to occur in the sector. A similar growth is projected for the next two decades (+1.1% pa in 2010-2020, and +1.2% pa in 2020-2030). Energy intensity in the tertiary sector is expected to improve by 1.5% pa in 2000-2010 (compared to 1.0% pa in 1990-2000) decelerating in the long run to 1.3% pa in 2010-2020 and 1.0% pa in 2020-2030, a trend clearly reflecting the high exploitation of potential technological improvements and changes in the fuel mix in the period to 2010.

Between 1990 and 2000 the number of households in the EU increased at a rate of 1.1% pa, while population grew by 0.3% pa. The number of inhabitants per household declined from 2.6 to 2.4. In the same period, the increase in consumers' disposable income led to higher comfort standards and further penetration of electric appliances. However, energy demand growth in the **household sector** was limited to 0.7% pa in 1990-2000 implying an increase of consumption per capita by just 0.4% pa. The key drivers for this are the fact that construction technologies, design techniques, materials and equipment have evolved rapidly in Europe, allowing plenty of scope to incorporate energy efficiency features into new buildings and appliances, but also saturation effects at the level of end uses such as space heating, water heating and cooking. Changes in the fuel mix towards natural gas and electricity are also important for better energy efficiency. These trends are projected to prevail for the household sector over the period to 2030. Energy demand is projected to grow by 1.0% pa in 2000-2010 exhibiting a slight increase compared to the last decade, but decelerating afterwards to 0.5% pa in 2010-2020 and 0.2% pa in 2020-2030. The implied energy intensity improvement[28] of 1.6% pa in 2000-2030 can be considered optimistic but is still broadly in line with that observed in the last decade (-1.25% pa).

Energy consumption in the EU **transport sector** grew at an average annual rate of 2.0% between 1990 and 2000. In 2000, total energy demand in the transport sector (excluding marine bunkers) amounted to 309 Mtoe or 32.4% of final energy demand, an increase of 2.9 percentage points from 1990 levels. These trends underline the predominant role of the transport sector in the growth of total EU final energy demand. Since 1990, transport has contributed 62% of the total increase of final energy demand, the rest arising mainly from the domestic sector. By 2010, transportation is projected to account for a third of EU final energy consumption, remaining the fastest growing sector in the EU in 2000-2010 (+1.5% pa). However, beyond 2010, energy demand growth in the sector is projected to slow down (+0.9% pa in 2010-2020 and +0.4% pa in 2020-2030). This is due to the combined effects of an overall deceleration in transport activity growth and technological progress (e.g. advanced vehicle technologies becoming mature and gaining significant market share clearly encouraged by the fuel efficiency agreement with the car industry). Nevertheless, transport remains the second fastest growing demand sector over the projection period (+31.6% in 2000-2030 compared to +28.2% for industry, +40.6% for the tertiary sector, and +18.9% for households).

2.2.3.2. Final energy demand by fuel

Liquid fuels remain the main energy carrier in the EU energy demand sectors over the projection period (see Table 2-12). However, the annual growth rate in transportation energy demand is actually higher than that for liquid fuels over the projection period (+0.9% pa in 2000-2030 compared to 0.5% pa), implying a decline in oil consumption in the other energy demand sectors. By the end of the forecast horizon oil becomes almost exclusively a fuel for transportation (about 80% of final energy demand for oil). By 2030 solid fuels are projected to become an obsolete energy form at the level of end-users. The change of the fuel mix on the demand side in favour of natural gas, electricity and steam is projected to continue over the period to 2030. Energy demand for natural gas increases at a rate of 1.0% pa in 2000-2030, that of steam by 1.5% pa and that of electricity by 1.5% pa also.

Under Baseline assumptions, novel final energy forms, such as hydrogen and ethanol, do not make significant inroads, primarily due to high costs. Demand for biomass declines in absolute terms beyond 2010 due to the decline in the number of rural households (the major users of wood), whereas demand for waste, a fuel exclusively used in industrial boilers on the demand side, is projected to increase by 0.9% pa. Other renewable energy forms, such as solar energy used in water heaters, grow quite rapidly (+5.1% pa in 2000-2030) but they remain insignificant as a proportion of overall final energy consumption.

The different growth patterns for final energy fuels, determined to a large extent by the differential growth rates of energy consump-

27 It should be noted, however, that the accuracy of statistics concerning the split of energy demand between tertiary and household sectors has only improved in recent years. For a long time, the energy balances were provided only for the aggregate "domestic sector" (including households, services, agriculture and fisheries). This aggregate has now been split but many definitional and statistical problems arose in the first few years after the split.

28 Energy intensity in households is computed using per capita income as the denominator.

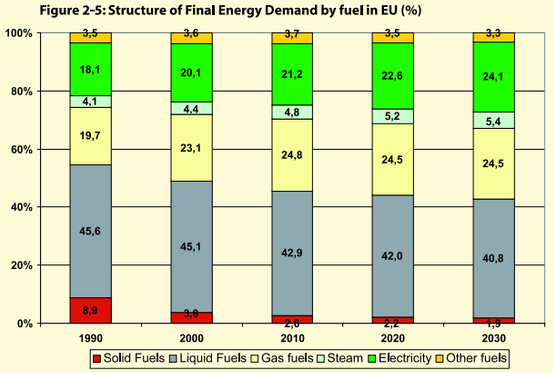
Table 2-12: Final Energy Demand by Fuel in EU

	Mtoe						*Annual Growth Rate (%)*			
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	76.8	36.0	28.4	25.2	23.1	-7.3	-2.3	-1.2	-0.9	-1.5
Liquid Fuels	391.5	430.6	462.2	489.0	501.9	1.0	0.7	0.6	0.3	0.5
Gas fuels	169.7	220.3	266.6	285.0	300.8	2.6	1.9	0.7	0.5	1.0
Steam	35.2	42.1	51.9	60.7	66.6	1.8	2.1	1.6	0.9	1.5
Electricity	156.0	191.6	228.3	263.8	296.3	2.1	1.8	1.5	1.2	1.5
New fuels (hydrogen etc.)	0.0	0.0	0.3	0.9	1.3	-	-	12.8	3.3	-
Biomass	24.3	26.7	29.0	28.4	26.7	1.0	0.8	-0.2	-0.6	0.0
Waste	5.5	7.1	8.3	8.9	9.2	2.5	1.7	0.7	0.3	0.9
Other renewables	0.5	0.7	1.8	2.7	3.2	4.0	9.4	4.4	1.7	5.1
Total	**859**	**955**	**1077**	**1165**	**1229**	**1.1**	**1.2**	**0.8**	**0.5**	**0.8**

Source: PRIMES

tion and efficiency improvements in the major energy using sectors, are clearly reflected by the changes in the fuel mix. As shown in Figure 2-5 changes in the shares of various fuels over the next 30 years are relatively modest. The most notable change is the increase by 3.6 percentage points in the share of electricity, a change that is in line with one of the best-established long-term energy trends, namely, the gradual electrification of the energy system in developed countries. However, two issues need to be emphasised: first, that even by 2030, electricity accounts for less than a quarter of total EU final energy demand; and, second, that

Figure 2-5: Structure of Final Energy Demand by fuel in EU (%)



Source: PRIMES

the projected growth in electricity consumption, at +1.5% pa, is rather modest by historical standards given that electricity has historically grown faster than GDP. The share of natural gas in final energy demand, which increased by 3.5 percentage points in the last decade, is also projected to increase further, though at a significantly lower pace - by 2 percentage points over the horizon to 2030. Natural gas accounts for 24.5% of total final energy demand by 2030. The share of distributed steam is also projected to increase by 1 percentage point over this period. These increases occur to the detriment of, mainly, liquid fuels (-4.3 percentage points in 2030 from 2000 levels) and solid fuels (-1.9 percentage points).

2.2.3.3. Energy demand in individual industrial sectors

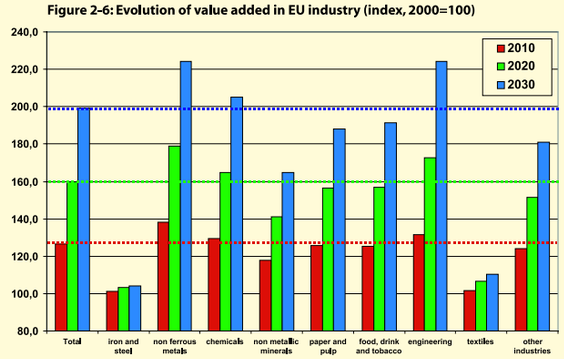
Industry has been greatly influenced by the increasing globalisation of the world economy during the 1990s and the enhanced level of economic integration within the EU. The process of globalisation has had a considerable impact on the location of production. Many firms have extended their operations beyond national borders in an attempt (amongst other things) to circumvent remaining trade barriers, increase proximity to customers, reduce costs (labour, transportation or other inputs), guarantee supply of materials and avoid regulation. Globalisation encompasses a wide range of issues such as the development of trade in goods, international financial flows, and various forms of linkages between businesses, cross-border operations and the penetration of national economies. Groups of enterprises are at the core of the globalisation process and may be seen as agents of cross-border transactions, as they control entities located in different countries via their decisions, information flows and strategies. The qualitative nature of the information required to define any such group's perimeter can often make it difficult to obtain reliable statistical information (as far as the statistical system stands today). One of the key constraints is that global enterprises make their decisions against a worldwide backdrop, whilst these decisions continue to be analysed using national data sets that are arbitrarily defined by geographical borders.

The structure of EU industry has undergone significant changes in the last decade with the fastest growing areas being those driven by marketing, innovation and technology. Looking in more detail at the activity breakdown, the fastest growing sectors in the EU were office machinery and computers, aircraft and aerospace, motor vehicles and their parts and accessories, and pharmaceuticals. These sectors tend to be dominated by multinational companies. All of these sectors can be considered as either research-driven with a high degree of technological innovation, or alternatively marketing-driven, with brand image playing an important role in differentiating products.

As discussed earlier, the restructuring of EU industry towards activities with high value added and a lower material base is projected to continue to 2030. Figure 2-6 illustrates the developments in industrial value added by major industrial branches. Engineering industries are the key driver as regards economic growth of EU industry, accounting for some 51% of total sectoral value added in industry by 2030 (from 45% in 2000). Non-ferrous metals and chemicals are also projected to grow at rates above average with some additional gains in terms of market shares over the projection period. Production in the iron and steel and textiles industries is projected to remain relatively stagnant over the projection period, whereas all other industrial sectors are projected to exhibit growth of value added, but at below average rates.

Table 2-13 presents the developments in industrial energy demand[29] by sector in the EU. As expected, there are significant differences as regards the projected evolution of energy demand in industrial sectors. Energy demand in sectors that have been in long decline in the EU, like iron and steel and textiles, decreases over the projection period (by -0.5% pa and -0.05% pa in 2000-2030, respectively). On the other hand, following the strong sectoral growth, energy demand in engineering, non-ferrous metals and chemicals increases at rates well above average (+2.1% pa, +1.9% pa and +1.6% pa respectively in 2000-2030). In total, energy demand in industry increases by 0.8% pa in 2000-2030, whereas the corresponding sectoral value added growth reaches 2.3% pa. It is important to note that, while the economic growth of industry is rather uniform across the projection period, the growth of energy demand is more pronounced in the short term (+1.1% pa in 2000-2010) and decelerates in the long run (to reach 0.6% pa in 2020-2030). This result reflects, to a large extent, the extensive restructuring that has taken place in EU industry over the recent past, which limits the scope for further energy savings in the short run.

Figure 2-6: Evolution of value added in EU industry (index, 2000=100)



Source: PRIMES

In term of fuel mix, significant changes have occurred since 1990 with the declining contribution of solids and oil products balanced by increasing use of gas and electricity. Solids consumption has declined by 40% in both the coke and steam coal markets since 1990. Consumption is increasingly concentrated in the iron and steel sector that now absorbs 68% of industrial solids consumption against 48% in 1990, despite the recent growth of electric arc furnaces. Since 1990 coal use has more than halved in the non metallic minerals sector where it competes with petroleum coke and industrial wastes, but use has doubled in iron and steel which now constitutes its largest final demand market, mainly for direct injection in blast furnaces. Oil consumption has declined conti-

Table 2-13: Final Energy Demand by Industrial sector in EU

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
iron and steel	56.1	51.5	49.2	47.4	44.1	-0.9	-0.4	-0.4	-0.7	-0.5
non ferrous metals	10.8	10.4	13.4	16.1	18.5	-0.4	2.5	1.8	1.4	1.9
chemicals	50.2	45.7	52.3	57.0	60.1	-0.9	1.4	0.9	0.5	0.9
non metallic minerals	35.7	34.4	37.9	39.2	39.5	-0.4	1.0	0.3	0.1	0.5
paper and pulp	27.6	33.8	37.9	40.0	40.0	2.1	1.1	0.6	0.0	0.6
food. drink and tobacco	21.9	24.9	30.5	35.8	40.5	1.3	2.0	1.6	1.3	1.6
engineering	27.3	24.7	31.6	38.2	45.7	-1.0	2.5	1.9	1.8	2.1
textiles	8.5	8.3	8.3	8.3	8.2	-0.3	0.1	0.0	-0.2	-0.05
other industries	21.3	32.0	38.3	43.2	48.1	4.2	1.8	1.2	1.1	1.4
Total	**262.2**	**268.7**	**299.4**	**325.3**	**344.6**	**0.2**	**1.1**	**0.8**	**0.6**	**0.8**

Source: PRIMES

29 EUROSTAT Energy Balances do not take into account non-marketed steam, i.e. steam generated in CHP plants and used on site by industrial consumers. Using statistical information provided by EUROSTAT on CHP, the non-marketed steam generated in CHP units as well as the corresponding fuel input have been estimated for purposes of this study. Steam has been attributed to the demand side and the fuel input to the supply side. This approach ensures better comparability of historical figures with the projections. However, in this report slight differences exist for certain figures related to steam generation - both in terms of final energy demand and transformation input - compared to EUROSTAT energy balances.

Table 2-14: Final Energy Demand by Fuel in Industry for EU

	Mtoe					Annual Growth Rate (%)				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
solids	49.3	30.9	27.4	25.0	23.0	-4.6	-1.2	-0.9	-0.8	-1.0
liquids	43.1	36.2	33.8	32.1	31.2	-1.7	-0.7	-0.5	-0.3	-0.5
gas	67.9	81.5	96.3	104.5	113.1	1.8	1.7	0.8	0.8	1.1
biomass-waste	8.2	9.8	12.7	14.3	14.8	1.8	2.7	1.2	0.3	1.4
steam (co-generated)	22.6	26.6	33.5	40.5	44.3	1.6	2.3	1.9	0.9	1.7
electricity	68.1	80.8	95.7	108.9	118.2	1.7	1.7	1.3	0.8	1.3
Total	**262.2**	**268.7**	**299.4**	**325.3**	**344.6**	**0.2**	**1.1**	**0.8**	**0.6**	**0.8**

Source: PRIMES

nuously since 1990. The reduction of residual fuel oil use, about 8.7 Mtoe, exceeded the total reduction in oil use in industrial energy demand. This was partly compensated by increases in LPG, heating gas oil and petroleum coke consumption. Consequently the share of heavy products (residual fuel and petroleum coke) in liquids has declined from 64% in 1990 to 54% in 2000. Gas and electricity, with an average annual growth rate of about 1.8% and 1.7% respectively since 1990, now dominate the industrial energy market. In addition to substitution induced by environmental concerns, gas consumption has benefited from the significant improvements in all gas-based technologies (gas turbines, gas engines etc.) over the last few years, resulting in higher efficiencies and reduced environmental impacts. Electricity also benefited from the development of a wide range of new electro-technologies, ever more heavily utilised in industrial applications.

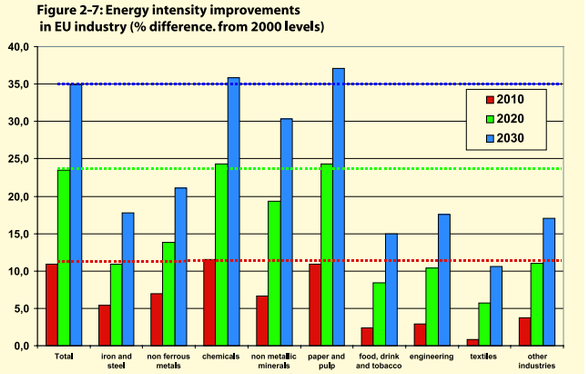
The further structural changes projected to occur in EU industry under Baseline assumptions are also reflected in the evolution of fuel consumption in the sector (see Table 2-14). The most notable change is the continued rapid decline in the use of solid fuels. By 2030 solid fuels are almost exclusively used in integrated blast furnaces in the iron and steel sector (84.5% of final demand for solids in industry) and in cement production (9.5% of final demand for solids in industry). Consumption of liquid fuels also falls, especially heavy oil products, the share of which is less than 34% of total liquids consumption in industry by 2030.

Changes in the industrial fuel mix in favour of natural gas, substituting solids and liquids, continues to 2030 though at a slower pace beyond 2010. Demand for co-generated steam is projected to grow strongly in the short term but to slow down afterwards due to issues related, mainly, to networks infrastructure. Electricity demand grows consistently faster than overall industrial energy demand, driven by both structural and technological changes. Biomass and waste, fuels used almost exclusively in industrial boilers, exhibit a strong growth, though this is to some extent limited by the growth of co-generated steam. In general the outlook for EU industry is characterised by a trend towards less carbon intensive and more efficient energy forms.

The combined effect of the factors discussed above is illustrated in the energy intensity improvements projected to occur in EU industrial sectors. Overall energy intensity (expressed in terms of energy demand per unit of value added) for industry is projected to improve in 2030 by 35% from 2000 levels. As illustrated in Figure 2-7 the overall energy intensity improvement is well above that observed at the level of most of the individual industrial sectors. This clearly reflects the fact that structural changes towards less energy intensive sectors, and especially engineering, contribute significantly to this progress. There are only two sectors (namely chemicals and paper and pulp) for which energy intensity improvement exceeds 35% in 2000-2030. Structural changes within these sectors towards less energy intensive products and processes are the key drivers for this development.

The strongest energy intensity improvement is observed in the paper and pulp industries. Value added generated from printing and publishing activities (neither being energy intensive processes) grows at rates significantly above that of paper and pulp

Figure 2-7: Energy intensity improvements in EU industry (% difference. from 2000 levels)



Source: PRIMES

production (+2.3% pa compared to +1.5% pa respectively in 2000-2030). Furthermore, production of pulp increases at much lower rates than that of paper. The chemical sector is characterised by a strong shift from energy intensive products such as fertilisers and petrochemicals towards value intensive products such as pharmaceuticals/cosmetics. Non-metallic minerals production also achieves significant improvement (+30.3% in 2000-2030), driven by a slightly decreasing production of cement over the projection period and higher use of recycled glass.

In non-ferrous metals production, the higher use of recycled aluminium combined with the stronger growth for other non-ferrous metals such as alloys etc. (products with high value added) play a significant role in terms of energy intensity improvement (+21.1% in 2030 from 2000 levels). The iron and steel sector, despite the fact that it is not growing, exhibits an energy intensity improvement of 17.8%, mainly due to the shift from integrated steelworks towards electric arc processing.

In the non-energy intensive industries (food, drink and tobacco, engineering, textiles and other industries) intensity gains, which are mainly driven by technological progress, range between 15 and 17.5%. In the textiles industry, given limited scope for investment and issues related to existing over-capacity, energy intensity improvements are limited to 10%.

Iron and steel industry

The European steel industry is increasingly confronted with challenges posed by globalisation. The framework in which the EU steel industry operates has changed as a result of the introduction of market-oriented policies (deregulation, privatisation, strict state aid disciplines, removal of trade barriers) since the late eighties. Industry operations are, in view of increased public concern for the environment, driven towards environmentally "friendly" products and technologies. Moreover, client requirements have induced production of innovative quality products in combination with a high "service" component. Although the steel business will remain volatile, taking into account, in particular, the new competitors challenging the existing players, the increasing global concentration of client industries, the accelerating technological changes and the permanent cost/price squeeze for steel products, the capability to face future challenges is quite good. This is due to the considerable efforts made by the EU steel industry to reshape its production structure, improve its technological performance and better employ its skilled human resources. Moreover, via strategic alliances, the industry has transcended national boundaries and developed a truly European production and market base.

Steel is produced by two different basic technologies. Integrated steelworks produce crude steel out from iron ore and coal/coke. Due to the high quality of steel made, this technology accounts for most of the production of flat sheets and plates. The electric arc furnace, which requires a lower capital intensity and provides greater operational flexibility, was in the past primarily aimed at other products (including special steel products). Driven by new technological developments, it has started to be used also for flat steel production. This generally requires high quality scrap.

In the context of intensifying international competition, steel production in the EU increased by only 1.0% pa between 1990 and 2000 while sectoral value added fell by 1.0% pa. This decline reflects the strong restructuring towards electric arc furnaces, the output from which increased at a rate of 3.7% pa compared to -0.5% pa for integrated steelworks, observed in the EU in the last decade.[30] In 2000, the share of electric arc furnace production in the EU was 39.7%, from 30.4% in 1990, which is similar to the situation in Japan, but compares with 45% in the USA. Energy demand in the iron and steel industry declined at a rate of -0.9% pa in 1990-2000 implying an intensity gain of close to 1.8% per ton of output. This change in energy intensity partly reflects the shift towards electric arc furnaces, the general overall improvement in the use of energy, and the closure of older, less efficient plants. However, following the increasing use of electric arc processing with lower value added per tonne of output, energy intensity in terms of value added exhibited the reverse trend - worsening at a rate of 0.2% pa in the last decade.

Under Baseline assumptions value added in the iron and steel industry exhibits limited growth over the projection period (+0.1% pa in 2000-2030) with a similar growth in terms of production (+0.1% pa). The shift of production towards electric arc furnaces, the production of which increases by 0.7% pa continues over the projection period. Integrated steelworks production experiences further decline at a rate of -0.3% pa. By 2030 the share of electric arc furnaces in EU steel production exceeds 47.6%, approaching both the technological and input (i.e. scrap) availability limitations.

Energy demand in iron and steel declines between 2000 and 2030 at a rate of -0.5% pa, with implied intensity gains of 0.7% pa in terms of value added and 0.6% pa in terms of product output given the combined effect of technological progress and the shift towards electric arc processing. Given the sector's low profitability, excess capacity and high capital intensity, technological progress is mainly the result of retrofitting, rather than the construc-

30 Electric arc furnaces products have, in general, lower product quality compared to integrated steelworks ones. Consequently the value added generated per unit of output for electric arc furnaces is also lower.

tion of new plants. In that sense advanced techniques such as direct smelting, that involves direct coal injection in the blast furnace and improves energy efficiency up to 20%, do not make significant inroads under Baseline assumptions.

Finally, the further shift towards electric arc furnaces results in higher use of electricity (+0.2% pa); electricity is the only fuel for which demand in iron and steel industries is projected to increase. By 2030, electricity's share in iron and steel reaches 22.8% compared to 18.6% in 2000 and 14.6% in 1990.

Non ferrous metals industry

The non-ferrous sector produces intermediate goods used in a wide variety of downstream activities, involving the refining and primary and secondary processing of a large number of metals. The sector faces competition from substitute materials such as plastics or specialist ceramics. Some non-ferrous metals (such as aluminium, silicon, titanium, magnesium or iridium) have seen their use rapidly develop within the transport, electrical and electronic equipment sectors in recent years. Production of primary aluminium, the product of the electrolysis of alumina, is by far the most energy intensive process in the sector involving the use of large quantities of electricity. Secondary aluminium production thermally converts scrap aluminium into primary aluminium, a process that is more than 6.5 times less energy intensive than primary production. The production of other non-ferrous metals uses specific processes, both thermal but also electrolytic ones. Recycling of waste material is widely practised in the sector allowing for significant energy intensity gains. The sector is highly capital and energy intensive, a fact that has led to the limited number of players in the production of primary metals. However, greater diversification of companies occurs at the secondary processing level.

The non-ferrous sector relies on imports of metal ores, due to insufficient deposits within the EU. This may explain to some degree the limited contribution of the sector to industrial value added but also the importance of recycling waste and scrap non-ferrous metals in the EU. The EU non-ferrous industry accounted for only 1.4% of total added value of industry in 2000. Its production remained stable during the first part of the 1990s but increased by 2.5% pa since then, driven by the growth of aluminium and copper production. According to the Recycling Forum of the European Commission,[31] at least 40% of non-ferrous metal produced in the EU at the end of the 1990s was produced from recycled material (47.7% for aluminium production compared to 39.5% in 1990). As the quality of secondary metal is similar to that of raw material, savings in raw material and energy costs determine the demand for secondary metal, with recycled metals traded globally in direct competition with the raw material.

Between 1990 and 2000 energy demand in EU non-ferrous industries declined at a rate of -0.4% pa, with an implied energy intensity gain of -1.6% pa. This trend was related to the strong restructuring that occurred in EU non-ferrous industries and the rapid increase in the use of recycled material.

Under Baseline scenario assumptions the sector is projected to experience a significant growth with sectoral value added growing at a rate of 2.7% pa in 2000-2030, driven by the increasing demand for aluminium, copper and other alloys. However, even by 2030, the sector accounts for just 1.6% of industrial economic activity in the EU. In the same period energy demand in the sector is projected to grow by 1.9% pa with implied intensity gains decelerating from the levels observed in the last decade to 0.8% pa. Technical and availability constraints in terms of the further use of recycled material in non-ferrous industries are partly responsible for this slowdown in intensity gains. It should be noted, however, that by 2030 more than 55% of aluminium production derives from secondary processing.

As regards fuel use, natural gas is projected to remain the fastest growing energy form in the sector (+3.5% pa in 2000-2030 compared to +2.9% pa in 1990-2000) gaining further market share in thermal processing. Electricity demand also grows significantly (+1.8% pa) remaining the main energy carrier in the sector. Electricity accounts for 52.8% of energy needs by 2030 compared to 55% in 2000.

Chemical industry

The chemical sector is an exceptionally diverse industry creating a wide variety of products ranging from highly energy intensive raw materials, such as basic petrochemicals, to high value added consumer commodities (pharmaceuticals and cosmetics). Furthermore, the sector is also characterised by a wide range of energy related technologies involved in the production process. Two main categories can be distinguished: production of petrochemicals, fertilisers and other inorganic chemicals, which is characterised by high energy-intensity and low value added; and production of pharmaceuticals, cosmetics etc. which are high value added and low energy intensity products mainly supplied to final consumers.

The chemical industry is the largest energy intensive industrial sector in the EU. Between 1990 and 2000 the sector experienced significant structural changes, shifting in favour of high value added chemical commodities. Overall economic activity in chemicals grew at a rate of 2.1% pa in 1990-2000, well above the EU industrial average of 1.4%. By 2000, the chemical industry accounted for 11.7% of industrial value added compared to 10.8% in 1990.

31 Recycling Forum 1999-2000, Final Report, 28 January 2000.

Activities based on traditional energy-intensive processes grew at a slower pace and underwent significant restructuring in order to benefit from economies of scale both through vertical integration and relocation in a limited number of areas. The petrochemical industry has experienced the highest degree of competitive pressure and restructuring in the last decade, growing at a rate of 0.6% pa in 1990-2000. Issues related to excess capacity, strong dependence on naphtha instead of natural gas and increased competition from areas of low energy prices, such as the Middle East, are the key drivers for this trend. Sales growth was rather limited for fertilisers and other energy intensive chemicals production (+1.3% pa and +2.0% pa respectively) due to the restricted growth in agriculture but also increasing international competition. On the contrary, much more pronounced growth was observed in pharmaceuticals, cosmetics etc. production (+3.7% pa). By 2000 pharmaceuticals, cosmetics etc. accounted for 41.3% of value added produced in the EU chemicals sector compared to 35.6% in 1990.

The restructuring, in favour of low energy intensity products that occurred in the chemical sector in the last decade, is also clearly reflected in energy demand, which declined at a rate of -0.9% pa between 1990 and 2000. Implied energy intensity gains in that period reached up to 3.0% pa. It is interesting to note that in 1990-1995 intensity gains, due to the extensive restructuring of the sector, reached 5.5% pa, whereas in the second half of the nineties they were limited to 0.5% pa.

Under Baseline scenario assumptions the chemical sector remains one of the fastest growing industrial sectors in the EU (+2.4% pa in 2000-2030). Structural shifts in favour of high value added products are projected to continue with economic growth for pharmaceuticals, cosmetics etc. production reaching 3.5% pa. In 2030, close to 57% of chemicals value added will come from the latter sub-sector. On the contrary, economic growth in petrochemicals is projected to be much slower - limited to 0.5% pa.

Energy demand in chemicals is projected to grow at a rate of 0.9% pa in the period from 2000-2030 with intensity gains exhibiting an accelerating trend over the projection period (+1.2% in 2000-2010, +1.6% in 2010-2020, +1.6% in 2020-2030). These intensity gains are partly driven by further restructuring and partly by technological progress at the level of the different production processes (ranging between 0.8% pa in petrochemicals to 0.3% pa in fertiliser production).

The chemical industry is a sector that relies heavily upon the use of steam and electricity to satisfy its energy needs. In 2000 52% of total energy needs in chemicals was for electricity and co-generated steam (up from 49% in 1990). This trend is projected to continue in the long run. Demand for co-generated steam is projected to increase at a rate of 1.7% pa whereas that for electricity at 1.5% pa. Natural gas demand is also forecasted to exhibit significant growth in this sector (+1.2% pa). Biomass and waste are also projected to show considerable growth (+10% pa) as fuel input in industrial boilers for steam generation. This penetration of biomass and waste in the context of the lower contribution of industrial boilers in steam generation following higher use of co-generated steam will put strong pressure on the use of solid and liquid fuels in the chemical sector, both of which are projected to decline over the projection period. It is clear from the above that the chemical industry is characterised by a strong shift towards the use of high efficiency and low carbon-intensity fuels (electricity and co-generated steam account for 62.7% of energy needs in 2030).

Non-energy demand in chemicals originates from the need for feedstock in petrochemical plants. Given the limited economic growth in the sector, non-energy demand is projected to grow at a rate of 0.2% pa. As discussed earlier, EU petrochemical plants are strongly dependent on the use of naphtha as feedstock. Given the longevity of petrochemical plants, and the difficulties as regards feedstock switching, non-energy demand in the EU chemical sector is projected to remain dominated by the use of naphtha. However, faced with strong international competition, the use of natural gas, often seen to be a more economic option as a feedstock, is projected to experience significant growth accounting in 2030 for 43% of the sector's needs compared to 15% in 2000.

Cement and other non-metallic minerals

The manufacturing of non-metallic mineral products is to a large extent an activity requiring transformation of materials that have often been mined or quarried for use as intermediate goods in downstream activities. Although this sector accounts for a relatively small share of total EU manufacturing output, it plays an important role as a supplier to the construction, steel, chemical and packaging sectors. It includes production of cement, concrete and bricks but also consumer goods in the form of glass or ceramic tableware and ornaments. All these transformation industries are generally highly energy intensive ones. The sector's prospects are largely linked to building activity and, consequently, the sector experiences strong cyclical trends. However, the tradability of cement and glass does not allow for a firm linkage between production and building activity. For example, it is possible for the sector to stagnate even in a country with a building boom, if the country imports most of its additional cement and glass demand.

Because of the high investment and financial cost involved in building a new plant and the nature of the product, which is

heavy and expensive to transport, the cement industry is largely characterised by regional markets. Both cement production and consumption have varied during the 1990s with a decline by 8.0% between 1990 and 1995, followed by a progressive recovery to reach in 2000 a production level just 2.3% above that in 1990.

The glass industry provides many different products. There are a number of important sectors to which the performance of the glass sector is tied, including food and beverages for packaging (the most common use of glass), construction, transport equipment, as well as more specialist applications and households. Glass production, as a whole, increased by 1.9% pa on average during the 1990s but recycled glass production increased by 8.1% pa while basic glass production grew by only 0.4% pa. Glass faces strong competition from substitute materials such as plastics and metals and, as a result, there is pressure to reduce costs.

In total the EU non-metallic minerals sector grew by only 0.4% pa during the 1990s, accounting by 2000 for 4.4% of industrial value added compared to 4.8% in 1990. Energy demand in the sector declined in that period at a rate of -0.4% pa implying intensity gains of 0.8% pa resulting from the structural shift towards recycled glass in glass production but also significant intensity improvements in the cement industry.

The non-metallic minerals industry is projected to grow at rates well above those observed in the last decade (+1.7% pa in 2000-2030) driven by further specialisation and structural shifts towards higher value added products. Cement production is expected to experience limited growth to 2010 (+0.8% pa), remaining rather stable thereafter (+0.1% pa in 2010-2030). Established trends in glass production are also anticipated to prevail in the long run (+1.9% pa as in the last decade). Glass recycling is projected to accelerate. By 2030 recycled glass, growing at a rate of 3.2% pa, accounts for 38.5% of total glass production compared to 27% in 2000. Ceramics and other non-metallic minerals production are projected to grow at a rate of 1.8% pa.

Changes in production structure, combined with further exploitation of glass recycling, lead to a limited growth of energy demand in the sector (+0.5% pa) with implied intensity gains reaching up to 1.2% pa over the projection period. The shift towards more efficient energy forms is also partly responsible for this result. Following its rapid penetration between 1990 and 2000 (+2.9% pa) natural gas is projected to gain further market share, growing at a rate of 1.7% pa. Electricity demand is also foreseen to increase at rates well above average (+0.8% pa) whereas demand for solid and liquid fuels is projected to decline (-2.3% and -1.7% pa respectively). By 2030 solid fuels are almost exclusively used in cement production.

Paper, pulp and printing industries

The paper, pulp and printing industry has undergone significant changes in the recent past stemming from two main factors: high levels of capital investment have created scale economies in upstream sectors such as pulp and paper; whilst the introduction of information technology (IT) has changed production techniques and skills requirements in downstream sectors such as publishing and printing. The links between wood, pulp and paper producers are often strong and it is common for enterprises to be located near to their suppliers of raw materials. Although concentration levels have increased in the EU, the majority of producers are still relatively small by world standards, especially when compared to Canadian and US competitors.

Almost any paper can be recycled, including used newspapers, cardboard, packaging, stationery, magazines, catalogues, greeting cards and wrapping paper. The average utilisation of recovered paper reached 48% in 2000 for the EU as a whole. Production of pulp in the EU increased at a rate of 1.8% pa in 1990-2000 compared to 3.8% pa for paper - clearly reflecting increased paper recycling.

In the last decade value added in the EU paper, pulp and printing industry increased at a rate of 1.9% pa. The paper and pulp sector exhibited significant growth between 1990 and 1995 (+4.5% pa) followed by a limited decline in the second part of the decade (-0.4% pa in 1995-2000). Economic growth for printing and publishing followed a more uniform pattern, growing at a rate of 1.9% pa. In 2000 the sector accounted for 8.8% of industrial value added in the EU compared to 8.4% in 1990. More than 80% of economic activity in the sector was attributed to printing and publishing processes.

The sector is projected to grow at a rate of 2.1% pa between 2000 and 2030. The bulk of this growth will be the outcome of the further expansion of printing and publishing (+2.3% pa), which by 2030 will account for close to 85% of total activity in the sector. Exploitation of recycling potential is also projected to continue: paper production grows at a rate of 1.4% pa compared to 0.8% pa for pulp production.

The combined effect of the above factors allows for significant energy intensity gains in the sector (+1.5% pa) with energy demand growing at a rate of 0.6% pa. Following a rapid growth in 1990-2000 (+4.3% pa), co-generated steam is projected to further penetrate the paper and pulp industries (+1.5% pa in 2000-2030). Furthermore, biomass and waste demand is also projected to grow (+0.6% pa), mainly used in steam production from industrial boilers, reflecting the clear dominance of this energy form in most of the energy uses in the sector. Electricity demand is also projec-

ted to grow at rates slightly above average (+0.6% pa), while gas demand remains rather stable over the projection period and both solid and liquid fuels demand declines (-2.8% pa and -1.5% pa respectively).

Other industries

This sector includes all other industries not covered in the sectors discussed above. It is characterised by the large divergence in terms of products and by low energy intensity, as most of these products involve high value added with limited energy use. The sector produces equipment goods for households and industry (such as appliances, vehicles, engines), food, beverages and tobacco, textiles etc.

The **food and beverage** sector is among the largest industrial activities in the EU, accounting for 11.6% of manufacturing value added in 2000 (11.3% in 1990). This sector is highly fragmented when compared to manufacturing as a whole. In addition, the sector is less subject to economic cycles than other manufacturing activities and its output tends to grow in a moderate, regular fashion.

The food and beverage sector displayed positive annual growth rates for value added between 1990 and 2000, equal to about 1.6% pa with energy demand growing at a rate of 1.3% pa. The sector is projected to grow at 2.2% pa in 2000-2030 accounting for 11.1% of industrial value added in 2030. The corresponding energy demand growth reaches 1.6% pa, i.e. the sector exhibits limited energy intensity gains of some 0.5% pa. This is largely due to the fact that the sector, as well as the other sectors included under the 'other industries' category, is not energy intensive and energy costs represent only a small fraction of total production costs. In that sense the sector shows strong inertia and adjusts slowly to energy related technological improvements. Electricity and steam are the main energy carriers used in the food, beverage and tobacco industries. Co-generated steam (+2.0% pa in 2000-2030) and electricity (+1.8% pa) account for 61.5% of the sector's energy needs in 2030 (57% in 2000). Gas demand is also projected to experience significant growth (+1.3% pa). Finally, the use of renewable energy sources (biomass and waste used for steam generation in industrial boilers with growth of 7.2% pa in 1990-2000) is projected to rise further (+5.0% pa) over the projection period, though accounting for only 3.7% of energy needs in 2030 (1.4% in 2000).

Engineering industries cover mainly mechanical and electrical engineering. Mechanical engineering is the largest branch. In 2000 EU output of mechanical equipment was twice that of electrical equipment. Amongst the 22 mechanical and electro-technical sub-sectors included in the engineering industry, industrial engines and turbines (except for means of transportation) have seen the strongest growth. One of the key economic characteristics of the sector is its strong sensitivity regarding overall economic conditions and, more particularly, business confidence which affects new investment. Furthermore, strong interrelationships exist among the different branches of the sector. For example, economic growth in manufacturing of transport equipment (one of the major branches in EU engineering) is an important source of demand growth for a number of upstream activities including metals, rubber, plastics, electronics and engineering services. Electrical and optical equipment industries are also one of the fastest growing segments in the engineering sector, providing the infrastructure and other hardware for the information society, for the business community and also for consumers.

After the deep 1992-93 recession, EU engineering industries have been growing steadily. Between 1990 and 2000, average growth reached 1.7% pa whereas energy demand declined at –1.0% pa, i.e. the sector exhibited a marked energy intensity improvement of 2.6% pa. This progress is mainly being driven by the strong shift towards higher value added products in the engineering sector. Under Baseline scenario assumptions the engineering sector is projected to grow at a rate of 2.7% pa between 2000 and 2030, accounting for more than 50% of EU industrial economic activity compared to 45.1% in 2000. Energy demand growth reaches 2.1% pa with implied intensity gains of 0.6% pa. The fuel mix of the sector is dominated by the use of natural gas (39% of total energy use in 2000, growing at a rate of 2.3% pa in 2000-2030 to reach 42% in 2030) and electricity (45% of energy needs both in 2000 and 2030, growing at 2.1% pa in line with overall energy needs in the sector).

Production processes in the **textile** sector are often very labour-intensive and this has led to a large-scale redeployment of productive capacity away from the EU, to regions where average labour costs are considerably lower. Consequently the textile sector represented only 4.9% of manufacturing value added in 2000, some 1.8 percentage points lower than in 1990. Sectoral production has declined by 1.7% pa between 1990 and 2000 with a major reduction between 1990 and 1993, whereas energy demand decreased by only 0.3% pa. The sector is projected to experience limited growth in 2000-2030 (+0.3% pa), accounting for 2.7% of industrial activity in the EU by 2030. Energy demand is projected to decline further (-0.05% pa) with implied intensity gains reaching 0.4% pa. Some small increase is projected to occur in the demand for gas (+0.2% pa) to the detriment of other energy forms, especially liquid fuels (-0.3% pa).

Finally, **'other industries'** include a wide variety of non-energy intensive activities such as manufacture of wood products, rubber and plastic products, fabricated metal products etc. The sector exhibited significant growth between 1990 and 2000, 1.4% pa,

and is projected to grow at a rate of 2.0% pa in 2000-2030. By 2030 other industries are projected to account for 8.2% of industrial value added compared to 9.0% in 2000. Energy demand is projected to grow at a rate of 1.4% pa in the same period with implied intensity gains reaching 0.6% pa. This is a significant change compared to the last decade in which demand grew by 4.1% pa, but with a significant worsening of energy intensity by 2.8% pa.

2.2.3.4. Services and agriculture

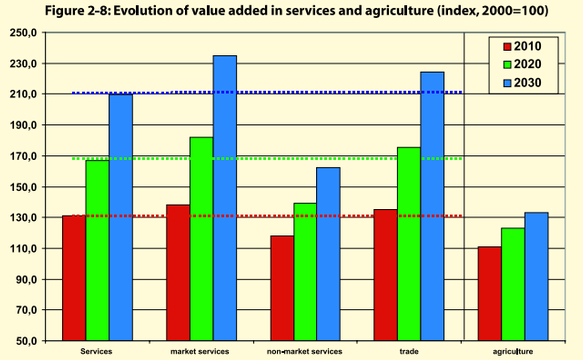
During the last decade the tertiary sector (services and agriculture) was the fastest growing segment of the EU economy, growing at a rate of 2.4% pa - well above GDP growth (2.0% pa). Growth in the services sector was the key driver for this trend (+2.4% pa in 1990-2000) with its share in the EU economy rising from 66.2% in 2000 to 68.8% in 2000, whereas agriculture saw limited growth (+1.2% pa in 1990-2000) due to pressures related to the opening of EU markets to world competition. As a result the share of agriculture in the EU economy shrank from 2.7% in 1990 to 2.5% in 2000.

Rising standards of living, combined with increasing competition in industrial goods markets from low cost developing countries, were the main factors that led to further specialisation towards services in EU countries. It has been observed that services related to leisure and telecommunications increase very rapidly with income. As saturation effects for most consumer goods are already present at the level of households' consumption, even for the less developed EU Member States, households spent an ever-higher proportion of their income on services. Furthermore, industrial specialisation in the EU towards knowledge-based industries provided a boost for high value added content services, such as engineering and financial services. Consequently market services (+3.0% pa) and trade (+2.6% pa) were, over the last decade, the main drivers for the growth in the services sector whereas non-market services, strongly affected by the fiscal reforms undertaken in most EU Member States in the recent past, grew at a slower pace (+1.6% pa).

As was seen in the discussion of macroeconomic trends, much of the future economic growth is likely to originate from the services sector (+2.5% pa in 2000-2030), the share of which in the EU economy is projected to reach some 71.5% in 2030. On the other hand, economic growth in agriculture is rather limited (+1.0% pa) and consequently the share of this sector in gross value added decreases to 1.7% by 2030.

The above-mentioned factors that generated economic growth in services in the last decade are likely to prevail also in its future growth. As can be seen in Figure 2-8 market services are assumed to remain the most dynamic segment of the services sector (growing by 2.9% pa in 2000-2030) followed by the trade sector (+2.7% pa). Economic growth in non-market services is less pronounced (+1.6% pa). Different growth patterns amongst services sub-sectors will result in a different structure of services in the long run. In 1990 market services accounted for 36.1% of services value added, non-market services for 32.2% and trade for 31.5%. Already in 2000 this picture has changed with market services' share increasing to 38.1% and trade to 32.1% whereas the non-market services' share (29.8% in 2000) fell by 2.4 percentage points in the 1990s. Under Baseline scenario assumptions the change of the services sector structure in the long run becomes even more pronounced with market services accounting in 2030 for 42.7%, trade for 34.2% and non-market services for just 23.1%.

Figure 2-8: Evolution of value added in services and agriculture (index, 2000=100)



Source: PRIMES

These changes in the services sector structure impact upon the projected evolution of energy requirements. The bulk of energy use in the sector is required for heating and cooling purposes. Therefore, a key determinant of energy use in the sector is the total floor space of services that in turn determines the volume of space that needs to be heated, illuminated etc. However, energy needs per square metre differ substantially amongst the different sectors reflecting the different purpose and intensity of use. Non-market services (including health, education, public services etc.), the floor area of which grows at a rate of 0.8% pa in 2000-2030, are by far the most energy intensive sector. These are followed by market services (i.e. offices, tourism, telecommunications etc.) the floor space of which increases by 2.0% pa, while trade (floor space increasing at 1.9% pa) is the least energy intensive. Of crucial importance is the increasing use of office electrical equipment, including computers, printers, telecommunication systems etc., which in turn generate significant gains in terms of the sector's productivity.

Energy demand in services increased at a rate of 1.5% pa in the 1990s, with an implied energy intensity gain (expressed as energy demand per unit of value added) of -0.9% pa. Energy demand

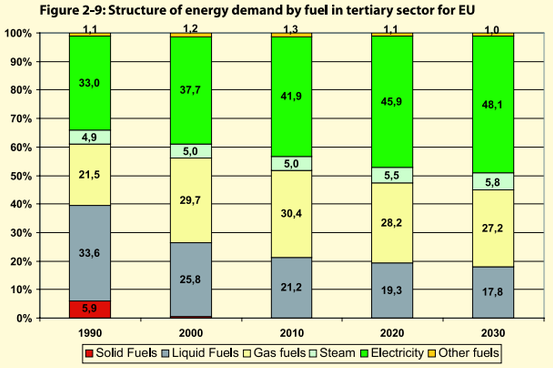
in market services[32] increased at a rate of +3.2% pa and in trade by 3.1% pa. Both sectors were characterised by a worsening of energy intensity (+0.2% pa and +0.5% pa respectively). This worsening is due to the increased penetration of electrical equipment and the improved degree of comfort (especially as regards air conditioning) in services. In contrast, over the same period non-market services witnessed a decline in their energy needs at a rate of -1.3% pa, with implied energy intensity gains reaching some 2.9% pa. Factors such as better management, adoption of energy saving policies and changes in the fuel mix towards more efficient energy forms were the key drivers for this result. Energy demand in agriculture grew at a rate of 1.0% pa in 1990-2000 with implied intensity gains of 0.1% pa.

Under Baseline scenario assumptions energy demand in the tertiary sector is projected to increase at a rate of 1.1% pa in 2000-2030 (see Table 2-15). Services demand increases at a rate of 1.2% pa while demand growth in agriculture is limited at 0.6% pa. Amongst the different services sectors, market services remain the fastest growing segment with energy needs increasing at a rate of +1.6% pa over the projection period. A similar growth is projected for trade (+1.4% pa), while demand growth in non-market services is limited to 0.5% pa.

Energy demand growth in the sector is driven by the increasing use of electric appliances (+3% pa in 2000-2030) and the rapid penetration of air conditioning in services (+2.3% pa) especially over the period to 2010. Better insulation in new building construction, against the background of high comfort standards as regards heating (already achieved in the EU), lead to a modest increase in energy demand for heating purposes (+0.7% pa).

The above trends in terms of energy use (especially the strong increase for electricity related applications) are also reflected in the fuels consumed in the tertiary sector. Electricity is the fastest growing fuel (+2.0% pa in 2000-2030 compared to +2.8% pa in 1990-2000) and by 2030 it accounts for 48.1% of energy requirements in the tertiary sector, an increase of more than 10 percentage points from 2000 levels (see Figure 2-9). Demand for distributed heat is also projected to grow at rates above average (+1.7% pa in 2000-2030) and to gain some additional market share. On the other hand whilst the demand for natural gas is projected to rise at levels above average in the period to 2010 (+1.4% pa), following the marked growth of 4.7% pa between 1990-2000, it is projected to decelerate to levels well below average in the long run (0.6% pa in 2010-2030). The high market share already achieved by natural gas, the slower growth in energy needs for

Figure 2-9: Structure of energy demand by fuel in tertiary sector for EU



Source: PRIMES

Table 2-15: Final Energy Demand in the Tertiary Sector for EU

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
By Sector										
Services	95.8	111.1	125.8	140.8	160.5	1.5	1.3	1.1	1.3	1.2
Market services	33.3	45.6	54.7	63.1	74.0	3.2	1.8	1.4	1.6	1.6
Non-market services	40.8	35.9	37.1	39.2	42.0	-1.3	0.3	0.5	0.7	0.5
Trade	21.7	29.5	34.0	38.5	44.6	3.1	1.4	1.3	1.5	1.4
Agriculture	19.5	21.6	23.4	24.9	26.1	1.0	0.8	0.6	0.5	0.6
By Use										
Heating and cooling	90.4	101.7	109.6	116.8	129.0	1.2	0.7	0.6	1.0	0.8
heating uses	88.0	94.5	99.1	104.3	115.0	0.7	0.5	0.5	1.0	0.7
air conditioning	2.3	7.2	10.5	12.5	14.0	12.0	3.8	1.8	1.2	2.3
Specific electric	10.2	15.1	21.7	29.3	36.7	4.0	3.7	3.0	2.3	3.0
Agriculture specific uses	14.7	15.8	17.9	19.7	20.9	0.7	1.2	1.0	0.6	0.9
Total	**115**	**133**	**149**	**166**	**187**	**1.4**	**1.2**	**1.1**	**1.2**	**1.1**

Source: PRIMES

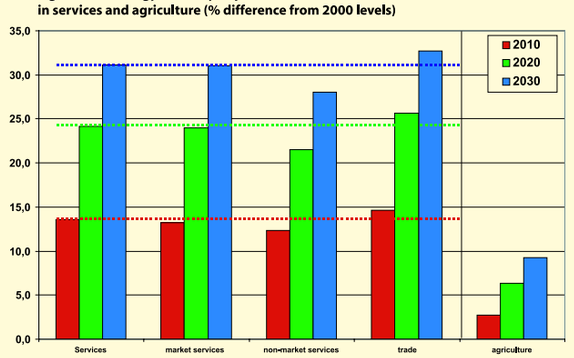
32 For the purpose of an in depth analysis of energy use and its driving forces, an allocation of the overall energy consumption in services to specific energy uses and sub-sectors has been undertaken here on the basis of a number of surveys and qualitative information. Consequently, many of the detailed numbers presented both for the past and the future should be considered as being indicative of actual trends rather as precise data and forecasts.

heating purposes but also issues related to infrastructure constraints, are the key reasons for this result. Consequently the market share of gas in services peaks in 2010 (30.4% of energy needs in the sector) decelerating afterwards at levels slightly below those observed in 2000 (27.2% of energy needs in 2030 compared to 29.7% in 2000).

Even over the horizon to 2010 solid fuels are projected to become an obsolete energy form in the tertiary sector. Finally, renewable energy forms grow slowly over the projection period (+0.4% pa in 2000-2030) mainly because of the limited growth in agriculture (the main consumer of biomass and waste).

Overall energy intensity improvement between 2000 and 2030 in services reaches 31.1% (see Figure 2-10). The highest improvement is projected for trade (+32.7%), followed by market services (+31.1%) and non-market services (+28%). The energy intensity improvement in agriculture is limited to 9.2% over the projection period.

Figure 2-10: Energy intensity improvements in services and agriculture (% difference from 2000 levels)



Source: PRIMES

There are a number of factors that lead to this substantial improvement in the services sector. As already discussed, the services sector is projected to exhibit significant progress in terms of productivity through its further specialisation towards higher value added products. One effect of this improvement is reflected in the evolution of floor space (growing at a rate of 1.7% pa in 2000-2030 compared to economic growth of 2.5% pa). The energy intensity improvements projected for the services sector are due to changes in the fuel mix and the adoption of improved technologies, as well as to approaching saturation in energy uses. The larger size of typical energy consumers in the services sector has important implications for both technology choice and the implementation of potential policy measures. Technologies that facilitate economies of scale in energy use are much more likely to be adopted in services for procurement purposes. Furthermore, the larger size of consumers allows for easier agreement regarding the greater use of a specific fuel, for example natural gas or distributed heat. The combined effect of the above leads to an improvement of energy use per square metre in the sector of close to 0.5% pa over the projection period.

2.2.3.5. Households sector

The main energy uses in households are space conditioning (heating and cooling), cooking, water heating, lighting and appliances. The availability of detailed and consistent data on the varied services provided by these uses (such as lumens, hours of television etc.) is rather limited. Furthermore, in some cases, even energy data are not reliable since statistics concerning the split of domestic energy demand between the tertiary and household sectors only became sufficiently accurate in the last few years. Since the bulk of the energy use by households takes place in buildings, the main driving forces for energy use include the number of households, income levels, the average size of each home, the number of individuals belonging to the average household, and climatic and cultural conditions.

In the recent past a decoupling of energy use in households from the evolution of the above-mentioned factors has been observed. Significant improvements in the energy efficiency of the capital stock of households (incorporating energy efficiency features in new buildings and appliances) are partly responsible for this result. Incremental increases in household income do not generate strong growth in household energy needs as most of them are linked to essential services. Thus in most EU Member States, households have already satisfied most of their needs for heating purposes, lighting etc. Further increases in income are likely to be consumed via more luxury goods and services. Greater utilisation of air conditioning, as well as the use of novel and more expensive appliances, falls under this category. Furthermore, as income rises, consumers change their behavioural patterns towards leisure activities. This results in a reduction of energy related activity within dwellings through increased travel, staying in hotels, replacement of cooking by eating in restaurants etc.

Between 1990 and 2000 energy demand in EU households increased by 0.7% pa while the corresponding growth in the number of households reached 1.1% pa and that of disposable income 1.6% pa. Demand growth for heating purposes[33] (space heating, water heating and cooking) was limited to 0.5% pa, while a more pro-

33 As in the case of the tertiary sector, for the purpose of an in depth analysis of energy use and its driving forces, an allocation of the overall energy consumption to specific energy uses has been undertaken here on the basis of a number of surveys and qualitative information.

Table 2-16: Final Energy Demand by Fuel in Households for EU

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
solids	19.8	4.1	0.8	0.2	0.1	-14.5	-15.1	-15.3	-7.8	-12.8
liquids	59.9	55.5	45.8	42.5	38.1	-0.8	-1.9	-0.7	-1.1	-1.2
gas	76.0	98.4	124.6	133.3	136.4	2.6	2.4	0.7	0.2	1.1
biomass-waste	20.6	22.6	22.8	21.4	19.5	0.9	0.1	-0.6	-0.9	-0.5
solar energy	0.3	0.5	1.5	2.5	3.0	5.2	11.6	5.3	1.9	6.2
steam	6.9	8.9	10.9	11.2	11.5	2.5	2.1	0.3	0.2	0.9
electricity	44.6	54.7	64.5	73.2	82.7	2.1	1.7	1.3	1.2	1.4
Total	**228.1**	**244.7**	**270.9**	**284.4**	**291.0**	**0.7**	**1.0**	**0.5**	**0.2**	**0.6**

Source: PRIMES

nounced growth was observed in electrical appliances consumption (+1.9% pa) and, especially, air conditioning (+14.6% pa). Energy demand in households accounted in 2000 for 25.6% of final energy needs in the EU compared to 26.5% in 1990. Implied intensity gains (expressed as energy demand per unit of income) exceeded 1.2% pa while growth of energy consumption per capita was limited to 0.4% pa.

Energy demand in households is expected to grow very modestly over the next 30 years primarily because of the relatively stable population in the EU, changes in behavioural patterns, improved insulation standards in new buildings, saturation effects for some energy uses and energy efficiency gains, counterbalancing the increase of 0.7% pa in 2000-2030 as regards the total number of households. Thus, the annual growth in energy consumption in 2000-2030 is projected at 0.6% pa. Demand for heating purposes (space heating, water heating and cooking) is projected to increase at a rate of only 0.3% pa in 2000-2030. On the other hand energy needs for electric appliances and air conditioning are foreseen to grow at significantly higher rates (+2.0% pa and +3.4% pa respectively).

The implied energy intensity improvement of 1.6% pa is optimistic when compared to the recent past. Energy demand per capita is projected to increase at a rate of 0.5% pa. As a result the household sector is projected to account for 23.7% of EU final energy demand in 2030.

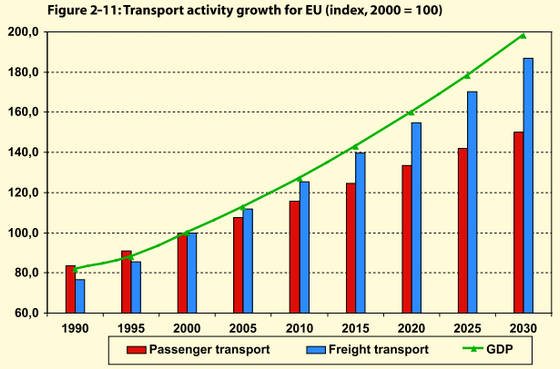
The high penetration of air conditioning, especially in the southern EU countries, as well as the greater number of electrical appliances per household, are the main reasons for the faster growth in electricity demand (+1.4% pa in 2000-2030). The substitution in favour of natural gas (+1.1% pa) and distributed heat (+0.9% pa) in heating uses is also projected to continue, but at a slower pace compared to the last decade. The highest growth rate among all fuels is projected for solar energy (+6.2% pa) but even so this energy carrier accounts for only 1% of final energy demand in 2030. The use of solids by households reduces sharply over the next 30 years (-12.8% pa). The use of biomass and waste in households is also projected to exhibit a small decline (-0.5% pa). Finally, demand for liquid fuels declines at a rate of -1.2% pa, mainly as a result of fuel switching in heating uses.

2.2.3.6. Transport sector

The transport sector is one of the most important sectors from the viewpoint of both energy consumption and environmental implications. The near complete dependence of the sector on oil products generates two sorts of concern: security of oil supplies with rising needs for transportation purposes; and worries about climate change combined with longer standing problems of congestion, noise and urban pollution.

Under Baseline scenario assumptions passenger transport activity is projected to increase at a rate of 1.4% pa in 2000-2030 whereas freight transport activity increases by 2.1% pa in the same period. In comparison to past trends, both the growth of passenger and freight transport activity exhibit a significant slowdown. As regards passenger transport activity this slowdown can be explained by the rather stable EU population and by the fact that, at some stage, human mobility (either for necessity or for recreational reasons) is expected to experience some saturation effects in the long run. More specifically energy related transport activity per capita is projected to reach 19383 km pa in 2030 compared to 13261 km pa in 2000. On the other hand goods transportation is closely associated with overall economic activity and, historically, has grown at least as fast as GDP. However, the structural shift of the EU economy towards services and high value added manufacturing activities gives rise to some decoupling between GDP and freight transport growth. This is because these sectors are less freight intensive than the more traditional basic manufacturing and extraction activities.

Figure 2-11: Transport activity growth for EU (index, 2000 = 100)



Source: PRIMES

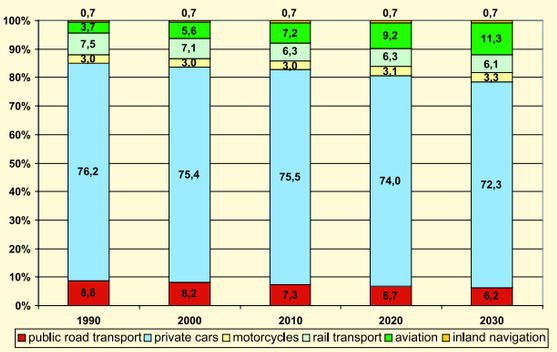
The projected moderate decoupling between transport activity and economic growth is illustrated in Figure 2-11. It is important to note that the decoupling of passenger transport activity is much more pronounced and starts from the beginning of the projection period, whereas that for freight transport activity occurs only in the long run.[34]

Passenger Transport

During the 1990s passenger traffic increased at a rate close to GDP growth. This evolution has been relatively uniform across most of the European countries. Southern countries (Portugal, Greece, Italy and Spain) showed above-average growth in passenger transport volume while in Germany, Austria and the United Kingdom growth was significantly below average. The increase in overall European passenger traffic volume was 19.7% since 1990 for all transportation modes considered together. But the relative proportion of rail, bus and even passenger car traffic has declined continuously since 1990 in favour of air traffic (see Figure 2-12). This was a result of rising real incomes leading to increased leisure air travel, combined with the recent liberalisation of air markets that induced spectacular reductions in fares - a trend initiated by low-cost airlines and followed by the major companies. Since 1990, the demand for mobility per person has increased on average by 1.5% pa, half of the growth rate registered during the 1980s. This seems to herald the possible further slow down of passenger traffic in the medium term.

Furthermore, the rate of car ownership is steadily increasing with the number of cars in the European Union having risen by about 3.3% pa on average since 1980; however, this growth rate has slowed down to 2.1% pa since 1990. In addition, larger cars (over 1500 cc) have increased their share of new registrations at the expense of smaller cars. In 2000, marked differences in car ownership rates still existed between countries: Greece had the lowest ownership with about 280 passenger cars per 1000 inhabitants and Luxembourg the highest with more than 610. The European average reached about 468 cars per 1000 inhabitants, a 19.7% increase since 1990. Variations in income levels and fuel prices, and different tax regimes for the purchase, ownership and use of cars, are part of the explanation for these differences.

Figure 2-12: Structure of passenger transport activity in EU



Source: PRIMES

Transport activity by private cars is projected to increase at a rate of 1.2% pa in 2000-2030 indicating a decrease of the share of this transport mode in total passenger transport activity. Both public road transportation (+0.4% pa) and rail transport (+0.9% pa) continue to lose market shares. Aviation travel, which is projected to grow at a rate of 3.8% pa in the period to 2030, has been the fastest growing mode of transport in the recent past and a number of factors will contribute to its rapid growth in future. These include changing tastes and the need for more long distance travel, the much greater speed of air travel etc. By 2030 aviation more than doubles its market share compared to 2000. Transport activity by motorcycles (+1.7% pa) and inland navigation[35] (+1.6% pa) are also projected to gain some market share but still remain the least used transport means.

Energy consumption for passenger transport is projected to increase at a rate of 0.3% pa in 2000-2030 (see Table 2-17), which

34 It should be noted that in the period to 2010 Baseline projections both for passenger and freight transport activity growth, as well as regarding the split between different transport means, are in line with the "White Paper on Common Transport Policy up to 2010" Anticipated-trends scenario, taking into account the different macro-economic assumptions used in the study.

35 It should be noted that inland navigation for passenger transport includes only waterborne transport on rivers, canals and lakes as well as domestic sea shipping. However, international short sea shipping is not included in the above category as, according to EUROSTAT energy balances, energy needs for international shipping are allocated to bunkers.

Table 2-17: Final Energy Demand by mean of passenger transport in EU

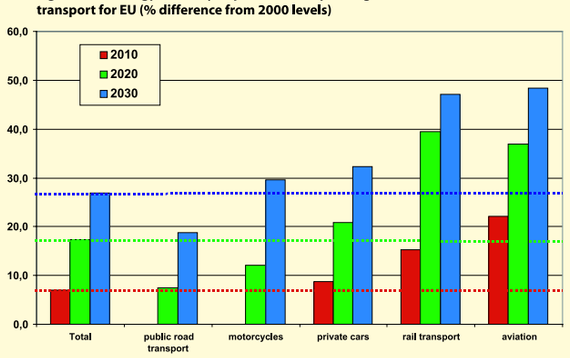
	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
public road transport	6.3	5.8	6.0	5.8	5.3	-0.8	0.3	-0.3	-0.9	-0.3
motorcycles	1.8	2.1	2.4	2.5	2.4	1.4	1.5	0.6	-0.4	0.6
private cars	128.5	143.4	151.8	148.4	139.8	1.1	0.6	-0.2	-0.6	-0.1
rail transport	5.6	6.2	5.4	4.4	4.2	1.0	-1.4	-2.0	-0.4	-1.2
aviation	27.8	43.8	51.1	60.7	68.7	4.7	1.6	1.7	1.3	1.5
inland navigation	0.8	0.5	0.7	0.7	0.8	-3.7	2.0	1.3	1.1	1.5
Total	**170.7**	**201.8**	**217.4**	**222.6**	**221.3**	**1.7**	**0.7**	**0.2**	**-0.1**	**0.3**

Source: PRIMES

is significantly less than the growth of transport activity, implying a substantial improvement of energy intensity (expressed as energy consumption per passenger-km). This improvement is all the more impressive if the growing size and degree of comfort of future cars, as well as the shift towards aviation, which is the most energy intensive transport mode, are taken into account.

The highest energy demand growth among all transport modes is, as expected, projected for aviation (+1.5% pa), followed by inland navigation (+1.5% pa) and motorcycles (+0.6% pa). Consumption in other transport modes is projected to decrease over the projection period. However, energy consumption for private cars and public road transport is still increasing in the period to 2010. As a result of the rather limited growth, and the penetration of electric trains throughout Europe to the detriment of diesel use for rail purposes, energy demand for passenger rail transport is projected to decrease at a rate of -1.2% pa in the period to 2030. The effects arising from the EU-ACEA/KAMA/JAMA negotiated agreements, which become fully visible between 2010 and 2020 (see also Figure 2-13) as the existing stock of private cars is replaced with new fuel efficient ones, lead to an overall decrease of energy demand for private cars by -0.1% pa. Finally, low activity growth combined with technological progress give rise to a decrease of energy demand in public road transport activity by -0.3% pa.

Figure 2-13: Energy intensity improvement in passenger transport for EU (% difference from 2000 levels)



Source: PRIMES

Overall energy intensity[36] improvement in passenger transport reaches 27% in 2000-2030 (17.3% in 2000-2020 and 7.0% in 2000-2010). It is interesting to note that efficiency gains are not evenly distributed over time but occur mainly between 2010 and 2020. More specifically, electrification of railroads, which is projected to be completed by 2020, leads to an intensity improvement of some 39.5% by 2020 with additional progress in 2020-2030 limited to some 7.5 percentage points. Similarly the increasing aircraft needs, combined with replacement of the old aircraft fleet by new more efficient planes, leads to an energy intensity improvement of some 37% in the period to 2020, just exceeding 48% in 2030[37]. Private cars also exhibit the highest intensity gains between 2010 and 2020. Between 2000 and 2005 energy intensity improvement for private cars is less than 1%. This is followed by a substantial 20.5% improvement in 2005-2020 and a 14.5% improvement in 2020-2030 due to the effects of the EU-ACEA/KAMA/JAMA agreements, which have impacts on the car stock over time. For the other transport modes improvements in energy intensity occur mainly in the long run as a result of vehicle replacement and technological progress.

36 Energy intensity in passenger transport is computed on the basis of energy use per passenger-km travelled. Given inconsistencies between transport and energy statistics, absolute numbers (especially at the level of individual Member States), might be misleading in some cases. For that reason, the analysis focuses on trends, which illustrate achieved efficiency gains.

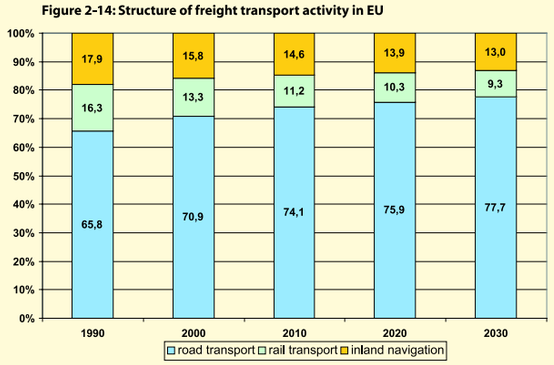
37 It should be noted here that, as regards air transport, efficiency improvements of even higher magnitude have been already observed in the recent past (more than 50% between 1970 and 2000). Such improvements are driven mostly by technological changes (engines, aerodynamics and use of new materials) but also because of larger aircraft and better management.

Freight Transport

Freight transport evolved differently from passenger traffic in the last decade. Since 1990, especially as a consequence of just-in-time industrial organisation to reduce stocks and working capital, and also specialisation within the EU, goods transport increased by 2.7% pa on average with a marked acceleration in 1997 and 1998. Road transport grew by 40.3% between 1990 and 2000 followed by inland waterways (+15.2%) and rail (+6.1%). In addition large differences existed in modal split by countries: the share of road transport varied from 40% in Austria to 98% in Ireland; rail from 2% in Ireland to 40% in Austria; and inland waterways, having a significant share in only six countries, peaked at 45% in the Netherlands.

As already discussed freight transport activity is projected to increase at a rate of 2.1% pa in 2000-2030. Following recent trends, road freight transport activity increases at a rate of 2.4% pa, constantly increasing its share in total freight transport (see Figure 2-14). Both rail freight and inland navigation[38] increase at rates well below average (+0.9% pa and +1.5% pa respectively).

Figure 2-14: Structure of freight transport activity in EU



Source: PRIMES

The shift towards road freight (which is the most energy intensive mode in freight transport) does not allow for significant overall energy intensity[39] gains. At the level of the different transport modes efficiency gains are quite significant (+14.3% in 2000-2030 for trucks, +47.5% for rail freight and +6.2% for inland navigation), but still well below the levels observed for passenger transport (with the exception of rail freight which improves following electrification). However, the structural shift towards road transport more than offsets this improvement over the period to 2010, with overall efficiency in freight transport worsening by -3.9% from 2000 levels. It is only in the long run that efficiency gains at the level of the different transport modes become more pronounced than the corresponding structural shifts. As a result energy intensity gains in freight transport by 2030 amount to 7.6% from 2000 levels. The limited intensity gains in freight transport lead to an increase of energy demand by 1.8% pa in 2000-2030 (1.9% for road freight, -1.3% for rail and +1.2% for inland navigation), a figure, however, significantly lower than that observed in the recent past (energy demand in freight transport increased by 2.6% pa in 1990-2000).

Final energy demand in Transport Sector (passenger and freight combined)

Energy consumption in transport grew at an average annual rate of 2.0% between 1990 and 2000. In 2000, total energy demand in the transport sector (excluding marine bunkers) accounted for 32.4% of final energy demand in the EU compared with only 29.5% in 1990. The share of diesel has increased continuously in the last decade, growing from 37.8% in 1990 to reach 44.6% in 2000 to become the main energy carrier in the sector. This evolution is the result of two main phenomena: the increasing volume of goods transported by road and the progressive dieselisation of the car fleet. This structural change occurred at the expense of gasoline, the demand for which declined by -0.3% pa in 1990-2000. The demand for aviation fuel grew by 4.7% pa between 1990-2000 driven by air transport activity growth.

Overall energy use in the transport sector is projected to grow by 0.9% pa in 2000-2030. This rate is substantially below historical trends and is due to the projected evolution of passenger transport both in terms of activity (individuals start approaching saturation levels for their personal travel despite their rising income), as well as in terms of technological progress (EU-ACEA/KAMA/JAMA negotiated agreements, the replacement of the existing vehicle stock with technologically advanced vehicles) that leads to a substantial improvement of energy efficiency in passenger transportation.

The specific fuel demands largely reflect the differential growth rates among the various modes of transport discussed above. Thus, the very rapid growth in kerosene demand (+1.5% pa in 2000-2030) is the result of the expected continued increase in the share of air transport. Increasing energy requirements of trucks,

38 Inland navigation includes both waterborne transport activity and domestic sea shipping. However, international short sea shipping is not included in the above category as, according to EUROSTAT energy balances, energy needs for international shipping are allocated to bunkers.

39 Energy intensity in freight transport is computed on the basis of energy use per ton-km travelled. Issues related to consistency of transport and energy statistics also apply to freight transport.

Table 2-18: Final Energy Demand by fuel in transport sector for EU

	Mtoe					Annual Growth Rate (%)				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
liquid fuels	249.6	303.6	350.9	382.4	399.3	2.0	1.5	0.9	0.4	0.9
liquified petroleum gas	2.7	2.8	3.3	3.2	3.2	0.3	1.8	-0.2	-0.2	0.5
gasoline	122.3	118.3	126.2	126.1	121.8	-0.3	0.6	0.0	-0.3	0.1
of which mixed biofuels	0.0	0.2	3.0	4.8	6.7	-	31.6	4.9	3.4	12.6
kerosene	27.7	43.7	51.1	60.7	68.7	4.7	1.6	1.7	1.3	1.5
diesel oil	96.0	138.2	169.6	191.8	205.0	3.7	2.1	1.2	0.7	1.3
of which mixed biofuels	0.0	0.3	4.3	7.6	11.4	-	31.5	5.7	4.1	13.1
other petroleum products	0.9	0.7	0.7	0.7	0.6	-2.3	-0.2	-0.4	-0.4	-0.3
natural gas	0.2	0.3	0.5	0.5	0.5	4.6	3.3	1.2	0.6	1.7
methanol - ethanol	0.0	0.0	0.2	0.5	0.6	-	-	8.9	2.6	-
liquified hydrogen	0.0	0.0	0.1	0.4	0.7	-	-	19.9	4.0	-
electricity	4.0	5.1	5.6	5.6	5.6	2.5	0.9	0.0	0.1	0.3
Total	**253.8**	**309.1**	**357.2**	**389.4**	**406.7**	**2.0**	**1.5**	**0.9**	**0.4**	**0.9**

Source: PRIMES

which are expected to continue to be predominantly reliant on diesel engines, leads to an increase of diesel oil demand by 1.3% pa. On the other hand, gasoline demand, after peaking in 2010, experiences negative growth afterwards and - by 2030 - is close to 2000 levels (0.1% pa growth in 2000-2030). This is the result of the low growth for passenger transport activity and technological progress in private cars. Similar results apply to the use of liquefied petroleum gas in the transport sector. The completion of the electrification of rail transport is the key driver for the growth of electricity demand by 0.3% pa in the transport sector.

Novel energy forms, such as methanol, ethanol and hydrogen, grow quite rapidly but they remain insignificant in absolute terms even by 2030. This is because novel vehicle technologies, such as fuel cell cars, are not expected to gain significant market shares in the horizon to 2030 under Baseline assumptions, primarily because of cost considerations but also because of the lack of infrastructure for the supply and distribution of novel fuels. However, it should be noted that the share of biofuels as a blended ingredient of gasoline and diesel oil (i.e. as the fuel is available at the pump) is projected to reach under Baseline conditions 5.5% of gasoline consumed in 2030 (2.3% in 2010) and 5.54% of diesel oil consumed in 2030 (2.6% in 2010). These shares are, however, significantly below those in the proposed directive on biofuel consumption.[40] According to this proposed directive Member States must ensure a minimum of 2% of biofuels in total gasoline and diesel sales for transportation purposes in 2005; this share increases to 5.75% in 2010.

2.2.4. Electricity and steam generation

2.2.4.1. Electricity/steam demand and completion of the internal market

Because of a number of favourable characteristics of electricity, such as easy controllability, precise measurement, cleanliness at the point of use and concentration of useful energy, there is a well-established long-term trend towards increased electrification in most sectors of developed economies. Furthermore, a number of processes, appliances and applications can use energy only in the form of electricity.

In the context of the completion of the internal electricity market, the existence of sufficient cross-border transmission capacities and their efficient utilisation are of crucial importance. Historically, transmission system operators (TSOs) have not designed the interconnections between their networks primarily to facilitate bulk power trade, but rather to achieve better reliability and efficiency of supply through co-operation amongst themselves. Hence, the introduction of open access to transmission networks has made visible a number of bottlenecks in cross-border transmission capacity. These can have an adverse effect upon competition and thus on the integration of the internal market.

Analysis carried out by the European Commission[41] suggested that a certain minimum level of interconnection capacity between Member States (in terms of total import capacity in relation to the total installed generation capacity in each Member State) would be justified. This is not only in terms of enhancing security of supply but also from a purely economic point of view in terms

40 Idem 21.

41 Communication from the Commission to the European Parliament and the Council on European Infrastructure (COM (2001) 775 final of 20.12.2001).

Table 2-19: Electricity requirements by sector in EU

	TWh					Annual Growth Rate (%)				
	1995	2000	2010	2020	2030	95/00	00/10	10/20	20/30	00/30
Industry	830	951	1113	1267	1375	2.8	1.6	1.3	0.8	1.2
Tertiary	503	581	727	884	1044	2.9	2.3	2.0	1.7	2.0
Households	582	636	750	852	961	1.8	1.7	1.3	1.2	1.4
Transports	55	60	65	65	65	1.8	0.9	0.0	0.1	0.3
Energy sector	209	218	239	262	292	0.8	0.9	0.9	1.1	1.0
in power plants	*158*	*178*	*197*	*219*	*247*	*2.4*	*1.0*	*1.0*	*1.2*	*1.1*
in refineries	*28*	*26*	*29*	*30*	*32*	*-1.6*	*1.0*	*0.5*	*0.6*	*0.7*
Trans. and distr. Losses	147	171	172	159	146	3.1	0.1	-0.8	-0.9	-0.5
(Net imports)	17	42	38	38	37	19.5	-1.0	-0.1	-0.2	-0.5
Total	**2308**	**2574**	**3027**	**3450**	**3846**	**2.2**	**1.6**	**1.3**	**1.1**	**1.3**

Source: PRIMES

of enhancing competition. A minimum level requirement would suggest the need for network reinforcements on the borders of Ireland, the UK, Spain, Portugal, Italy and France. Achieving such minimum levels of interconnection would obviously require efforts on both sides of the borders in question. Additional interconnection capacities between France and Italy and France and Spain would, in particular, be highly cost-effective. For transit countries (Belgium, the Netherlands, Denmark, Sweden, Germany, Austria, the United Kingdom and France) additional criteria would have to be applied to define an appropriate level of interconnection to ensure that the network capacity in these countries is not weaker than that in the neighbouring countries.

An in-depth study of trade developments in electricity would necessitate further work on the PRIMES model, which goes beyond the scope of this study. Thus the country-by-country modelling, performed in the context of the study, has focused on the dynamics of the energy system within a country, while considering electricity trade between countries on the basis of current infrastructure and trends.

EU electricity consumption since 1985 has shown an average increase of 2.2% pa, but the more recent trends indicated a progressive slowdown with only 1.9% growth pa since 1990. Electricity growth was largely driven by the tertiary sector. In the period 1985-90, electricity demand from the services sector grew by 4.7% pa on average, followed by industry with 2.3% and the domestic sector with 2.0%. The pattern changed perceptibly during the 1990s. Growth of services demand still reached 2.8% pa on average while domestic consumption grew by 2.1% and industry by only 1.7%.

Overall, the demand for electricity under Baseline assumptions is expected to expand by 1.3% pa in 2000-2030 and its growth will be especially rapid in the tertiary and the residential sectors (see Table 2-19). Electricity imports exhibit a limited decline over the projection period (-0.5% pa) and, consequently, their contribution to electricity supplies decreases over time. Transmission and distribution losses of electricity are projected to decrease, both in absolute terms and as a share of electricity production, due to better network system management.

Steam demand[42] is projected to grow by 1.1% pa in the period to 2030 (see Table 2-20). The industrial sector is the dominant user of steam. Households and the tertiary sector are potentially large users of distributed heat but their distance from generation plants, where steam is a by-product and the difficulties involved in the transportation of steam, have prevented its extensive use. Partly because of the shift towards decentralisation and partly as a consequence of technological progress allowing for smaller-scale distributed heat networks, steam applications in the tertiary sector are expected to grow quite rapidly over the projection period (+1.7% pa in 2000-2030), whereas less pronounced growth is projected for the residential sector (+0.9% pa). Steam losses are projected to decline over the projection period (-0.4% pa) driven by further decentralisation and improved insulation of distributed heat networks.

The environment within which electricity and steam will be produced in the EU over the next 30 years anticipates the substantial restructuring of the sector. Market liberalisation is likely to involve increasing market and investment risks and to influence technology choice. Whilst the current Directive on electricity market liberalisation left Member States the choice between alternative market opening mechanisms, most States have opted for the approach likely to create the most positive effects in terms of the functioning of the market. For instance, regulated third-party access, the authorisation procedure for new generating capacity, full

42 Including steam generated in industrial boilers and consumed on site by industrial consumers.

Table 2-20: Steam demand by sector in EU

	TWh					Annual Growth Rate (%)				
	1995	2000	2010	2020	2030	95/00	00/10	10/20	20/30	00/30
Industry	579	613	706	802	857	1.2	1.4	1.3	0.7	1.1
Tertiary	72	77	87	105	126	1.3	1.3	1.9	1.8	1.7
Households	114	103	127	131	133	-2.0	2.1	0.3	0.2	0.9
Energy sector	28	32	38	40	42	2.7	1.8	0.4	0.5	0.9
in refineries	*24*	*30*	*34*	*35*	*37*	*4.3*	*1.2*	*0.4*	*0.5*	*0.7*
Trans. and distr. Losses	28	24	25	24	22	-2.9	0.2	-0.5	-0.7	-0.4
Total	**821**	**850**	**983**	**1102**	**1180**	**0.7**	**1.5**	**1.1**	**0.7**	**1.1**

Source: PRIMES

legal unbundling of operation of the network from production/distribution and putting in place independent regulatory authorities, are the options most Member States have chosen. These systems are the most appropriate to avoid discrimination against new market entrants. As a result, one of the most visible effects, lower electricity prices, is becoming a reality. Statistics on EU electricity price trends from 1999 to 2002 show that prices for large consumers have fallen by around 6% on average and by up to 25% in some cases. Where markets have been fully liberalised, these benefits have spread to small businesses and households. Small business electricity bills have fallen up to 40% in some Member States.

Liberalisation is also changing the industry's relationships with policy makers, regulators, and consumers. It also induces increased competition in the sector and more widely in the energy market. Since natural gas is expected to be a key energy form for the coming decade, the liberalisation of the gas market also has implications for the restructuring of the electricity sector. Furthermore, the development of new technologies, such as gas turbines combined cycle (GTCC), has reduced the size of the optimal plant and the scope for economies of scale, favouring decentralisation of supply and the reduction in the share of traditional utilities. Finally policies already in place, such as the nuclear phase out in certain Member States and policies promoting renewable energy forms, enhance the scope for restructuring of the power generation system.

2.2.4.2. Capacities

In 2000, the EU's installed capacity for electricity generation was about 579 GW, of which 59.6% was thermal capacity, the remainder comprising nuclear power stations (22.6%), and hydro and wind power stations (17.7%). Since 1990, after allowing for closure of older plants, installed capacity has increased by 56 GW, 70% of this was added in the last five years. Over the same period new capacity, excluding re-powering and conversion of existing units, was about 123 GW in more than 5,000 units, of which: 12.2 GW were nuclear units, 41 GW gas turbine combined cycle units, 51 GW in other conventional thermal units, 6 GW hydro power and 12.2 GW for wind power. About 50% of combined cycle capacity is located in the United Kingdom but this technology is also expanding in many other Member States: Italy, the Netherlands, Germany, Belgium and Portugal. In addition, the progressive deregulation of electricity markets will favour the use of gas in power generation, especially in combined cycle units, as smaller companies entering the market favour plants with shorter lead times, lower capital costs and higher efficiency leading to lower fuel costs.

Despite the slowdown in electricity demand growth, in comparison to past trends, total power capacity requirements for the EU are projected to increase by some 372.5 GW in 2000-2030 to meet expanding demand (see Table 2-21). Furthermore, some 508.4 GW of new capacity will be required for the replacement of existing plants due to be decommissioned between 2000 and 2030. In total 881 GW of new power plants are projected to be commissioned in the EU over the period to 2030. This means that more than 90% of total installed capacity in 2030 will have been selected and constructed during the current projection period.

The use of conventional thermal power plants (open cycle monovalent and polyvalent units) is projected to decline very rapidly - by 2030 reduced to some 40% of the corresponding installed capacity in 2000. Similarly, due to decommissioning of existing nuclear plants and phase out policies in Belgium, Germany and Sweden, there is a significant decline in nuclear capacity, especially in the long run. As illustrated in Figure 2-15, by 2030, nuclear power plants account for just 11% of total EU installed generating capacity compared to 22.6% in 2000. These declines in capacity are to a large extent compensated by the dramatic increase in gas turbine combined cycle plants. Their capacity increases by a factor of 7 over the projection period to reach 323 GW in 2030. Small gas turbines (using natural gas and diesel oil as input fuel) capacity is projected to more than double from 2000 levels. As a result gas fuelled power plants account for some 40% of total capacity in

Table 2-21: Installed generation capacity by plant type in EU[43]

	GW$_e$				
	1995	**2000**	**2010**	**2020**	**2030**
Nuclear	126.2	131.0	121.9	100.1	105.0
Large Hydro (pumping excl.)	85.1	87.7	88.9	88.9	89.2
Small hydro	2.0	2.1	8.1	12.2	14.5
Wind	2.5	12.8	69.9	94.8	120.2
Other renewables	0.0	0.2	0.5	0.6	14.0
Thermal plants	322.9	344.8	399.5	516.1	608.1
of which cogeneration plants	59.3	77.1	102.3	129.9	146.4
Open cycle - Fossil fuel	281.8	276.9	214.7	135.8	113.3
Clean Coal and Lignite	0.0	0.0	0.0	0.6	4.4
Supercritical Polyvalent	0.0	0.0	0.4	51.0	114.6
Gas Turbines Combined Cycle	20.0	46.0	157.3	279.3	323.0
Small Gas Turbines	20.3	21.0	25.9	48.2	51.4
Fuel Cells	0.0	0.0	0.0	0.0	0.0
Geothermal	0.7	1.0	1.2	1.3	1.4
Total	**539**	**579**	**689**	**813**	**951**

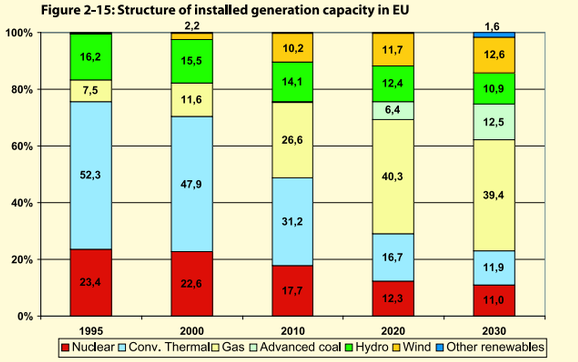
Source: PRIMES

2030 compared to 11.6% in 2000. Because of higher gas prices in the long term, the cost advantage of gas turbine combined cycle plants over coal fired plants becomes less pronounced and, in the latter part of the projection period, advanced coal technologies begin to make inroads.

Supercritical polyvalent units (capable of burning coal, lignite, biomass and waste) emerge in the 2015-2030 period and play a predominant role in the replacement of retired nuclear plants. By 2030 installed capacity of supercritical polyvalent plants is projected to reach 115 GW (or 12% of total installed capacity). It is important to note, however, that under Baseline conditions the clean coal technologies (IGCC and PFBC technologies) are not projected to become a cost-effective option for power generation even in the long run. The same is true as regards fuel cell technologies. Of course this relies on currently prevailing technology forecasts, and could be revised if integrated gasification technology or fuel cells were to develop more rapidly than currently envisaged.

The potential of non-hydro renewable energy sources was largely unexploited in the Community until recently. The need to promote renewable energy sources as a priority measure is now widely recognised given that their exploitation contributes to supply security, environmental protection and sustainable development. It is therefore necessary to ensure that this potential is better exploited within the framework of the internal electricity market. The promotion of electricity produced from renewable

Figure 2-15: Structure of installed generation capacity in EU



Source: PRIMES

energy sources is a priority, as outlined in the White Paper on Renewable Energy Sources. The main reasons include security and diversity of energy supply, environmental protection, and social and economic cohesion. In September 2001, a Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market was adopted including indicative targets for the consumption of electricity produced from renewable energy sources[44]. This Directive needs to be transposed into national law no later than 27 October 2003.

Renewable energy forms are expected to play an important role for power generation in the future. A rapid increase is projected as regards wind turbine capacity, which is projected to exceed 120 GW in 2030 (12.5% of total installed capacity compared to just above 2% in 2000), whereas solar photovoltaic energy starts emerging beyond 2020 (accounting for 1.6% of total installed capacity by 2030). Contrary to the above trends, and as a result of the already high exploitation of suitable sites in the EU, capacity of large hydro plants is expected to remain rather stable over the projection period, whereas some investment is projected for small-scale hydro units. Consequently, there is a decreasing share as regards hydro power plants capacity to total generation capacity (from 15.5% in 2000 to 10.9% in 2030).

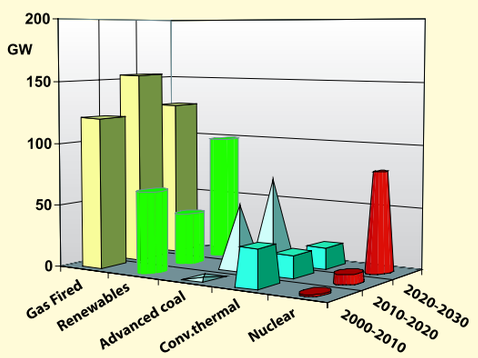
The composition of the 881 GW investment projected to occur in the EU power generation system between 2000 and 2030 is illustrated in Figure 2-16. 402 GW of gas-fired plants (of which more than 350 GW of combined cycle gas turbines) will be commissioned in that period. The corresponding investment in renewable energy forms is 206 GW, of which 177 GW is projected to be wind

43 Clean coal technologies include fluidised bed combustion, integrated gasification combined cycle and supercritical plants. The latter have been included in the Table in a separate category.

44 Idem 18.

turbines. It is interesting to note that for both gas fired plants and renewable energy forms the projected cumulative investments during the projection period are higher than their installed capacity in 2030. This reflects the replacement of plants of these types that have been commissioned during the projection period. On the other hand, investment in conventional thermal power plants is less than 65 GW, while the investment for advanced coal is 119 GW. New nuclear construction in the EU is projected to reach 89 GW (mainly occurring in the long run and well below the levels of existing capacity which will be decommissioned progressively).

Figure 2-16: Capacity expansion in 2000-2030 for EU



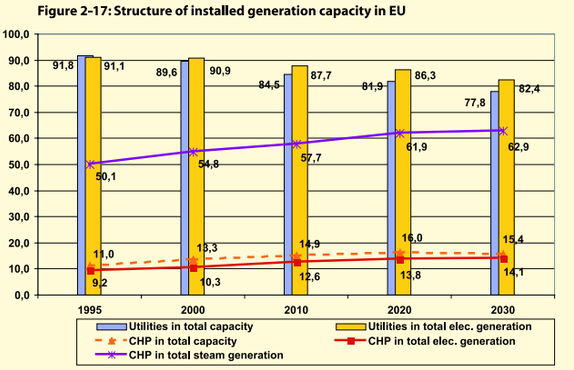
Source: PRIMES

2.2.4.3. CHP and market structures

The last decade was marked by the development of combined heat and power (CHP) generation. Electricity generation from CHP increased significantly, from 205 TWh in 1994 to 274 TWh in 1998, an increase of 34%.[45] Cogeneration was sustained by district heating networks, industrial on-site CHP production and, more recently, by the rapid expansion of smaller-scale cogeneration in buildings. The installed capacity of CHP in 2000 was estimated at about 77 GW or 22% of total EU thermal capacity. Cogeneration has been identified as a high priority measure to reduce CO_2 emissions and the Commission has proposed a doubling of its contribution to total electricity production by 2010. It has a key role in ensuring the development of the internal market for energy, EU competitiveness and sustainable development through the most efficient use of fossil fuels.

Technological advances, combined with changes in the market structure, will reduce the dominance of utilities (i.e. large-scale generators) in electricity generation. Thus, as shown in Figure 2-17, utilities are expected to own 78% of total installed capacity by 2030 compared to about 90% in 2000. This trend is clearly related to the widespread use of gas turbines since the economics of this form of generation indicate that economies of scale benefits are very limited above a rather modest size of turbine. In terms of electricity generation, the share of utilities also decreases (82.4% of total electricity generation in 2030 compared to 90.9% in 2000). The slower pace of decline reflects the base load characteristics of large-scale generators.

Figure 2-17: Structure of installed generation capacity in EU



Source: PRIMES

The use of gas turbines in combined cycle mode also encourages the more widespread use of steam, especially by autoproducers. CHP plants are projected to account for more than 15% of total installed capacity by 2030 (compared to 13.3% in 2000). Electricity production from co-generation units is also projected to increase (from 10.3% in 2000 to 14.1% in 2030), whereas steam generated from CHP units is projected to account for 63% of total steam production compared to 55% in 2000. The share of industrial boilers in steam generation declines significantly over the projection period (from 39% in 2000 to 32% in 2030) as production of steam in industrial boilers increases at a rate well below that of steam demand (+0.4% pa compared to +1.1% pa). Similar findings apply to steam generation in district heating units, with production growing by 0.6% pa but market share declining from 6% in 2000 to 5% in 2030.

2.2.4.4. Fuel mix in power generation

As regards fuel input in thermal power stations, the last decade has seen significant changes in the fuel mix, reflecting changes in capacity installation. Up to 2000 solid fuels have remained the major contributor (48% of energy consumed in EU thermal power plants) even though their demand exhibited a strong decline by -1.9% pa since 1990. Oil consumption increased slowly over the period 1990-95 (+0.3% pa), but then declined at a rate of -5% pa between 1995 and 2000. Italy accounted for about 50% of total EU oil consumption for power generation in 2000, a share similar to

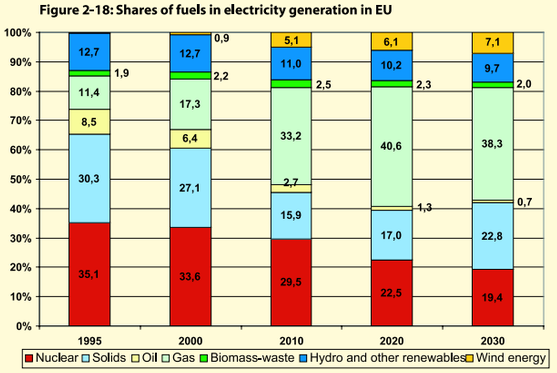
45 Combined Heat and Power Production in the EU – Summary of Statistics 1994-1998, Eurostat, 2001.

that observed in 1990. The growth of gas consumption has been very spectacular. Gas use in thermal power plants increased by 9% pa in the 1990s, resulting in a natural gas share of total fuel input of 33.5% in 2000 compared to only 15.4% in 1990. Although the share of biomass and waste remained small (about 5.4% of total input in 2000), their consumption increased sharply since 1990 (+5.5% pa) due to the development of incinerators in some Member States.

Replacement of old-fashioned units and the development of new technologies, such as combined cycles, supercritical units and gas turbines, underpinned a continuous improvement in thermal efficiency in the power sector. Between 1990 and 2000 the efficiency of thermal electricity production increased by about 0.8% pa.

The trends in fuel use for electricity and steam generation purposes reflect the choice of fuel for new capacity requirements. As a result of nuclear phase-out policies and decommissioning of existing nuclear capacity, nuclear electricity generation declines quite dramatically in the long run accounting for 19.4% of electricity production in 2030 compared to 33.6% in 2000 (see Figure 2-18). Production from solid fuels decreases in the short/medium run but after that it recovers in absolute terms. However, the solid fuel share remains well below the 2000 level throughout the projection period. Production from gas is projected to exhibit a strong increase in the period to 2020, although stabilising at that level in the long run. Oil is becoming a rather obsolete energy form for power generation as many of the existing oil-fired plants are kept only as part of the required reserve margin. Finally, the contribution of renewable energy forms in power generation is projected to grow over time reaching some 18.7% of total electricity production in 2030. As already discussed, wind energy is the key driver for this evolution accounting for almost 7% of electricity generation in 2030.

Figure 2-18: Shares of fuels in electricity generation in EU



Source: PRIMES

Table 2-22 summarises the projected fuel inputs in power generation for the EU. The total fuel input is projected to grow significantly slower than electricity production (0.5% pa in 2000-2030 compared to 1.3%) driven by investment choices of electricity generators towards technologies with high conversion efficiencies, such as gas turbine combined cycle plants, and certain renewable energy forms. The replacement of nuclear power plants (with an efficiency between 33%-35%) by other forms of generation (with efficiencies of e.g. some 55% for gas combined cycles or 100% as attributed by statistical conventions for e.g. hydro and wind) further contributes to this development.

It is also interesting to note that hard coal is projected to make a strong come back in the long run, whereas this is not the case for lignite. This occurs because the EU power generation system is projected to rely heavily on imported coal in the long run (close to 97.5% of coal used in power generation in 2030 compared to just 55% in 2000). Imported coal has a much more competitive price compared to domestically produced coal. Biomass and

Table 2-22: Fuel use for electricity generation (including CHP) in EU [46]

	Mtoe					*Annual Growth Rate (%)*				
	1995	**2000**	**2010**	**2020**	**2030**	**95/00**	**00/10**	**10/20**	**20/30**	**00/30**
Hard coal	115.8	106.9	73.0	93.0	146.0	-1.6	-3.7	2.4	4.6	1.0
Lignite	48.1	46.7	44.7	40.8	33.2	-0.6	-0.4	-0.9	-2.0	-1.1
Oil products	49.6	38.3	20.3	11.1	6.8	-5.0	-6.1	-5.8	-4.9	-5.6
Gas	66.0	106.3	172.4	222.8	229.6	10.0	5.0	2.6	0.3	2.6
Biomass	6.1	7.7	10.8	11.4	12.3	5.0	3.4	0.5	0.8	1.6
Waste	7.4	9.4	13.2	14.2	13.0	4.8	3.5	0.7	-0.9	1.1
Nuclear energy	201.2	222.8	230.3	198.7	180.0	2.1	0.3	-1.5	-1.0	-0.7
Geothermal Heat	2.1	3.0	3.4	3.6	3.9	6.6	1.4	0.7	0.8	1.0
Total	**496**	**541**	**568**	**596**	**625**	**1.7**	**0.5**	**0.5**	**0.5**	**0.5**

Source: PRIMES

46 Including input for non-marketed co-generated steam used on site in industry, which in EUROSTAT energy balances is allocated to the demand side.

waste are also projected to make some significant inroads in power generation over the projection period but still account for only 4% of total fuel input in 2030. Novel energy forms, such as hydrogen, methanol and ethanol, are not projected to emerge in the EU energy system under Baseline scenario technological assumptions.

Table 2-23 illustrates the evolution of steam production, and the corresponding fuel inputs, from industrial and refinery boilers and district heating units[47]. As already discussed, both industrial/refinery boilers, as well as district heating unit production, are projected to grow much slower than demand for steam given the prospects for cogeneration. Industrial boilers are characterised by a tendency towards higher use of biomass and waste whereas oil (mainly because of the increasing use of refinery gas in refinery boilers) and gas consumption remains rather stable over the projection period. Biomass and waste are projected to be the main energy carriers for the production of steam in district heating units in the long run.

2.2.4.5. Efficiencies, costs and investment expenditure

A significant improvement is expected to occur in the efficiency of power generation (see Table 2-24). The efficiency of the overall electricity and steam generation system, including electricity production as well as steam production from co-generation power plants, industrial and refinery boilers and district heating units, is projected to increase by around 11 percentage points and to reach 64.1% by 2030 from 53.2% in 2000.

The efficiency of the power generation system (including electricity and steam generation from CHP) is projected to improve from 49.5% in 2000 to 61.9% in 2030. As for thermal electricity production alone (i.e. without steam) the efficiency is projected to improve close to 12 percentage points between 2000 and 2030 (from 37.8% in 2000 to 49.7% in 2030). These projections follow from the modelling results on total new capacity requirements and in particular the result that the bulk of new capacity will be gas turbine combined cycle plants. This is because these plants are much more efficient than existing power stations and new advanced

Table 2-23: Fuel use for steam generation in boilers for EU

Steam outpout			**TWh**			***Annual Growth Rate (%)***				
	1995	**2000**	**2010**	**2020**	**2030**	**95/00**	**00/10**	**10/20**	**20/30**	**00/30**
Industrial and refinery boilers	332.5	334.0	350.7	367.1	377.8	0.1	0.5	0.5	0.3	0.4
District heating units	77.9	50.0	64.9	52.1	59.5	-8.5	2.7	-2.2	1.3	0.6
Total	**410**	**384**	**416**	**419**	**437**	**-1.3**	**0.8**	**0.1**	**0.4**	**0.4**
Fuel input in boilers			**Mtoe**			***Annual Growth Rate (%)***				
	1995	**2000**	**2010**	**2020**	**2030**	**95/00**	**00/10**	**10/20**	**20/30**	**00/30**
Industrial and refinery boilers	33.7	34.0	35.5	36.5	37.3	0.2	0.4	0.3	0.2	0.3
Solids	2.8	1.3	0.7	0.0	0.0	-13.8	-6.9	-75.6	0.0	-39.0
Oil products	10.4	8.3	8.9	8.5	8.3	-4.2	0.6	-0.5	-0.2	0.0
Gas	11.4	14.5	13.2	13.8	14.1	5.0	-1.0	0.4	0.3	-0.1
Biomass	2.9	2.7	4.4	5.4	5.6	-1.4	4.9	2.0	0.4	2.4
Waste	6.3	7.1	8.3	8.9	9.2	2.5	1.7	0.7	0.3	0.9
District heating units	11.0	6.0	6.2	5.2	6.0	-11.4	0.4	-1.7	1.3	0.0
Solids	1.9	0.2	0.1	0.0	0.0	-34.5	-13.3	-31.6	-12.9	-19.8
Oil products	0.9	0.7	0.1	0.1	0.6	-4.4	-15.6	0.2	16.6	-0.4
Gas	5.5	1.7	1.9	0.5	0.4	-20.7	0.7	-12.6	-1.7	-4.7
Biomass	0.8	1.0	1.6	2.0	2.3	5.7	4.7	2.1	1.4	2.8
Waste	1.9	2.3	2.6	2.6	2.6	3.8	1.1	0.1	0.1	0.4
Total	**45**	**40**	**42**	**42**	**43**	**-2.2**	**0.4**	**0.0**	**0.3**	**0.3**

Source: PRIMES

47 EUROSTAT statistics do not provide data as regards production of steam from industrial boilers and the corresponding fuel inputs. For purposes related to the better representation of competition for steam generation and the opportunities for steam co-generation, steam requirements of industrial sectors and refineries are computed in the context of PRIMES on the basis of available surveys and technical data. Steam is represented as a competing energy form on the demand side, whereas the corresponding fuels used for the production of that steam are allocated to the supply side. It should be noted, however, that the final model output is in line, as regards steam generation in industrial and refineries boilers, with EUROSTAT statistics: i.e. fuel inputs used for this purpose are re-allocated to the corresponding industrial demand sectors and to energy branch consumption of refineries.

Table 2-24: Electricity and steam generation efficiency for EU

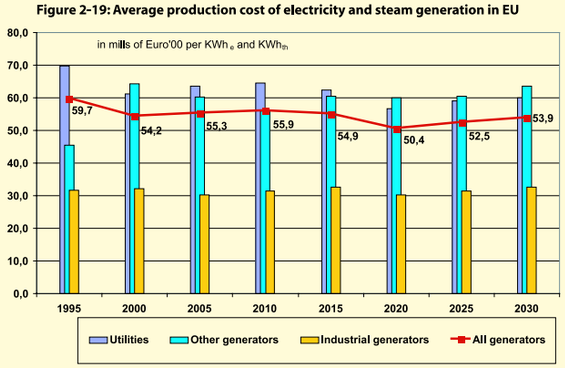
	%					*index (2000 = 100)*				
	1995	**2000**	**2010**	**2020**	**2030**	**1995**	**2000**	**2010**	**2020**	**2030**
total thermal production (power plants and boilers)	51.3	53.2	59.7	63.1	64.1	96.4	100.0	112.2	118.7	120.5
thermal electricity and steam prod. (power plants)	47.1	49.5	56.5	60.7	61.9	95.1	100.0	114.1	122.6	125.0
thermal electricity production	36.6	37.8	43.9	48.0	49.7	97.0	100.0	116.4	127.2	131.6
industrial & refinery boilers / district heating units	79.0	82.5	85.8	86.3	87.0	95.7	100.0	103.9	104.6	105.4

Source: PRIMES

coal technologies. It is interesting to note that in the long run, where significant investments are foreseen to take place in advanced coal technologies, efficiency gains are smaller compared to the previous periods despite the fact that it is between 2020 and 2030 that most of existing nuclear power plants are decommissioned. [48]

The average production cost of electricity and steam generation is projected to exhibit a limited increase in the period to 2010, declining modestly over the horizon to 2020 and again increasing afterwards (see Figure 2-19). Costs in 2030 are however slightly below those in 2000 in real terms. These developments are due to the combined effect of a number of countervailing factors including increasing prices for input fuels and significant new capacity requirements, but also rising competition, higher generation efficiency, and increasing use of co-generation technologies.

Figure 2-19: Average production cost of electricity and steam generation in EU



Source: PRIMES

The projected generation costs for the different types of generators incorporate a number of interesting features. The cost of electricity and steam production for industrial autoproducers, who to a large extent satisfy their own needs for electricity and steam, remains at around half the level of the cost of utilities. This is, to a large extent, due to the substantially lower transmission and distribution costs faced by industrial autoproducers but also to benefits stemming from co-generation (leading to lower levels of lost energy in the transformation process). In the case of other generators, i.e. small-scale independent producers, it can be seen that while the average generation cost is significantly lower than that of utilities in the period to 2015 it tends to rise significantly in the long run and then even to exceed that of utilities. This change is largely due to the fact that, in the context of market liberalisation, an increasing proportion of independent autoproducers tend to act as mini utilities that focus upon satisfying medium to peak load electricity demand.

The effects from rising competition and efficiency gains are even more clearly reflected in the projected electricity tariffs[49]. These decline steadily in the period to 2020 (see Table 2-25), but then remain rather stable at those levels in the long run. By 2020 the average electricity tariff is 8.6% below its level in 2000 though it rises by a little less than 1% in 2020-2030 due to the need for increased investment expenditure to compensate for retired capacity and the continuous rise of input fuel prices. The decline in tariffs in 2000-2030 varies between 7% for service sector consumers to more than 10% in industry.

Power generation is capital intensive and has been one of the most important investment sectors in developed economies for a long time. The replacement of decommissioned plants, especially

48 Idem 24.

49 In the PRIMES model the rate of growth of pre-tax electricity prices by sector follow the corresponding ones of electricity tariffs (i.e. electricity tariffs are an indicator that acts as a proxy for the average electricity price by sector in a country).

Table 2-25: Average electricity tariffs in real terms for EU

	mills of Euro'00 per KWh					*index (2000 = 100)*				
	1995	**2000**	**2010**	**2020**	**2030**	**1995**	**2000**	**2010**	**2020**	**2030**
Average	85.6	76.1	75.2	69.6	70.2	112.4	100.0	98.8	91.4	92.2
Industry	70.7	64.6	63.2	57.6	57.9	109.4	100.0	97.9	89.2	89.6
Tertiary	92.0	80.9	81.7	76.0	75.3	113.8	100.0	101.1	93.9	93.0
Households	104.0	90.9	87.8	81.8	83.5	114.4	100.0	96.6	90.0	91.8

Source: PRIMES

nuclear ones, after 2015 combined with the increase in electricity demand has important implications for investment as well as overall energy system costs. The cumulative expenditure per decade for new EU power plant capacity is projected to increase continuously over time (see Table 2-26). An investment expenditure of some 177 billion Euros is estimated to be required in 2000-2010. This amount is projected to rise to 414 billion Euros for the period 2020 to 2030 (close to 3 times as high as the expenditure incurred between 1990 and 2000) to satisfy electricity needs in the long run.

In terms of expenditure per kWh generated, investment remains stable in the period to 2010, as a consequence of plant technology choice and the existence of surplus capacity in the EU. Thereafter, investment expenditure per kWh increases substantially, but at rates below those of total investment expenditure given the increasing electricity demand.

2.2.5. The outlook for energy-related CO_2 emissions

On the basis of EUROSTAT energy balances energy related CO_2 emissions in the EU reached 3118 million tons in 2000, a level slightly above that observed in 1990 with quite similar climatic conditions. However, according to the report of the European Environment Agency CO_2 emissions in the EU, as computed under the rules of the Framework Convention on Climate Change (FCCC) and on the basis of national emission inventories data, exhibited a slight decrease between 1990 and 2000. Therefore, the EU has achieved the non-binding target of the FCCC to stabilise CO_2 emissions at the 1990 level.

This slight difference of CO_2 emission statistics in the 1990s is the outcome of the different treatment of aviation bunkers (i.e. fuel consumption for international air transport) between EUROSTAT and FCCC. Aviation bunkers are not accounted for under the rules of the FCCC - due to disagreement about the assignment of emissions among countries. On the other hand EUROSTAT energy balances include fuel consumption for international air transport in final energy demand for transport. Therefore energy related CO_2 emissions include international air transport in addition to domestic flights and it is because of this that the statistics on energy related CO_2 emissions in this report deviate from those based on national inventories. International air transport has been growing particularly fast over the last decade and is expected to do so in the future. Consequently, it is important to bear in mind that the estimates given for future developments of energy related CO_2 emissions are computed on the basis of the way energy consumption is treated in EUROSTAT energy balances.

Between 1990 and 2000 there was a reduction of CO_2 emissions in industry and in the power and steam generation sector, which largely offset the increases from the transport sector and the energy branch, while emissions from the tertiary and household sectors saw a small decline. The relative stabilisation of CO_2 emissions between 1990 and 2000 is the result of three main factors: the ongoing decrease in energy intensity induced by structural change and the continuous improvement of technologies; the increasing contribution of non-fossil fuels, mainly nuclear and to a smaller extent some wind energy and biomass; and the greater penetration of natural gas both for power generation and in final markets in substitution for solid fuels and oil products. The recent

Table 2-26: Investment in generation capacities for EU

	000 mio of Euro'00				*Annual growth rate (%)*		
	1990-2000	**2000-2010**	**2010-2020**	**2020-2030**	**00/10**	**10/20**	**20/30**
Investment expenditure/000 mio of Euro'00	144.1	176.6	265.7	413.7	2.1	4.2	4.5
per unit of electricity generated/mills of Euro'00	29.5	30.4	39.7	55.2	0.3	2.7	3.4

Source: PRIMES

growth of emissions since 1998 came from the power sector and especially from transport, being partly offset by the reduction from industry and from the tertiary and households sector.

2.2.5.1. Future evolution of CO_2 emissions and carbon intensities by sector

Under the assumptions of the Baseline scenario, CO_2 emissions in the EU energy system are projected to increase by 0.5% pa between 2000 and 2030. In the period to 2010 there are a number of factors that limit emissions growth to 0.3% pa (see Table 2-27). Such factors include the restructuring of the EU economy towards less energy intensive uses, changes in the fuel mix in favour of less carbon intensive energy forms both on the demand and the supply sides, as well as technological progress. In 2010, the middle year in the first Kyoto budget period 2008-2012, energy related CO_2 emissions in the EU are projected to exceed the 1990 level (the base year of the Kyoto Protocol) by 4%. Beyond 2010 CO_2 emissions are projected to rise more rapidly by some 0.7% pa over the period to 2030.

The CO_2 emissions increase is driven by the transport sector up to 2010. In the period 2010 to 2030, most of the emission increase takes place in power and steam generation. CO_2 emissions from electricity and steam generation grow by +1.0% pa in 2000-2030. Demand for transport, electricity and steam is derived from various social and economic activities related to different economic sectors (industry, services, agriculture, households). It should be noted in this respect that electricity and steam generation is not an end in itself but a means to provide energy services in an efficient way at the point of end use. To the extent that final demand sectors such as industry, services and households switch to more electricity or steam, they "export" considerable parts of their CO_2 emissions to the power and steam generation sector. Following the statistical conventions of EUROSTAT and others on the breakdown of CO_2 emissions by sector, with power and steam generation being one sector, this modelling exercise has calculated future emissions accordingly and the projected CO_2 emissions are reported in line with statistical practices.

The increase in electricity and steam demand and the increased fossil fuel use by the sector causes the projected rise of emissions in the electricity and steam generation sector. However, following a decline of emissions by -0.2% pa between 1990 and 2000, the increase of emissions in the first decade is rather modest (+0.1% pa). The continuation of trends observed in the sector in the last decade, i.e. penetration of natural gas in conjunction with the efficiency gains obtained from gas turbine combined cycle plants and co-generation in thermal power generation, as well as the significant growth in electricity generation from renewable energy forms and nuclear power plants, is the key driver for this result.

Carbon intensity in power generation (excluding district heating) improved by 22.5% over 1990-2000 and is projected to further improve to 2010 by 39.8% from 1990 levels (see Figure 2-20). The projected improvement of carbon intensity in 2000-2010 (22.3%) is as important as that seen in the previous decade. Beyond 2010 and as electricity demand continues to grow at rates well above average, the progressive re-emergence of coal generation, nuclear decommissioning, the slowdown in the expansion of natural gas and renewable energy forms (at comparatively high levels of renewables deployment), lead to more accelerated growth of CO_2 emissions. Consequently there is a worsening of the electricity and steam sector's position in terms of carbon intensity. After the considerable decrease in 1990 to 2010, CO_2 emissions per MWh produced rise by 5.7% between 2010 and 2030 reflecting the nuclear phase-out decided in certain Member states, which will show its main effects only after 2010. Carbon intensity remains, however, close to 18% lower in 2030 than it was in 2000. The EU power generation system achieves the lowest level for carbon intensity in 2015, 42.7% lower than the 1990 level.

Table 2-27: CO_2 emissions by sector in EU

	Mt CO_2					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Industry	576.2	509.3	458.4	460.0	466.4	-1.2	-1.0	0.0	0.1	-0.3
Tertiary	203.5	199.6	202.6	206.4	219.8	-0.2	0.2	0.2	0.6	0.3
Households	436.4	412.9	432.4	440.6	434.2	-0.6	0.5	0.2	-0.1	0.2
Transports	738.5	902.2	1024.5	1105.3	1140.2	2.0	1.3	0.8	0.3	0.8
Electricity-steam production	960.9	941.0	947.0	1098.4	1277.6	-0.2	0.1	1.5	1.5	1.0
District heating	36.7	7.2	5.0	1.5	2.9	-15.0	-3.7	-11.0	6.5	-3.0
New fuels (hydrogen etc.) prod.	0.0	0.0	0.2	1.1	1.7	-	-	19.9	4.0	-
Energy branch	129.8	145.4	135.0	130.5	125.9	1.1	-0.7	-0.3	-0.4	-0.5
Total	**3082**	**3118**	**3205**	**3444**	**3669**	**0.1**	**0.3**	**0.7**	**0.6**	**0.5**

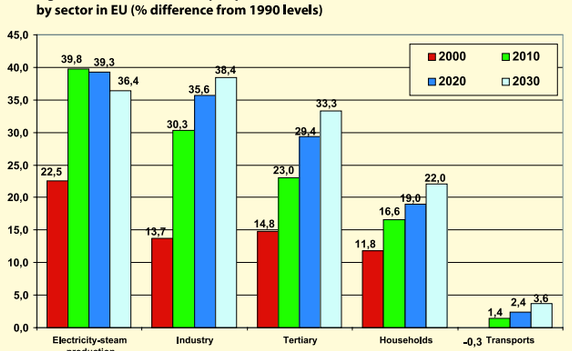
Source: PRIMES

It is not surprising that between 1990 and 2010 transport is the sector with the fastest increase of CO_2 emissions as it exhibits the highest energy demand growth. The limited possibilities as regards changes in the fuel mix of the sector do not allow for significant gains in terms of carbon intensity. As a result, by 2010 the transport sector is projected to become the major CO_2 emissions contributor of the EU energy system (with CO_2 emissions growing at a rate of 1.3% pa in 2000-2010). Beyond 2010, there is lower growth of CO_2 emissions (0.5% pa in 2010-2030) in the transport sector. This evolution is strongly related to the slowdown in transport activity growth, mainly due to some decoupling of passenger transport demand from GDP; and the considerable fuel efficiency improvements in private cars, resulting from the implementation of the EU-ACEA/JAMA/KAMA negotiated agreement.

As discussed earlier both the tertiary and household sectors are projected to exhibit a strong tendency towards the use of more efficient and less carbon intensive fuels. Carbon intensity improvement in the tertiary sector reaches 33.3% between 1990 and 2030, whereas that for households reaches 22%. However, CO_2 emissions in both sectors are projected to grow over the projection period (+0.3% pa and +0.2% pa respectively), driven by increasing energy use and due to saturation effects in terms of further potential changes in the fuel mix.

Industry is the only sector in which carbon intensity improvements (+38.4% between 1990 and 2030) more than offset the growth of energy requirements. As a result CO_2 emissions in this sector decrease at a rate of -0.3% pa between 2000 and 2030.

Figure 2-20: Carbon intensity improvement by sector in EU (% difference from 1990 levels)



Source: PRIMES

In addition to these improvements in carbon intensity (expressed in CO_2 emissions per unit of primary energy needs), the EU energy system undergoes considerable improvements in terms of energy intensity (expressed in energy demand per unit of GDP) in all sectors. Consequently, CO_2 emissions grow at a much slower pace than GDP. As can be seen in Table 2-28, CO_2 emissions in 2010 are up 4% compared with their 1990 level, while primary energy demand increases by 19% and GDP by 56%. Between 1990 and 2030 there is a total GDP growth of 142%, while primary energy demand increases by 30% and CO_2 emissions by 19%.

Table 2-28: Key indicators for the EU energy system

	Index (1990 = 100)				
	1990	**2000**	**2010**	**2020**	**2030**
Gross Domestic Product	100	122	156	195	242
Gross Inland Consumption	100	110	119	125	130
CO_2 emissions	100	101	104	112	119
Energy intensity	100	90	77	64	54
Carbon intensity	100	92	87	89	91
CO_2 emissions / unit of GDP	100	83	67	57	49

Source: PRIMES

Energy intensity decreases continuously up to 2030. Carbon intensity, however, decreases only until 2015, and deviates thereafter from its secular downward trend; in 2030, under Baseline conditions including a nuclear phase-out in certain Member States, carbon intensity will be only marginally below that in 2000. Despite this, the carbon intensity of the economy (i.e. CO_2 emissions per unit of GDP) develops favourably. In 2030, one unit of GDP can be produced with less than half the amount of CO_2 emissions that were emitted in 1990.

The absolute level of CO_2 emissions per unit of GDP decreases from 441 t CO_2 / mill € in 1990 to reach only 217 t CO_2 / mill € in 2030 in real terms (money of 2000). While this is still unsatisfactory compared to the climate change challenge ahead, it shows however that the EU economy is much less carbon intensive than for example the US economy (which emitted in 2000 some 580 t CO_2 per mill $ of GDP according to the Annual Energy Outlook 2002 of the US Department of Energy – Energy Information Administration). This relative EU position vis-à-vis the USA holds true even if the US greenhouse gas intensity targets are achieved.

2.2.5.2. CO_2 emissions by fuel

The impacts of changes in the fuel mix are shown in Table 2-29, which illustrates the evolution of CO_2 emissions by fuel under Baseline assumptions. Emissions from solid fuels exhibit a strong decline to 2010 but rise rapidly in the long run and, by 2030, exceed those in 2000. On the other hand, emissions from natural gas increase at a rate 10 times faster than total CO_2 emissions in the first part of the projection period, reflecting the strong penetration of natural gas that is currently taking place both on the energy demand and supply sides in most EU Member States. In absolute terms the increase of gas more than compensates for the fast decline in emissions that results from the reduction in the use of solid fuels. In the long run, the growth of CO_2 emissions from gas use decelerates to levels close to average. As regards

Table 2-29: CO_2 emissions by fuel type and major products in EU

	Mt CO_2					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solids	1089,8	769.0	593.0	642.6	811.0	-3.4	-2.6	0.8	2.4	0.2
Hard coal	612.5	481.4	337.1	407.3	612.4	-2.4	-3.5	1.9	4.2	0.8
Coke	125.0	80.2	66.3	63.7	59.3	-4.3	-1.9	-0.4	-0.7	-1.0
Lignite	279.7	195.2	186.5	169.5	138.0	-3.5	-0.5	-1.0	-2.0	-1.2
Liquids	1433.4	1527.4	1543.1	1581.8	1591.6	0.6	0.1	0.2	0.1	0.1
gasoline	353.8	340.5	354.6	349.0	331.2	-0.4	0.4	-0.2	-0.5	-0.1
kerosene	91.7	144.5	161.3	186.3	208.1	4.7	1.1	1.5	1.1	1.2
diesel oil	577.4	690.0	751.9	812.5	843.9	1.8	0.9	0.8	0.4	0.7
fuel oil	266.4	189.9	123.6	88.3	71.0	-3.3	-4.2	-3.3	-2.2	-3.2
Gas	558.9	821.2	1068.8	1219.6	1266.0	3.9	2.7	1.3	0.4	1.5
natural gas	477.6	757.6	1015.7	1169.4	1217.9	4.7	3.0	1.4	0.4	1.6
Total	**3082**	**3118**	**3205**	**3444**	**3669**	**0.1**	**0.3**	**0.7**	**0.6**	**0.5**

Source: PRIMES

liquid fuels, CO_2 emissions of kerosene exhibit the highest growth over the projection period (+1.2% pa in 2000-2030) following the strong increase of aviation activity, whereas diesel oil emissions increase at a much slower pace (+0.7% pa). On the other hand, emissions of fuel oil are projected to decrease over the projection period (-3.2% pa) mainly driven by changes in the fuel mix. Emissions from gasoline decline slightly (-0.1% pa) due to the effects of the EU-ACEA/JAMA/KAMA negotiated agreement in private car consumption but also the projected slowdown in passenger transport growth.

2.2.5.3. CO_2 emissions by Member State

Large differences in the projected trends of CO_2 emissions growth across EU Member States exist under the Baseline scenario conditions. In most Member States, energy related CO_2 emissions increase above their 1990 levels, in some at a substantial rate, whereas a few Member States keep emissions below the 1990 levels. There are different circumstances in the Member States as reflected in the Burden Sharing agreement,[50] which relates to the combined development of six greenhouse gases. On the basis of the projected development of energy related CO_2 emissions, all Member States would need to reduce the emissions of the other greenhouse gases significantly and/or to resort to Kyoto flexible mechanisms (such as emission trading) and/or act on sinks to fulfil their Kyoto commitments. Energy and transport policy measures to reduce CO_2 emissions are of course another field for action. However, it should be recalled, that the Baseline does not include new additional policies and measures in order to achieve the Kyoto targets. As mentioned previously, this is motivated by analytical reasons in order to identify the gap that needs to be closed in view of complying with Kyoto targets (and beyond) following the ratification of the Kyoto protocol by the EU and its Member States in 2002.

Only three Member States are projected to reduce their CO_2 emissions significantly below 1990 levels for the first Kyoto budget period (2008-2012), namely Denmark (-11.7% in 2010 from 1990 levels), Germany (-12.7%) and the United Kingdom (-8.7%). In Denmark, a number of policy initiatives and growth of wind energy are the key drivers for this result. As regards Germany, the reunification led to a sharp decline in the emissions of the eastern "Länder" following the restructuring of the lignite-based economy, which has had a marked influence on the emission trajectory of the whole country. In addition, various policy measures have been implemented (e.g. on renewable energy) that contribute to the reduction of CO_2 emissions below the 1990 level. Finally, in the UK the bulk of the emissions reduction can be attributed to the massive penetration of natural gas in the power generation system (at the expense of solid fuels) but also the strong penetration of renewable energy forms in power generation in the period to 2010. It is true that the modelling for Finland also leads to CO_2 emissions in 2010 that are somewhat below the 1990 level. This is due to considerable nuclear investment coming on stream in 2010, which means that the years 2008 and 2009 are still dominated by more fossil fuel intensive electricity generation and higher CO_2 emissions.[51]

50 In June 1998 the EU Member States agreed to share the minus 8% target for the EU in 2008-2012 in the following way among the Member states : Austria-13.0%; Belgium -7.5%; Denmark -21.0%; Finland 0.0%; France 0.0%; Germany -21.0%; Greece 25.0%; Ireland 13.0%; Italy -6.5%; Luxembourg -28.0%; the Netherlands -6.0%; Portugal 27.0%; Spain 15.0%; Sweden 4.0% and the UK -12.5%.

51 It is important to note that the PRIMES modelling deals with every fifth year, which can be considered as representative for the years around this year unless there are important changes in that particular year modelled.

Table 2-30: CO_2 emissions by Member State in EU

	Mt CO_2					% change from 1990 levels			
	1990	2000	2010	2020	2030	2000	2010	2020	2030
Austria	55.1	57.1	60.7	66.7	69.6	3.7	10.2	21.2	26.5
Belgiun	106.3	115.9	112.2	120.1	145.9	9.0	5.6	12.9	37.2
Denmark	52.8	52.6	46.6	45.0	45.6	-0.3	-11.7	-14.6	-13.6
Finland	53.2	54.5	51.4	55.7	59.0	2.4	-3.3	4.7	11.0
France	354.1	368.9	406.4	447.9	457.3	4.2	14.8	26.5	29.1
Germany	943.0	809.8	823.6	869.8	881.1	-14.1	-12.7	-7.8	-6.6
Greece	71.1	89.2	105.6	112.2	115.4	25.4	48.5	57.8	62.3
Ireland	29.7	41.1	46.5	48.7	50.0	38.5	56.8	64.1	68.6
Italy	390.8	421.4	422.2	437.4	461.7	7.8	8.0	11.9	18.1
Luxemburg	10.6	8.8	11.6	12.6	14.6	-16.9	9.6	18.8	37.0
The Netherlands	152.9	165.6	174.0	184.4	211.5	8.3	13.8	20.6	38.3
Portugal	39.0	58.5	67.9	80.4	92.8	49.9	74.0	106.1	137.7
Spain	203.8	283.3	302.6	335.7	357.3	39.0	48.5	64.7	75.3
Sweden	50.6	47.7	54.0	68.3	102.8	-5.8	6.8	35.1	103.2
United Kingdom	569.1	543.3	519.4	559.0	604.0	-4.5	-8.7	-1.8	6.1
EU15	**3082**	**3118**	**3205**	**3444**	**3669**	**1.2**	**4.0**	**11.7**	**19.0**

Source: PRIMES

For all other Member States there are significant increases of CO2 emissions between 1990 and 2010 varying from +5.6% in Belgium to +74% in Portugal. As expected, the Member States projected to exhibit the highest economic growth in the period, namely Greece, Ireland, Portugal and Spain, are also those with the highest growth in terms of CO_2 emissions (all above +45% in 2010 from 1990 levels).

These substantial divergences between EU Member States reflect many factors including economic growth, the different dynamics in each country's energy system, the existing structure of energy production and the prospects for industrial restructuring. The carbon intensity of the power generation system plays a key role in the evolution of CO_2 emissions in the different Member States. The assumed absence of further policies and measures in the Baseline, combined with the decommissioning of existing nuclear plants beyond 2015, leads to continuing CO_2 emissions growth beyond 2010.

CO_2 emissions in 2030 reach 3669 Mt, which is +19% above the 1990 level. The differences between countries become even larger in the long term - ranging from +138% for Portugal in 2030 to -13.6% for Denmark. It is interesting to note that, as the projection horizon moves towards the long-term, CO_2 emissions increase steadily, even for those Member States that experience significant reductions in the short to medium term. Under Baseline assumptions, between 2010 and 2020, CO_2 emissions increase in all EU Member States except Denmark while, over the period 2020-2030, there is limited CO_2 emissions growth even in Denmark under Baseline conditions. These projections highlight the point that CO_2 emissions limitation and reduction is a long-term challenge (and an opportunity) for the energy system. Seizing the available opportunities should result in a low carbon energy system that also ensures secure energy supplies at competitive prices.

2.3 Concluding remarks

In 2000, the EU accounted for more than 17.5% of the world's GDP but only 14.6% of global energy consumption, reflecting its remarkably better position in terms of energy intensity compared with major trading partners. Between 1990 and 2000 GDP in the EU increased by 22.3% while energy needs increased by 10%. Further enlargement of the EU is underway. The EU energy system will need to deal with a number of major challenges over the next 30 years, including issues related to security of supply, tightening environmental pressures, competitive energy prices and significant investment decisions.

Current EU Member States are projected to almost double their GDP between 2000 and 2030 (+98% or +2.3% pa) while the growth of primary energy demand is projected to be only 18.4% (or 0.56% pa) in the same period. This is a rate significantly lower than that observed historically, but demonstrating that there is still no complete decoupling between energy demand and economic growth. Energy intensity gains of 1.7% pa are driven by structural changes on the demand side, better efficiency and technology in the individual sectors, and investment decisions in power generation.

The further dematerialization of EU industry, combined with structural changes within sectors, strong saturation effects for a number of energy uses, improvements in thermal characteristics of buildings in the tertiary and household sectors, the slowdown

in transport activity growth and the impacts arising from the EU agreement with car manufacturers, all contribute towards the decoupling of energy demand from economic growth on the demand side. Improvements of energy technology and changes in the fuel mix towards more efficient energy forms also exert a positive impact on energy intensity. In particular, the changes projected to occur in power generation towards the use of renewable energy forms and more efficient technologies and fuels further contribute to this tendency.

The EU energy system will remain dominated by fossil fuels over the next 30 years. Their share is projected to increase by more than 2 percentage points over the projection period, reaching 80.5% of overall energy needs by 2030. A more favourable trend is projected to occur in the horizon to 2015 with the share of fossil fuels declining by close to 1 percentage point from 2000 levels. The adverse trend observed thereafter is closely related to the substantial decommissioning of existing nuclear power plants due to occur after that date, following the nuclear phase-out policies for a number of EU Member States, or the decisions of economic actors who do not always replace nuclear plants at the end of their lifetime with new nuclear plants.

The use of fuels in the EU energy system will become increasingly specialised. Solids decline over the period to 2015 but strongly increase thereafter as a highly competitive option in power generation in replacement of nuclear but also of natural gas. Higher natural gas import prices and maturity of advanced coal technologies are the key drivers for this result. By 2030 the bulk of solid fuels consumption occurs in power generation and in process specific industrial uses (iron and steel, and cement). Oil becomes a fuel overwhelmingly used in the transport sector and as a petrochemical feedstock, growing at rates significantly lower than average. By 2030 its share in gross inland consumption declines to about 35%, more than 5 percentage points below 2000 levels. Gas demand is projected to continue growing strongly over the period to 2015 (+2.6% pa in 2000-2015) but to stabilise thereafter due to reduced competitiveness against coal in power generation but also limited potential for further changes in the fuel mix towards the use of gas on the demand side. Renewable energy forms are projected to remain the fastest growing energy carrier in the EU energy system over the projection period (+1.9% pa in 2000-2030). The exploitation of renewable options in power generation is the key driver for this result. However, even in 2030, their share amounts to only 9% of primary energy needs, well below indicative targets set within the EU even in the horizon to 2010. Novel energy forms (hydrogen, methanol etc.) do not make significant inroads under Baseline assumptions primarily due to cost considerations.

The projected Baseline case increase in the use of fossil fuels has a twofold impact upon the EU energy system. First, fossil fuels are mainly imported and with their continuing dominance more than two thirds of EU primary energy needs would need to be imported by 2030, compared to slightly less than half in 2000. The most significant change regarding EU energy security relates to the increasing dependence upon gas imports from a limited number of suppliers and significantly more distant locations. Secondly, fossil fuels give rise to CO_2 emissions. In 2010, CO_2 emissions are projected to exceed the 1990 level by 4%, which will be exacerbated by 2030 when emissions are up 19% compared with 1990. The projected rising share of solid fuels in the long run will increase the carbon intensity of the EU energy system. It is clear from the above that additional measures will be required for the EU energy system to meet the targets set under the Kyoto Protocol.

Environmental and energy import dependency issues are important for the EU power generation sector. Some 90% of the installed capacity by 2030 will need to be chosen and commissioned over the next three decades. This key sector will, therefore, face strategic technology and fuel choice dilemmas over that period. In turn, the solutions to these will have a major effect upon the overall EU energy system in the long run.

Moreover, the EU is enlarging. At the time of writing this report, negotiations with 10 candidate countries have concluded. Negotiations with other countries continue or might start in the future. In any case, the EU is embedded in the wider European context, especially in energy matters concerning imports and transit. The following part reports on candidate countries and direct neighbours whereas the subsequent one deals in particular with the EU after its enlargement to 25 Member States.

EU CANDIDATE AND NEIGHBOURING COUNTRIES' ENERGY AND TRANSPORT OUTLOOK TO 2030

PART III

PART III

EU CANDIDATE AND NEIGHBOURING COUNTRIES' ENERGY AND TRANSPORT OUTLOOK TO 2030

3.1. Main assumptions of the Baseline Scenario

The European Council held in Copenhagen in December 2002 has concluded accession negotiations with 10 candidate countries, namely Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia for their membership in the EU from 2004. These countries are called hereafter for brevity reasons Acceding Countries, or by the acronym ACC. The wider group of countries that applied for membership and received the status of candidate countries include Bulgaria, Romania and Turkey in addition to the acceding ones. This group of 13 countries will continue to be called candidate countries in this report on the energy baseline.

This part extends the energy analysis to the candidate countries as well as to Norway and Switzerland, which being direct neighbours, have close economic relations with the EU and are also relevant for future EU energy developments. This group of 15 countries, which for purposes of brevity will be called Candidate Countries/ Neighbours or by the acronym CCN, is clearly quite diverse. It includes some of the most developed countries in the world, like Switzerland and Norway; some middle income market economies, as well as many countries that had centrally planned economies and started transition to market economies around 1990.

Energy developments in these countries are of great interest for the EU. This is partly because of the high likelihood that ten of these countries will join the EU in 2004 and partly because of the environmental and competitiveness implications that may follow the restructuring of the region. For example, many countries in Central and Eastern Europe will depend increasingly in future on imports of Russian natural gas. Since these countries are often served by the same pipeline infrastructure that also serves many EU countries, there is obvious scope for partnership in managing future European gas needs. Similarly, in view of the flexibility mechanisms allowed for under the Kyoto Protocol, there is scope for co-operation to reduce emissions. This collaboration will naturally be reinforced to the extent that EU enlargement comes into effect.

The Baseline scenario for the energy system of candidate and neighbouring countries was constructed following the same approach as that for EU Member States, i.e. it is conceived as the most likely development of the energy system in the future in the context of current knowledge, policy objectives and means. For this purpose, the ACE[52] model has been used. Detailed assumptions are provided below.

3.1.1. Demographic Assumptions

Population data and short-term projections used here are from EUROSTAT. Population growth rates from 2003 to 2030, and projections on the number of households and household size per country, are from the UN Centre for Human Settlements .[53] Table 3-1 presents the demographic outlook, showing that the population of CCN grows by close to 14 million people between 2000 and 2030, to reach 200 million people by 2030.

There are important differences among individual countries. Thus, whereas Turkey's population rises by around 23.5 million people, most candidate countries see considerable reductions in population. Only Cyprus and Malta are projected to experience some population growth to 2030. The population in Norway and Switzerland grows very modestly to 2030.

Another key demographic factor that significantly affects household energy demand is household size (i.e. the number of persons per household). According to UN-HABITAT projections, the trends in the last decade in CCN countries (reduction of household size from 3.33 persons in 1990 to 3.09 in 2000) are expected to continue (see Table 3-2). By 2030 the average household size in CCN countries reaches 2.61 persons. Rising life expectancy, declining birth rates and changes in societal and economic conditions are the main drivers.

As discussed earlier climate conditions, which are important in determining both the intensity and the overall pattern of energy use, are assumed to remain unchanged to 2030, i.e. the degree-days parameter is assumed to remain constant at 2000 levels.

3.1.2. Macroeconomic Assumptions

The population of CCN countries in 2000 was some 49% of the EU population but the GDP of all these countries was only 13% of EU GDP. The contrast is greater if Norway and Switzerland, two of the most developed countries in the world, are excluded from this analysis. The population of the thirteen candidate countries in 2000 was some 45% that of the EU while the corresponding real GDP was only 7% of current EU GDP. However, if the GDP of the

52 The Accession Countries Energy (ACE) Model is an energy demand and supply model developed and maintained at the National Technical University of Athens, E3M-Laboratory led by Prof. Capros. It was used to study the potential future energy-related developments in all EU candidate and neighbouring countries; and uses OECD and EUROSTAT as the main data sources, with 2000 being the base year.

53 United Nations (2002) Global Urban Observatory and Statistics Unit of UN-HABITAT (UN Centre for Human Settlements): Human Settlement Statistical Database version 4 (http://www.unhabitat.org/programmes/guo/guo_hsdb4.asp)

Table 3-1: Population trends in CCN countries, 1990 to 2030.

	Million inhabitants					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Bulgaria	8.72	8.17	7.39	6.65	5.95	-0.65	-0.99	-1.05	-1.11	-1.05
Cyprus	0.68	0.75	0.81	0.85	0.87	1.12	0.69	0.49	0.29	0.49
Czech Republic	10.36	10.27	10.12	9.88	9.51	-0.09	-0.15	-0.25	-0.38	-0.26
Estonia	1.57	1.37	1.23	1.11	0.98	-1.35	-1.05	-1.06	-1.23	-1.12
Hungary	10.37	10.02	9.54	9.07	8.58	-0.33	-0.49	-0.51	-0.55	-0.52
Latvia	2.67	2.37	2.24	2.11	1.98	-1.18	-0.56	-0.59	-0.68	-0.61
Lithuania	3.70	3.51	3.41	3.30	3.17	-0.53	-0.28	-0.33	-0.40	-0.34
Malta	0.36	0.39	0.40	0.41	0.42	0.80	0.37	0.24	0.06	0.22
Norway	4.24	4.49	4.63	4.76	4.88	0.57	0.31	0.27	0.25	0.28
Poland	38.12	38.65	38.26	37.67	36.62	0.14	-0.10	-0.15	-0.28	-0.18
Romania	23.21	22.44	21.79	21.01	20.13	-0.34	-0.29	-0.36	-0.43	-0.36
Slovakia	5.30	5.40	5.42	5.37	5.23	0.19	0.04	-0.09	-0.27	-0.11
Slovenia	2.00	1.99	1.95	1.89	1.80	-0.04	-0.19	-0.34	-0.50	-0.34
Switzerland	6.71	7.17	7.18	7.24	7.28	0.67	0.01	0.08	0.06	0.05
Turkey	56.20	67.46	76.00	83.79	90.99	1.84	1.20	0.98	0.83	1.00
CCN	**174.19**	**184.46**	**190.40**	**195.11**	**198.37**	**0.57**	**0.32**	**0.24**	**0.17**	**0.24**
of which Acceding Countries	75.12	74.73	73.40	71.67	69.14	-0.05	-0.18	-0.24	-0.36	-0.26

Source: EUROSTAT. Global Urban Observatory and Statistics Unit of UN-HABITAT. ACE.[54]

Table 3-2: Average size of households in CCN countries, 1990 to 2030

	Inhabitants per household					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Bulgaria	2.86	2.61	2.30	2.10	1.93	-0.91	-1.24	-0.92	-0.85	-1.00
Cyprus	4.63	4.68	4.49	4.54	4.63	0.11	-0.40	0.09	0.20	-0.04
Czech Republic	2.86	2.61	2.44	2.34	2.28	-0.91	-0.69	-0.41	-0.26	-0.45
Estonia	2.59	2.43	2.08	1.88	1.66	-0.64	-1.57	-0.98	-1.21	-1.25
Hungary	2.62	2.37	2.22	2.11	2.05	-1.00	-0.66	-0.52	-0.29	-0.49
Latvia	2.69	2.56	2.41	2.33	2.21	-0.49	-0.62	-0.30	-0.54	-0.49
Lithuania	2.87	2.75	2.43	2.25	2.12	-0.43	-1.23	-0.76	-0.59	-0.86
Malta	3.18	2.92	2.63	2.45	2.30	-0.85	-1.04	-0.69	-0.63	-0.79
Norway	2.43	2.32	2.15	1.98	1.89	-0.46	-0.77	-0.81	-0.47	-0.68
Poland	3.11	2.81	2.57	2.49	2.42	-1.01	-0.87	-0.32	-0.30	-0.50
Romania	3.25	2.86	2.61	2.53	2.46	-1.27	-0.90	-0.32	-0.27	-0.50
Slovakia	2.48	2.17	1.97	1.87	1.78	-1.33	-0.97	-0.54	-0.47	-0.66
Slovenia	3.33	3.08	2.83	2.73	2.66	-0.78	-0.83	-0.36	-0.28	-0.49
Switzerland	2.23	2.05	1.83	1.70	1.65	-0.84	-1.14	-0.74	-0.29	-0.72
Turkey	4.83	4.47	3.94	3.58	3.33	-0.77	-1.26	-0.96	-0.69	-0.97
CCN	**3.33**	**3.09**	**2.84**	**2.71**	**2.61**	**-0.73**	**-0.84**	**-0.49**	**-0.36**	**-0.57**
of which Acceding Countries	2.92	2.66	2.44	2.35	2.27	-0.94	-0.83	-0.40	-0.33	-0.52

Source: Global Urban Observatory and Statistics Unit of UN-HABITAT.

candidate countries is expressed in purchasing power standards the gap becomes less pronounced (i.e. GDP in purchasing power standards is some 15% of EU GDP) - but still remains significant. The economic outlook presented below uses the same underlying assumptions as for the EU Member States. The recent economic slowdown - including the impacts of the terrorist attack of 11 September 2001 - is assumed to be transitory and the longer-term global international climate to remain generally positive. Furthermore, integration of candidate countries in the EU is assumed to boost their economic growth.

The increase of GDP in CCN for 1990-1995 was 0.6% pa, while

54 More specifically the growth rates of the base case projections of the Global Urban Observatory and Statistics Unit of UN-HABITAT for the candidate and neighbouring countries were applied to historical data for the population in 2000 to construct the population growth projection used in the ACE baseline. This was to cope with inconsistencies between EUROSTAT data for 2000 and corresponding figures in UN-HABITAT projections.

Table 3-3: Annualised percent change for GDP in the Baseline scenario, CCN countries

annual growth rate

	1990-1995	1995-2000	2000-2001	2001-2002	2002-2003	2003-2005	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025	2025-2030
Bulgaria	-2.61	-0.83	4.30	4.00	5.00	5.15	4.72	4.15	3.25	2.82	2.43	2.12
Cyprus	4.52	3.78	3.70	2.50	4.00	4.15	3.70	3.60	3.35	3.05	2.82	2.60
Czech Republic	-0.96	1.22	3.60	3.40	3.90	3.92	3.75	3.52	3.05	2.62	2.19	1.92
Estonia	-7.44	4.90	5.40	4.00	5.30	5.15	5.00	3.55	3.02	2.27	1.85	1.62
Hungary	-2.36	4.02	3.80	3.50	4.50	4.40	4.12	3.57	3.15	2.42	2.05	1.91
Latvia	-13.23	5.28	7.60	5.00	6.00	5.65	5.98	4.22	3.52	2.87	2.25	1.92
Lithuania	-10.33	3.33	5.90	4.00	5.00	4.65	4.84	4.55	4.02	3.62	3.01	2.45
Malta	5.48	4.23	-1.00	3.90	4.00	3.80	2.88	3.65	4.09	4.15	3.55	2.76
Norway	3.88	3.51	1.96	1.94	2.07	2.39	2.15	2.37	2.40	2.27	2.02	1.87
Poland	2.20	5.14	1.10	1.40	3.20	4.50	2.93	4.67	4.45	4.12	3.82	3.45
Romania	-2.15	-1.33	5.30	4.20	4.90	5.05	4.90	5.05	4.58	4.02	3.37	2.75
Slovakia	-2.99	3.78	3.30	3.60	4.20	4.05	3.84	4.02	3.79	3.56	3.02	2.62
Slovenia	-0.58	4.34	3.00	3.10	4.00	4.00	3.62	3.32	2.52	2.05	1.82	1.65
Switzerland	-0.08	1.81	1.33	0.99	1.96	2.00	1.66	2.35	2.27	2.25	2.08	2.00
Turkey	3.21	3.95	-7.40	2.50	3.70	4.32	1.38	5.35	6.20	5.92	5.45	4.95
CCN	**0.65**	**3.06**	**0.62**	**2.11**	**3.08**	**3.48**	**2.55**	**3.67**	**3.72**	**3.54**	**3.29**	**3.06**
of which Acceding Countries	-0.63	4.10	2.48	2.48	3.78	4.36	3.49	4.16	3.84	3.45	3.12	2.82

Source: EUROSTAT. Economic and Financial Affairs DG. ACE.[57]

growth for 1995-2000 reached 3.1% pa. In April 2002, the Commission's Directorate-General for Economic and Financial Affairs published a forecast on economic growth of the EU candidate countries for the short term (2001-2003) taking into account the latest trends in the world economy.[55] These forecasts were incorporated into the ACE Baseline scenario for the short term. For the period beyond 2003, macroeconomic forecasts from WEFA (now DRI-WEFA)[56] were used and adjusted to reflect recent developments.

As can be seen in Table 3-3, projections made by the Economic and Financial Affairs DG indicate that the current slowdown will not be prolonged. However it certainly leads to slower economic growth for CNN between 2000 and 2005 (+2.55% pa) by some half-percentage point pa compared to that in 1995-2000. But between 2005 and 2010 economic growth in candidate and neighbouring countries rebounds at high levels (+3.7% pa). The integration of the acceding countries into the EU as well as the assumed more favourable world economic conditions, cause this acceleration, which is projected to continue in the CCN to 2020 (+3.6% pa in 2010-2020). Beyond 2020 growth exhibits some deceleration and is projected to be around +3.2% pa in 2020-2030. Overall economic growth in 2000-2030 reaches +3.3% pa, some one-percentage point higher pa compared to the projected economic growth in the same period for the EU. This clearly reflects the fundamental assumption made for the Baseline scenario that candidate countries converge towards EU levels throughout the projection period.

The evolution of per capita GDP (expressed in purchasing power standards) in candidate and neighbouring countries under Baseline assumptions is illustrated in Table 3-4. Despite the projected gradual convergence of candidate countries' economies towards EU levels, this process remains far from complete even by 2030. Per capita GDP in the CCN countries is limited to 56% of that for the EU in 2030 (compared with 40% in 2000). This is despite the fact that for both Norway and Switzerland per capita GDP remains well above the EU average (by 34% and 15% respectively in 2030). However, the acceding countries exhibit a much better picture with per capita GDP reaching 70% of the EU average in 2030 (compared with 45% in 2000).

3.1.2.1. Economic growth by sector

From 1990 to 2000 industry was the fastest growing segment of CCN countries' economies, growing significantly faster than total gross value added (+2.5% pa compared to 1.8% pa respectively).

55 Economic Forecasts for Candidate Countries, Spring 2002 ((EUROPEAN ECONOMY, ENLARGEMENT PAPERS, No.9, April 2002. European Commission. Brussels. KC-AA-02-003-EN-C; ISSN 1608-9022). Also available at: http://europa.eu.int/comm/economy_finance/index_en.htm.

56 Idem 9.

57 Incorporating results obtained from the WEFA study (this applies to all macroeconomic assumptions).

Table 3-4: Per capita GDP (expressed in Purchasing Power Standards) for CCN countries

	Euro'00 per capita					annual growth rate				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
Bulgaria	6842	5991	10217	15316	21445	-1.32	5.48	4.13	3.42	4.34
Cyprus	11665	15590	20834	27188	34523	2.94	2.94	2.70	2.42	2.69
Czech Republic	12605	12621	18300	24804	31577	0.01	3.79	3.09	2.44	3.10
Estonia	9225	9134	15429	22289	29958	-0.10	5.38	3.75	3.00	4.04
Hungary	10197	11426	17505	24236	31167	1.14	4.36	3.31	2.55	3.40
Latvia	10070	6992	12155	17661	23243	-3.58	5.69	3.81	2.78	4.09
Lithuania	11306	8078	13137	19757	26924	-3.31	4.98	4.17	3.14	4.09
Malta	8034	11890	15807	23099	31322	4.00	2.89	3.87	3.09	3.28
Norway	25293	33090	40103	49191	58143	2.72	1.94	2.06	1.69	1.90
Poland	6331	8951	13122	20273	29810	3.52	3.90	4.45	3.93	4.09
Romania	6476	5463	9139	14442	20375	-1.69	5.28	4.68	3.50	4.49
Slovakia	10165	10478	15347	22227	30164	0.30	3.89	3.77	3.10	3.59
Slovenia	12652	15255	21862	28340	35395	1.89	3.66	2.63	2.25	2.85
Switzerland	26805	27322	33274	41274	50207	0.19	1.99	2.18	1.98	2.05
Turkey	4776	5619	6932	11324	17313	1.64	2.12	5.03	4.34	3.82
CCN	**8130**	**8924**	**12190**	**17673**	**24432**	**0.94**	**3.17**	**3.78**	**3.29**	**3.41**
of which Acceding Countries	8663	10048	14912	21787	30144	1.49	4.03	3.86	3.30	3.73
EU	19076	22565	28000	34937	43494	1.69	2.18	2.24	2.21	2.21

Source: EUROSTAT. ENERDATA. Economic and Financial Affairs DG. ACE.

The services sector was also characterised by above average growth (+2.1% pa), whereas agriculture and construction declined. In the Baseline scenario services and industry continue to expand rapidly to 2030 with services taking the lead, while the other sectors also show positive growth (see Table 3-5). Beyond 2010, the shift towards services becomes even more pronounced, while industry grows at rates below average.

Given these trends the share of industrial value added in CCN countries' economies increases marginally from 24.9% in 2000 to 25.0% in 2010, declining thereafter to reach 23.8% in 2030 (see Figure 3-1). The share of services value added reaches 61.1% in 2010 and 63.4% in 2030. This growth occurs to the detriment of other sectors, namely, agriculture, construction and the energy branch. The agricultural value added share declines to 2020 to reach 4.9% of total value added, from 6.2% in 2000. However, during the last decade of the projection period the agricultural value added regains some market share (reaching 5.1% in 2030) mainly due to the high economic growth of Turkey. The energy sector also experiences a significant decline in market shares (from 4.7% in 2000 to 3.2% in 2030) while the construction share exhibits a more limited decline (from 5.0% in 2000 to 4.5% in 2030).

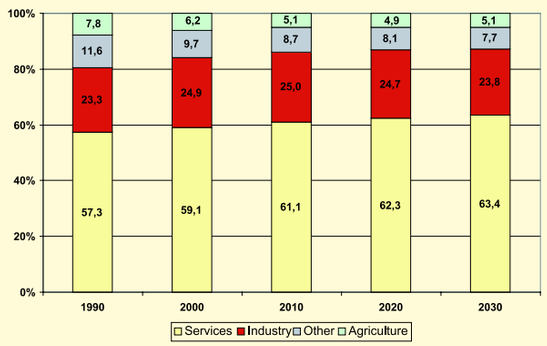
The CCN countries' economies remain more reliant on industry and agriculture than the current EU Member States. The shift to services in these countries lags behind that of the EU. This is in line with the assumed overall level of development of these countries. Key features of the macroeconomic outlook of individual countries, as well as sectoral forecasts according to the ACE model's disaggregation level (i.e. differentiating into iron and steel industry, chemical industry, rest of industry, tertiary sector, agriculture, construction and energy sector) are presented in Appendix 1.

Table 3-5: Evolution of sectoral value added in CCN countries

	000 MEuro'00					annual growth rate				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
Gross Value added	827	986	1347	1948	2679	1.76	3.17	3.76	3.24	3.39
Industry	193	246	337	481	637	2.46	3.19	3.64	2.84	3.22
Construction	50	49	63	90	122	-0.18	2.48	3.58	3.12	3.06
Services	474	583	823	1213	1700	2.08	3.51	3.96	3.43	3.63
Agriculture	64	61	69	95	136	-0.56	1.28	3.25	3.58	2.70
Energy branch	46	47	55	69	85	0.21	1.64	2.27	2.16	2.02

Source: EUROSTAT. Economic and Financial Affairs DG. ACE.

Figure 3-1: Structure of the CCN countries' economies, shares in gross value added 1990-2030



Source: ACE

3.1.3. Price Assumptions

3.1.3.1. International fuel prices

The Baseline projections of international fuel prices assume that global energy markets remain well supplied at relative modest cost to 2030. The evolution of primary fuel prices is illustrated in Table 3-6. Oil prices are assumed to decrease over the next few years from their high 2000 level. The 2010 oil price is projected at 20.1US$(2000), from where it grows smoothly to reach by 2030 27.9US$(2000). Natural gas prices are assumed to reach 16.8US$(2000) per barrel of oil equivalent in 2010, which is higher than their 2000 level. This means a medium term decrease in the oil–gas price gap. With increasing gas-to-gas competition gas prices are decoupled from oil prices in the second part of the projection period. Coal prices remain essentially stable in real terms.

3.1.3.2. Taxation and subsidies

In general, fuel prices were low before 1990 in most candidate countries given very low taxation (and sometimes subsidies) especially in Central and Eastern European countries (CEEC). In view of the path towards EU accession, there is a tendency towards tax harmonisation with EU levels, but with considerable differences between countries. For this study it has been assumed that tax reforms will be largely completed by 2010 in advanced candidate countries, given that they are expected to join the EU in 2004. For other candidate countries they will be completed somewhat later to avoid price shocks within a short period of time.

3.1.4. Policy Assumptions

The Baseline scenario assumes that candidate countries will gradually implement current EU policies, albeit at a differing pace, according to each country's attainment of the acquis communautaire and overall convergence towards EU standards. For Norway and Switzerland the core assumption is that these countries follow their own policy plans as well as the overall trends of EU Member States set out in relevant EC Directives.

Hence, the Baseline scenario takes into account the following general factors:

- Restructuring of the sectoral pattern of economic growth, which gradually shifts away from traditional energy intensive sectors towards high value added activities, thereby improving energy intensity.
- Technological progress, induced both by economic growth and modernisation of installations in all sectors, thereby improving efficiency of the energy system.
- Continuation of energy efficiency policies including ongoing reform of energy prices and taxes.
- Changes in primary energy production patterns in many candidate countries, characterised by closure of unprofitable coal mines in the 1990s and which are expected to continue over the next few decades.
- The effects from restructuring due to liberalisation of electricity and gas markets in candidate countries to attain compliance with EC directives in the medium or, in some cases, the long term.
- Restructuring in power and steam generation, which is encouraged by mature gas-based power generation; this technology is efficient, involves low capital costs and is flexible regarding plant size, co-generation and independent power production.
- Energy policies that promote renewable energy (wind, small hydro, solar energy, biomass and waste), involving e.g. subsidies on capital costs, in an attempt to follow similar trends in EU countries.

Table 3-6: International price assumptions for the baseline.

	Average border prices in CCN ($00/boe)					*annual growth rate*			
	1990	2000	2010	2020	2030	1990-2000	2000-2010	2010-2020	2020-2030
Crude oil	27.9	28.0	20.1	23.8	27.9	0.03	-3.27	1.74	1.59
Natural gas	15.6	15.5	16.8	20.6	23.3	-0.06	0.80	2.06	1.25
Hard coal	13.1	7.4	7.2	7.0	7.0	-5.60	-0.25	-0.22	-0.01

Source: POLES

- Nuclear policies of each country, in particular the candidate countries' plans concerning nuclear plant refurbishment/closure, as already agreed or under negotiation with the European Commission.[58]

- As regards transportation, in the case of passenger cars the agreements of the European Commission with the automobile manufacturer associations (ACEA, JAMA and KAMA respectively)[59]are assumed to take effect in candidate countries too. Even so, differentiation among countries was necessary because of their different rate of convergence to EU legislation and the diverse national regulations concerning indigenous production of new vehicles as well as imports of used vehicles, which affect assumptions about average fuel economy of new registrations.

- For biofuels in transportation it was assumed that all countries follow EU rules sooner or later. The impact of blending gasoline and diesel with biofuels on final consumer prices was assumed to be negligible, since higher fuel production costs will probably be offset by tax reductions on these fuel blends.

3.1.5. Other assumptions

The assumptions of the Baseline scenario for candidate and neighbouring countries as regards environmental policy issues, discount rates and capacity expansion and decommissioning plans are in line with those adopted for EU Member States.

3.2. Baseline scenario results[60]

3.2.1. Main Findings

Restructuring of the CEEC economies in the 1990s had major impacts on their energy system. Primary energy needs in candidate and neighbouring countries declined between 1990 and 2000 at -1.1% pa compared to an increase of GDP by 1.8% pa. Economic and structural reforms, combined with more efficient use of energy, were the key drivers for the substantial improvement of energy intensity (expressed as primary energy demand per unit of GDP) for candidate and neighbouring countries by 2.9% pa in 1990-2000. However, in 2000 energy intensity for CCN countries was still more than twice that in the EU. Many CEEC are extremely energy intensive primarily because of their energy use in industry.[61] In terms of energy use per capita, some of these countries[62] consume more energy than some EU countries, despite their per capita GDP being often only a fraction of that of EU countries. Thus, in principle, the rapid economic growth assumed to occur over the outlook period in candidate countries could occur with limited growth in overall energy demand.

Energy related CO_2 emissions in CCN countries[63] fell by 1.9% pa between 1990 and 2000, implying that the carbon intensity (-0.8% pa in 1990-2000) of the CCN countries' energy systems has also improved significantly. Changes in the fuel mix were the key driver for this improvement.

Under Baseline assumptions primary energy demand in CCN countries increases by 1.4% pa in 2000 to 2030 compared to 3.3% for GDP, implying the energy intensity of the CCN countries' energy systems improves by 1.9% pa in 2000-2030. CO_2 emissions in the corresponding period are projected to grow by 1.3% pa with carbon intensity gains limited to 0.1% pa (see Figure 3-2).

Modernisation and restructuring away from energy intensive activities, energy efficiency improvements and more rational use of energy lead to strong decoupling between energy demand and economic growth in CCN countries. But despite significant changes in the fuel mix on the demand side, high growth of ener-

58 Nuclear policy assumptions of Central and Eastern European countries were drawn from the information contained in the 2001 Regular Reports from the Commission on Progress towards Accession, 13 November 2001 (http://europa.eu.int/comm/enlargement/report2001/index.htm). It is assumed that Bulgaria's Kozloduy 1-4 reactors will be closed before 2010 and reactors 5-6 upgraded; the Czech Republic's two Temelin reactors will be in full operation in 2003 and the Dukovany plant will be upgraded; Hungary's Paks plant will be upgraded and remain operational until it reaches a 40-year lifetime; Lithuania's Ignalina reactors 1 and 2 will be shut in 2004 and 2009 respectively; Romania's Cernavoda unit 2 will operate shortly after 2010; Slovakia's Mochovce 1 and 2 reactors will be in full operation by 2005 and Bohunice V1 close according to schedule in 2006 and 2008, whereas Bohunice V2 units will shut by 2025, when they reach their 40-year lifetime; Slovenia's Krško plant will stay in operation according to its assumed 40 year lifetime; and Switzerland's plants undergo some retrofitting and remain operational for an extended lifetime of 50 years.

59 Idem 19.

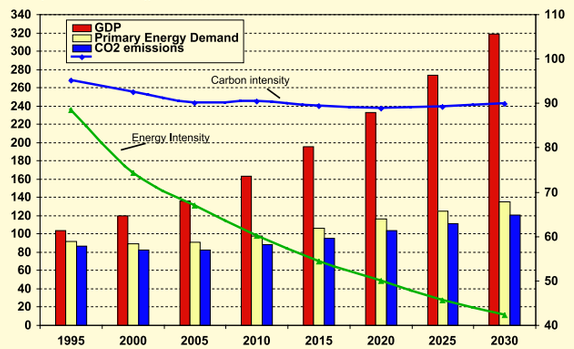
60 Aggregate results for CCN and ACC regions as well as by country can be found in Appendix 2.

61 It is important to note that there are significant problems with GDP estimates based on market exchange rates for Central and Eastern European countries. These generally underestimate economic activity leading to an overestimate of energy intensity. If GDP expressed in purchasing power parities is used, then energy intensity for CCN countries is some 1.35 times higher than the EU average.

62 World Bank, Economic Reform and Environmental Performance in Transition Economies, Technical Paper 446, p.6 estimates that in 1990 the "excess" energy consumption (i.e. the difference between "expected" consumption based on the level of development of a country and actual consumption as a percentage of total consumption) was more than 70% in Bulgaria and the Slovak Republic, more than 60% in Poland and more than 50% in Hungary.

63 It should be noted here that, as in the PRIMES model, in the ACE model aviation includes both national and international flights. Consequently total CO2 emissions from aviation are accounted for at the level of each country.

Figure 3-2: CCN countries primary energy indicators (index 1990=100), 1990-2030



Source: ACE

gy demand in the transport sector and the relatively higher cost effectiveness of coal in power generation do not allow significant gains in the carbon intensity of CCN countries' energy systems.

3.2.2. Primary Energy Needs

Despite the significant decline of primary energy needs in CCN countries in the last decade, indigenous production of primary energy grew by 1.6% pa in 1990-2000. The rapid expansion of crude oil and natural gas production in Norway was the main driver for this. Crude oil production rose by 6.1% pa between 1990 and 2000 while that of natural gas reached 1.6% pa. The energy sector in CEEC was seriously affected by restructuring, replacement of obsolete equipment and closure of unprofitable facilities. Solid fuels production declined by -2.7% pa, with big reductions occurring in Poland, the Czech Republic and Romania. Primary production of renewable energy forms grew by 3.3% pa, boosted by the rapid increase in the use of biomass to replace solids.

Table 3-7 shows the outlook for primary energy production by fuel to 2030. Overall primary energy production in CCN countries peaks in 2010 and declines thereafter. Crude oil production decreases continuously after 2000, whereas natural gas production experiences a steady increase; the outlook for both oil and gas is dominated by the projected evolution in Norway.

Solid fuel production in CCN countries is projected to decline to 2030, given competition from imported coal and closure of unprofitable and/or exhausted mines. Indigenous coal production declines by -1.5% pa in 2000-2030, reaching by 2030 under 64% of its level in 2000. Lignite production declines even faster (-2.4% pa or -51% from 2000 levels in 2030) due to the low quality of lignite in some CCN countries.

Nuclear production remains essentially stable at about 28 Mtoe between 2000 and 2020. This is because new plants entering service in the Czech Republic and Romania counterbalance the closure of plants in Bulgaria, Lithuania and Slovakia. Beyond 2020, closure of several plants in Bulgaria, the Czech Republic, Hungary, Slovakia, Slovenia and Switzerland leads to a fall in nuclear production at about 12 Mtoe (-58% from 2000 levels).
Growth of renewable energy sources is expected to slow down to 2010, whilst receiving a significant boost thereafter given policy measures and technological progress. Average annual growth in primary production of renewable energy forms is expected to reach 1.4% pa between 2000 and 2030.

Primary energy demand in CCN declined on average by -1.8% pa between 1990 and 1995 and -0.5% pa between 1995 and 2000. The biggest decline was that of solid fuels, followed by oil and natural gas, while primary energy consumption of nuclear energy and especially renewable energy forms saw some increase. By 2000, solid fuels still dominated consumption in CCN although their share fell from 60% in 1980 to 34%. Oil and gas accounted for 30% and 19% of primary energy consumption in 2000.

As illustrated in Table 3-8, CCN primary energy demand is projected to recommence growing in the first decade of the projection

Table 3-7: Primary production of fuels in CCN countries.

	Mtoe					*Annual growth rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	167.7	127.5	110.5	90.9	74.8	-2.7	-1.4	-1.9	-1.9	-1.8
Hard coal	97.6	70.4	58.5	51.3	46.7	-3.2	-1.8	-1.3	-0.9	-1.4
Lignite	70.1	57.0	52.0	39.6	28.1	-2.0	-0.9	-2.7	-3.4	-2.3
Liquid Fuels	98.4	177.8	172.6	133.6	92.3	6.1	-0.3	-2.5	-3.6	-2.2
Natural Gas	54.0	63.4	93.2	113.1	128.3	1.6	3.9	2.0	1.3	2.4
Nuclear	25.6	28.0	26.4	27.7	11.8	0.9	-0.6	0.5	-8.2	-2.8
Renewable En. Sources	30.5	42.1	45.9	52.4	63.9	3.3	0.9	1.3	2.0	1.4
Total	**376**	**439**	**449**	**418**	**371**	**1.6**	**0.2**	**-0.7**	**-1.2**	**-0.6**

Source: ACE

Table 3-8: Primary energy demand in CCN.

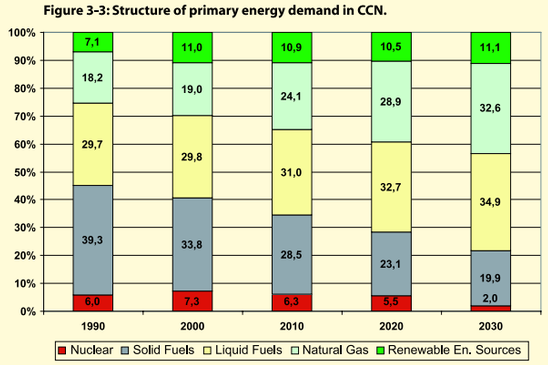
	Mtoe					*Annual growth rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	168	129	120	115	115	-2.6	-0.8	-0.4	0.0	-0.4
Liquid Fuels	127	114	130	163	202	-1.1	1.3	2.3	2.2	1.9
Natural Gas	78	73	101	144	188	-0.7	3.3	3.6	2.7	3.2
Nuclear	26	28	26	28	12	0.9	-0.6	0.5	-8.2	-2.8
Renewable En. Sources	30	42	46	52	64	3.2	0.9	1.3	2.0	1.4
Total	**428**	**382**	**420**	**498**	**577**	**-1.1**	**0.9**	**1.7**	**1.5**	**1.4**

Source: ACE

period (+9.7% in 2000-2010 compared to -10.7% in 1990-2000) and to accelerate further beyond 2010 (+18.8% in 2010-2020, +15.8% in 2020-2030). Natural gas and liquid fuels are the fastest growing fuels. Over the period 2000-2030, natural gas grows more than twice as fast as total primary energy needs; whereas liquid fuels - spurred by the rapid increase of energy needs in the transport sector - are projected to grow by half a percentage point more than total energy. Use of solid fuels continues to fall until 2020 both in absolute terms and as a proportion of total energy demand. However, the decommissioning of nuclear plants during the last decade of the projection period, combined with some loss of competitiveness of gas-based generation due to higher natural gas import prices, lead to a stabilisation in demand for solid fuels beyond 2020. Under Baseline technology assumptions, novel energy forms, such as hydrogen and methanol, do not make significant inroads, primarily due to cost considerations.

The fossil fuel dependence of the CCN energy system is projected to increase in the long run. More specifically the share of fossil fuels increases from 82.7% in 2000 to 87.4% in 2030. Figure 3-3 illustrates the projected change in the structure of gross inland consumption. The use of solid fuels decreases continuously over the forecast period, and their share in primary demand declines from over 39% in 1990 and 34% in 2000 to 20% by 2030. This occurs to the advantage of natural gas, which, spurred by its penetration in new power generation plants and in final demand, increases its market share by some 14 percentage points to approach 33% of primary energy consumption in 2030. Liquid fuels are also projected to experience some significant gains with their share reaching 35% of primary energy needs in 2030. By 2010, liquid fuels become the most important energy carrier in the CCN energy system, and remain so over the projection period.

Figure 3-3: Structure of primary energy demand in CCN.



Source: ACE

The share of nuclear energy in the CCN falls to just 2% in 2030 compared to 7.3% in 2000, following decommissioning of existing nuclear power plants and the absence of new nuclear investment except that already decided. The share of renewable energy forms is projected to exhibit a limited decline to 2020 compared to 2000 levels, mainly because of the shift away from the use of biomass in final energy use. However, further exploitation of renewable energy forms in power generation is projected to occur in the long run, driven by promoting policies and technological maturity. By 2030, their share in primary energy needs rises just above that in 2000 (11.1% in 2030 compared to 11% in 2000).

Following the significant decline of primary energy needs between 1990 and 2000, and rapid exploitation of indigenous resources in Norway, CCN became a net exporter of energy both in 1995 and 2000 while in 1990 it was a net importer. Import dependency declined from +12.9% in 1990 to -14.8% in 2000. However, given increasing energy demand, declining production of solid fuels, and lower production of oil in Norway, beyond 2015 CCN is projected to become again a net importer of energy with import dependency reaching 36.2% in 2030 – see Table 3-9.

Import dependency for solid fuels is projected to reach 34.8% in 2030 (from -1.5% in 2000). As for oil, the expected decline of crude oil production in Norway, combined with the increasing demand for liquids projected to occur to 2030, lead to higher import dependency for liquids (55.2% compared to -52.1% in 2000 – when CCN was a net oil exporter). In contrast import dependency

Table 3-9: Import dependency in CCN.

	%				
	1990	**2000**	**2010**	**2020**	**2030**
Solid fuels	-0.7	-1.5	7.6	21.0	34.8
Liquid fuels	25.3	-52.1	-30.0	19.6	55.2
Natural gas	31.7	13.0	7.8	21.5	31.7
Total	12.9	-14.8	-6.2	16.8	36.2

Source: ACE

for natural gas remains at relatively lower levels (31.7% in 2030 compared to 13% in 2000) mainly because of the increasing exploitation of Norwegian natural gas resources.

3.2.3. Final Energy Demand projections

CCN final energy demand decreased by -2.6% pa on average in 1990-1995. The decline was less pronounced in the second part of the nineties (-0.6% pa in 1995-2000). This rapid decrease in the early 1990s arose from the slowdown of economic activity in CEEC, the massive closure of old energy-inefficient factories and the progressive alignment of energy prices to world energy market levels. Between 1995 and 2000, while CCN GDP increased by 16%, the improvement of energy intensity led to further decline in final energy demand, demonstrating the large energy saving potential of CEEC. Implied intensity gains on the demand side (expressed in terms of energy consumption per unit of GDP) reached 3.4% pa in the 1990s.

Final energy demand in the Baseline scenario grows by 63% in 2000-2030, while CCN primary energy needs grow by 51% in the same period. This differential reflects the significant improvements in conversion efficiency for power generation projected to occur in the CNN energy system.

Table 3-10 illustrates the evolution of the different demand sectors of the CCN energy system under Baseline assumptions. Energy demand in industry between 1990 and 2000 declined at a rate of -3.5% pa while sectoral value added increased by 2.5% pa, i.e. intensity gains in the sector reached 5.8% pa. A further decline (by -0.4% pa) is projected to occur to 2010, reflecting the large potential for intensity gains as well as the further shift towards less energy intensive processes. Beyond 2010, industrial energy demand grows by slightly above 0.8% pa. The sector exhibits marked intensity gains of some 2.7% pa over the projection period, driven both by structural changes but also by the exploitation of energy saving options, especially as regards changes in the fuel mix.

Energy demand in the household and tertiary sectors also declined significantly in the last decade. The impact of restructuring of CEEC was much more pronounced in the **tertiary** sector with energy demand declining by -2.1% pa in 1990-2000, while sectoral value added grew by 1.8% pa - clearly reflecting the great inefficiencies in the past[64]. Further restructuring of the CCN economy towards services, combined with increasing comfort standards, is projected to boost energy demand over the projection period (+1.9% pa in 2000-2030). Energy intensity in the tertiary sector is expected to improve by 1.9% pa in 2000-2010 (compared to 3.9% pa in 1990-2000), further decelerating in the long run (1.8% pa in 2010-2020 and 1.1% pa in 2020-2030).

Energy demand in the **household sector** declined by -0.6% pa in 1990-2000. However, in the same period the population in CCN increased by 0.6% pa, implying a reduction in consumption per capita by -1.1% pa. More rational use of energy, changes in the fuel mix and replacement of inefficient equipment, were the main explanatory factors. Under Baseline assumptions energy demand in households is projected to grow by 1.2% pa in 2000-2010, accelerating to 1.7% pa in 2010-2020, but decelerating afterwards to 1.5% pa in 2020-2030. The implied energy intensity improvement[65] remains significant over the projection period (-1.8% pa in 2000-2030 compared to -2.3% pa in 1990-2000). This rate is perhaps optimistic, but reflects the huge potential for more rational

Table 3-10: Final energy demand in CCN by sector.

	Mtoe					*Annual growth rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Industry	122.7	86.4	82.9	91.0	98.2	-3.5	-0.4	0.9	0.8	0.4
Domestic	119.6	106.8	121.2	145.4	173.4	-1.1	1.3	1.8	1.8	1.6
Tertiary	44.4	35.7	41.1	50.1	62.9	-2.1	1.4	2.0	2.3	1.9
Households	75.2	71.0	80.2	95.3	110.5	-0.6	1.2	1.7	1.5	1.5
Transport	46.9	53.4	70.7	98.5	129.6	1.3	2.8	3.4	2.8	3.0
Total	**289**	**247**	**275**	**335**	**401**	**-1.6**	**1.1**	**2.0**	**1.8**	**1.6**

Source: ACE

64 Idem 27.

65 Energy intensity in households is computed using per capita income as the denominator.

use of energy. Saturation effects in some end uses such as space heating, water heating and cooking, especially in the long run, and changes in the fuel mix towards use of natural gas and electricity, are also of major importance.

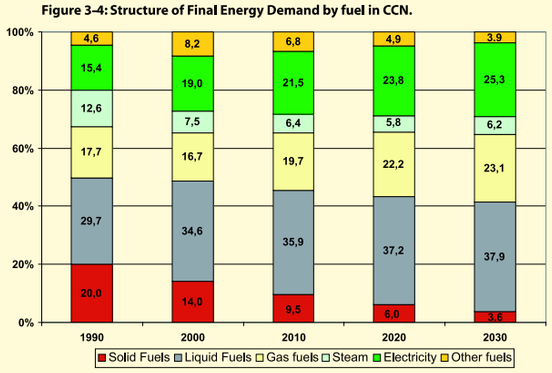
The **transport sector** was the only CCN final demand sector that exhibited growth between 1990 and 2000 (+1.3% pa). The sector represented some 22% of final energy demand in 2000 compared to 16% in 1990. Increasing transport activity, combined with changes in consumers' behaviour (increasing income leads to higher car ownership ratios and a shift away from public transport), were the key drivers. The transport sector is projected to remain the fastest growing segment of the demand side over the projection period (+3.0% pa in 2000-2030). By 2030, transportation accounts for almost a third of CCN final energy consumption.

Lower energy demand during the last decade affected **energy forms** in different ways. Demand for solid fuels declined by some 40% in 1990-2000 given the huge reduction in direct uses for steam and heat production in all sectors, the shift to more efficient energy forms and the marked slowdown in steel production. To a significant extent, solid fuels in direct uses were replaced by biomass and waste, demand for which rose by 50% and 10% respectively. Gas consumption was influenced by new supply arrangements imposed by Russia upon CEEC, which invoiced its supplies at world market prices instead of the special conditions prevailing before 1990. Consequently, between 1990 and 2000, gas consumption fell by 20%. The biggest reduction was for distributed heat (-50% in 1990-2000) given industrial restructuring but also reduction of previously very inefficient use of this energy form in CEEC as subsidies were reduced. Finally, despite the significant downward pressures in industrial sectors, electricity demand increased by 5% in 1990-2000.

As regards future fuel needs, liquid fuels remain the main energy carrier in the CCN energy demand sectors over the projection period (see Table 3-11). However, the annual growth rate in transportation energy demand is actually higher than that for liquid fuels over the projection period (+3% pa for energy demand in transport compared to +2% pa for liquids demand in 2000-2030). Thus oil consumption in all other demand sectors experiences a strong decline. By 2030 solid fuels become an obsolete energy form for most end-users. The change of the fuel mix on the demand side in favour of electricity is projected to continue to 2030, whereas demand for natural gas and steam is projected to grow significantly. Demand for natural gas increases by 2.7% pa in 2000-2030, steam by 1.0% pa and electricity by 2.6% pa.

Cost considerations are the main factor limiting penetration of novel final energy forms, such as hydrogen and ethanol, under Baseline assumptions. Demand for biomass and waste is projected to decline over the projection period due to the fall in the number of rural households, the major users of wood. Other renewable energy forms, such as solar energy used in water

Figure 3-4: Structure of Final Energy Demand by fuel in CCN.



Source: ACE

Table 3-11: Final energy demand in CCN by fuel.

	Mtoe					*Annual growth rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	57.9	34.6	26.2	20.2	14.6	-5.0	-2.8	-2.5	-3.2	-2.8
Liquid Fuels	85.8	85.2	98.8	124.6	152.0	-0.1	1.5	2.3	2.0	2.0
Gas fuels	51.2	41.3	54.2	74.4	92.7	-2.1	2.8	3.2	2.2	2.7
Steam	36.3	18.4	17.7	19.5	24.9	-6.6	-0.4	1.0	2.5	1.0
Electricity	44.5	46.8	59.2	79.8	101.4	0.5	2.4	3.0	2.4	2.6
New fuels (hydrogen etc.)	0.0	0.0	0.0	0.3	0.4	-	-	25.7	5.1	-
Biomass	12.6	18.9	17.4	14.3	11.7	4.1	-0.8	-2.0	-2.0	-1.6
Waste	0.7	0.7	0.7	0.6	0.5	1.0	-0.7	-1.8	-1.7	-1.4
Other renewables	0.1	0.6	0.6	1.4	2.9	19.9	-0.3	9.0	7.6	5.4
Total	**289**	**247**	**275**	**335**	**401**	**-1.6**	**1.1**	**2.0**	**1.8**	**1.6**

Source: ACE.

heaters, grow quite rapidly (5.4% pa in 2000-2030) but remain insignificant in overall final consumption.

The decline of solid fuels in final energy uses (their share falls from about 14% in 2000 to less than 4% in 2030) follows the established pattern of economic development, in which solid fuels are replaced by 'cleaner' energy forms. The shares of gas and electricity rise to 23.1% and 25.3%, respectively, by 2030. Many of the CCN countries already use steam quite extensively in final energy demand. The share of steam is expected to continue declining up to 2020 (due to closure of old district heating plants) and then to rise to 2030 because of increasing use of steam from co-generation plants. The share of oil is projected to rise, up to 38% by 2030, mainly because of growth in transportation.

3.2.3.1. Energy demand in industry

In most CCN countries, industrial energy demand declined dramatically between 1990 and 2000 as much heavy industry closed or worked much below capacity. The high share of **industry** in final energy demand, compared to other industrialised countries, reflects the predominance of heavy industries based on old technologies inherited from the centrally planned regime. Recent changes result from the modernisation of industrial processes and diversification to industries with higher added values. This evolution was sustained by privatisation of state companies and impressive foreign investment. Nevertheless in 2000 the energy intensity of industry in CCN remained over twice that in the EU, demonstrating the large potential for energy savings and continuing reduction of industry's share in final energy consumption.

Modernisation of all industrial sectors is assumed to continue over the next thirty years while new industrial activities with high value added and lower material base develop faster than traditional energy intensive industrial branches. For reasons of data availability, only three industrial sectors are examined for CCN, namely iron and steel, chemicals and other industries. Industrial value added is projected to grow by 3.2% in 2000-2030 (2.5% pa in 1990-2000). Growth of the iron and steel sector is 1.6% pa (2.3% pa in 1990-2000), with the sector accounting for 1.7% of industrial value added in 2030 compared to 2.7% in 2000. Chemicals are projected to exhibit the most pronounced growth (+3.9% in 2000-2030 from +2.9% in 1990-2000), accounting for 13.7% of industrial value added in 2030 (11.4% in 2000). Other industries, including a large variety of divergent manufacturing processes such as non-metallic minerals production, paper and pulp production, non-ferrous metals production (all of which are energy intensive ones), but also food, drink, tobacco, textiles, engineering and others (which are less energy intensive), grow at a rate of 3.2% pa in 2000-2030 (2.4% pa in 1990-2000). It is obvious that other industries, as defined in this study of CCN, represent the bulk of industrial activity (85.8% of industrial value added in 2000, and 84.5% in 2030).

In iron and steel there is huge potential for energy savings. Energy intensity (energy consumption per unit of value added) in 2000 was 2.7 times higher than in the EU. This is reflected in the evolution of sectoral energy demand, which declines to 2020 with limited growth thereafter (see Table 3-12). Energy demand in the iron and steel industry declines by -0.8% pa in 2000-2030 with implied intensity gains reaching 2.3% pa compared to 5.6% pa in 1990-2000. By 2030 the energy intensity of the iron and steel industry in CCN remains 1.6 times above that of the EU.

Following a large decline in 1990-2000 energy demand in the chemical sector grows at an accelerated pace over the projection period (+0.6% pa in 2000-2030). Efficiency improvements combined with a shift towards less energy intensive products allow for intensity gains of 3.1% pa between 2000 and 2030 (from 7.4% pa in 1990-2000). However, by 2030 energy intensity in chemical industries remains 23% higher than those in the EU (from 100% in 2000).

Energy demand in other industries remains stable to 2010, then exhibiting significant growth in 2010-2020 that however slows down thereafter. Average demand growth in 2000-2030 is projected at +0.7% pa with intensity gains of 2.4% pa. Despite the significant intensity improvements projected to occur in CCN industry under Baseline assumptions (2.7% pa in 2000-2030) the sector remains significantly more energy intensive than that in the EU. By

Table 3-12: Final energy demand by sector in Industry for CCN.

	Mtoe					*Annual growth rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
iron and steel	27.8	19.5	15.5	14.8	15.4	-3.5	-2.3	-0.4	0.3	-0.8
chemicals	22.2	13.8	14.3	15.4	16.8	-4.6	0.3	0.8	0.9	0.6
other industries	72.7	52.9	53.2	60.8	66.1	-3.1	0.1	1.3	0.8	0.7
Total	**122.7**	**86.4**	**82.9**	**91.0**	**98.2**	**-3.5**	**-0.4**	**0.9**	**0.8**	**0.4**

Source: ACE.

Table 3-13: Final Energy Demand by Fuel in Industry for CCN

	Mtoe					Annual growth rate (%)				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
solids	30.4	25.4	21.3	18.0	13.6	-1.8	-1.8	-1.6	-2.8	-2.1
liquids	15.4	12.8	12.0	11.1	9.5	-1.9	-0.6	-0.8	-1.6	-1.0
gas	36.3	19.9	19.6	24.0	28.7	-5.8	-0.2	2.1	1.8	1.2
biomass-waste	2.7	4.3	4.2	3.9	3.8	4.6	-0.2	-0.9	-0.1	-0.4
steam (co-generated)	15.1	3.8	3.7	4.2	5.2	-12.9	-0.2	1.4	2.0	1.1
electricity	22.7	20.1	22.2	29.6	37.4	-1.2	1.0	2.9	2.3	2.1
Total	**122.7**	**86.4**	**82.9**	**91.0**	**98.2**	**-3.5**	**-0.4**	**0.9**	**0.8**	**0.4**

Source: ACE

2030 industrial energy intensity is more than 45% higher than the EU (from 115% in 2000).

As regards the **fuel mix** of industrial energy demand in CCN, significant changes are projected to 2030 (see Table 3-13). Between 1990 and 2000 the only energy forms for which consumption in industry increased were biomass and waste (+1.2% pa) mainly in substitution of coal and gas in direct steam uses. Demand for solid fuels (-1.8% pa), liquids (-1.9% pa) and electricity (-1.2% pa) declined at rates below average, while the energy forms strongly affected by the ongoing restructuring of the industrial sector in CEEC declined faster: natural gas (-5.8% pa; for reasons related to changes in pricing mechanisms) and distributed steam (-12.9% pa; mainly due to inefficient use in the past).

In the Baseline scenario demand for solid fuels is projected to decline over the projection period (-2.1% pa in 2000-2030). By 2030 solid fuels account for less than 14% of industrial energy demand compared to 29% in 2000. Consumption of liquid fuels also decreases. Natural gas demand exhibits a limited decline to 2010. Beyond then natural gas is a much more cost-effective option with demand growing at rates well above average. Demand for co-generated steam also grows strongly in the long run. Electricity demand grows consistently faster than overall industrial energy demand, driven by both structural and technological changes. Biomass and waste fuels, used almost exclusively in industrial boilers, exhibit a limited decline over the projection period, as demand for co-generated steam increases. A shift towards less carbon intensive and more efficient energy forms can be clearly identified as regards the outlook of CCN industry.

3.2.3.2. Services and agriculture

The services sector in CCN is still at a rather early stage of development (especially in CEEC) compared to the EU, accounting in 2000 for some 59% of gross value added (68.8% in the EU). Much of future economic growth in CCN originates from the services sector (+3.6% pa in 2000-2030), the share of which in the CCN economy is projected to reach some 63.5% in 2030. Economic growth in agriculture is less pronounced (+2.7% pa) and its share decreases to 5.1% by 2030 from some 6.2% of gross value added in 2000.

Table 3-14: Final Energy Demand in Tertiary Sector for CCN

	Mtoe					Annual growth rate (%)				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
By Sector										
Services	20.5	22.3	29.3	37.3	48.2	0.8	2.8	2.4	2.6	2.6
Agriculture	23.9	13.5	11.8	12.8	14.7	-5.6	-1.3	0.9	1.4	0.3
By Fuel										
solids	7.9	2.3	1.3	0.6	0.3	-11.5	-5.9	-7.9	-6.9	-6.9
liquids	16.1	11.1	9.8	9.3	8.5	-3.6	-1.3	-0.5	-0.9	-0.9
gas	5.0	5.8	9.1	14.0	19.5	1.6	4.6	4.4	3.4	4.1
biomass-waste	0.9	1.2	1.5	2.0	2.2	2.4	2.8	2.4	1.0	2.1
solar energy	0.1	0.0	0.1	0.2	1.2	-7.0	14.3	7.6	17.9	13.2
steam (co-generated)	4.4	2.8	2.8	3.2	4.2	-4.6	0.3	1.2	2.7	1.4
electricity	10.0	12.4	16.4	20.8	27.0	2.3	2.8	2.4	2.6	2.6
Total	**44.4**	**35.7**	**41.1**	**50.1**	**62.9**	**-2.1**	**1.4**	**2.0**	**2.3**	**1.9**

Source: ACE

An important feature of the tertiary sector in CCN, and mainly in CEEC, is its low energy consumption per capita and high energy intensity. Following the restructuring of CEEC economies, energy demand in the services sector increased between 1990 and 2000 by 0.8% pa with intensity gains reaching 1.2% pa, while energy demand in agriculture exhibited a strong decline of -5.6% pa with marked intensity gains of 5.0% pa. Despite this significant progress in the last decade, energy consumption per unit of value added, i.e. energy intensity, in CCN was 1.9 times higher than EU levels in services and more than 2 times higher in agriculture. This illustrates the inefficient use of energy in the CCN tertiary sector but also the potential for further efficiency gains. By 2000, energy consumption per capita in services remained significantly below the corresponding EU levels (120 kgoe per capita compared to 294 kgoe in the EU).

Energy demand in the tertiary sector is projected to increase by 1.9% pa in 2000-2030 (see Table 3-14). Services demand increases at a rate of 2.6% pa with limited intensity gains of 1% pa. Rising comfort standards more than offset efficiency and productivity gains in the sector and, consequently, energy intensity in services by 2030 deviates further from the EU average becoming twice as high (from 1.9 times higher in 2000). Nevertheless, energy consumption per capita in services in CCN remains below EU levels of 2000 (243 kgoe per capita, while in the EU consumption per capita increases to 413 kgoe in 2030). Energy demand growth in agriculture is limited at 0.3% pa with intensity gains of 2.3% pa. By 2030, the CCN agriculture sector comes close to EU levels in terms of energy intensity. A key explanation is that the bulk of agricultural growth comes from Turkey, which, even in 2000, was characterised by energy intensity levels in the sector close to the EU average. Overall energy intensity gains in the tertiary sector reach 40% in 2000-2030.

There are significant changes in the fuel mix to 2030. Electricity demand grows at rates well above average (+2.6% pa in 2000-2030 compared to +2.3% pa in 1990-2000) and by 2030 it accounts for some 43% of energy requirements in the tertiary sector, an increase of 8 percentage points from 2000 levels. Natural gas is the fastest growing fuel in the sector (+4.1% pa in 2000-2030 compared to +1.6% pa in 1990-2000), driven by its comparative advantages (more efficient and less carbon intensive) against solids and liquid fuels, both of which exhibit declining trends over the projection period (-6.9% pa and -0.9% pa, respectively, in 2000-2030). By 2030, natural gas meets 31% of energy needs in the tertiary sector, up from 16% in 2000; solids become an obsolete energy form and the share of liquids is limited to 13.5% (31% in 2000). Energy demand for biomass, mainly consumed in agriculture, also increases at rates above average (+2.1% pa in 2000-2030) replacing solid fuels. Following closure of old district heating plants, substituted by advanced co-generation units, and improvements in the steam distribution networks, demand for distributed heat is also projected to grow at rates above average in the long run (+1.4% pa in 2000-2030). Finally, solar energy, though growing at very high rates (+13.2% pa in 2000-2030) remains insignificant in absolute terms.

3.2.3.3. Households sector

As in the tertiary sector, households in CCN are characterised by inefficient use of energy and are far from desired comfort standards. This, of course, is not the case for countries such as Norway and Switzerland but clearly reflects the current situation in CEEC. In 1990, energy intensity in CCN (expressed as energy consumption per unit of income) was 1.9 times higher than the EU average, while consumption per capita did not exceed 70% of the corresponding EU level.

Between 1990 and 2000 energy demand in households declined by -0.6% pa while the growth in population was close to 0.6% pa, implying a reduction of energy consumption per capita by -1.1% pa. This was largely caused by increasing tariffs to reflect the real price of energy that led to energy intensity gains in households of 2.3% pa in 1990-2000. However, energy intensity in CCN remained some 70% higher than in the EU, while energy consumption per capita was limited to 62% of the EU average in 2000.

Low per capita use is due to relatively small dwellings, large household size and limited use of appliances in CEEC; these factors are expected to change significantly over the outlook period. A reason for larger households in CEE in the past was the scarcity of dwellings. Over the outlook period the overall number and space of dwellings is assumed to rise significantly with high economic growth and decreasing household size.

These factors suggest a large increase in household energy demand, but the savings potential stemming from current, highly inefficient, use of energy in buildings will moderate future energy needs. The main reasons for inefficient use of energy are poor distribution infrastructures (especially for distributed heat), poor energy characteristics of buildings and lack of incentives to use energy rationally. It is projected that energy use in households will become substantially more efficient – although it will not have reached EU levels even by 2030. As a result energy demand in households grows at rates below those of total final demand (+1.5% pa in 2000-2030 compared to +1.6% pa). The implied energy intensity improvement of 1.8% pa is optimistic, though lower than that of the recent past. Energy demand per capita is projected to increase by 1.2% pa, reaching 74% of corresponding consumption in the EU. As a result the sector is projected to account for 27.5% of CCN final energy demand in 2030.

Table 3-15: Final Energy Demand by Fuel in Households for CCN

	Mtoe					*Annual growth rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
solids	19.4	6.9	3.6	1.6	0.7	-9.9	-6.2	-7.7	-7.7	-7.2
liquids	9.3	9.3	7.9	8.1	7.7	0.0	-1.6	0.3	-0.5	-0.6
gas	9.9	15.5	25.5	35.9	43.8	4.6	5.1	3.5	2.0	3.5
biomass-waste	9.6	14.2	12.4	9.0	6.2	4.0	-1.4	-3.1	-3.7	-2.7
solar energy	0.0	0.5	0.5	1.2	1.7	32.0	0.1	9.4	3.9	4.4
steam (co-generated)	16.8	11.8	11.2	12.0	15.5	-3.4	-0.6	0.7	2.6	0.9
electricity	10.2	12.9	19.2	27.5	34.8	2.4	4.1	3.7	2.4	3.4
Total	**75.2**	**71.0**	**80.2**	**95.3**	**110.5**	**-0.6**	**1.2**	**1.7**	**1.5**	**1.5**

Source: ACE

As shown in Table 3-15, the use of solid fuels declines sharply over the next 30 years (-7.2% pa). Demand for biomass, which between 1990 and 2000 increased by 4% pa mainly in replacement of solid fuels, is also projected to experience a large fall to 2030 (-2.7% pa). This decline becomes more pronounced in the long run and is strongly related to fall in the number of rural households. Consumption of liquids (-0.6% pa) is also affected by the projected fuel switching in heating uses. Substitution by natural gas (+3.5% pa in 2000-2030) will continue over the projection period, whilst decelerating in the long run. Beyond 2010, and especially in the long run, distributed heat is also projected to make a strong come back, growing by 0.9% pa in 2000-2030. Electricity demand, driven by increasing income and the further use of electric appliances in households, also exhibits rapid growth to 2030 (+3.4% pa). By 2030 some 40% of household energy needs are met by natural gas (22% in 2000) and 31.5% by electricity (18% in 2000).

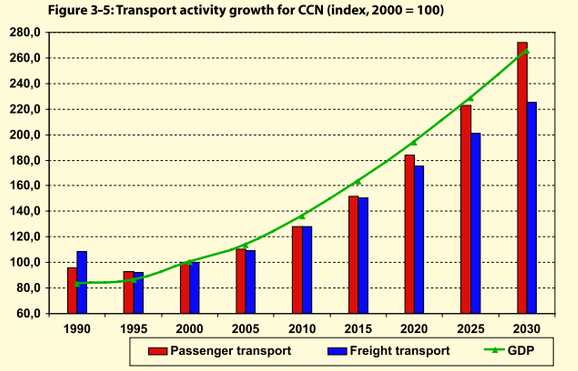
3.2.3.4. Transport sector

Transport is the fastest growing energy consuming sector worldwide. In CCN, and specifically in CEEC, the transport sector has been characterised by limited private mobility, extensive use of subsidised public transportation, obsolete infrastructures and inefficient use of freight capacity. The economic reforms of the 1990s led to a large increase in private car ownership (although the use of cars has not followed the same trend) and a decline in public transport. In freight transportation CCN has relied heavily on rail transport, reflecting planning choices in the past as well as a large share of bulk transport associated with heavy industries that dominated production. However, freight traffic also experienced significant restructuring in 1990-2000, with trucks overtaking rail in importance, although use of both modes decreased considerably in the early 1990s due to negative economic growth.

The continuation of both trends mentioned above, i.e. further increase in private cars ownership and higher share of road transportation in freight, will play a predominant role in the evolution of transportation energy demand in CCN. Improved road networks, partly through EU financing of major European corridors, will also facilitate growth in road transport activity. Finally, a significant contributor to future freight energy demand in CCN countries will be the growth in international trade these countries experience.

The outlook for total transportation activity, along with GDP, which is the main driver of passenger and freight mobility, is presented in Figure 3-5. Structural shifts in the CCN economies towards services and high value added industries (characterised by low freight intensity) give rise to some decoupling between freight transport activity and GDP. Freight transport activity grows by 2.7% pa in 2000-2030 and GDP by 3.3% pa. Passenger transport activity, strongly influenced by population and economic growth in Turkey, is projected to grow as fast as private income in the long run. Energy related transport activity per capita is projected to reach 12447 km in 2030 compared to 4924 km in 2000. Despite this rapid growth, even in 2030, transport activity per capita in CCN remains below the 2000 level in the EU (13261 km per capita).

Figure 3-5: Transport activity growth for CCN (index, 2000 = 100)



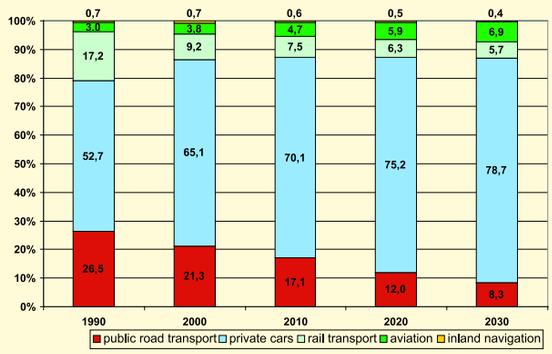
Source: ACE

Figure 3-6 depicts the projected structure of **passenger transport** activity. Private cars and aviation experience the strongest growth in passenger transport; the share of cars and motorcycles rises from 65.1% in 2000 to 78.7% in 2030, and that of aviation from 3.8% in 2000 to 6.9% in 2030. Air transport has the fastest growth rates throughout the outlook period (+5.5% pa in 2000-2030), whereas growth in passenger kilometres of cars reaches 4% pa. Following a substantial decline in the 1990s (from 17.2% of passenger transport activity in 1990 to 9.2% in 2000) rail transport activity is projected to grow by 1.8% pa. By 2030, the rail share in passenger transport further decreases to 5.7%. Public road transport activity is projected to remain rather stable over the projection period (+0.2% pa), and, consequently, the share in passenger transport activity decreases from 21.3% in 2000 to 8.3% in 2030.

As illustrated in Figure 3-7, **freight transportation** is projected to change considerably in future, with road gaining significant market shares at the expense of rail: the share of trucks rose from 47.4% in 1990 to 63.4% in 2000 and rises to more than 80% in 2030. Rail transport, although still increasing in absolute terms after a significant decline in the 1990s (+0.5% pa in 2000-2030), falls from 45% of total freight transport in 1990 to 27.3% in 2000 and 13.8% by 2030.

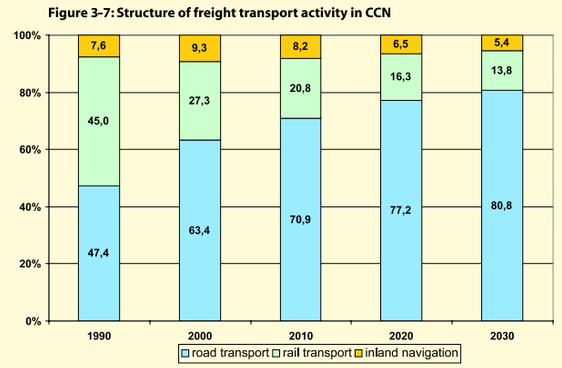
Transportation energy demand is projected to be the fastest growing segment of final energy demand. As shown in Table 3-16, its growth for the CCN as a whole is expected to average 3.0% pa in 2000-2030 from 1.4% in 1990-2000. As in the EU, oil products maintain their almost complete dominance. In 2000, total transport energy demand (excluding marine bunkers) accounted for 21.7% of CCN final energy demand compared to only 16.2% in 1990. This share is projected to continue to rise, reaching 32.3% in 2030.

Figure 3-6: Structure of passenger transport activity in CCN.



Source: ACE

Figure 3-7: Structure of freight transport activity in CCN



Source: ACE

Table 3-16: Energy demand in the transportation sector for CCN.

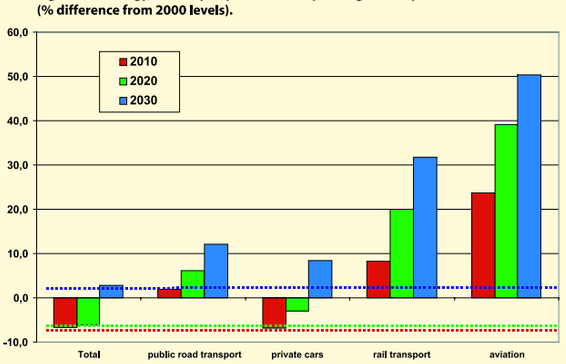
	Mtoe					*Annual growth rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
liquid fuels	45.0	52.0	69.1	96.1	126.3	1.5	2.9	3.3	2.8	3.0
liquified petroleum gas	0.0	2.4	1.6	1.0	0.8	66.5	-4.2	-4.0	-2.8	-3.7
gasoline	22.7	23.3	32.7	46.6	62.9	0.2	3.5	3.6	3.0	3.4
of which mixed biofuels	0.0	0.0	0.1	0.4	1.3	-	-	9.7	13.4	-
kerosene	4.3	5.3	6.5	9.4	13.1	2.1	2.0	3.7	3.4	3.1
diesel oil	17.1	20.8	28.2	38.9	49.4	2.0	3.1	3.3	2.4	2.9
of which mixed biofuels	0.0	0.0	0.1	0.3	1.1	-	-	14.8	15.0	-
other petroleum products	0.8	0.2	0.1	0.2	0.1	-12.4	-3.3	0.2	-0.1	-1.1
natural gas	0.0	0.0	0.0	0.4	0.6	1.3	11.8	25.0	5.3	13.7
methanol - ethanol	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
liquified hydrogen	0.0	0.0	0.0	0.3	0.4	-	-	25.7	5.1	-
electricity	1.7	1.4	1.5	1.9	2.2	-1.6	0.6	2.1	1.8	1.5
Total	**46.6**	**53.4**	**70.7**	**98.5**	**129.6**	**1.4**	**2.8**	**3.4**	**2.8**	**3.0**

Source: ACE

The strong shift towards private passenger transport activity, and the assumed decline of average load factors for private cars[66] , leads to rapid growth in gasoline demand by 3.4% pa in 2000-2030. Kerosene demand also increases strongly (+3.1% pa in 2000-2030) driven by projected growth in air transport activity. Increasing energy requirements of trucks, predominantly reliant on diesel engines, leads to diesel oil demand growth of 2.9% pa. Rail electrification is the key driver for growth of electricity demand by 1.5% pa in the transport sector.

Consumption of energy in transportation would grow much faster in the absence of technological progress. Figure 3-8 shows the variation in energy intensity in CCN to 2030 compared to the 2000 levels. Lower occupancy rates in private cars, combined with rapid growth of car use, more than offset technological progress to 2010 with energy intensity[67] of private cars (fuel consumed per passenger kilometre) increasing by 0.7% pa in 2000 to 2010 (compared to 1.2% pa observed between 1990 and 2000). This trend is comparable to that seen in the last decade in North America and Western Europe, where increasing safety and comfort standards in passenger cars, combined with purchases of bigger vehicles on average, have hindered further improvements in overall fuel economy. Beyond 2010, and as modernisation of the car stock accelerates (due to increasing private income) and the effects of the fuel efficiency agreement with the car industry materialise, energy intensity of private cars exhibits a significant improvement, especially in the long run (0.4% pa in 2010-2020, 1.2% pa in 2020-2030). Overall efficiency in private cars improves some 8.5% between 2000 and 2030.

Figure 3-8: Energy intensity improvement in passenger transport for CCN (% difference from 2000 levels).



Source: ACE

All other passenger transport modes exhibit much higher efficiency gains over the projection period. Rail electrification leads to an intensity improvement of some 20% by 2020 with additional progress in 2020-2030 of 12 percentage points. Similarly the increasing aircraft needs, combined with replacement of the old aircraft fleet by new more efficient planes, leads to an energy intensity improvement of some 39% to 2020, just exceeding 50% in 2030. For public road transport and inland navigation improvements in energy intensity are less pronounced and result from replacement of equipment and technological progress. Overall energy intensity affected by the strongly rising number of private cars but also by the high growth of aviation worsens by 6.5% in 2010 and 6% in 2020 from 2000 levels. It is only by 2030 that some energy intensity gains in passenger transport are projected to occur in CCN (-3% from 2000 levels).

Efficiency improvements[68] in freight transport (-7% in 2000-2030) are more pronounced than those for passenger traffic despite the strong shift towards road freight, which is a much more energy intensive than rail freight. However, the replacement of the vehicle stock and issues related to better management of truck trips (improved load factors etc.) allow for energy intensity gains in road freight transport of 13% between 2000 and 2030 (compared to 8% in 1990 to 2000). Finally, as in the case of passenger transport, the electrification of the rail network allows for a significant energy intensity improvement of 35% in 2000-2030 for rail freight activity.

3.2.4. Electricity and steam generation

Electricity demand in CCN declined by 0.8% pa in 1990-1995. However, in 1995 to 2000, this trend was reversed and electricity demand increased on average by 1.8% pa. Higher electricity use in most sectors is due to the improvement of economic conditions in CCN over the projection period, leading to higher penetration of electrical appliances in households and services. Electrification is also related to the favourable characteristics of electricity, such as controllability, precise measurement, cleanliness at the point of use and concentration of useful energy.

As shown in Table 3-17, electricity demand is expected to expand by 2.4% pa in 2000-2030, and its growth will be especially rapid in the residential and tertiary sectors. The CCN energy system is characterised by significant electricity exports, mainly because of the large hydro potential of Norway. Net electricity exports are projected to exhibit a limited decline, especially in the long run.

66 Average occupancy rates in the range of 2.3-2.6 passengers per car, which were recorded in most CEE countries in the 1990s, are assumed to decrease gradually to 1.7-1.8 passengers per car by 2030.

67 Idem 36.

68 Idem 39.

Table 3-17: Electricity requirements by sector in CCN.

	TWh					Annual growth rate (%)				
	1995	2000	2010	2020	2030	95/00	00/10	10/20	20/30	00/30
Industry	227	233	258	344	434	0,6	1,0	2,9	2,3	2,1
Tertiary	116	145	190	242	314	4,5	2,8	2,4	2,6	2,6
Households	138	149	223	319	405	1,7	4,1	3,7	2,4	3,4
Transports	17	17	18	22	26	-0,7	0,6	2,1	1,8	1,5
Energy sector	78	77	95	125	151	-0,1	2,1	2,8	1,9	2,3
Trans. and distr. Losses	75	82	104	141	179	1,9	2,4	3,1	2,4	2,6
(Net imports)	-16	-46	-40	-43	-34	23,4	-1,3	0,7	-2,4	-1,0
Total	**666**	**749**	**928**	**1236**	**1543**	**2,4**	**2,2**	**2,9**	**2,2**	**2,4**

Source: ACE

Table 3-18: Steam demand by sector in CCN.

	TWh					Annual growth rate (%)				
	1995	2000	2010	2020	2030	95/00	00/10	10/20	20/30	00/30
Industry	95	44	43	49	60	-14,3	-0,2	1,4	2,0	1,1
Tertiary	38	32	33	37	49	-3,2	0,3	1,2	2,7	1,4
Households	161	138	130	139	180	-3,1	-0,6	0,7	2,6	0,9
Energy sector	45	31	28	29	35	-7,1	-1,0	0,3	2,0	0,4
Trans. and distr. Losses	20	19	18	19	23	-1,0	-0,8	0,8	2,0	0,6
Total	**359**	**264**	**252**	**274**	**348**	**-6,0**	**-0,5**	**0,9**	**2,4**	**0,9**

Source: ACE

Given the closure of district heating plants, steam demand is projected to decline to 2010. However, beyond 2010 steam demand is expected to grow quickly (see Table 3-18) because of decentralisation and smaller-scale distributed heat networks. Growth will be more pronounced in the industrial and tertiary sectors, whilst residential demand for steam increases at high levels only beyond 2020. Steam losses grow by only 0.6% pa to 2030, well below the growth of steam demand, as a result of decentralisation and improved insulation of heat networks.

The CCN electricity system has significant over-capacity, with the load factor reaching 46.2% in 2000 from 45% in 1995, But as much generating capacity was old, inefficient and highly polluting, huge investment has been required to refurbish existing plants - improving their performance, cutting production costs and reducing their environmental impacts. Use of low-quality coal, and the absence of adequate environmental control equipment, led to acute environmental pollution problems in CEEC, particularly acid rain. Big efforts have been made to improve the environmental performance of coal-fired plants.

Power generating capacity (see Table 3-19) is expected to more than double between 2000 and 2030, reaching 431 GW. Investments in conventional fossil fuel-powered plants will be limited, so that capacity of these plants is foreseen to reach 132 GW and their share will fall to about 30% of total installed capacity in 2030 from close to 50% in 2000. Without new nuclear plant construction, besides those units under construction or already decided, nuclear capacity is also projected to decline accounting by 2030 for not more than 1.5% of total installed capacity (from 9.2% in 2000).

Most new plant investment will comprise combined cycle gas turbines, increasing from about 7 GW in 2000 to 112 GW in 2030, representing 26% of total installed capacity in 2030. Supercritical polyvalent units (able to burn coal, lignite, biomass and waste) exhibit a significant growth in 2015-2030 and play a key role in replacing retired nuclear plants. By 2030 installed capacity of supercritical polyvalent plants is projected to reach 20.6 GW (or 4.8% of total installed capacity). In contrast other clean coal technologies (IGCC and PFBC technologies) are not projected to become a cost-effective option even in the long run. The same is true for fuel cell technologies.

Hydropower capacity is expected to expand by almost 30 GW between 2000 and 2030, mainly due to large investments in Turkey (some 20 GW), while wind power capacity is forecast to reach 36.5 GW in 2030, accounting for 8.5% of total installed capacity in 2030. Solar photovoltaic energy emerges after 2020 (1.1% of total installed capacity by 2030).

Table 3-19: Power generation capacity by type of plant in CCN, 1995-2030.

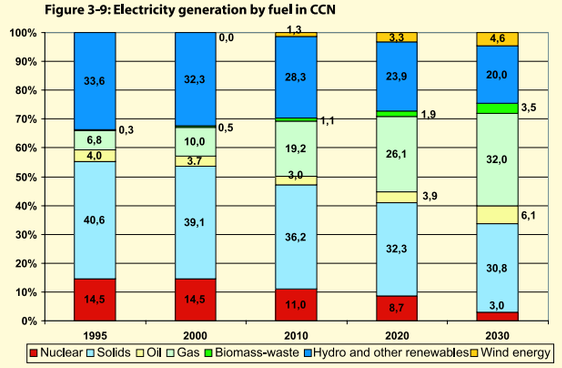
	GWe					% share				
	1995	**2000**	**2010**	**2020**	**2030**	**1995**	**2000**	**2010**	**2020**	**2030**
Nuclear	15.5	17.0	13.9	14.6	6.3	9.0	9.2	5.6	4.2	1.5
Large Hydro (pumping excl.)	62.1	66.9	77.4	91.2	95.2	36.3	36.0	31.2	26.3	22.1
Small hydro	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.1	5.9	20.5	36.5	0.0	0.0	2.4	5.9	8.5
Other renewables	0.0	0.0	0.0	0.3	1.1	0.0	0.0	0.0	0.1	0.3
Thermal plants	93.5	101.5	150.8	219.9	291.4	54.6	54.7	60.8	63.5	67.7
of which cogeneration plants	*28.9*	*23.9*	*20.2*	*27.4*	*43.4*	*16.9*	*12.9*	*8.2*	*7.9*	*10.1*
Open cycle - Fossil fuel	89.0	92.3	102.9	116.7	132.3	52.0	49.8	41.5	33.7	30.7
Clean Coal and Lignite	0.0	0.0	0.0	0.4	2.9	0.0	0.0	0.0	0.1	0.7
Supercritical Polyvalent	0.0	0.0	0.6	6.4	20.6	0.0	0.0	0.2	1.9	4.8
Gas Turbines Combined Cycle	3.1	7.0	40.2	80.7	111.9	1.8	3.8	16.2	23.3	26.0
Small Gas Turbines	1.3	2.2	7.1	15.6	23.7	0.8	1.2	2.9	4.5	5.5
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**171**	**185**	**248**	**346**	**431**	**100**	**100**	**100**	**100**	**100**

Source: ACE

The strong penetration of gas turbine combined cycle plants in CCN power generation also encourages the more widespread use of steam, especially by independent autoproducers. CHP plant capacity is projected to increase from 24 GW in 2000 to 43.5 GW in 2030 accounting, however, for a much lower proportion of total installed capacity (10% in 2030 down from 12.9% in 2000). By 2030, electricity production from co-generation units, experiencing a strong decline in the period to 2015, is projected to come close to levels observed in 2000 (15.3% of total electricity generation compared to 16.2% in 2000). In heat/steam generation, district heating plants (i.e. plants that produce only heat) almost disappear from the energy system (accounting for less than 13% of steam supplies in 2030, down from 61% of total steam in 1990).

Decisions on capacity expansion for CCN power generation are clearly reflected in the changes of fuel use for electricity and steam generation purposes. Decommissioning of existing nuclear capacity leads to a decline of nuclear electricity generation - accounting for 3% of total electricity generation in 2030 from 14.5% in 2000 (see Figure 3-9). Production from solid fuels, though increasing in absolute terms, continues to lose market share - accounting by 2030 for 30.8% of total electricity generation compared to 39.1% in 2000. Natural gas is projected to largely cover the gap and, by 2030, becomes the main energy carrier in the CCN power generation system. Oil is also projected to exhibit significant growth, especially in the long run, accounting by 2030 for some 6% of total electricity generation. This is explained by the increasing use of small gas turbines (fuelled largely by oil), driven by increasing peak demand in the tertiary and residential sectors. Finally, the share of renewable energy forms in power generation is projected to decline over time reaching some 28% of total electricity production in 2030 from 32.8% in 2000. Limited growth of hydro capacity is the key driver for this trend, while, despite its strong growth, wind energy cannot offset the lack of further investment in hydro.

Figure 3-9: Electricity generation by fuel in CCN



Source: ACE

The pattern of fuel input in thermal power and steam generating plants, shown in Table 3-20, follows the outlook for capacity and generation: solid fuels lose much of their share to natural gas which, starting from about 14% of thermal fuel input in 2000, gains more than 20 percentage points to reach 35.6% in 2030. It is important to note that the evolution of coal and lignite consumption in power generation is completely divergent. Thus, while coal input in power generation increases, and its share in total fuel input rises from 21% in 2000 to 31% in 2030, consumption of lignite decreases continuously for reasons related to low quality and high production costs. By 2030, the share of lignite in fuel inputs for power generation is only 13%, some 24 percentage points less than in 2000. Table 3-22 shows efficiency indicators

Table 3-20: Fuel use for electricity generation in CCN.

	Mtoe					Annual growth rate (%)				
	1995	2000	2010	2020	2030	95/00	00/10	10/20	20/30	00/30
Hard coal	26.2	28.2	33.3	48.1	66.2	1.5	1.7	3.7	3.3	2.9
Lignite	51.3	49.5	48.0	37.7	27.2	-0.7	-0.3	-2.4	-3.2	-2.0
Oil products	10.0	8.1	7.5	12.2	21.8	-4.1	-0.8	4.9	6.0	3.4
Gas	15.6	18.7	31.2	52.2	76.8	3.7	5.3	5.3	3.9	4.8
Biomass	0.5	0.5	1.4	3.5	7.8	-1.8	10.7	9.8	8.4	9.6
Waste	0.8	1.1	1.6	2.6	4.2	7.0	3.4	5.0	4.9	4.5
Nuclear energy	25.2	28.0	26.4	27.7	11.8	2.1	-0.6	0.5	-8.2	-2.8
Geothermal Heat	0.1	0.1	0.0	0.0	0.0	-1.7	-100.0	-	-	-100.0
Total	**130**	**134**	**149**	**184**	**216**	**0.7**	**1.1**	**2.1**	**1.6**	**1.6**

Source: ACE

Table 3-21: Electricity and steam generation efficiency in CCN.

	%					index (2000 = 100)				
	1995	2000	2010	2020	2030	1995	2000	2010	2020	2030
total thermal production (power plants and boilers)	50.0	48.2	51.9	56.1	60.3	103.8	100.0	107.7	116.5	125.2
thermal electricity and steam prod. (power plants)	46.1	45.2	49.9	55.2	59.9	101.9	100.0	110.3	121.9	132.5
thermal electricity production	30.4	33.5	39.3	44.4	48.0	90.7	100.0	117.5	132.7	143.2
district heating units	73.6	74.2	75.7	76.1	76.6	99.2	100.0	102.1	102.6	103.2

Source: ACE Model.

related to power and steam generation in CCN over the forecast period.

Overall thermal efficiency for total power and steam generation and for power generation only will rise considerably given new investment in plants based mainly on natural gas. The decline in the use of nuclear energy[69] and lignite in CCN power generation also contributes to improved thermal generation efficiency. By 2030, efficiency for thermal electricity production reaches 48%, 14.5 percentage points higher than in 2000; while efficiency gains in overall thermal electricity and steam generation exceed 12 percentage points in the same period (from 48.2% in 2000 to 60.3% in 2030). Both figures are closely comparable to the projected efficiencies of the EU energy system (64.1% for total thermal production, 49.7% for electricity generation).

3.2.5. The outlook of energy-related CO_2 Emissions

CO_2 emissions in CCN declined steeply between 1990 and 2000 given restructuring of CEEC economies. The decline was more pronounced in 1990-1995 (-2.8% pa) while, in the second part of the last decade, it was limited to -1% pa. CO_2 emissions in 2000 were 17.3% lower than in 1990. This resulted from economic restructuring, improved energy efficiency, lower demand caused by higher real energy prices, and fuel switching away from solid fuels. Despite these improvements, a large potential for additional improvement still exists. Per capita CO_2 emissions, which were 9% above the average EU level in 1985, fell to only 63% of the EU level in 2000 - but living standards between the two regions are not comparable. CO_2 emissions per unit of GDP declined since 1990 by about 2.9% pa, but were still 2.4 times higher than those for the EU in 2000.

The projected evolution of energy-related CO_2 emissions by sector is shown in Table 3-22. CO_2 emissions in the CCN energy system increase at a rate of 1.3% pa between 2000 and 2030. In the period to 2010 further restructuring in CEEC limits emissions growth to 0.7% pa but they will then increase by more than 1.5% pa to 2030. However, CO_2 emissions are forecast to reach 1990 levels again beyond 2015. By 2030, CO_2 emissions reach 1411 Mt, compared to 1165 Mt in 1990. Over the projection period the CO_2 emissions increase is driven by the transport sector (+3.0% pa in 2000-2030). The increase in electricity and steam demand and higher fossil fuel use causes a significant rise in power generation emissions (+1.6% pa). But emissions growth in the tertiary and residential sectors is lower (+0.8% pa and +1.2% pa, respectively, in 2000-2030), while emissions in industry decline over the pro-

69 Idem 24.

Table 3-22: CO_2 emissions by sector in CCN.

	Mt CO_2					*Annual growth rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Industry	267.3	195.3	172.7	166.2	153.6	-3.1	-1.2	-0.4	-0.8	-0.8
Tertiary	93.4	57.3	56.3	63.4	72.6	-4.8	-0.2	1.2	1.4	0.8
Households	128.6	90.4	96.7	114.2	128.2	-3.5	0.7	1.7	1.2	1.2
Transports	134.0	153.3	203.8	283.1	367.8	1.4	2.9	3.3	2.7	3.0
Electricity-steam production	433.4	388.2	427.7	506.6	621.9	-1.1	1.0	1.7	2.1	1.6
District heating	75.7	36.0	31.5	23.1	15.1	-7.2	-1.3	-3.1	-4.1	-2.8
New fuels (hydrogen etc.) prod.	0.0	0.0	0.1	0.8	1.3	-	-	25.7	5.1	-
Energy branch	32.8	42.8	43.1	47.4	50.6	2.7	0.1	0.9	0.7	0.6
Total	**1165**	**963**	**1032**	**1205**	**1411**	**-1.9**	**0.7**	**1.6**	**1.6**	**1.3**

Source: ACE

jection period by -0.8% pa. Changes in the fuel mix and structural changes are the key drivers as regards the projected evolution of emissions on the demand side with the exception of transport.

High growth in transport activity and the increased contribution of fossil fuels in power generation do not allow for significant gains in carbon intensity (expressed in CO_2 emissions per unit of primary energy needs). As illustrated in Table 3-23, this improves by 3% between 2000 and 2030. However, the significant energy intensity gains (expressed in energy demand per unit of GDP) of some 43% in the CCN energy system between 2000 and 2030 generate a strong decoupling between CO_2 emissions growth and GDP growth. CO_2 emissions in 2010 remain 11% below their 1990 level, while primary energy decreases by only 2% below the 1990 level and GDP increases by 63%. Total GDP growth from 1990 to 2030 reaches 218%, while primary energy demand increases by 35% and CO_2 emissions by 21%. The carbon intensity of the economy (i.e. CO_2 emissions per unit of GDP) also develops favourably with one unit of GDP in 2030 being produced with less than 40% of the CO_2 emissions emitted in 1990.

In absolute terms, CO_2 emissions per unit of GDP decrease from 887 t CO_2 / mill € in 2000 to only 490 t CO_2 / mill € in 2030 in real terms (money of 2000 at market exchange rates). In comparison to the EU economy, which in 2000 emitted 365 t CO_2 / mill € and by 2030 is projected to emit only 217 t CO_2 / mill €, the CCN energy system remains significantly more carbon intensive.

Table 3-23: Key indicators for the CCN energy system

	INDEX (1990 = 100)				
	1990	**2000**	**2010**	**2020**	**2030**
Gross Domestic Product	100	120	163	233	318
Gross Inland Consumption	100	89	98	116	135
CO_2 emissions	100	83	89	103	121
Energy intensity	100	74	60	50	42
Carbon intensity	100	93	90	89	90
CO_2 emissions / unit of GDP	100	69	54	44	38

Source: ACE.

Table 3-24 summarises CO_2 emissions by fuel in the CCN energy system. Natural gas emissions are projected to exhibit the highest growth among all energy forms, driven by the high penetration of gas on both the demand and supply sides. The strong growth of transport activity is clearly reflected in the evolution of liquid fuels emissions with those of gasoline reaching +3.3% pa in 1990-2000, and those of kerosene growing at 2.9% pa. Emissions from diesel oil grow at lower rates (+2.3% pa) but still above average, mainly because of changes in the fuel mix of final demand sectors except transportation. Finally, emissions growth for fuel oil is limited to 0.2% pa. To a large extent the projected decline of CO_2 emissions from lignite (-2.3% pa in 2000-2030, or -118 Mt CO_2) offsets the projected growth of CO_2 emissions by other fuels and limits the overall emissions growth of the CCN energy system.

There are noticeable differences between countries as regards their CO_2 emissions evolution (see Table 3-25). The Mediterranean candidate countries (Cyprus, Malta, Slovenia, Turkey) and the neighbouring countries (Norway, Switzerland), where emissions will be mainly affected by economic growth and efficiency improvements, are projected to experience considerable growth in emissions. Norway, with almost 100% renewable power generation in 2000, will experience significant growth from very low emission levels because of the penetration of gas-fired power generating options (CO_2 emissions in 2030 increase by 51.3% from 1990 levels). Emission increases in Switzerland (+33.4% in 2030 from 1990) will be partly spurred by closure of a significant fraction of its nuclear capacity. The same reason applies to Slovenia with emissions rising by 40% in 2030 from 1990 levels. The energy systems of Cyprus and Malta are characterised by the strong limitations upon changes in the fuel mix, both being strongly dependent upon oil use. Consequently emissions

Table 3-24: CO_2 emissions by fuel in CCN.

	Mt CO_2					Annual growth rate (%)				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
Solids	625.2	482.3	458.8	445.1	444.6	-2.6	-0.5	-0.3	0.0	-0.3
Hard coal	267.2	206.7	213.9	256.5	308.8	-2.5	0.3	1.8	1.9	1.3
Coke	64.1	39.4	29.0	24.1	19.3	-4.8	-3.0	-1.8	-2.2	-2.4
Lignite	282.1	234.3	216.0	164.5	116.6	-1.8	-0.8	-2.7	-3.4	-2.3
Liquids	339.0	302.2	340.0	433.0	541.9	-1.1	1.2	2.4	2.3	2.0
gasoline	65.9	67.8	94.1	133.2	177.1	0.3	3.3	3.5	2.9	3.3
kerosene	15.5	16.6	19.7	28.0	39.0	0.6	1.8	3.6	3.4	2.9
diesel oil	127.2	121.3	143.8	190.1	237.4	-0.5	1.7	2.8	2.2	2.3
fuel oil	110.3	59.4	51.7	53.5	63.4	-6.0	-1.4	0.3	1.7	0.2
Gas	200.9	178.8	233.1	326.6	424.6	-1.2	2.7	3.4	2.7	2.9
natural gas	167.1	154.8	218.1	316.0	416.4	-0.8	3.5	3.8	2.8	3.4
Total	**1165**	**963**	**1032**	**1205**	**1411**	**-1.9**	**0.7**	**1.6**	**1.6**	**1.3**

Source: ACE Model.

Table 3-25: CO_2 emissions by country in CCN.

	Mt CO_2					% change from 1990 levels			
	1990	2000	2010	2020	2030	2000	2010	2020	2030
Bulgaria	73.6	41.4	42.9	43.0	47.6	-43.8	-41.7	-41.6	-35.3
Cyprus	4.5	7.2	8.1	8.9	9.3	59.1	79.3	97.8	106.0
Czech Republic	158.8	119.0	103.1	100.5	108.9	-25.1	-35.1	-36.7	-31.5
Estonia	36.6	13.7	14.2	11.8	12.1	-62.5	-61.1	-67.8	-67.0
Hungary	68.5	53.7	62.2	68.9	76.3	-21.6	-9.3	0.6	11.3
Latvia	16.9	6.6	8.3	9.9	10.7	-60.8	-51.1	-41.2	-36.6
Lithuania	32.2	10.3	17.2	22.0	25.1	-67.9	-46.4	-31.5	-21.9
Malta	2.5	2.7	3.3	4.2	4.7	6.4	29.9	67.1	85.1
Norway	29.1	33.7	39.1	42.7	44.0	15.8	34.3	46.6	51.3
Poland	340.1	290.2	286.2	325.1	343.1	-14.7	-15.8	-4.4	0.9
Romania	168.6	85.2	90.3	100.6	111.7	-49.5	-46.4	-40.3	-33.8
Slovakia	51.4	36.0	41.6	46.2	50.1	-30.0	-19.1	-10.2	-2.5
Slovenia	10.9	14.1	14.0	15.4	15.4	28.7	28.2	40.7	40.3
Switzerland	42.8	44.9	47.9	50.8	57.0	4.9	12.1	18.8	33.4
Turkey	128.6	204.6	253.5	354.6	495.3	59.2	97.2	175.8	285.2
CCN	1165.2	963.3	1031.9	1204.7	1411.2	-17.3	-11.4	3.4	21.1
of which Acceding Countries	*722.5*	*553.5*	*558.2*	*613.0*	*655.6*	*-23.4*	*-22.7*	*-15.2*	*-9.3*

Source: ACE Model.

grow significantly in both countries (+106% from 1990 levels in 2030 for Cyprus, +85% for Malta). Turkey, with a growth of emissions of almost 60% between 1990 and 2000, is projected to exhibit, by far, the biggest rise in CO_2 emissions (+285% in 2030 compared to 1990). High population growth, combined with economic advances over the projection period, is the key driver. In 2030 Turkey accounts for some 35% of total emissions in CCN compared to 21% in 2000.

CO_2 emissions in CEEC (excluding Slovenia) declined steeply in the last decade (from -15% for Poland to -68% in Lithuania in 1990-2000). Continued economic restructuring, combined with changes in the fuel mix, lead in many countries in that region to a further reduction of emissions over the period to 2010. Furthermore, in the long run, these countries are faced with a marked decline in population, which causes lower emissions growth. Consequently, it is only Hungary (+11.3% in 2030 compared to 1990 levels) and Poland (+0.9%) in which CO_2 emissions in 2030 reach levels above those observed in 1990. All other central and eastern European countries are projected in 2030 to have lower emissions compared to 1990 (from -2.5% in Slovakia to -67% in Estonia).

3.3. Concluding remarks and view on Europe-30

Developments in both candidate and neighbouring countries (CCN) will influence energy developments in the wider European energy system. This includes the EU, the 13 candidate countries, as well as the two EU neighbours namely Norway and Switzerland, which for purposes of brevity will be called Europe-30.

Table 3-26: Per capita GDP in Europe-30[70]

	Euro'00 per capita					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
EU15	19076	22565	28000	34937	43494	1.69	2.18	2.24	2.21	2.21
CCN	8130	8924	12190	17673	24432	0.94	3.17	3.78	3.29	3.41
Europe - 30	**15547**	**18097**	**22794**	**29185**	**37056**	**1.53**	**2.33**	**2.50**	**2.42**	**2.42**

Source: EUROSTAT. ENERDATA. Economic and Financial Affairs DG. PRIMES. ACE.

3.3.1. The relative position of candidate countries / neighbours and the current EU in Europe-30

In the context of Europe-30, candidate and neighbouring countries (CCN) accounted in 2000 for some 33% of population, 11% of GDP and 21% of primary energy needs. The main trends that characterise the EU energy system in the Baseline scenario are also projected to prevail in Europe-30. Nevertheless, comparison between the above shares also shows that, due to the dominance of candidate countries, the CCN region has a much lower per capita income and higher energy intensity compared with the average in Europe-30 and also the current EU. These indicators are examined in more detail in Figures 3-10 and 3-11 below.

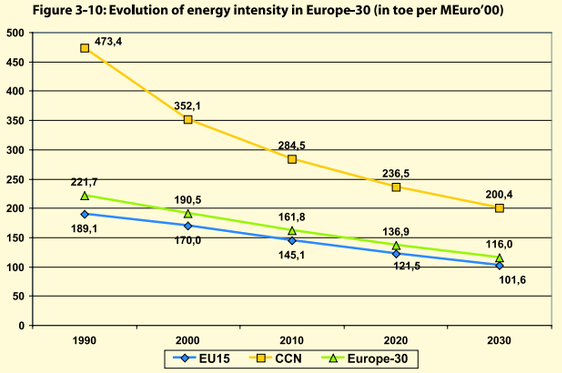
By 2030, CCN accounts for 34% of the Europe-30 population, for 15% of Europe-30 GDP but still for 25% of primary energy needs. This clearly indicates that per capita income in CCN remains below the average for Europe-30 and the EU (see Table 3-26); and that the CCN energy system remains much more energy intensive compared with those of Europe-30 and the EU (see Figure 3-10).

While energy intensity in CCN decreases substantially by 43% to reach 200 toe per million € in 2030, energy intensity in the current EU continues to decrease albeit at a slower pace. Nevertheless, in 2030, energy intensity in CCN is still nearly twice as high as that of EU (102 toe per million €). Energy intensity in Europe-30 falls from 190 toe / million € in 2000 to 116 toe / million € in 2030.

Energy intensity improvements in the 1990s were substantial due to restructuring of previously highly inefficient, centrally planned economies in central and eastern European countries. In the last decade, CCN GDP increased by 20% while energy needs declined by more than 10%.

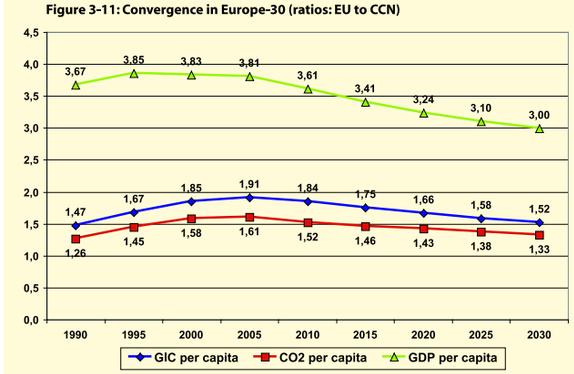
In the Baseline scenario, the CCN economy is projected to see accelerated growth with GDP rising between 2000 and 2030 by 165% or 3.3% pa. This growth is mainly driven by economic development in candidate countries (as Norway and Switzerland belong to the highly developed countries and their economies are projected to grow at rates similar to those of the EU). The effects of CEEC economic restructuring, but also the integration of candidate countries in the EU, are the key drivers for this growth. Primary energy needs in CCN are projected to grow in the same period by 51% or 1.4% pa. Modernisation and economic restructuring away from energy intensive activities, energy efficiency improvements and more rational use of energy all lead to the strong decoupling of energy demand from economic growth in the Baseline scenario for CCN, with energy intensity gains reaching 1.9% pa.

Figure 3-10: Evolution of energy intensity in Europe-30 (in toe per MEuro'00)



Source: PRIMES, ACE.

Figure 3-11: Convergence in Europe-30 (ratios: EU to CCN)



Source: PRIMES, ACE.

70 Expressed in terms of purchasing power standards for CCN countries.

The pace of convergence of CCN towards EU levels can be seen by comparing per capita levels for key indicators of the energy system, namely GDP, gross inland consumption and CO_2 emissions as illustrated in Figure 3-11. The EU GDP per capita is projected to remain 3 times higher than that of CCN (expressed at market exchange rates) even by 2030 (in 2000 the ratio was 3.8). The convergence in terms of gross inland consumption is more pronounced, with EU citizens consuming 52% more energy per capita compared to CCN (down from 85% more in 2000). This reflects the different levels of economic development achieved in the current EU and in the candidate countries. The inefficiencies inherited from the former centrally planned system, and the more carbon intensive character of the CCN energy system, is reflected in

CO_2 emissions per capita. In 2000, emissions per capita in the EU energy system were only 58% higher than those in CCN (a much lower difference than that for energy consumption per capita of --85% in 2000) and the gap is projected to fall further to 33% to 2030. This implies much faster growth of emissions per capita in CCN (+36% in 2000-2030) compared to the EU (+15% in 2000-2030).

Under Baseline assumptions the CCN energy system becomes increasingly dependent on fossil fuels over the next 30 years (as does the EU energy system). The fossil fuel share in CCN primary energy needs is projected to reach 87.5% in 2030, increasing by more than 4.5 percentage points. High growth in transportation demand, but also limitations in terms of exploitable hydro potential and further nuclear energy use, are the key drivers for this trend.

Higher use of fossil fuels, and the fall in CCN primary energy production after 2010, leads towards much higher energy import dependence. By 2030, CCN is projected to import more than 36% of its primary energy needs whereas in 2000 it was a net exporter of energy with an import dependency of -15%. Furthermore, in the long run, the rising contribution of fossil fuels will lead to a significant growth of CO_2 emissions, which by 2030 are projected to be 21.1% higher than in 1990. This largely results from the assumed economic and demographic growth of Turkey.

3.3.2. Energy and CO_2 emission developments in Europe-30

Primary energy needs in Europe-30 are projected to grow at a rate of 0.8% pa in 2000-2030 (see Table 3-27). Natural gas is by far the fastest growing fuel in the Europe-30 energy system (+80% in 2000-2030) becoming in the long run nearly as important as liquid fuels. Significant growth is also projected for renewable energy forms (+67% in 2000-2030). The share of renewable energy forms in primary energy consumption increases from 7.1% in 2000 to 9.5% in 2030. Demand for liquid fuels is also projected to increase by some 15% in 2000-2030, but displaying different trajectories in the current EU (+3% in 2000-2030) and in CCN (+77%). Strong growth of energy needs in the CCN transportation sector is the main reason. Energy demand in the transport sector of CCN grows by 142% in 2000-2030 compared to just 31.5% in the EU. The strongest decrease is projected for nuclear energy (-24% in 2000-2030) due to the nuclear phase out occurring in certain EU Member States, the closure of nuclear plants with safety concerns in some candidate countries and the decommissioning of existing nuclear capacity at the end of its life in other countries, where nuclear plants are not always replaced with new nuclear investment. The long-term decrease of solid fuels is limited to just -1.5% as, in the long run with increasing oil and gas prices, they become a highly cost effective option for power generation.

By 2030, fossil fuels account for 82.2% of primary energy needs in Europe-30 compared to 79.3% in 2000, almost returning to the 1990 level (82.6%). The projected increasing contribution of fossil fuels, in both the EU and CCN energy systems, is also clearly reflected in CO_2 emissions (see Table 3-28). In 2010, the Europe-30 energy system is projected to emit 10 Mt less of CO_2 (-0.2%) com-

Table 3-27: Gross inland consumption in Europe -30

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	471	342	287	295	337	-3.2	-1.7	0.3	1.4	0.0
Liquid Fuels	673	701	727	770	806	0.4	0.4	0.6	0.5	0.5
Natural Gas	300	412	557	674	743	3.2	3.1	1.9	1.0	2.0
Nuclear	207	251	257	226	192	1.9	0.2	-1.3	-1.6	-0.9
Renewable En. Sources	97	130	168	191	217	3.0	2.6	1.3	1.3	1.7
Total	**1749**	**1835**	**1995**	**2156**	**2297**	**0.5**	**0.8**	**0.8**	**0.6**	**0.8**
EU15	**1321**	**1453**	**1576**	**1657**	**1719**	**1.0**	**0.8**	**0.5**	**0.4**	**0.6**
CCN	**428**	**382**	**420**	**498**	**577**	**-1.1**	**0.9**	**1.7**	**1.5**	**1.4**

Source: PRIMES, ACE.

Table 3-28: Evolution of CO_2 emissions in Europe-30

	Mt CO_2					*% change from 1990 levels*			
	1990	**2000**	**2010**	**2020**	**2030**	**2000**	**2010**	**2020**	**2030**
Industry	843	705	631	626	620	-16.5	-25.2	-25.8	-26.5
Tertiary	297	257	259	270	292	-13.5	-12.8	-9.1	-1.5
Households	565	503	529	555	562	-10.9	-6.4	-1.8	-0.5
Transports	873	1056	1228	1388	1508	21.0	40.8	59.1	72.8
Electricity-steam production	1394	1329	1375	1605	1900	-4.7	-1.4	15.1	36.2
District heating	112	43	36	25	18	-61.6	-67.6	-78.1	-84.0
Energy branch	163	188	178	180	179	15.8	9.7	10.6	10.4
Total	**4247**	**4081**	**4237**	**4649**	**5080**	**-3.9**	**-0.2**	**9.5**	**19.6**
EU15	**3082**	**3118**	**3205**	**3444**	**3669**	**1.2**	**4.0**	**11.7**	**19.0**
CCN	**1165**	**963**	**1032**	**1205**	**1411**	**-17.3**	**-11.4**	**3.4**	**21.1**

Source: PRIMES, ACE.

pared to 1990 levels. This stabilisation of CO_2 emissions in Europe-30 arises from diverging trends in CCN and the current EU. Energy related CO_2 emissions in CCN are projected to decrease from 1990 levels by 133 Mt of CO_2 (-11.4%), largely due to restructuring of CEEC, whereas emissions in EU-15 increase by 123 Mt of CO_2 (+4%). In the long term, however, emission growth in CCN is more pronounced than in the current EU so that in 2030 CO_2 emissions exceed the 1990 level by 21% in CCN – a result strongly influenced by developments in Turkey, compared with 19% in EU-15. As a result CO_2 emissions in Europe-30 increase by 20% between 1990 and 2030.

By 2030, emissions in Europe-30 are projected to reach 5080 Mt of CO_2 (+833 Mt of CO_2, 20% above 1990 levels). This clearly identifies the major environmental challenges facing Europe in the long run. Another important issue for the Europe-30 energy system in the long run is the rising import dependency. Higher energy requirements combined with lower indigenous fossil fuel production and declining nuclear generation, lead to an import dependency for Europe-30 of 60% by 2030, up from 36% in 2000 (see Table 3-29).

Table 3-29: Import dependency by fuel in Europe-30

	%				
	1990	**2000**	**2010**	**2020**	**2030**
Solid fuels	18.8	30.8	37.0	50.1	65.1
Liquid fuels	69.7	55.3	61.3	71.9	79.8
Natural gas	39.0	39.9	49.0	62.1	67.7
Total	**39.3**	**36.2**	**41.8**	**52.4**	**60.0**
EU15	**47.6**	**49.4**	**54.3**	**62.9**	**67.8**
CCN	**12.9**	**-14.8**	**-6.2**	**16.8**	**36.2**

Source: PRIMES Model. ACE Model.

Because of the inclusion of Norway and the generally greater reliance of CCN on indigenous solid fuels, the current import dependency for CCN is significantly lower than that of the EU. The CCN is projected to remain a net exporter of energy to 2010 (-6%) but becomes a net importer of energy by 2030 (+36%). On the other hand, the EU becomes increasingly dependent of energy imports with import dependency rising to 54% in 2010 and 68% in 2030. Import dependence for liquid fuels is projected to reach very high levels in the long run (80% in 2030). Perhaps the most significant change regarding energy security in the Europe-30 energy system over the outlook period relates to the volume of gas imports. These are projected to more than triple from 164 Mtoe in 2000 to 503 Mtoe in 2030. Imports will come from increasingly distant places (Russia and the Middle East), while competition for gas supplies may intensify, especially if the developing Asia region becomes a major purchaser of gas from Russia and other countries in Asia.

Finally, it should be noted that the long-term Baseline projections of CO_2 emissions and import dependency are rather similar for both the current EU and Europe-30, with high CO_2 emission growth as well as strongly increasing import dependency by 2030. Developments in Europe-30 are however affected considerably by trends in Norway and Turkey, which lead to lower import dependency in Europe-30 thanks to Norwegian oil and gas, on the one hand, but also to higher CO_2 emissions following high population and economic growth in Turkey. The evolution of the EU-25 energy system (the current EU and the 10 acceding countries) is discussed in detail in the next part.

PART IV

4.1. Demographic and economic outlook

The European Council in Copenhagen in December 2002 concluded the accession negotiations with ten candidate countries for their EU membership from 2004 (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia; called for brevity reasons Acceding Countries or by the acronym ACC). This part presents the outlook of the enlarged EU of 25 Member States (called hereafter EU-25).

The assumptions used for the construction of the Baseline scenario for the EU Member States (referred to in the context of this part as current EU or EU-15) and Acceding Countries were discussed in detail in preceding parts. Some of the key demographic and economic factors, strongly affecting the evolution of the EU-25 energy system to 2030, are summarised below.

The acceding countries have been modelled with the ACE model that is less sophisticated than PRIMES, which has been used for EU-15 Member states. Therefore, this part on EU-25 is to some extent less detailed compared with part II on EU-15. Efforts are being made to develop PRIMES also for the acceding countries.

4.1.1. Demographic Outlook

EU-25 population is projected to remain rather stable, peaking in 2020 at some 462 million but declining thereafter to reach 458 million by 2030 (see Table 4-1). The population in ACC is projected by 2030 to decline by some 5.6 million people or 7.5% of the population in 2000. Population in ACC accounts by 2030 for 15% of EU-25 population compared to 16.5% in 2000.

Rising life expectancy, combined with declining birth rates and changes in societal and economic conditions, are the main drivers for a significant decline in average household size (i.e. the number of persons per household), both in the EU-15 and in ACC. Average household size in the EU-15 is expected to decline from 2.4 persons in 2000 to 1.97 persons in 2030 (-0.65% pa in 2000-2030). The corresponding decline in ACC is less pronounced (-0.52% pa, from 2.66 persons per household in 2000 to 2.27 persons in 2030). Average household size in EU-25 amounts to 2.0 persons per household in 2030 compared to 2.44 in 2000, with the projected decline giving rise to significant growth in the number of households (+0.7% pa in 2000-2030) despite the rather stable evolution of population (see Table 4-2). Growth in the number of households is one of the key drivers of energy demand in the residential sector.

Weather conditions, which are important in determining both the intensity and the overall pattern of energy use, are assumed to remain unchanged over the projection period, i.e. the degree-days parameter is taken as constant at 2000 levels.

4.1.2. Macroeconomic Outlook

The economic outlook of EU-25 is dominated by the evolution of the current EU economy. This is because the contribution of

Table 4-1: Population trends in EU-25, 1990 to 2030.

	Million inhabitants					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
EU15	366.01	378.69	387.83	390.45	389.02	0.34	0.24	0.07	-0.04	0.09
ACC	75.12	74.73	73.40	71.67	69.14	-0.05	-0.18	-0.24	-0.36	-0.26
EU-25	**441.13**	**453.41**	**461.23**	**462.11**	**458.16**	**0.28**	**0.17**	**0.02**	**-0.09**	**0.03**

Source: EUROSTAT. Global Urban Observatory and Statistics Unit of UN-HABITAT. PRIMES. ACE.[71]

Table 4-2: Number of households in EU-25, 1990 to 2030

	Million households					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
EU15	141.25	157.67	174.21	187.33	197.12	1.11	1.00	0.73	0.51	0.75
ACC	25.72	28.11	30.03	30.53	30.46	0.89	0.66	0.17	-0.02	0.27
EU-25	**166.97**	**185.78**	**204.24**	**217.86**	**227.58**	**1.07**	**0.95**	**0.65**	**0.44**	**0.68**

Source: Global Urban Observatory and Statistics Unit of UN-HABITAT. PRIMES. ACE.

71 Idem 6; idem 54.

Table 4-3: Evolution of gross domestic product in EU-25, 1990 to 2030

	000 MEuro'00					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
EU15	6982	8545	10859	13641	16920	2.04	2.43	2.31	2.18	2.30
ACC	333	394	574	821	1100	1.70	3.82	3.64	2.97	3.48
EU-25	**7315**	**8939**	**11433**	**14462**	**18020**	**2.03**	**2.49**	**2.38**	**2.22**	**2.36**

Source: EUROSTAT. Economic and Financial Affairs DG. PRIMES. ACE. [73]

Table 4-4: Per capita GDP in EU-25[77]

	Euro'00 per capita					*annual growth rate*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
EU15	19076	22565	28000	34937	43494	1.69	2.18	2.24	2.21	2.21
ACC	8663	10048	14912	21787	30144	1.49	4.03	3.86	3.30	3.73
EU-25	**17303**	**20502**	**25917**	**32898**	**41479**	**1.71**	**2.37**	**2.41**	**2.34**	**2.38**

Source: EUROSTAT. Economic and Financial Affairs DG. PRIMES. ACE.

acceding countries, despite their much faster growth over the projection period (+3.5% pa in 2000-2030 compared to +2.3% pa in EU-15), remains rather limited in terms of overall EU-25 GDP (see Table 4-3). By 2030, ACC GDP reaches 6.1% of EU-25 economic activity compared to 4.4% in 2000[72] and, consequently, overall economic growth of EU-25 (+2.4% pa) follows closely that of the EU-15.

The slowdown in economic growth for ACC between 1990 and 2000 (+1.7% pa compared to +2.0% for the EU-15) largely reflects the major reforms of political and economic structures that Central and Eastern European countries (CEEC) have experienced since the early 1990s. These included: industrial restructuring and privatisation; establishment of viable legal structures and regulatory systems; reform of capital markets and trade policies, etc.; which in turn induced a deep recession between 1990 and 1993 in all countries except Poland.

The GDP projections for EU-25 Member States are based on Economic and Financial Affairs DG forecasts of April 2002[74] for the short term (2001-2003); and on macroeconomic forecasts from WEFA (now DRI-WEFA),[75] adjusted to reflect recent developments, for the horizon to 2030. Furthermore, the results of the GEM-E3 model[76] were used for current EU-15 Member States but the model is not yet available for the acceding countries. Economic growth is not uniformly distributed across countries, but the convergence of Member States' economies (including ACC) is assumed to continue over the projection period. Furthermore, the integration of ACC into the European Union is assumed to generate accelerated growth for their economies.

However, the convergence of ACC economies towards EU-15 levels remains far from complete even by 2030 (see Table 4-4). Despite much faster growth of per capita income projected in ACC than in EU-15 (+3.7% pa in 2000-2030 compared to +2.2% pa), per capita GDP in ACC (expressed in purchasing power stan-

72 The validity of GDP estimates based on market exchange rates for Central and Eastern European countries is under debate as they generally underestimate the level of GDP. If GDP expressed in purchasing power standards is used the contribution of ACC economies in EU-25 GDP would reach 8.1% of EU-25 economic activity in 2000.

73 Incorporating results obtained from the WEFA study and GEM-E3 model runs (this applies to all the macroeconomic assumptions).

74 Idem 12; idem 55.

75 Idem 9.

76 Idem 10.

77 Expressed in purchasing power standards for ACC countries.

Table 4-5: Evolution of sectoral value added in EU-25

	000 MEuro'00					*Annual growth rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Gross Value added	6833	8351	10793	13730	17165	2.03	2.60	2.44	2.26	2.43
Industry	1486	1698	2168	2758	3436	1.34	2.47	2.44	2.22	2.38
Construction	431	439	532	653	783	0.18	1.93	2.08	1.83	1.94
Services	4482	5709	7525	9667	12210	2.45	2.80	2.54	2.36	2.57
Agriculture	198	222	247	275	298	1.12	1.09	1.06	0.84	1.00
Energy branch	236	283	322	377	437	1.84	1.29	1.62	1.47	1.46

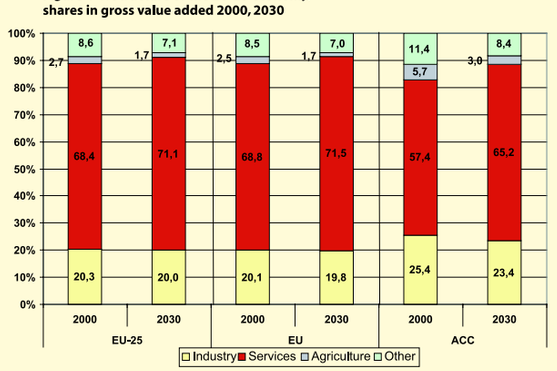
Source: EUROSTAT. Economic and Financial Affairs DG. PRIMES. ACE.

dards) amounts to 69.3% of the corresponding EU-15 figure in 2030 (compared, however, to only 44.5% in 2000).

The Baseline assumptions for economic growth of EU-15 Member States and acceding countries also reflect the long established trend of structural changes in developed economies, away from primary and secondary sectors and towards services. The projected evolution of sectoral value added in EU-25 is given in Table 4-5.

Services value added increases over the projection period at rates above average, implying a continuous increase of its share in total economic activity (71.1% in 2030 compared to 68.3% in 2000). This increase in market share of services occurs to the detriment of all other sectors of the economy. The market share of industrial activity, which grows at rates slightly below average, declines by 1.7 percentage points over the projection period (from 21.7% in 2000 to 20% in 2030). The lowest economic growth is projected for agriculture (+1.0% pa in 2000-2030), while the energy branch and construction sectors are also projected to exhibit a significant decline in terms of market shares, growing by 1.5% pa and 1.9% pa, respectively, to 2030.

Figure 4-1: Structure of the EU-25 economy, shares in gross value added 2000, 2030



Source: PRIMES, ACE.

As illustrated in Figure 4-1, despite the significantly faster growth of services, the acceding countries' economies are projected to remain more reliant on industry and agriculture than the EU-15 to 2030. This clearly reflects the existing structural differences of their economies in 2000, differences that are not projected to be fully eliminated by 2030. The key features of the macroeconomic outlook of individual countries as well as sectoral forecasts are presented in Appendix 1.

4.2. Baseline scenario results[78]

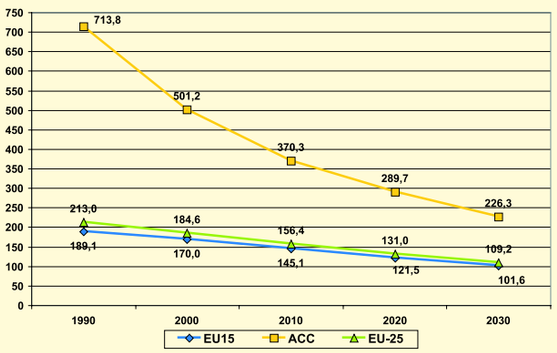
4.2.1. Main Findings

The evolution of the EU-25 energy system to 2030 under Baseline assumptions clearly reflects the decoupling between energy demand and economic growth. These trends materialise both in the acceding countries and in EU-15. The ACC energy system is characterised by modernisation and economic restructuring away from energy intensive activities, energy efficiency improvements and more rational use of energy, and gradual implementation of EU-15 policies. Similarly, the changes in the structure of industry, the saturation in demand for some important energy needs, and the policies in place under Baseline assumptions in the EU-15 contribute to a decoupling of energy use from economic growth in the enlarged Union of 25. Primary energy needs in EU-25 are projected to grow by 0.6% pa in 2000-2030 compared to annual GDP growth of 2.4% pa.

The energy intensity (primary energy demand per unit of GDP at market exchange rates) of the EU-25 energy system improves at a rate of 1.7% pa in 2000-2030, the same as that observed for the last decade (also 1.7% pa). Energy intensity reaches 109 toe per million € in 2030 from 213 in 1990. However, as illustrated in Figure 4-2, the pace of improvement is significantly different between the EU-15 and the ACC. Following a substantial improvement in energy intensity of 3.5% pa during the last decade, driven by the economic restructuring of CEEC, energy intensity in ACC is projected to further improve at rates well above the EU-25 average over the projection period

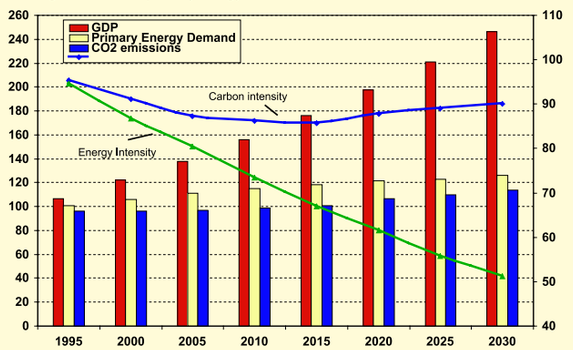
78 Aggregate results for EU-25 and by country can be found in Appendix 2.

Figure 4-2: Evolution of energy intensity in EU-25 (in toe per MEuro'00)



Source: PRIMES, ACE.

Figure 4-3: EU-25 primary energy indicators (index 1990=100), 1990-2030



Source: PRIMES, ACE.

(+2.6% pa in 2000-2030) reaching 226 toe per million € in 2030 compared to 713.8 toe per million € in 1990. The energy intensity improvement in EU-15 is less pronounced with a decrease from 170 toe per million € in 2000 to 102 in 2030 (-1.7% pa in 2000-2030). Nevertheless, energy intensity for ACC remains, even by 2030, more than twice that of the EU-15 (compared to 3.8 times higher in 1990 and 2.9 times higher in 2000). [79]

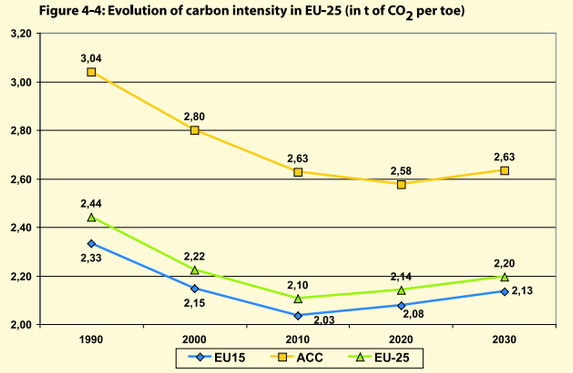
The restructuring in CEEC resulted in a decline of CO_2 emissions by an astonishing -23% for the ACC region between 1990-2000 while the fall in primary energy needs was -17% in the same period. Furthermore, the changes in the fuel mix that occurred during this decade in the EU-15 limited the increase of emissions to 1% in 1990-2000 compared with a 10% growth of primary energy needs. Both developments contributed to the decline of CO_2 emissions at the EU-25 level by -3.5% between 1990 and 2000 compared with a rise of primary energy needs by 6%.

Beyond 2000, CO_2 emissions at the EU-25 level are projected to grow, reaching +14% from 1990 levels by 2030. But the emissions growth (+0.5% pa in 2000-2030) remains slower than the growth in primary energy needs (+0.6% pa) implying a further improvement of carbon intensity to 2030. Nonetheless, as illustrated in Figure 4-3, carbon intensity exhibits a continuous improvement only to 2015 whereas beyond that time it starts to deteriorate again.

This trend is rather similar both for the EU-15 and the ACC (see Figure 4-4). While opportunities for CO_2 emissions reductions through fossil fuel switching are largely exploited, there are several factors that contribute to a deterioration of carbon intensity beyond 2015. These include: replacement of nuclear with fossil fuels and coal in particular in the course of nuclear decommissioning largely brought about by the nuclear phase-out in certain Member States; the relatively slow penetration of renewables; and the significant growth of transport demand in ACC (with very limited possibilities for fuel switching).

Differences between the EU-15 energy system and that of the acceding countries remain significant, as can be seen by comparing per capita levels of key indicators of the energy system, namely GDP, gross inland consumption and CO_2 emissions (see Figure 4-5). By 2030, GDP per capita in EU-15 remains some 45% higher than in acceding countries[80] compared to 125% higher in 2000. This indicates that, despite the significant improvements in acceding countries' economies, full convergence with the EU-15 will not be completed by 2030.

Figure 4-4: Evolution of carbon intensity in EU-25 (in t of CO_2 per toe)

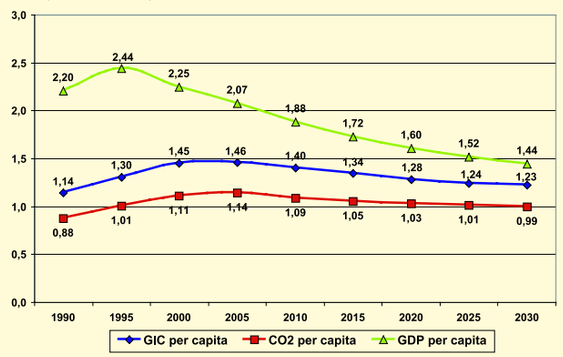


Source: PRIMES, ACE.

79 If GDP expressed in purchasing power standards is used energy intensity for ACC countries is some 1.55 times higher compared to EU average in 2000 declining to 1.17 times higher by 2030.

80 GDP per capita for acceding countries is expressed in terms of purchasing power standards.

Figure 4-5: Convergence in EU-25 (ratios: EU-15 to ACC)



Source: PRIMES, ACE.

On the other hand, convergence in terms of energy consumed per capita is more pronounced, with EU-15 citizens consuming by 2030 some 23% more energy than those in acceding countries (compared to 45% more in 2000). The more carbon intensive character of the acceding countries' energy systems compared to the EU-15 is reflected in CO_2 emissions per capita. By 2030 CO_2 emissions per capita in the EU-15 are projected to be 1% lower than in the acceding countries, although EU-15 has much higher energy consumption per capita. In 2000, per capita CO_2 emissions in the EU-15 were still 11% higher compared with the acceding countries.

4.2.2. Primary Energy Needs

Total indigenous production of primary energy in EU-25 is projected to decline continuously over the projection period (-1% pa in 2000-2030). As illustrated in Table 4-6 the decline is more pronounced in fossil fuels production, while, in contrast, renewable energy forms are expected to grow over the projection period. Indigenous production of solid fuels declines by some -50% between 2000-2030 (-54% for coal, -43% for lignite) driven by the increasing competitiveness of imported coal and natural gas. Crude oil and natural gas production also experiences a significant decline (-47% and -40% respectively from 2000 levels by 2030) due to the exhaustion of currently exploited reserves and the limited scope for the exploitation of new, more costly ones in a world of relatively modest energy prices.

Nuclear production is projected to experience limited growth to 2010. Thereafter it is likely to decline steeply (-22% in 2030 from 2000 levels), as a result of the closure of unsafe nuclear plants in some acceding countries and the nuclear phase out policies decided in certain EU-15 Member States. In other countries the decommissioning of nuclear plants at the end of their lifetime is not always compensated by new nuclear investment. As regards the use of renewable energy forms in the EU-25 energy system, policy measures and technological progress are the key drivers for the significant boost projected (+74% in 2000-2030). Beyond 2020, renewable energy forms become the second most important indigenous energy source (after nuclear) in the EU-25 energy system.

It is interesting to note that indigenous production declines much faster in acceding countries (-1.5% pa in 2000-2030) compared to the EU-15 (-0.9% pa), a result strongly related to the dominance of solid fuels as an indigenous energy form in the acceding countries' energy systems in the past. By 2030 acceding countries account for some 13.2% of indigenous production of primary energy in EU-25, compared to 15.3% in 2000.

Primary energy demand in EU-25 rose some 6% between 1990 and 2000 with completely different trends in EU-15 (+10%) and ACC (-17%). In the acceding countries, the slowdown of economic activity in CEEC, the massive closure of old energy-inefficient

Table 4-6: Primary production of fuels in EU-25.

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	350.9	203.1	152.3	124.1	101.6	-5.3	-2.8	-2.0	-2.0	-2.3
Hard coal	212.7	120.2	81.4	64.4	54.7	-5.5	-3.8	-2.3	-1.6	-2.6
Lignite	138.3	82.9	70.9	59.7	46.9	-5.0	-1.5	-1.7	-2.4	-1.9
Liquid Fuels	120.4	164.1	131.5	102.0	86.4	3.1	-2.2	-2.5	-1.6	-2.1
Natural Gas	139.6	196.7	196.9	147.6	117.1	3.5	0.0	-2.8	-2.3	-1.7
Nuclear	197.1	237.8	245.4	213.7	185.2	1.9	0.3	-1.4	-1.4	-0.8
Renewable En. Sources	70.5	97.2	132.9	151.5	169.6	3.3	3.2	1.3	1.1	1.9
Total	**878**	**899**	**859**	**739**	**660**	**0.2**	**-0.5**	**-1.5**	**-1.1**	**-1.0**
current EU	708	761	743	635	573	0.7	-0.2	-1.6	-1.0	-0.9
acceding countries	170	138	116	103	87	-2.1	-1.7	-1.1	-1.7	-1.5

Source: PRIMES, ACE.

Table 4-7: Primary energy demand in EU-25.

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	431	303	243	252	296	-3.5	-2.2	0.4	1.6	-0.1
Liquid Fuels	599	634	655	678	685	0.6	0.3	0.3	0.1	0.3
Natural Gas	259	376	510	598	630	3.8	3.1	1.6	0.5	1.7
Nuclear	197	238	245	214	185	1.9	0.3	-1.4	-1.4	-0.8
Renewable En. Sources	70	97	133	152	170	3.3	3.2	1.3	1.1	1.9
Total	**1558**	**1650**	**1788**	**1895**	**1968**	**0.6**	**0.8**	**0.6**	**0.4**	**0.6**
current EU	1321	1453	1576	1657	1719	1.0	0.8	0.5	0.4	0.6
acceding countries	238	198	213	238	249	-1.8	0.7	1.1	0.5	0.8

Source: PRIMES, ACE.

factories and increasing energy prices progressively aligned to world energy market levels led to a rapid decline of primary energy needs in the nineties. It is important to note that, before 1990, CEEC were characterised by the world's highest energy intensity after the Former Soviet Union. This situation resulted from an industrial structure based on energy-intensive industries (steel, cement, chemicals) using energy inefficiently; and very low energy prices as energy consumption was largely supplied from the Former Soviet Union at prices usually well below world market levels.

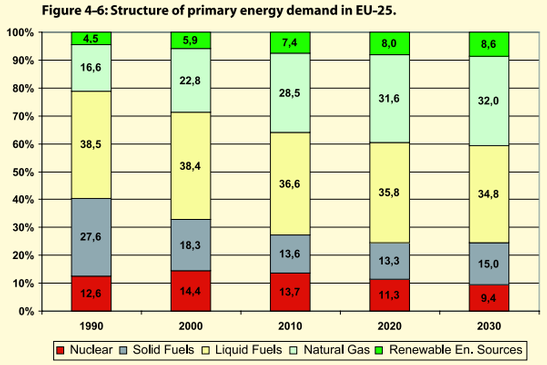
Acceding countries accounted in 2000 for some 12% of primary energy needs in EU-25 (from 15% in 1990) compared to 16.5% of the population and 4.4% of GDP, clearly reflecting the great inefficiencies that still prevailed in the ACC energy system. In the Baseline scenario primary energy demand is projected to grow by 19.3% between 2000 and 2030 (see Table 4-7), with energy needs growing slightly faster in acceding countries (+26%) compared to the EU-15 (+18.4%). By 2030 primary energy demand in acceding countries is projected to reach 12.6% of overall energy needs in EU-25. The evolution of primary energy needs remains dominated by prevailing trends in the EU-15 energy system over the projection period.

Natural gas and renewable energy forms are projected to remain the fastest growing fuels in the EU-25 energy system (as was the case during the last decade), growing at rates 3 times faster than overall energy needs over the projection period (+1.7% pa for natural gas; +1.9% pa for renewables). Primary energy demand for liquid fuels exhibits a moderate growth over the projection period (+0.3% pa) though at a rate well below average. Solid fuels, after a strong decline to 2010, are projected to regain some market share in the EU-25 energy system beyond 2015 as a result of the increasing competitiveness of imported coal and also nuclear plant decommissioning. By 2030, primary energy demand for solid fuels is projected to come close to that observed in 2000.

Novel energy forms, such as hydrogen and methanol, are not projected to make significant inroads in the EU-25 energy system in the period to 2030.

Under Baseline assumptions the EU-25 energy system is projected to become increasingly dependent on fossil fuels, though with significant changes occurring in the fuel mix (see Figure 4-6). Following a substantial decline during the last decade (from 27.6% of primary energy needs in 1990, down to 18.3% in 2000), the share of solid fuels is projected to further decline to 2015 (accounting then for 12.3% of primary energy needs), regaining some market share thereafter (15% in 2030). Liquid fuels are also projected to exhibit a modest decline with their market share reaching 34.8% in 2030 compared to 38.4% in 2000. On the contrary, natural gas, spurred by its rapid penetration both on the

Figure 4-6: Structure of primary energy demand in EU-25.



Source: PRIMES, ACE.

demand and the supply sides, accounts by 2030 for 32% of primary energy needs (+9.2 percentage points compared to 2000 levels). Overall, in the Baseline case, the share of fossil fuels is projected to reach 81.8% of primary energy demand in the EU-25 energy system by 2030 compare to 79.6% in 2000.

As regards non fossil fuels, nuclear energy accounts for 9.4% of primary energy demand in 2030 (compared to 14.4% in 2000). The share of renewables increases only moderately from 5.9% of primary energy demand in 2000 to reach 8.6% in 2030 despite the considerable growth of renewable energy sources (including waste) in percentage terms (+74% in 2000-2030).

The combined effect of increasing primary energy demand for fossil fuels and declining primary production results in a significant growth of **import dependency** for the EU-25 energy system from 47.1% in 2000 up to 67.5% in 2030 (see Table 4-8), an increase of more than 20 percentage points. By 2030 more than 88% of primary energy needs for oil, excluding requirements for marine bunkers, will be satisfied by imports compared to 76.5% in 2000. Oil imports are projected to continue consisting mainly of crude oil, as net imports of oil products will remain marginal. The EU-25 external dependence in terms of natural gas is projected to increase sharply, reaching 81.4% by 2030 compared to 49.5% in 2000. As regards solid fuels, though import dependency under Baseline assumptions is also projected to grow significantly, it remains at lower levels compared to oil and gas, reaching by 2030 65.7% up from 30.1% in 2000.

Table 4-8: Import dependency in EU-25.

	%				
	1990	**2000**	**2010**	**2020**	**2030**
Solid fuels	17.4	30.1	37.4	50.8	65.7
Liquid fuels	80.9	76.5	81.4	86.1	88.5
Natural gas	47.6	49.5	61.4	75.3	81.4
Total	**44.8**	**47.1**	**53.3**	**62.1**	**67.5**
current EU	47.6	49.4	54.3	62.9	67.8
acceding countries	28.6	29.9	45.7	56.7	65.2

Source: PRIMES, ACE.

Both EU-15 and acceding countries' energy systems are projected to reach similar levels of import dependency in the long run (67.8% and 65.2% respectively in 2030). This is despite the much better current position of acceding countries, with an import dependency of 30% in 2000 compared to 49% in the EU-15. Faster growing energy needs in acceding countries, combined with a steep decline of indigenous solid fuels production, are the main reasons.

The increasing dependence of the EU-25 energy system on energy imports (more than two thirds of primary energy needs in 2030) raises significant concerns as regards the security of supply in the long run. This is especially the case for natural gas given the increasing dependence upon gas imports from a limited number of suppliers and the need for long distance transport infrastructures, as well as the increasing natural gas demand in other world regions such as Asia. In the oil market, supply is increasingly concentrated in the Middle East while North Sea production is declining. On the other hand, the world coal market remains well diversified with abundant supplies (see also part I).

4.2.3. Final Energy Demand projections

Final demand sectors have undergone significant changes both in the EU-15 and the acceding countries during the last decade. In EU-15, changes in the 1990s related mainly to shifts towards less energy intensive manufacturing industries and services, higher standards of living, associated with widespread ownership of private cars and domestic appliances, increasing comfort levels in space heating and cooling, and changes in the fuel mix away from solid and liquid fuels towards gas and electricity uses. As regards acceding countries, the restructuring of Central and Eastern European countries' economies between 1990 and 2000, including the massive closure of old energy-inefficient factories and increasing energy prices progressively aligned to world energy market levels, explain the changes in the demand side.

Between 1990 and 2000 final energy demand in EU-25 increased by 6% with the EU-15 exhibiting growth of 11%, whilst energy demand in acceding countries declined by -21.5%. Under Baseline assumptions, the factors that prevailed during the last decade in EU-15 are assumed to continue to do so in the future, while they are also likely to become important for acceding countries as the restructuring in CEEC progresses and economic conditions improve, further stimulated by the process of convergence.

Final energy demand in EU-25 is projected to increase by 29.3% between 2000 and 2030, well above that projected for primary energy needs (+19.3%). This difference reflects the significant efficiency gains that power generation undergoes under Baseline assumptions. Overall final energy demand growth is rather similar in the EU-15 and acceding countries (+28.5% and +34% respectively in 2000-2030), though exhibiting significant differences in terms of growth patterns (see Table 4-9). Thus, while demand growth in EU-15 is projected to peak in the next decade and decelerates afterwards, energy demand in acceding countries is projected to exhibit even stronger growth between 2010 and 2020 and then to slow down in the long run. The main drivers for these different growth patterns include: issues related to the different economic evolution between EU-15 and acceding countries; the further reduction of inefficiencies in CEEC; and the likely faster development of saturation effects for a number of energy uses beyond 2010 in the EU-15.

Table 4-9: Final energy demand in EU-25 by sector.

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Industry	328.4	310.2	338.1	364.8	385.5	-0.6	0.9	0.8	0.6	0.7
Domestic	412.2	433.3	482.3	522.7	556.4	0.5	1.1	0.8	0.6	0.8
Tertiary	144.8	154.3	173.7	193.9	217.8	0.6	1.2	1.1	1.2	1.2
Households	267.4	279.1	308.6	328.9	338.6	0.4	1.0	0.6	0.3	0.6
Transport	273.6	333.1	388.6	428.5	449.8	2.0	1.6	1.0	0.5	1.0
Total	**1014**	**1077**	**1209**	**1316**	**1392**	**0.6**	**1.2**	**0.9**	**0.6**	**0.9**
current EU	859	955	1077	1165	1229	1.1	1.2	0.8	0.5	0.8
acceding countries	155	121	132	151	163	-2.4	0.9	1.3	0.7	1.0

Source: PRIMES, ACE.

4.2.3.1. Final energy demand by sector

The evolution of energy demand by sector for the EU-25 energy system is illustrated in Table 4-9. Between 1990 and 2000, structural changes in the EU-15 industrial sectors, combined with the impacts of industrial restructuring in CEEC, led to a decline of energy demand in **industry** by 6%. In the same period industrial value added increased by 14% with implied intensity gains in the sector reaching 1.9% pa. In the period 2000-2030, energy demand in EU-25 industry is projected to grow by 24.3% driven by higher economic growth (sectoral value added more than doubles between 2000 and 2030). However, energy intensity gains remain significant over the projection period (+1.6% pa) driven by structural changes towards less energy intensive manufacturing processes but also by the exploitation of energy saving options; changes in the fuel mix towards fuels allowing for higher efficiency at use contribute to this development.

Energy demand in the **tertiary** sector exhibited a limited increase in the last decade (+0.6% pa). However, energy demand in the sector grew much slower than economic growth, which reached 2.4% pa in 1990-2000, driven mainly by structural shifts in the EU-15 and to a lesser extent by economic restructuring in acceding countries. In the Baseline scenario energy demand in the tertiary sector is projected to continue growing at a rather uniform pace over the projection period (+1.2% pa in 2000-2030) while the expected continuation of the restructuring of the EU-25 economy towards services leads to an economic growth of 2.5% pa. The improvement[81] of energy intensity in the sector (energy consumption per unit of value added) is projected to reach 1.3% pa in 2000-2030 (compared to 1.7% pa in 1990-2000) but with a decelerating pace over the projection period.

The EU-25 **residential** sector also exhibited limited growth in terms of energy demand (+0.4% pa) between 1990 and 2000. The restructuring of CEEC economies (involving a more rational use of energy in the context of increasing energy prices), technological improvements (both in buildings and equipment), changes in the fuel mix and saturation effects in many end uses for the EU-15 are some of the reasons for the limited growth of household energy needs. In the period to 2010, energy demand in households is projected to grow by 1% pa, but to decelerate afterwards to 0.6% pa in 2010-2020 and 0.3% pa in 2020-2030. The implied energy intensity improvement [81] in the residential sector reaches -1.6% pa in 2000-2030 compared to -1.5% pa observed in the last decade.

The **transport sector** exhibited the highest demand growth between 1990 and 2000 (+2.0% pa), accounting for some 95% of the total increase of EU-25 final energy demand. Following the strong decline of energy needs in industry in the same decade, the transport sector (excluding marine bunkers) became by 2000 the largest demand side sector - accounting for 31% of final energy demand compared to 27% in 1990. The predominant role of the transport sector in final energy demand growth is projected to continue under Baseline assumptions. It is only in the long run that the combined effect of decoupling of transport activity from economic growth (especially in passenger transport in EU-15) and technological progress lead to a deceleration of transport demand growth. However, the transport sector remains the second fastest growing demand sector over the projection period (+35% in 2000-2030 compared to +24.3% in industry, +41.2% in the tertiary and +21.3% in the residential sector). Transport in EU-25 is expected to account for close to one third of final energy demand in 2030.

4.2.3.2. Final energy demand by fuel

The demand side of the EU-25 energy system has undergone significant changes in terms of the fuel mix during the last decade as a result of shifts towards the use of more efficient energy forms.

81 Energy intensity in households is computed using per capita income as the denominator.

Table 4-10: Final energy demand in EU-25 by fuel.

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Solid Fuels	120.7	56.7	41.7	33.6	29.0	-7.3	-3.0	-2.1	-1.5	-2.2
Liquid Fuels	427.5	465.0	503.7	538.7	554.9	0.8	0.8	0.7	0.3	0.6
Gas fuels	195.1	246.2	299.2	324.7	341.3	2.4	2.0	0.8	0.5	1.1
Steam	60.5	55.6	64.6	74.3	83.5	-0.8	1.5	1.4	1.2	1.4
Electricity	176.6	211.3	253.6	297.7	337.1	1.8	1.8	1.6	1.3	1.6
New fuels (hydrogen etc.)	0.0	0.0	0.3	1.0	1.4	-	-	13.5	3.3	-
Biomass	27.3	33.7	35.4	33.7	31.2	2.1	0.5	-0.5	-0.8	-0.3
Waste	6.0	7.5	8.7	9.2	9.4	2.2	1.5	0.6	0.2	0.8
Other renewables	0.5	0.8	2.0	3.2	4.0	4.6	10.0	4.9	2.4	5.7
Total	**1014**	**1077**	**1209**	**1316**	**1392**	**0.6**	**1.2**	**0.9**	**0.6**	**0.9**

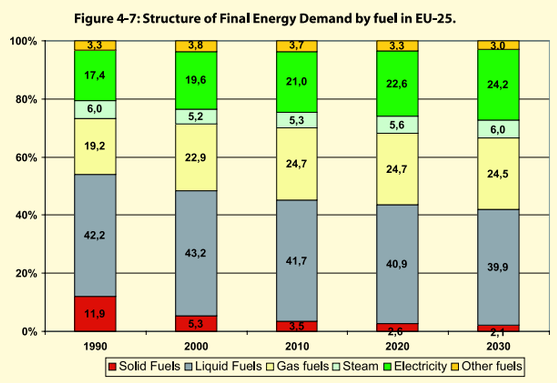
Source: PRIMES, ACE.

Demand for solid fuels declined by more than 50% between 1990 and 2000 while demand growth for liquid fuels (+0.8% pa) was significantly lower than that in the transport sector (+2.0% pa), implying a decline in oil consumption in all other demand sectors. Natural gas (growing by 2.4% pa - a rate four times higher than average) and electricity (+1.8% pa) made some significant inroads in the demand side during the last decade, substituting for solids and liquid fuels. Demand for biomass and waste also increased at rates above average, although still representing a rather small proportion of final energy needs in 2000; while demand for distributed steam exhibited a significant decline in the last decade, strongly affected by the restructuring of CEEC.

Under Baseline assumptions these trends are also projected to prevail in the future evolution of final energy demand in EU-25 (see Table 4-10). Liquid fuels are projected to remain the main energy carrier in the EU-25 energy demand sectors over the projection period, but growing at rates well below average, constantly losing market share. By 2030 some 80% of liquid fuels demand is projected to arise from the transport sector, compared to 70% in 2000. Solid fuels demand declines over the projection period and by 2030 they become an obsolete energy form in final use; while demand for biomass, though rising to 2010, declines thereafter mainly because of the fall in the number of rural households. In contrast, demand for waste increases over the projection period through its accelerated use in direct heating uses in industry. Electricity demand is projected to exhibit the highest growth over the projection period (+1.6% pa in 2000-2030) while demand growth for natural gas (+1.1% pa in 2000-2030) decelerates in the long run due to limitations in infrastructure but also technological factors. The exploitation of cogeneration opportunities leads to significant growth of demand for distributed steam (+1.4% pa) over the outlook period. Novel final energy forms, such as hydrogen and ethanol, do not progress under Baseline assumptions primarily because of cost considerations. Finally, other renewable energy forms, such as solar energy used in water heaters, grow quite rapidly (5.7% pa in 2000-2030) but they remain insignificant as a proportion of overall final consumption.

The changes that the fuel mix in final demand sectors undergoes under Baseline assumptions are illustrated in Figure 4-7. By 2030 solid fuels account for 2.1% of energy needs on the demand side, compared to 5.3% in 2000 and 11.9% in 1990. Oil is also projected to lose market share dropping just below 40% in 2030 from 43.2% in 2000. The share of gas rises to 24.5% by 2030, while that of distributed steam, following a strong decline in the last decade, reaches 6% by 2030 because of increasing use of steam from cogeneration plants. The most notable change is the increase by 4.6 percentage points in the share of electricity though, even by 2030, it accounts for less than a quarter of final energy demand. The projected electricity demand growth (+1.6% pa) can be considered as modest given that, historically, electricity use grew at rates above GDP. Saturation effects, technological progress and the exploitation of energy savings options are the main reasons limiting electricity demand growth in the Baseline scenario.

Figure 4-7: Structure of Final Energy Demand by fuel in EU-25.



Source: PRIMES, ACE.

Table 4-11: Final Energy Demand by Fuel in Industry for EU-25

	Mtoe					Annual Growth Rate (%)				
	1990	2000	2010	2020	2030	90/00	00/10	10/20	20/30	00/30
solids	70.5	44.3	36.8	31.6	28.0	-4.5	-1.8	-1.5	-1.2	-1.5
liquids	50.2	40.3	37.6	35.5	34.3	-2.2	-0.7	-0.6	-0.3	-0.5
gas	82.4	92.6	108.1	117.4	125.8	1.2	1.6	0.8	0.7	1.0
biomass-waste	10.1	12.1	14.9	16.3	16.4	1.9	2.1	0.9	0.1	1.0
steam	34.1	29.5	36.3	43.6	48.2	-1.4	2.1	1.9	1.0	1.7
electricity	78.1	88.5	104.5	120.5	132.8	1.3	1.7	1.4	1.0	1.4
Total	**328.4**	**310.2**	**338.1**	**364.8**	**385.5**	**-0.6**	**0.9**	**0.8**	**0.6**	**0.7**
current EU	262.2	268.7	299.4	325.3	344.6	0.2	1.1	0.8	0.6	0.8
acceding countries	66.1	41.5	38.7	39.6	40.9	-4.5	-0.7	0.2	0.3	-0.1

Source: PRIMES, ACE.

4.2.3.3. Energy demand in industry

The last decade has been characterised by major changes in the **industrial** sector both in the EU-15 and acceding countries. The increasing globalisation of the world economy during the 1990s and the enhanced level of economic integration within the EU-15 were very important factors influencing the evolution of the industrial sector in the last decade. Changes included structural shifts away from energy intensive manufacturing processes towards activities with high value added, as well as extensive renewal of equipment also involving changes in the fuel mix towards more efficient fuels. As regards acceding countries the restructuring of CEEC economies in the last decade was the main driver for the changes observed in their industrial sectors. Economic restructuring involved the modernisation of industrial processes and the shift to activities with higher added values, an evolution sustained by privatisation of state companies and impressive foreign investment, and significant improvements in terms of industrial efficiency. It is important to note that, before the restructuring of CEEC, heavy industry played a predominant role in their energy system making it extremely energy intensive. Energy demand in industrial sectors declined during the last decade by 6% at the EU-25 level, with intensity gains (energy consumed per unit of value added) reaching 1.9% pa. Industrial energy demand in EU-15 exhibited limited growth (+2.5%) between 1990 and 2000 with energy intensity gains of 1.1% pa. But the restructuring of CEEC economies led to a substantial decline of energy needs in acceding countries' industry (more than -37% in 1990-2000) clearly reflecting the significant inefficiencies that prevailed in the past. Even though energy intensity gains in acceding countries' industry reached an astonishing 5.7% pa, the sector remained in 2000 2.85 times more energy intensive than EU-15 industry (from 4.6 times more energy intensive in 1990).

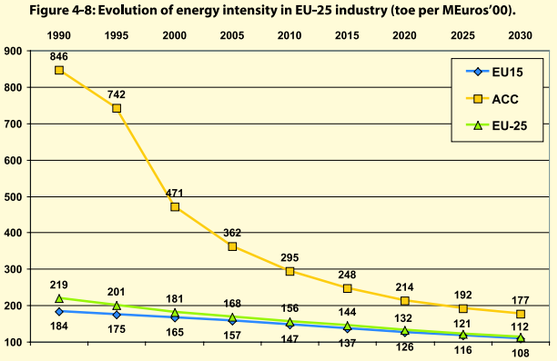
The fuel mix of industrial demand was also heavily affected by the changes that occurred in the nineties. Solid fuels demand in 2000 was limited to some 63% of that in 1990, while a strong decline was also observed in the use of liquid fuels and distributed steam (-20% and -13% respectively in 1990-2000). On the other hand, the shift away from energy intensive sectors and towards more efficient fuels led to an increase of electricity and gas demand by 13% and 12%, respectively, from 1990 levels. Finally, demand for biomass and waste also increased significantly between 1990 and 2000 (+20%) mainly because of its extensive use in direct heating uses in acceding countries (replacing solid fuels).

In the Baseline scenario the trends that prevailed in most of the EU-15 industry during the 1990s are assumed to continue over the projection period. After a period of radical industrial restructuring in CEEC, acceding countries are also very likely to exhibit similar trends in view of their integration in the EU-15. Table 4-11 illustrates the evolution of final energy demand in industrial sectors by fuel to 2030. The use of solid fuels is projected to decline further (-1.5% pa in 2000-2030) as they increasingly become an energy form exclusively used in specific industrial processes such as integrated blast furnaces in iron and steel and cement production. Consumption of liquid fuels is also projected to decline to 2030 (-0.5% pa). This is especially the case for heavy oil products. The shift in industrial uses towards natural gas is projected to peak in the period to 2010, and to continue to do so but at a decelerating pace, to 2030. Similar trends are projected for electricity demand. Demand for co-generated steam also exhibits a strong increase over the projection period, while the growth of biomass and waste demand is less pronounced but still significant.

Overall industrial energy demand is projected to grow by 0.7% pa between 2000 and 2030. Energy demand for industrial purposes increases significantly in the EU-15 (+0.8% pa in 2000-2030), but it declines in acceding countries (-0.1% pa in 2000-2030). The inefficiencies that still prevail in 2000 in acceding countries' industries allow for a further decline of energy requirements in the sector to

2010 followed by limited growth beyond then, despite the fast growth of industrial activities. The industrial sector expands by +3.8% pa in 2000-2030 in acceding countries compared to +2.4% pa in EU-15. By 2030, energy demand in the EU-15 accounts for 89.5% of overall energy needs in EU-25 industrial sectors compared to 86.5% in 2000.

Figure 4-8: Evolution of energy intensity in EU-25 industry (toe per MEuros'00).



Source: PRIMES, ACE.

Overall energy intensity gains in industry at the EU-25 level reach 1.6% pa in 2000-2030 (compared to 1.9% pa in 1990-2000). The industrial sector in acceding countries is projected to experience significant intensity gains over the outlook period (+3.2% pa in 2000-2030). However, as illustrated in Figure 4-8, EU-15 industry (for which intensity gains are "limited" to 1.4% pa under Baseline assumptions) remains about 65% more efficient in 2030, partly because of more efficient use of energy but also due to the different structure of the industrial sector.

4.2.3.4. Services and agriculture

The tertiary sector was the fastest growing segment of the economy in the nineties both for the EU-15 and for acceding countries. The services sector was the main driver for this growth (+2.4% pa in 1990-2000 at the EU-25 level) while agriculture exhibited less pronounced growth (+1.1% pa). In 2000 the share of services in the EU-25 economy reached 68.4% (from 65.6% in 1990) whereas that of agriculture declined from 2.9% in 1990 to 2.7% in 2000. However, large differences exist between EU-15 and acceding countries. The services sector in acceding countries is at a rather early stage of development, accounting in 2000 for 57.4% of gross value added compared to 68.8% in the EU-15.

Furthermore, one of the most important features of the tertiary sector in acceding countries is that it is characterised by low energy consumption per capita and high energy intensity. Following the restructuring of CEEC, energy demand in the acceding countries' services sector remained stable between 1990 and 2000 with intensity gains exceeding 2.6% pa. In the 1990s, energy demand in agriculture exhibited a strong decline of -6.9% pa with marked intensity gains of 7.4% pa. In the same period, energy demand in services in EU-15 increased by 1.4% pa (with intensity gains of 0.9% pa) and in agriculture by 1% pa (with intensity gains of 0.1% pa).

Despite this significant progress over the last decade in acceding countries compared to the EU-15, energy consumption per unit of value added, i.e. energy intensity, remained around 3.5 times higher in acceding countries compared to EU-15 levels both in services and agriculture. This illustrates the inefficient use of energy in acceding countries but also the potential for further efficiency gains. On the other hand, energy consumption in services per capita remained significantly lower in acceding countries than in the EU-15 (188 kgoe per capita compared to 293 kgoe in the EU-15).

Under Baseline assumptions, the services sector is projected to remain the fastest growing segment of the EU-25 economy over the outlook period (+2.6% pa). Growth will be more pronounced in acceding countries (+4.0% pa) than in the EU-15 (+2.5% pa). By 2030, services are projected to account for more than 71% of the EU-25 economy (71.5% in the EU-15 and 65.2% in the acceding countries). Economic growth in agriculture is rather limited (+1.0% pa) and consequently the share of this sector in gross value added decreases to 1.7% by 2030.

The evolution of energy demand in the tertiary sector is summarised in Table 4-12. Tertiary demand in EU-25 is projected to grow by 1.2% pa in 2000-2030, broadly similar both for the EU-15 (+1.1% pa) and acceding countries (+1.2% pa).

The growth of energy needs in the tertiary sector is driven by the evolution of services, in which energy demand increases by 1.3% pa, whereas demand growth in agriculture is limited to 0.5% pa. Between 2000 and 2030 more than 93% of additional tertiary sector energy requirements arise from services.

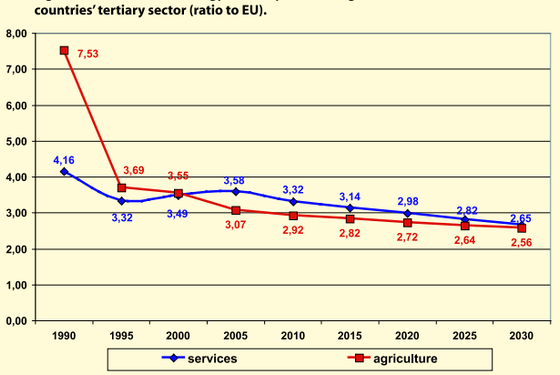
Continuing trends observed in the last decade, the fuel mix of the tertiary sector is projected to undergo further changes towards the use of more efficient and "clean" energy forms. Thus, consumption of solid fuels, following a substantial decline of close to -80% in 1990-2000, is projected to further diminish to 2030. Oil consumption is also projected to further decline in 2000-2010 at a rate of 0.7% pa (compared to -1.8% pa in 1990-2000), but exhibiting limited growth thereafter. Energy demand for biomass and waste is projected to increase to 2010 but decline thereafter as a result of the limited growth in agricultural use. Demand for natural gas in the tertiary sector increases by 1.0% pa. A more pronounced growth is projected for distributed heat (+1.5% pa) following the substitution of advanced co-generation units for old

Table 4-12: Final Energy Demand in Tertiary Sector for EU-25

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
By Sector										
Services	109.8	125.1	143.4	161.8	184.3	1.3	1.4	1.2	1.3	1.3
Agriculture	35.0	29.2	30.3	32.1	33.5	-1.8	0.4	0.6	0.4	0.5
By Fuel										
solids	14.4	3.0	1.4	0.6	0.3	-14.4	-7.1	-8.0	-6.9	-7.4
liquids	47.2	39.5	36.7	36.9	37.7	-1.8	-0.7	0.1	0.2	-0.1
gas	28.6	44.4	52.3	55.4	60.3	4.5	1.6	0.6	0.8	1.0
biomass-waste	1.5	2.4	2.9	2.8	2.7	4.8	1.7	-0.4	-0.4	0.3
solar energy	0.2	0.2	0.4	0.4	0.5	2.0	4.6	0.6	3.5	2.9
steam	9.5	8.6	9.5	11.2	13.5	-1.0	1.0	1.7	1.9	1.5
electricity	43.3	56.0	70.5	86.5	102.7	2.6	2.3	2.1	1.7	2.0
Total	**144.8**	**154.3**	**173.7**	**193.9**	**217.8**	**0.6**	**1.2**	**1.1**	**1.2**	**1.2**
current EU	115.3	132.7	149.2	165.7	186.6	1.4	1.2	1.1	1.2	1.1
acceding countries	29.5	21.6	24.5	28.1	31.2	-3.1	1.3	1.4	1.0	1.2

Source: PRIMES, ACE.

Figure 4-9: Evolution of energy intensity in acceding countries' tertiary sector (ratio to EU).



Source: PRIMES, ACE.

district heating plants and improvements in the steam distribution networks. Driven by the strong increase of electricity-related applications in services, electricity demand is projected to grow at rates well above average (+2.0% pa). By 2030, electricity accounts for more than 47% of tertiary sector energy needs compared to 36% in 2000. Finally, solar energy demand grows strongly over the projection period (+2.9% pa in 2000-2030) but remains insignificant in absolute terms.

Both the services sector and agriculture are projected to see significant intensity improvements in the period to 2030. Intensity gains in services are more pronounced, reaching 1.2% pa in 2000-2030 (compared to 1.1% pa in 1990-2000), whereas in agriculture they are limited at 0.5% pa (from 2.9% pa in 1990-2000). As expected, acceding countries exhibit a much higher improvement (+2.5% pa for the tertiary sector as a whole) compared to the EU-15 (+1.3% pa). However, as clearly illustrated in Figure 4-9, acceding countries remain much more energy intensive than the EU-15. Furthermore, between 1995 and 2005 the relative energy intensity of the services sector in acceding countries worsens compared to the EU-15. This development stems from rising comfort standards, which more than offset efficiency and productivity gains in the sector.

4.2.3.5. Households sector

Energy demand in households is driven by demographic and economic factors including the number of households, income levels, the average size of each home, the number of individuals in the average household, as well as climatic and cultural conditions. In the last decade, the total number of households in EU-25 grew by more than 11% while population growth was limited to 2.8%. This reflected a strong decline in the number of inhabitants per household (from 2.64 persons per household in 1990 down to 2.44 persons in 2000) following rising per capita incomes and changes in the age structure, societal conditions and lifestyles.

Despite the strong increase in the number of households and income between 1990 and 2000, growth of energy consumption in the residential sector was limited to 4.4%, implying a decoupling of energy use from the evolution of the above-mentioned factors. Furthermore, demand growth patterns differed significantly between EU-15 and acceding countries. In the EU-15 residential sector energy demand increased in 1990-2000 by 7.3%. On the other hand, residential energy demand in acceding countries declined by 12.5% between 1990 and 2000, strongly affected by the restructuring of CEEC economies.

It is important to note that the decoupling of energy use in households from income and the number of households in the last decade was driven by different factors in the EU-15 and in

Table 4-13: Final Energy Demand by Fuel in Households for EU-25

	Mtoe					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
solids	34.8	9.1	3.5	1.4	0.6	-12.5	-9.2	-8.7	-7.7	-8.5
liquids	61.8	57.4	48.0	45.9	41.8	-0.7	-1.8	-0.4	-0.9	-1.1
gas	83.0	108.1	138.3	151.2	154.4	2.7	2.5	0.9	0.2	1.2
biomass-waste	21.7	26.6	26.3	24.0	21.6	2.1	-0.1	-0.9	-1.0	-0.7
solar energy	0.3	0.5	1.6	2.8	3.5	6.0	11.8	5.7	2.3	6.5
steam	16.9	17.5	18.8	19.5	21.8	0.3	0.8	0.3	1.1	0.7
electricity	48.9	59.8	72.1	84.2	95.0	2.0	1.9	1.6	1.2	1.6
Total	**267.4**	**279.1**	**308.6**	**328.9**	**338.6**	**0.4**	**1.0**	**0.6**	**0.3**	**0.6**
current EU	228.1	244.7	270.9	284.4	291.0	0.7	1.0	0.5	0.2	0.6
acceding countries	39.3	34.4	37.8	44.5	47.6	-1.3	0.9	1.7	0.7	1.1

Source: PRIMES, ACE.

acceding countries. Energy demand in households in the EU-15 exhibits strong saturation trends as households in most Member States have already satisfied most of their energy needs for heating purposes, lighting etc. Thus it is mainly the increasing use of energy in more 'luxurious' energy services, such as air conditioning and novel and more expensive appliances, which generates increasing energy requirements in the sector. Furthermore, efficiency improvements in the capital stock of households (incorporating energy efficiency features in buildings and appliances) also contributed to the slowdown in energy demand growth.

On the contrary, acceding countries remain far from reaching EU-15 levels in terms of energy consumption per capita in households (460 kgoe in 2000, or some 71% of that in the EU-15) but, on the other hand, often use energy in a very inefficient way. Energy intensity (expressed as energy consumed per unit of income) in 2000 for acceding countries was 2.3 times higher than the EU-15 (down from 2.7 times higher in 1990). Reforms of the energy price system in CEEC played an important role in the more rational use of energy.

In the Baseline scenario, energy demand in the residential sector increases over the projection period (+21.3% in 2000-2030), with implied intensity gains reaching 1.6% pa. The growth of energy demand in EU-15 households is limited to 19% whereas in acceding countries it reaches 38% in 2000-2030. The implied energy intensity improvement in the EU-15 reaches 1.6% pa. Acceding countries are projected to exhibit an even more favourable evolution, with intensity gains reaching 2.4% pa in 2000-2030. However, even in 2030 the residential sector in acceding countries still remains much more energy intensive than that in the EU.

The use of solid fuels, oil products and biomass/waste is projected to fall significantly over the outlook period (see Table 4-13). Following a rapid decline in 1990-2000, solid fuels are projected to become an obsolete energy form for residential energy uses by 2030. Consumption of biomass and waste also faces strong downward pressures as the number of rural households in EU-25 is assumed to decrease over the projection period. The comparative advantages of natural gas in heating use lead to the continuation of the substitution, already seen in the nineties, of liquids (-1.1% pa in 2000-2030) by gas (+1.2% pa). Distributed heat is also projected to gain some additional market share growing by 0.7% pa. Solar energy exhibits the highest growth among all fuels in the residential sector (+6.5% pa in 2000-2030) but even in 2030 this energy carrier still accounts for only about 1% of final household energy demand. By 2030, electricity represents 28% of energy needs in households compared to 21.4% in 2000. The further use of electric appliances and air conditioning, given increasing income and improving comfort standards, are the main drivers for this pronounced growth of electricity demand over the outlook period (+1.6% pa). These changes in the fuel mix lead to a more efficient and less carbon intensive use of energy in the residential sector, as is also the case for the tertiary sector and industry.

4.2.3.6. Transport sector

The outlook for the transport sector is of great importance, mainly because of its nearly complete dependence on oil products. This generates two sorts of concern: security of oil supplies with rising needs for transportation purposes and increasing emissions of CO_2 combined with long standing problems of congestion, noise and pollution.

In the last decade the transport sector was by far the fastest growing energy consuming sector in EU-25, with energy demand for transportation increasing at a rate more than 3 times higher than overall final energy demand (+2.0% pa in 1990-2000 compared to +0.6% pa). Both EU-15 and acceding countries exhibited

identical growth rates (i.e. +2.0% pa) as regards transport demand. In the acceding countries, energy demand increased in the 1990s only for transport purposes while energy demand decreased in all other final demand sectors.

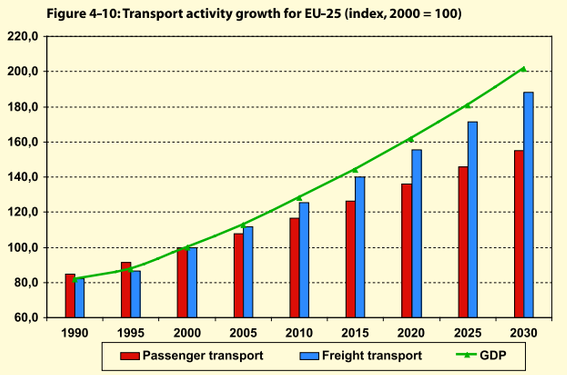
Transportation accounted for 31% of EU-25 total final energy demand in 2000 up from 27% in 1990. The corresponding share in EU-15 was somewhat higher and also increasing (32.4% in 2000, up from 29.5% in 1990). In acceding countries transport accounted for only 19.7% of final energy demand in 2000 (compared however to just 12.8% in 1990). In the past the transport sector of acceding countries, and especially CEEC, had been characterised by limited private mobility, extensive use of subsidised public transportation, obsolete infrastructure and inefficient use of freight capacity. The economic reforms of the 1990s led to a big increase in private car ownership (although the use of cars has not followed the same trend) accompanied by a decline in public transport. At the same time freight transport experienced a significant restructuring process, with trucks overtaking rail in importance.

As a result of the reforms in CEEC, the growth of passenger transport activity per capita in acceding countries was limited to just 2.4% in 1990-2000 compared to 15.7% in the EU-15. In acceding countries, the distance travelled per person reached 6665 km in 2000, considerably lower than the level in EU-15 (13260 km per capita in 2000). Overall passenger transport activity increased in the last decade by 1.9% in acceding countries and 19.7% in the EU-15.

In freight transport, there was a strong decoupling of activity from GDP due to the restructuring of CEEC economies, which involved structural shifts towards less energy intensive manufacturing processes and services. This resulted in a decline of freight transport activity by -16% in the nineties in acceding countries, whereas freight transport activity in the EU-15 increased by 30% in the same period.

The projected growth of transport activity, both in terms of passenger and freight transport, in the EU-15 strongly dominates the overall picture at the EU-25 level. In 2000, the EU-15 accounted for 91% of overall passenger activity and 87% of freight transport activity. The evolution of transport activity in EU-25 indicates a moderate decoupling between transport activity and economic growth as illustrated in Figure 4-10. The decoupling between passenger transport activity, growing by 1.5% pa in 2000-2030, and economic growth is much more pronounced and starts from the beginning of the projection period. This can be explained by the fact that, at some stage, human mobility (either for necessity or for recreational reasons) is expected to experience some saturation. By 2030 activity per capita is projected to reach 18653 km from 12174 km in 2000. Saturation effects are more pronounced in the EU-15 with activity per capita reaching 19383 km in 2030 (+1.3% pa in 2000-2030). The low mobility observed in the past combined with improved economic conditions in acceding countries, leads to much faster growth of activity per capita which, by 2030, reaches 14547 km (+2.7% pa) - remaining, however, significantly lower than that in the EU.

Figure 4-10: Transport activity growth for EU-25 (index, 2000 = 100)



Source: PRIMES, ACE.

On the other hand, the decoupling of freight transport activity (growing by 2.1% pa under Baseline assumptions in 2000-2030) and overall economic activity is projected to be significantly less pronounced, occurring mainly in the long run. The structural shifts of the EU-25 economy towards services and high value added manufacturing activities are the main drivers for this trend. Freight activity is projected to grow by 2.1% pa in EU-15 and 2.3% pa in acceding countries. Given, however, the much higher economic growth in acceding countries, they are projected to experience a stronger decoupling in terms of freight mobility, expressed in tonne-km per unit of GDP, compared to the EU-15. By 2030 freight mobility in acceding countries declines by some -30% from 2000 levels, in comparison to a reduction of -5.5% in EU-15. Despite this fact the acceding countries' economies remain significantly more "transport intensive" than the EU-15 with freight mobility 2.4 times higher in 2030 (from 3.2 times higher in 2000).

The structure of **passenger transpor**t activity is projected to undergo significant changes under Baseline assumptions, with trends that prevailed in the last decade continuing over the projection period (see Table 4-14). Air transport is the fastest growing transport mode over the projection period, accounting by 2030 for 10.8% of passenger transport activity compared to 5.4% in 2000. The need for more long distance travel (either for business or leisure purposes), and the much greater speed of air travel, are the main factors contributing to its rapid growth. It is public road

Table 4-14: Passenger transport activity in EU-25.

	Gpkm					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
road transport	4078	4785	5529	6321	7031	1.6	1.5	1.3	1.1	1.3
public road transport	485	494	504	533	556	0.2	0.2	0.6	0.4	0.4
cars and motorcycles	3594	4292	5025	5788	6475	1.8	1.6	1.4	1.1	1.4
rail transport	408	402	415	479	538	-0.1	0.3	1.5	1.2	1.0
aviation	170	298	449	664	923	5.8	4.2	4.0	3.3	3.8
inland navigation	29	34	40	47	54	1.6	1.8	1.5	1.5	1.6
Total	**4685**	**5520**	**6433**	**7511**	**8546**	**1.7**	**1.5**	**1.6**	**1.3**	**1.5**
current EU	4196	5022	5817	6700	7540	1.8	1.5	1.4	1.2	1.4
acceding countries	489	498	616	811	1006	0.2	2.1	2.8	2.2	2.4

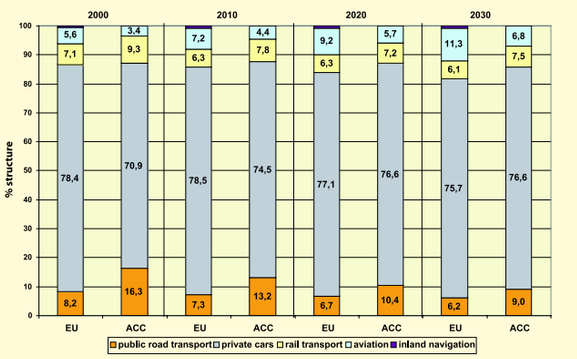
Source: PRIMES, ACE.

transport and rail transport activity, both growing at rates below average over the projection period, that face downward pressure in terms of market shares to 2030. More specifically, the share of rail declines from 7.3% in 2000 to 6.3% in 2030, whereas the decline is even more pronounced as regards public road transport (from 8.9% in 2000 to 6.5% in 2030). Transport activity by private cars and motorcycles is projected to increase by 1.4% pa in 2000-2030, indicating a limited decrease of the share of these transport modes in total passenger transport activity (75.8% in 2030, down from 77.7% in 2000). Transport activity by inland navigation[82] (+1.6% pa) is also projected to gain some market share.

As already discussed, the evolution of passenger transport activity in the EU-15 largely determines the overall picture at the EU-25 level. Thus, while the structure of passenger transport activity in the EU-15, shown in Figure 4-11, is broadly in line with the findings on EU-25 presented above, this is not the case for acceding countries. Public transport modes (public road and rail transport accounted for 42% of passenger transport activity in 1990) are projected to continue having a more important role in satisfying passenger transport activity in acceding countries over the projection period compared to the EU-15. In contrast, the contribution of air transports activity, though increasingly significantly in acceding countries, remains even by 2030 at levels well below those projected for the EU-15. Lower transport activity and income per capita in acceding countries compared to the EU-15 are two of the major factors contributing to the projected differences of the structure of transport activity in acceding countries, implying a less pronounced growth of activity for leisure purposes.

As illustrated in Figure 4-12, the structure of freight transportation is also projected to change considerably in the future. Road transportation gains significantly in terms of market share at the expense of rail: the share of trucks increases from 69% in 2000 to 77.4% in 2030. Rail transport, although still increasing in absolute terms after a significant decline in the 1990s (+0.7% pa in 2000-2030 compared to -1.8% in 1990-2000), falls from 17.1% of total freight transport in 2000 to 11.2% by 2030. The share of inland navigation[83] is also projected to exhibit a continuous, though limited, decline over the projection period. As in the case of passenger transport activity, the evolution of freight transport activity in acceding countries exhibits some differences compared to the EU-15. Thus, starting from a much higher share for rail freight transport in 2000 (43% of total freight activity compared to 13% in the EU-15), acceding countries are projected to remain heavily dependent on rail over the projection period. In 2030 some 24% of freight transport activity in acceding countries is satisfied by rail transport, whereas in the EU-15 the corresponding share is limited to just 9%. The higher contribution of rail transport in freight activity occurs almost exclusively to the detri-

Figure 4-11: Structure of passenger transport activity in EU-15 and acceding countries



Source: PRIMES, ACE.

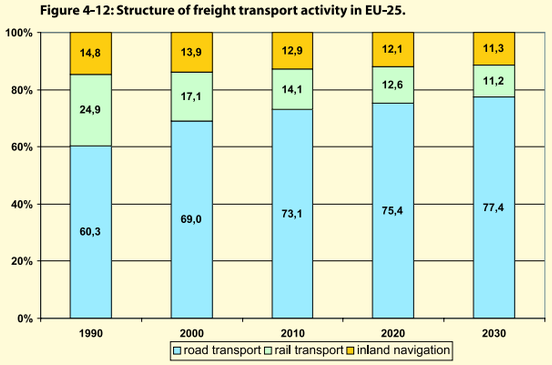
82 Idem 35.

83 Idem 38.

ment of inland navigation, which even by 2030 remains a largely unused transportation option for freight in acceding countries accounting for less than 1% of overall activity (13% in the EU-15).

In the last decade energy demand in the EU-25 transport sector grew at a rate of 2% pa and is projected to grow further at rates above average (+1% pa in 2000-2030) under Baseline assumptions, though at a decelerating pace over the projection period. By 2030 the transport sector (excluding marine bunkers) is projected to account for 32.3% of final energy demand in EU-25 compared to 31% in 2000. Energy consumption for passenger transport is projected to grow by 0.4% pa in 2000-2030 compared to an increase of 1.9% for freight transport (see Table 4-15).

Figure 4-12: Structure of freight transport activity in EU-25.



Source: PRIMES, ACE.

The projected growth of energy consumption in passenger transport is significantly lower than the growth of transport activity (+1.5% pa in 2000-2030), implying a substantial improvement of energy intensity (energy consumption per passenger-km) by 1.0% pa (compared to a worsening of -0.1% pa observed in 1990-2000). It is important to note, however, that the trend observed in the last decade was solely due to the structural changes in acceding countries towards the use of private cars, which resulted in a worsening of energy intensity by 2.5% pa. In the same period the EU-15 experienced a limited improvement of energy intensity by 0.1% pa. In any case, the projected improvement under Baseline assumptions is all the more impressive in view of the further shift towards aviation, which is the most energy intensive transport mode, and the growing size and comfort levels of cars in future.

Energy intensity gains in freight transport are significantly lower (0.25% pa) as energy consumption increases by 1.9% pa in 2000-2030 following, however, a worsening of freight transport efficiency (-0.4% pa) in the nineties resulting from the shift towards trucks and away from rail in acceding countries.

The shifts to different transport modes both for passenger and freight transport strongly affect the outlook for fuel consumption in the sector. Thus, consumption of kerosene grows at rates well above average (+1.6% pa in 2000-2030) driven by the increasing activity in aviation. The growing contribution of trucks, which are expected to continue to be predominantly reliant on diesel engines, in satisfying freight transport needs and a progressive

Table 4-15: Final Energy Demand by activity and fuel in transport sector for EU-25

	Mtoe					Annual Growth Rate (%)				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
By transport activity										
Passenger transport	182.5	217.2	237.7	247.6	247.7	1.8	0.9	0.4	0.0	0.4
Freight transport	91.1	115.9	151.0	181.0	202.2	2.4	2.7	1.8	1.1	1.9
By Fuel										
liquid fuels	268.1	326.8	381.4	420.4	441.1	2.0	1.6	1.0	0.5	1.0
liquified petroleum gas	2.7	3.5	3.6	3.4	3.2	2.5	0.5	-0.7	-0.5	-0.2
gasoline	132.1	129.8	142.1	145.4	141.6	-0.2	0.9	0.2	-0.3	0.3
of which mixed biofuels	*0.0*	*0.2*	*3.0*	*4.9*	*7.3*	-	*31.6*	*5.2*	*4.0*	*12.9*
kerosene	29.2	45.1	53.0	63.3	72.0	4.4	1.6	1.8	1.3	1.6
diesel oil	103.0	147.7	182.1	207.6	223.6	3.7	2.1	1.3	0.7	1.4
of which mixed biofuels	*0.0*	*0.3*	*4.3*	*7.7*	*11.9*	-	*31.5*	*5.9*	*4.5*	*13.3*
other petroleum products	1.1	0.7	0.7	0.7	0.6	-4.1	-0.6	-0.4	-0.4	-0.4
natural gas	0.2	0.3	0.5	0.6	0.7	4.3	3.5	3.2	1.4	2.7
methanol - ethanol	0.0	0.0	0.2	0.5	0.6	-	-	8.9	2.6	-
liquified hydrogen	0.0	0.0	0.1	0.5	0.8	-	-	20.5	3.9	-
electricity	5.0	5.9	6.4	6.5	6.6	1.6	0.8	0.2	0.2	0.4
Total	**273.6**	**333.1**	**388.6**	**428.5**	**449.8**	**2.0**	**1.6**	**1.0**	**0.5**	**1.0**
current EU	253.8	309.1	357.2	389.4	406.7	2.0	1.5	0.9	0.4	0.9
acceding countries	19.7	24.0	31.4	39.1	43.1	2.0	2.7	2.2	1.0	2.0

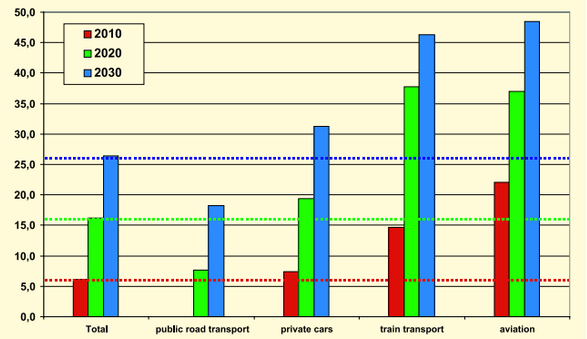
Source: PRIMES, ACE.

dieselisation of the car fleet, lead to an increase of diesel oil demand by 1.4% pa. Gasoline demand, after peaking in 2020, experiences a negative growth afterwards as a result of the slow-down in passenger transport activity growth and the technological progress in private cars. Electricity demand is projected to grow by 0.4% pa in 2000-2030 driven by the further electrification of rail transport, while novel energy forms, such as methanol, ethanol and hydrogen, grow quite rapidly but remain insignificant in absolute terms even by 2030. However, the role of biofuels as a blended ingredient of gasoline and diesel oil (i.e. as the fuel is available at the pump) is projected to become increasingly important in the long run. They reach a share of 5.1% of gasoline consumed in 2030 (2.0% in 2010) and 5.3% of diesel oil consumed in 2030 (2.4% in 2010).

Technological progress is of key importance in influencing the projected growth of energy consumption in the transport sector. Figure 4-13 illustrates the evolution of energy intensity by passenger transport mode in comparison to 2000 levels. Energy intensity[84] of private cars exhibits an improvement of 31.2% in 2000-2030 (7.4% in 2000-2010 and 19.3% in 2010-2020), driven by the modernisation of the car stock combined with the effects of the EU-ACEA/KAMA/JAMA agreements. Rail electrification, which is projected to be completed by 2020 in the EU-15 but still continues in acceding countries, leads to an intensity improvement of 38% by 2020 with additional progress in 2020-2030 limited to some 8.5 percentage points. Energy intensity improvements in aviation reach 22% in 2010 and 48.5% over the period to 2030, driven by the increasing aircraft needs, which in turn lead to faster renewal of the aircraft fleet with new, more efficient planes. For public road transport and inland navigation improvements in energy intensity are less pronounced and occur as a result of replacement of equipment and technological progress.

Efficiency improvements[85] in freight transport (-7.5% in 2000-2030) are significantly less pronounced compared to passenger transport, mainly because of the shift towards road freight that is a much more energy intensive activity compared to rail freight. Thus, this shift to less energy efficient modes largely offsets the significant intensity gains at the level of the different transport modes. More specifically, efficiency gains for trucks reach +16% in 2000-2030 driven by better management and technological progress, whereas the improvement for rail freight reaches +44% as a result of the rail electrification, which is taking place over the projection period in EU-25.

Figure 4-13: Energy intensity improvement in passenger transport for EU-25 (% difference from 2000 levels).



Source: PRIMES, ACE.

4.2.4. Electricity and steam generation

4.2.4.1. Electricity and steam demand

As discussed in preceding parts, demand for electricity will exhibit growth at rates well above average over the projection period. The increasing number of processes, appliances and applications that can use energy only in the form of electricity, but also issues related to the favourable characteristics of electricity (easy controllability, cleanliness at the point of use and others), lead to the increasing use of electricity in the EU-25 energy system. This projection is in line with the well established long-term trend towards increased electrification in most sectors of developed economies.

Electricity requirements in EU-25 have shown an average increase of 1.6% pa since 1990. Demand growth in the current EU-15 reached close to 1.9% pa while in acceding countries electricity requirements remained stable at 1990 levels. The restructuring of CEEC economies led to a decline of electricity demand in acceding countries by -1.5% pa in 1990-1995, which was strongly related to the progressive ending of subsidy policies for electricity prices. However, this downward trend was reversed in the second part of the last decade with electricity demand rising by 1.5% pa.

Under Baseline assumptions electricity demand is projected to expand by 1.5% pa in 2000-2030 (see Table 4-16). Its growth will be especially rapid in the tertiary sector, while demand in the residential sector also grows at rates above average. The different levels of electrification achieved in the EU-15 and in acceding countries by 2000 are also clearly reflected in the evolution of electricity demand to 2030. Thus, while electricity demand increases by 1.3% pa in the EU-15 between 2000 and 2030, with a

84 Idem 36.

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Table 4-16: Electricity requirements by sector in EU-25.

	TWh					Annual Growth Rate (%)				
	1995	2000	2010	2020	2030	95/00	00/10	10/20	20/30	00/30
Industry	950	1067	1244	1432	1576	2.4	1.5	1.4	1.0	1.3
Tertiary	562	652	820	1005	1194	3.0	2.3	2.1	1.7	2.0
Households	637	695	839	979	1104	1.8	1.9	1.6	1.2	1.6
Transports	64	69	75	76	77	1.3	0.8	0.2	0.2	0.4
Energy sector	229	239	269	308	350	0.9	1.2	1.4	1.3	1.3
Trans. and distr. Losses	183	201	211	209	204	2.0	0.5	-0.1	-0.3	0.0
(Net imports)	16	25	26	21	28	9.4	0.4	-2.0	2.9	0.4
Total	**2609**	**2898**	**3431**	**3988**	**4477**	**2.1**	**1.7**	**1.5**	**1.2**	**1.5**
current EU	2308	2574	3027	3450	3846	2.2	1.6	1.3	1.1	1.3
acceding countries	301	324	403	537	631	1.5	2.2	2.9	1.6	2.2

Source: PRIMES, ACE.

Table 4-17: Steam demand by sector in EU-25.

	TWh					Annual Growth Rate (%)				
	1995	2000	2010	2020	2030	95/00	00/10	10/20	20/30	00/30
Industry	327	343	422	507	561	0.9	2.1	1.9	1.0	1.7
Tertiary	96	100	110	131	157	1.0	1.0	1.7	1.9	1.5
Households	237	203	219	226	253	-3.0	0.8	0.3	1.1	0.7
Energy sector	30	27	27	27	32	-2.5	0.1	0.1	1.6	0.6
Trans. and distr. Losses	37	34	34	33	33	-1.4	-0.2	-0.2	-0.1	-0.2
Total	**726**	**707**	**812**	**924**	**1036**	**-0.5**	**1.4**	**1.3**	**1.1**	**1.3**
current EU	489	516	633	734	802	1.1	2.1	1.5	0.9	1.5
acceding countries	237	191	179	190	234	-4.2	-0.6	0.6	2.1	0.7

Source: PRIMES, ACE.

decelerating pace over time, much more pronounced growth is projected for acceding countries (+2.2% pa in 2000-2030) with an accelerated pace in the period to 2020.

The massive closure of inefficient district heating units in the nineties in CEEC, because of the restructuring of their energy system, which was characterised in the past by high levels of district heating utilisation, resulted in a decline of distributed steam demand in EU-25 by 0.8% pa in 1990-2000. The decrease in acceding countries reached an astonishing -6.1% pa, clearly reflecting the great inefficiencies that prevailed mainly at the level of steam distribution in CEEC in the past. In contrast, the use of distributed steam grew by +1.8% pa in the EU-15, driven by the further exploitation of cogeneration potential. The shift towards the decentralisation of electricity and steam production, projected to occur over the outlook period, as well as technological progress allowing for smaller-scale distribution networks, are the key drivers for the further growth of distributed steam demand in the EU-15 over the outlook period (+1.5% pa in 2000-2030) and the reversal of past trends beyond 2010 in acceding countries (+0.7% pa in 2000-2030). Overall distributed steam demand (i.e. excluding industrial and refinery boilers) is projected to grow in the EU-25 by 1.3% pa between 2000 and 2030 (see Table 4-17). Industry is projected to remain the dominant user of steam over the outlook period, with the tertiary sector, a potentially large user of steam, also exhibiting significant growth.

4.2.4.2. Capacities

Increasing energy requirements for electricity and steam lead to a large expansion of installed capacity in the EU-25 energy system, which is projected to almost double by 2030 from 2000 levels (see Table 4-18). Technological advances and the progressive deregulation of electricity markets - with smaller companies entering the market preferring plants with shorter lead times, lower capital costs and higher efficiency leading to lower fuel costs - are projected to cause significant growth in the use of gas for electricity generation. This is mainly through the extensive use of gas turbine combined cycle units. Thus installed capacity of gas turbine combined cycle plants is projected to increase dramatically, especially in the period to 2020, reaching by 2030 close to

Table 4-18: Power generation capacity by type of plant in EU-25, 1995-2030.

	GW_e					*% share*				
	1995	**2000**	**2010**	**2020**	**2030**	**1995**	**2000**	**2010**	**2020**	**2030**
Nuclear	134.7	140.3	129.8	108.0	107.8	22.0	21.4	16.4	11.2	9.5
Large Hydro (pumping excl.)	91.0	93.9	95.8	96.3	97.0	14.9	14.3	12.1	10.0	8.6
Small hydro	2.0	2.1	8.1	12.2	14.5	0.3	0.3	1.0	1.3	1.3
Wind	2.5	12.8	73.5	104.7	135.1	0.4	2.0	9.3	10.9	11.9
Other renewables	0.0	0.2	0.5	0.7	14.3	0.0	0.0	0.1	0.1	1.3
Thermal plants	381.4	406.1	484.9	639.0	762.9	62.4	62.0	61.2	66.5	67.4
of which cogeneration plants	80.7	93.2	117.6	150.9	179.5	13.2	14.2	14.8	15.7	15.9
Open cycle - Fossil fuel	339.4	335.2	278.9	210.0	196.8	55.5	51.1	35.2	21.9	17.4
Clean Coal and Lignite	0.0	0.0	0.0	0.8	5.5	0.0	0.0	0.0	0.1	0.5
Supercritical Polyvalent	0.0	0.0	0.8	55.3	126.3	0.0	0.0	0.1	5.8	11.2
Gas Turbines Combined Cycle	20.0	47.3	173.3	313.8	367.4	3.3	7.2	21.9	32.7	32.5
Small Gas Turbines	21.2	22.7	30.6	57.8	65.5	3.5	3.5	3.9	6.0	5.8
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.7	1.0	1.2	1.3	1.4	0.1	0.2	0.2	0.1	0.1
Total	**612**	**655**	**793**	**961**	**1132**	**100**	**100**	**100**	**100**	**100**
current EU	539	579	689	813	951	88	88	87	85	84
acceding countries	73	77	104	148	181	12	12	13	15	16

Source: PRIMES, ACE.

370 GW from 47 GW in 2000. Capacity of small gas turbines is also projected to grow by a factor of 3 over the outlook period. As a result, gas fuelled power plants account for more than 38% of total capacity in 2030 compared to 10.7% in 2000.

The overwhelming growth of gas-fired power plants occurs mainly at the expense of conventional fossil fuel and nuclear power plants. Installed capacity of conventional thermal power plants (open cycle monovalent and polyvalent units) is projected to decline very rapidly both in absolute terms and as a share of total installed capacity. By 2030, they are projected to represent some 17.5% of total installed capacity compared to more than 51% in 2000. The nuclear sector faces four major issues: the closure of unsafe nuclear plants in acceding countries; the massive decommissioning of existing nuclear plants beyond 2015; the nuclear phase-out policies in certain EU-15 Member States; and the likely decisions of economic actors not to replace decommissioned nuclear with new nuclear plants. These factors result in a continuous decline of nuclear capacity, which by 2030 accounts for no more than 9.5% of total installed capacity (from 21.4% in 2000).

Under Baseline assumptions, a predominant role in the replacement of retired nuclear plants will be played by supercritical polyvalent units (with scope for burning coal, lignite, biomass and waste). But other clean coal technologies (IGCC and PFBC technologies) are not projected to become a cost-effective option under Baseline conditions, on the basis of the currently prevailing technology forecasts, for power generation even in the long run. By 2030 installed capacity of supercritical polyvalent plants is projected to exceed 125 GW (or 11.2% of total installed capacity).

Renewable energy forms are also expected to have an important role in power generation in future, but this excludes hydropower. Capacity expansion in hydropower plants is projected to be rather limited over the outlook period as a result of the already high exploitation of suitable sites in the EU-25 energy system. This results in a decreasing share for hydro plants (from 14.7% in 2000 to 9.9% in 2030). In contrast, given supportive policies for renewable energy forms in the EU-15 - also likely to develop in acceding countries - wind turbine capacity increases substantially, reaching by 2030 up to 135 GW (almost 12% of total installed capacity) compared to under 13 GW in 2000. Solar photovoltaic energy starts emerging beyond 2020 (accounting for 1.3% of total installed capacity by 2030).

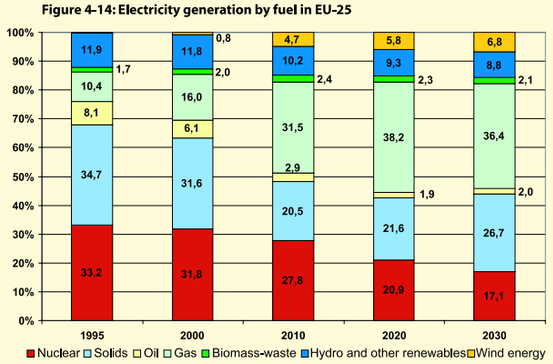
The strong shift towards a gas based power generation system combined with electricity market liberalisation is also projected to encourage the more widespread exploitation of cogeneration options, especially at the level of independent autoproducers. CHP plant capacity is projected to increase from 93.2 GW in 2000 to 179.5 GW in 2030. By 2030, more than 16% of total electricity generation will come from cogeneration units compared to 13.1% in 2000. In heat/steam generation, district heating plants (producing only heat) are projected to continuously lose market share under Baseline assumptions (accounting for less than 9% of steam supplies in 2030, down from 18.2% of total distributed steam in 2000).

4.2.4.3. Electricity and steam generation

As a result of nuclear phase-out policies and decommissioning of existing nuclear capacity, nuclear electricity generation declines quite dramatically in the long run accounting for 17.1% of electricity production in 2030 compared to 31.8% in 2000 (see Figure 4-14). Electricity production from solid fuels exhibits a continuous decline in the short/medium run, but it later recovers as a replacement fuel for nuclear both in absolute terms and as a share of total electricity generated (26.7% in 2030 compared to 31.6% in 2000). The emerging gap is largely covered by greater use of natural gas, which beyond 2010 is projected to become the main energy carrier in electricity generation. It is interesting to note, however, that in the long run, though gas use continues to increase in absolute terms, its share in electricity generation falls, a trend largely related to the increasing cost-effectiveness of coal fired technologies in that period.

The contribution of renewable energy forms in power generation is projected to grow over time reaching some 17.7% of total electricity production in 2030 from 14.6% in 2000. However, the limited potential for further exploitation and, consequently, the declining share of electricity generation from hydropower largely offsets the increasing contribution of wind energy in electricity generation, especially in the long run.

Figure 4-14: Electricity generation by fuel in EU-25



Source: PRIMES, ACE.

4.2.4.4. Fuel input and efficiency in power generation

Fuel input in power generation is projected to experience lower growth (0.6% pa in 2000-2030) than the increases in electricity generation by 1.5% pa and in steam cogeneration by 1.7% pa. As illustrated in Table 4-19, gas accounts for more than one third of fuel consumption by 2030 compared to 18% in 2000. Beyond 2010, and especially in the long run, coal is projected to make a strong come back. This, however, is not the case for lignite because the emergence of supercritical polyvalent units in the EU-25 power generation system is projected to be accompanied by a strong shift towards use of imported coal. Imports have lower prices than large parts of domestically produced coal and lignite and state aids for coal and in some cases also lignite are assumed to be substantially reduced by 2030. Consumption of biomass and waste also grows at rates above average over the projection period but they are projected to account for only 4% of total fuel input in 2030.

The significantly lower growth of fuel inputs in power generation compared to the corresponding electricity and steam produced largely reflects the investment choices of electricity generators towards technologies with high conversion efficiencies, such as gas turbine combined cycle plants, and certain renewable energy forms. The replacement of nuclear power plants (with an efficiency typically between 33-35%) by other forms of generation (with efficiencies of e.g. some 55% for gas combined cycles or 100% as attributed by statistical conventions for e.g. hydro and wind) further contributes to this development. Efficiency of thermal electricity production increases by 12 percentage points between 2000 and 2030 to reach 49.1%.

Table 4-19: Fuel use for electricity generation in EU-25.

	Mtoe					*Annual Growth Rate (%)*				
	1995	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Hard coal	139.9	132.7	103.1	133.2	195.9	-1.1	-2.5	2.6	3.9	1.3
Lignite	80.7	77.5	67.3	57.8	45.8	-0.8	-1.4	-1.5	-2.3	-1.7
Oil products	53.9	41.8	24.7	18.8	20.8	-5.0	-5.1	-2.7	1.0	-2.3
Gas	70.1	112.1	186.3	243.5	255.3	9.8	5.2	2.7	0.5	2.8
Biomass	6.2	8.0	11.6	13.0	15.1	5.3	3.7	1.2	1.5	2.1
Waste	7.5	9.7	13.8	15.2	14.5	5.2	3.6	1.0	-0.5	1.3
Nuclear energy	215.5	237.8	245.4	213.7	185.2	2.0	0.3	-1.4	-1.4	-0.8
Geothermal Heat	2.1	3.0	3.4	3.6	3.9	6.6	1.4	0.7	0.8	1.0
Total	**576**	**623**	**656**	**699**	**736**	**1.6**	**0.5**	**0.6**	**0.5**	**0.6**
current EU	496	541	568	596	625	1.7	0.5	0.5	0.5	0.5
acceding countries	80	81	87	103	112	0.4	0.7	1.7	0.8	1.1

Source: PRIMES, ACE.

Table 4-20: CO_2 emissions by sector in EU-25.

	Mt CO_2					*Annual Growth Rate (%)*				
	1990	**2000**	**2010**	**2020**	**2030**	**90/00**	**00/10**	**10/20**	**20/30**	**00/30**
Industry	724.6	606.1	538.1	529.0	527.5	-1.8	-1.2	-0.2	0.0	-0.5
Tertiary	269.3	236.5	239.5	244.2	256.7	-1.3	0.1	0.2	0.5	0.3
Households	518.7	461.0	481.1	497.2	489.6	-1.2	0.4	0.3	-0.2	0.2
Transports	794.1	970.6	1114.8	1217.2	1261.0	2.0	1.4	0.9	0.4	0.9
Electricity-steam production	1250.8	1195.8	1206.2	1400.2	1630.8	-0.4	0.1	1.5	1.5	1.0
District heating	103.9	38.1	31.7	20.8	15.1	-9.6	-1.8	-4.1	-3.1	-3.0
New fuels (hydrogen etc.) prod.	0.0	0.0	0.2	1.4	2.1	-	-	20.6	3.9	-
Energy branch	143.1	162.9	151.5	147.0	141.5	1.3	-0.7	-0.3	-0.4	-0.5
Total	**3805**	**3671**	**3763**	**4057**	**4324**	**-0.4**	**0.2**	**0.8**	**0.6**	**0.5**
current EU	3082	3118	3205	3444	3669	0.1	0.3	0.7	0.6	0.5
acceding countries	722	554	558	613	656	-2.6	0.1	0.9	0.7	0.6

Source: PRIMES, ACE.

4.2.5. The outlook for energy-related CO_2 emissions

The evolution of the EU-25 energy system in the last decade has been characterised by a strong decoupling of energy demand from economic growth and, in addition, by a decoupling between energy demand and CO_2 emissions growth. While primary energy needs increased by 5.9% in 1990-2000, CO_2 emissions declined in the same period by -3.5%. The restructuring of CEEC economies was the main driver for this trend (CO_2 emissions in acceding countries in 2000 were -23% lower than in 1990). In EU-15 structural shifts towards less energy intensive uses, technological progress and changes in the fuel mix all limited the CO_2 emissions growth to 1.1% between 1990 and 2000. As a result in 2000 acceding countries accounted for 15% of overall CO_2 emissions at the EU-25 level compared to 19% in 1990.

CO_2 emissions, under Baseline assumptions, are projected to grow over the outlook period (+0.5% pa in 2000-2030; see Table 4-20). However, even in 2030, CO_2 emissions in acceding countries remain at levels significantly below those observed in 1990 (-9.3% lower) while emissions in the EU-15 are projected to rise +19% from 1990 levels.

In the period 2000-2010, CO_2 emissions for EU-25 are projected to grow by 2.5%, but they remain 1% below the level observed in 1990. The further changes in the fuel mix towards less carbon intensive fuels, on both the demand and supply sides, are the main reason for this limited growth, with emission reductions in industry and in district heating largely offsetting the emissions growth projected from the transport sector. Beyond 2010, CO_2 emissions are projected to rise much faster with the power generation sector becoming the main driver for this increase. Massive decommissioning of nuclear power plants and the increasing competitiveness of coal in the sector cause these higher emissions. In contrast, the growth of CO_2 emissions in the transport sector decelerates in the long run both because of technological progress and as a result of the projected decoupling of transport activity from economic growth. This slowdown in transport emission growth takes place in spite of modal shift towards less energy efficient modes. By 2030 electricity and steam generation account for 38% of total CO_2 emissions (from 32.5% in 2000) while the share of the transport sector reaches 29.2% (compared to 26.4% in 2000) clearly reflecting the predominant role of these sectors in the EU-25 energy system.

It is important to note that the demand for transport, as well as for electricity and steam, derives from various social and economic activities related to different economic sectors (industry, services, agriculture, and households). Furthermore, to the extent that final demand sectors, such as industry, services and households, switch to more electricity or steam, they "export" considerable CO_2 emissions caused by their activities to the power and steam generation sector.[86]

Developments in two key sectors constrain the reduction of CO_2 emissions: the transport sector is characterised by the lack of alternatives as regards changes in the fuel mix towards less carbon intensive fuels; and the power generation sector is faced with higher fossil fuel use in the long run. Thus the carbon intensity (CO_2 emissions per unit of primary energy needs) of the EU-25 energy

86 The breakdown of CO_2 emissions by sector is based on the statistical conventions of EUROSTAT and others, with power and steam generation being one sector. Therefore, future emissions are calculated to reflect this convention, and the projected CO_2 emissions are reported in line with these statistical practices.

Table 4-21: Key indicators for the EU-25 energy system

	INDEX (1990 = 100)				
	1990	**2000**	**2010**	**2020**	**2030**
Gross Domestic Product	100	122	156	198	246
Gross Inland Consumption	100	106	115	122	126
CO_2 emissions	100	96	99	107	114
Energy intensity	100	87	73	62	51
Carbon intensity	100	91	86	88	90
CO_2 emissions / unit of GDP	100	79	63	54	46

Source: PRIMES, ACE.

system improves by no more than 1% between 2000 and 2030 (see Table 4-21). Beyond 2015 carbon intensity worsens and CO_2 emissions rise accordingly.

CO_2 emissions in 2010 remain 1% below their 1990 level. However, in 2030 CO_2 emissions exceed the 1990 level by 14%. This growth takes place against the background of substantial economic growth over the same period of time. Total GDP growth from 1990 to 2030 reaches 146%. The corresponding increase in primary energy demand is limited to 26% reflecting a considerable improvement in energy intensity (energy demand per unit of GDP). The role of energy intensity gains becomes of increasing importance in the long run leading to strong decoupling between CO_2 emissions growth and GDP growth. Energy intensity gains in 1990-2010 reach 27% and improve a further 30% in 2010-2030.

CO_2 emissions grow slower than energy demand and given the above energy intensity gains the carbon intensity of the economy (i.e. CO_2 emissions per unit of GDP) evolves favourably with one unit of GDP in 2030 being produced with 46% of the CO_2 emissions emitted in 1990. However, the challenge of climate change and the Kyoto process might require deep cuts in emissions up to 2030 and therefore better results than projected in the baseline might be needed

4.3. Concluding remarks

The integration of the ten acceding countries in the EU-15 is not projected to cause radical changes in the projected evolution of the EU-25 energy system in the period to 2030. This is because of the relatively small size of the acceding countries, both in economic and in energy terms, compared to the current EU-15. Thus, security of supply, environmental concerns, competitive energy prices and investment decisions remain the main challenges to be faced by the EU-25 energy system in the next 30 years, as already discussed in detail in the concluding remarks for the part on the EU-15 outlook to 2030. However the urgency with which these issues will become increasingly important for the energy system is certainly affected by the enlargement of the EU.

Given the huge inefficiencies that prevailed in acceding countries, and especially in CEEC, in the past and consequently the larger scope for efficiency gains compared to the EU-15, the decoupling between energy demand and economic growth in the EU-25 becomes even more pronounced compared to the EU-15. In the EU-25 GDP increases between 2000 and 2030 by +146% or +2.4% pa while the growth of primary energy demand is projected to be limited to 26% (or 0.6% pa) in the same period with energy intensity gains reaching over 1.7% pa.

The major role of fossil fuels in satisfying energy requirements becomes increasingly important for EU-25 (81.8% of overall energy needs by 2030 compared to 80.4% in the EU-15). This trend gives rise to the two major challenges facing the EU-25 energy system: security of energy supply and environmental concerns.

Given declining primary production of indigenous fuels, because of the exhaustion of available reserves or on the basis of cost considerations or following political decisions on nuclear, import dependency for EU-25 is projected to reach 67.5% in 2030 from 47.1% in 2000. In comparison to the EU-15 outlook import dependency in 2030 is projected to be 0.3 percentage points lower. This small difference reflects the larger availability of indigenous resources, mainly solids, in acceding countries. However, dependence upon gas imports, a key issue given the limited number of suppliers and the increasing distances from which gas will need to be imported, increases to 81.4% in EU-25, which is 1.6 percentage points higher than the corresponding level in the EU-15.

On the other hand, the restructuring of CEEC economies in the nineties and the resulting substantial decline of CO_2 emissions between 1990 and 2000 in acceding countries, allow for a more favourable evolution of CO_2 emissions for the EU-25 energy system. CO_2 emissions for EU-25 are projected to remain below 1990 levels in 2010 (-1%). However, emissions increase thereafter to reach +14% in 2030. The corresponding figures for CO_2 emissions in the EU-15 are +4% in 2010 and +19% in 2030. Therefore, energy and transport policies face a considerable challenge in dealing with these energy security and climate change issues.

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MAIN MACROECONOMIC AND DEMOGRAPHIC ASSUMPTIONS

APPENDIX 1

APPENDIX 1

MAIN MACROECONOMIC AND DEMOGRAPHIC ASSUMPTIONS

EU - 15: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	366.0	378.7	387.8	390.4	389.0	0.3	0.2	0.1	0.0					
Average household size (persons)	2.6	2.4	2.2	2.1	2.0	-0.8	-0.8	-0.7	-0.5					
Number of households (Million)	141.3	157.7	174.2	187.3	197.1	1.1	1.0	0.7	0.5					
Gross Domestic product (in 000 MEuro'00)	**6982.1**	**8545.0**	**10859.1**	**13641.2**	**16919.9**	**2.0**	**2.4**	**2.3**	**2.2**					
Households expenditure (in 000 MEuro'00)	**3998.7**	**4863.3**	**6147.2**	**7644.3**	**9345.6**	**2.0**	**2.4**	**2.2**	**2.0**					
Gross Value Added (in 000 MEuro'00)	**6537.9**	**8003.5**	**10283.4**	**12993.0**	**16174.3**	**2.0**	**2.5**	**2.4**	**2.2**					
Industry	1407.4	1609.6	2036.3	2573.5	3204.4	1.4	2.4	2.4	2.2	21.5	20.1	19.8	19.8	19.8
iron and steel	54.6	49.2	49.7	50.8	51.2	-1.0	0.1	0.2	0.1	0.8	0.6	0.5	0.4	0.3
non ferrous metals	20.5	23.2	32.1	41.5	52.0	1.2	3.3	2.6	2.3	0.3	0.3	0.3	0.3	0.3
chemicals	152.1	188.1	243.4	310.2	385.8	2.1	2.6	2.5	2.2	2.3	2.4	2.4	2.4	2.4
petrochemicals.fertilisers and others	98.0	110.5	131.1	150.3	166.9	1.2	1.7	1.4	1.1	1.5	1.4	1.3	1.2	1.0
pharmaceuticals and cosmetics	54.1	77.6	112.3	159.9	218.9	3.7	3.8	3.6	3.2	0.8	1.0	1.1	1.2	1.4
non metallic minerals	67.5	70.2	82.8	99.1	115.7	0.4	1.7	1.8	1.6	1.0	0.9	0.8	0.8	0.7
paper. pulp. printing	117.6	141.8	178.2	221.8	266.5	1.9	2.3	2.2	1.9	1.8	1.8	1.7	1.7	1.6
paper and pulp production	21.3	26.1	30.8	36.0	40.8	2.0	1.7	1.6	1.3	0.3	0.3	0.3	0.3	0.3
printing and publishing	96.3	115.7	147.4	185.7	225.7	1.9	2.5	2.3	2.0	1.5	1.4	1.4	1.4	1.4
food. drink. tobacco	158.5	185.9	233.1	291.6	355.8	1.6	2.3	2.3	2.0	2.4	2.3	2.3	2.2	2.2
textiles and leather	94.1	79.7	80.9	84.9	87.9	-1.7	0.1	0.5	0.3	1.4	1.0	0.8	0.7	0.5
engineering	615.4	726.0	955.5	1253.1	1626.4	1.7	2.8	2.7	2.6	9.4	9.1	9.3	9.6	10.1
other industries	127.2	145.5	180.7	220.5	263.3	1.4	2.2	2.0	1.8	1.9	1.8	1.8	1.7	1.6
Construction	407.7	418.0	500.9	607.9	722.8	0.3	1.8	2.0	1.7	6.2	5.2	4.9	4.7	4.5
Services	4330.7	5509.5	7219.9	9207.3	11564.7	2.4	2.7	2.5	2.3	66.2	68.8	70.2	70.9	71.5
market services	1568.5	2100.8	2900.0	3823.3	4939.3	3.0	3.3	2.8	2.6	24.0	26.2	28.2	29.4	30.5
non-market services	1396.3	1642.6	1937.5	2284.3	2667.5	1.6	1.7	1.7	1.6	21.4	20.5	18.8	17.6	16.5
trade	1365.9	1766.1	2382.3	3099.8	3957.8	2.6	3.0	2.7	2.5	20.9	22.1	23.2	23.9	24.5
Agriculture	179.4	201.9	224.5	248.3	268.7	1.2	1.1	1.0	0.8	2.7	2.5	2.2	1.9	1.7
Energy sector	212.7	264.6	301.9	356.0	413.7	2.2	1.3	1.7	1.5	3.3	3.3	2.9	2.7	2.6

Source: PRIMES

AUSTRIA: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	7.7	8.1	8.2	8.2	8.2	0.5	0.1	0.0	-0.1					
Average household size (persons)	2.6	2.5	2.4	2.3	2.2	-0.3	-0.5	-0.4	-0.4					
Number of households (Million)	3.0	3.2	3.5	3.6	3.7	0.8	0.6	0.5	0.3					
Gross Domestic product (in 000 MEuro'00)	**163.0**	**204.8**	**252.1**	**309.3**	**374.3**	**2.3**	**2.1**	**2.1**	**1.9**					
Households expenditure (in 000 MEuro'00)	**87.5**	**111.4**	**134.1**	**156.8**	**180.0**	**2.4**	**1.9**	**1.6**	**1.4**					
Gross Value Added (in 000 MEuro'00)	**152.4**	**195.3**	**242.8**	**300.6**	**366.3**	**2.5**	**2.2**	**2.2**	**2.0**					
Industry	31.5	41.4	52.2	65.0	79.9	2.8	2.3	2.2	2.1	20.7	21.2	21.5	21.6	21.8
iron and steel	1.7	2.4	2.6	2.6	2.6	3.4	0.8	0.1	0.0	1.1	1.2	1.1	0.9	0.7
non ferrous metals	0.7	0.9	1.3	1.7	2.3	2.3	3.4	3.0	2.9	0.5	0.5	0.5	0.6	0.6
chemicals	2.6	3.1	4.6	6.1	7.8	2.0	4.0	2.8	2.4	1.7	1.6	1.9	2.0	2.1
petrochemicals.fertilisers and others	1.8	1.7	2.3	2.9	3.4	-0.4	3.2	2.1	1.6	1.2	0.9	1.0	1.0	0.9
pharmaceuticals and cosmetics	0.8	1.4	2.3	3.2	4.4	5.9	4.9	3.5	3.1	0.5	0.7	0.9	1.1	1.2
non metallic minerals	2.3	2.6	2.7	3.3	3.9	0.9	0.7	1.9	1.6	1.5	1.3	1.1	1.1	1.1
paper. pulp. printing	2.6	3.7	4.6	5.5	6.5	3.4	2.2	1.9	1.6	1.7	1.9	1.9	1.8	1.8
paper and pulp production	0.9	1.1	1.2	1.3	1.4	1.2	1.1	0.9	0.6	0.6	0.5	0.5	0.4	0.4
printing and publishing	1.7	2.6	3.4	4.2	5.1	4.5	2.7	2.3	1.8	1.1	1.3	1.4	1.4	1.4
food. drink. tobacco	5.0	3.7	4.3	5.3	6.4	-3.1	1.5	2.2	1.9	3.3	1.9	1.8	1.8	1.8
textiles and leather	2.2	1.7	1.5	1.5	1.4	-2.2	-1.6	-0.2	-0.1	1.4	0.9	0.6	0.5	0.4
engineering	11.0	18.0	23.9	30.7	39.2	5.0	2.9	2.6	2.5	7.2	9.2	9.8	10.2	10.7
other industries	3.3	5.3	6.7	8.2	9.8	4.9	2.3	2.0	1.8	2.2	2.7	2.8	2.7	2.7
Construction	10.7	14.7	16.7	19.5	22.7	3.2	1.3	1.6	1.5	7.0	7.5	6.9	6.5	6.2
Services	101.6	127.9	160.5	200.7	246.6	2.3	2.3	2.3	2.1	66.7	65.5	66.1	66.8	67.3
market services	29.4	41.5	54.4	70.5	90.1	3.5	2.8	2.6	2.5	19.3	21.2	22.4	23.5	24.6
non-market services	34.2	38.7	45.0	53.2	61.4	1.2	1.5	1.7	1.4	22.5	19.8	18.5	17.7	16.8
trade	37.9	47.7	61.1	77.0	95.0	2.3	2.5	2.3	2.1	24.9	24.4	25.2	25.6	25.9
Agriculture	3.5	4.6	4.8	5.0	5.1	2.8	0.5	0.3	0.2	2.3	2.4	2.0	1.7	1.4
Energy sector	5.1	6.8	8.6	10.3	12.0	2.8	2.4	1.9	1.5	3.4	3.5	3.5	3.4	3.3

Source: PRIMES

BELGIUM: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	10.0	10.2	10.4	10.6	10.6	0.3	0.2	0.1	0.1					
Average household size (persons)	2.6	2.4	2.3	2.2	2.1	-0.6	-0.6	-0.5	-0.4					
Number of households (Million)	3.9	4.2	4.6	4.9	5.1	0.8	0.8	0.7	0.4					
Gross Domestic product (in 000 MEuro'00)	**199.8**	**248.3**	**308.1**	**367.4**	**432.1**	**2.2**	**2.2**	**1.8**	**1.6**					
Households expenditure (in 000 MEuro'00)	**105.5**	**128.9**	**157.4**	**190.1**	**225.6**	**2.0**	**2.0**	**1.9**	**1.7**					
Gross Value Added (in 000 MEuro'00)	**187.7**	**230.0**	**288.3**	**346.5**	**409.4**	**2.1**	**2.3**	**1.9**	**1.7**					
Industry	42.6	47.3	59.2	70.4	81.6	1.1	2.3	1.8	1.5	22.7	20.6	20.5	20.3	19.9
iron and steel	3.8	2.8	2.6	2.3	2.1	-3.0	-0.9	-1.0	-1.2	2.0	1.2	0.9	0.7	0.5
non ferrous metals	1.1	0.8	1.0	1.2	1.4	-3.6	2.5	1.8	1.3	0.6	0.3	0.4	0.4	0.3
chemicals	5.1	9.2	13.3	16.3	19.3	6.0	3.8	2.1	1.7	2.7	4.0	4.6	4.7	4.7
petrochemicals.fertilisers and others	3.4	6.2	8.3	9.1	9.4	6.1	3.0	1.0	0.2	1.8	2.7	2.9	2.6	2.3
pharmaceuticals and cosmetics	1.7	3.0	5.0	7.2	10.0	5.7	5.3	3.6	3.3	0.9	1.3	1.7	2.1	2.4
non metallic minerals	2.4	2.6	2.9	3.3	3.7	0.9	1.0	1.4	1.1	1.3	1.1	1.0	0.9	0.9
paper. pulp. printing	2.9	3.4	4.2	4.9	5.6	1.6	1.9	1.7	1.3	1.6	1.5	1.4	1.4	1.4
paper and pulp production	1.0	0.6	0.7	0.8	0.9	-4.0	1.4	1.1	0.7	0.5	0.3	0.3	0.2	0.2
printing and publishing	2.0	2.8	3.4	4.1	4.8	3.6	2.1	1.8	1.4	1.1	1.2	1.2	1.2	1.2
food. drink. tobacco	3.4	6.2	7.5	8.8	9.7	6.0	2.0	1.5	1.0	1.8	2.7	2.6	2.5	2.4
textiles and leather	3.3	2.8	3.0	3.1	3.1	-1.4	0.6	0.2	0.0	1.8	1.2	1.0	0.9	0.8
engineering	14.0	15.1	19.3	23.9	28.9	0.8	2.4	2.2	1.9	7.4	6.6	6.7	6.9	7.1
other industries	6.4	4.3	5.4	6.6	7.9	-3.9	2.3	2.0	1.8	3.4	1.9	1.9	1.9	1.9
Construction	10.1	11.5	13.8	16.2	18.7	1.3	1.8	1.7	1.4	5.4	5.0	4.8	4.7	4.6
Services	128.8	159.6	200.9	243.2	290.4	2.2	2.3	1.9	1.8	68.6	69.4	69.7	70.2	70.9
market services	43.8	63.5	90.0	115.5	146.8	3.8	3.5	2.5	2.4	23.3	27.6	31.2	33.3	35.8
non-market services	45.1	52.2	58.9	65.6	71.1	1.5	1.2	1.1	0.8	24.0	22.7	20.4	18.9	17.4
trade	40.0	43.9	52.1	62.1	72.5	0.9	1.7	1.8	1.5	21.3	19.1	18.1	17.9	17.7
Agriculture	2.6	3.6	3.8	3.9	4.0	3.4	0.5	0.4	0.3	1.4	1.6	1.3	1.1	1.0
Energy sector	3.7	7.9	10.7	12.7	14.7	8.0	3.0	1.7	1.5	2.0	3.5	3.7	3.7	3.6

Source: PRIMES

DENMARK: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	5.1	5.3	5.5	5.6	5.7	0.4	0.3	0.1	0.2					
Average household size (persons)	2.3	2.2	2.1	2.0	1.9	-0.4	-0.6	-0.5	-0.4					
Number of households (Million)	2.2	2.4	2.6	2.8	3.0	0.7	0.9	0.7	0.6					
Gross Domestic product (in 000 MEuro'00)	**138.3**	**173.9**	**215.2**	**258.8**	**307.5**	**2.3**	**2.2**	**1.9**	**1.7**					
Households expenditure (in 000 MEuro'00)	**67.5**	**81.5**	**99.0**	**122.6**	**148.7**	**1.9**	**2.0**	**2.2**	**1.9**					
Gross Value Added (in 000 MEuro'00)	**126.5**	**156.4**	**196.9**	**239.0**	**285.1**	**2.1**	**2.3**	**2.0**	**1.8**					
Industry	21.4	24.9	31.0	37.3	44.6	1.5	2.2	1.9	1.8	16.9	15.9	15.7	15.6	15.6
iron and steel	0.3	0.4	0.4	0.4	0.4	2.0	0.7	0.5	0.3	0.2	0.2	0.2	0.2	0.2
non ferrous metals	0.1	0.1	0.2	0.3	0.4	3.2	4.5	2.5	2.4	0.1	0.1	0.1	0.1	0.1
chemicals	2.0	2.8	3.9	4.8	5.9	3.5	3.2	2.3	2.0	1.6	1.8	2.0	2.0	2.1
petrochemicals.fertilisers and others	0.8	0.8	1.0	1.1	1.3	0.3	2.3	1.4	1.2	0.6	0.5	0.5	0.5	0.4
pharmaceuticals and cosmetics	1.2	2.0	2.9	3.7	4.6	5.1	3.6	2.5	2.2	1.0	1.3	1.5	1.6	1.6
non metallic minerals	1.0	1.2	1.3	1.6	1.9	1.3	1.5	1.8	1.6	0.8	0.7	0.7	0.7	0.7
paper. pulp. printing	2.1	2.4	3.1	3.7	4.3	1.7	2.3	1.7	1.7	1.6	1.6	1.6	1.5	1.5
paper and pulp production	0.1	0.1	0.1	0.1	0.1	-3.5	1.7	1.1	0.8	0.1	0.1	0.1	0.1	0.1
printing and publishing	1.9	2.3	3.0	3.5	4.2	2.0	2.4	1.7	1.7	1.5	1.5	1.5	1.5	1.5
food. drink. tobacco	4.6	4.7	5.6	6.6	7.7	0.1	1.8	1.7	1.6	3.7	3.0	2.8	2.8	2.7
textiles and leather	0.9	0.7	0.7	0.7	0.6	-2.4	0.1	-0.2	-0.9	0.7	0.4	0.3	0.3	0.2
engineering	7.8	9.3	11.7	14.4	17.6	1.8	2.3	2.1	2.0	6.2	6.0	6.0	6.0	6.2
other industries	2.6	3.3	4.0	4.9	5.8	2.3	2.1	1.8	1.8	2.1	2.1	2.1	2.0	2.0
Construction	6.5	7.2	8.1	10.1	11.9	1.0	1.3	2.2	1.7	5.1	4.6	4.1	4.2	4.2
Services	91.0	113.1	144.2	176.0	211.7	2.2	2.5	2.0	1.9	71.9	72.3	73.2	73.6	74.3
market services	30.8	37.4	52.6	66.8	82.7	2.0	3.5	2.4	2.2	24.3	23.9	26.7	27.9	29.0
non-market services	32.9	38.3	42.7	48.5	54.3	1.5	1.1	1.3	1.1	26.0	24.5	21.7	20.3	19.0
trade	27.4	37.4	48.8	60.7	74.8	3.2	2.7	2.2	2.1	21.6	23.9	24.8	25.4	26.2
Agriculture	4.2	5.4	6.1	6.8	7.2	2.5	1.3	1.0	0.6	3.4	3.5	3.1	2.8	2.5
Energy sector	3.4	5.8	7.5	8.8	9.7	5.5	2.7	1.6	1.0	2.7	3.7	3.8	3.7	3.4

Source: PRIMES

APPENDIX 1 MAIN MACROECONOMIC AND DEMOGRAPHIC ASSUMPTIONS

FINLAND: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	5.0	5.2	5.3	5.3	5.3	0.4	0.2	0.1	0.0					
Average household size (persons)	2.5	2.3	2.1	2.0	1.9	-0.8	-0.8	-0.7	-0.6					
Number of households (Million)	2.0	2.3	2.5	2.7	2.9	1.2	1.0	0.8	0.6					
Gross Domestic product (in 000 MEuro'00)	**106.0**	**131.1**	**167.9**	**197.8**	**230.1**	**2.1**	**2.5**	**1.6**	**1.5**					
Households expenditure (in 000 MEuro'00)	**53.4**	**61.0**	**77.0**	**94.3**	**112.4**	**1.4**	**2.4**	**2.0**	**1.8**					
Gross Value Added (in 000 MEuro'00)	**94.1**	**118.7**	**153.6**	**182.0**	**212.7**	**2.4**	**2.6**	**1.7**	**1.6**					
Industry	20.4	34.3	45.3	53.4	61.7	5.3	2.8	1.7	1.4	21.7	28.9	29.5	29.4	29.0
iron and steel	0.7	1.2	1.3	1.3	1.3	6.2	0.3	0.3	0.2	0.7	1.0	0.8	0.7	0.6
non ferrous metals	0.3	0.3	0.4	0.5	0.5	1.6	1.7	1.2	0.6	0.3	0.3	0.3	0.3	0.2
chemicals	1.4	1.9	2.3	2.5	2.8	3.1	1.7	1.2	0.8	1.5	1.6	1.5	1.4	1.3
petrochemicals.fertilisers and others	1.1	1.4	1.5	1.6	1.7	2.3	1.2	0.7	0.4	1.1	1.1	1.0	0.9	0.8
pharmaceuticals and cosmetics	0.3	0.6	0.7	0.9	1.1	5.1	2.8	2.2	1.6	0.4	0.5	0.5	0.5	0.5
non metallic minerals	1.0	1.1	1.3	1.4	1.4	0.8	1.7	0.8	0.3	1.0	0.9	0.8	0.7	0.7
paper. pulp. printing	4.4	7.6	8.6	9.3	9.5	5.5	1.3	0.7	0.3	4.7	6.4	5.6	5.1	4.5
paper and pulp production	2.4	5.0	5.2	5.3	5.4	7.3	0.4	0.3	0.1	2.6	4.2	3.4	2.9	2.5
printing and publishing	2.0	2.6	3.4	3.9	4.1	2.7	2.8	1.4	0.5	2.1	2.2	2.2	2.2	1.9
food. drink. tobacco	2.7	2.5	2.8	3.1	3.3	-0.7	1.2	1.1	0.7	2.8	2.1	1.8	1.7	1.6
textiles and leather	0.8	0.7	0.8	0.8	0.8	-0.4	0.7	0.3	0.1	0.8	0.6	0.5	0.4	0.4
engineering	6.7	15.4	23.2	28.9	35.4	8.7	4.2	2.2	2.1	7.1	13.0	15.1	15.9	16.6
other industries	2.5	3.5	4.7	5.6	6.6	3.4	3.0	1.9	1.6	2.6	2.9	3.0	3.1	3.1
Construction	6.3	5.1	6.1	7.2	8.0	-2.2	1.9	1.6	1.2	6.7	4.3	4.0	3.9	3.8
Services	60.5	71.5	93.7	112.3	133.6	1.7	2.7	1.8	1.8	64.2	60.3	61.0	61.7	62.8
market services	17.9	23.0	30.3	36.9	44.7	2.5	2.8	2.0	1.9	19.0	19.4	19.7	20.3	21.0
non-market services	21.9	23.1	26.4	29.9	33.5	0.6	1.3	1.3	1.1	23.2	19.5	17.2	16.4	15.7
trade	20.7	25.4	37.0	45.5	55.4	2.1	3.8	2.1	2.0	22.0	21.4	24.1	25.0	26.1
Agriculture	4.5	4.7	4.9	5.0	5.0	0.6	0.3	0.2	0.1	4.7	4.0	3.2	2.7	2.3
Energy sector	2.4	3.1	3.6	4.2	4.4	2.6	1.4	1.5	0.7	2.6	2.6	2.3	2.3	2.1

Source: PRIMES

FRANCE: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	58.2	60.6	63.1	64.6	65.4	0.4	0.4	0.2	0.1					
Average household size (persons)	2.6	2.4	2.2	2.1	1.9	-0.8	-0.8	-0.7	-0.6					
Number of households (Million)	22.5	25.5	28.7	31.5	33.9	1.3	1.2	0.9	0.7					
Gross Domestic product (in 000 MEuro'00)	**1177.7**	**1416.9**	**1791.9**	**2235.2**	**2748.8**	**1.9**	**2.4**	**2.2**	**2.1**					
Households expenditure (in 000 MEuro'00)	**659.2**	**756.9**	**959.5**	**1180.0**	**1423.7**	**1.4**	**2.4**	**2.1**	**1.9**					
Gross Value Added (in 000 MEuro'00)	**1099.8**	**1301.7**	**1664.6**	**2087.8**	**2572.6**	**1.7**	**2.5**	**2.3**	**2.1**					
Industry	194.0	241.1	322.5	410.9	509.2	2.2	3.0	2.5	2.2	17.6	18.5	19.4	19.7	19.8
iron and steel	7.1	7.9	9.6	10.3	10.5	1.1	2.0	0.7	0.2	0.6	0.6	0.6	0.5	0.4
non ferrous metals	2.6	3.2	4.6	5.8	7.1	2.2	3.7	2.4	2.0	0.2	0.2	0.3	0.3	0.3
chemicals	23.8	33.5	46.0	58.7	71.5	3.5	3.2	2.5	2.0	2.2	2.6	2.8	2.8	2.8
petrochemicals.fertilisers and others	12.9	15.3	18.6	21.2	23.0	1.8	1.9	1.4	0.8	1.2	1.2	1.1	1.0	0.9
pharmaceuticals and cosmetics	10.9	18.1	27.4	37.5	48.5	5.2	4.2	3.2	2.6	1.0	1.4	1.6	1.8	1.9
non metallic minerals	9.3	9.6	10.9	12.2	13.3	0.3	1.2	1.2	0.9	0.8	0.7	0.7	0.6	0.5
paper. pulp. printing	15.0	17.8	21.6	26.5	30.4	1.8	1.9	2.1	1.4	1.4	1.4	1.3	1.3	1.2
paper and pulp production	2.6	2.6	2.9	3.3	3.5	0.3	0.9	1.3	0.6	0.2	0.2	0.2	0.2	0.1
printing and publishing	12.4	15.2	18.7	23.2	26.9	2.0	2.1	2.2	1.5	1.1	1.2	1.1	1.1	1.0
food. drink. tobacco	22.6	27.5	35.9	44.2	52.8	1.9	2.7	2.1	1.8	2.1	2.1	2.2	2.1	2.1
textiles and leather	12.0	10.6	10.3	10.3	9.9	-1.2	-0.3	-0.1	-0.4	1.1	0.8	0.6	0.5	0.4
engineering	85.3	109.9	155.6	208.6	274.7	2.6	3.5	3.0	2.8	7.8	8.4	9.3	10.0	10.7
other industries	16.2	21.0	28.0	34.3	39.1	2.6	2.9	2.0	1.3	1.5	1.6	1.7	1.6	1.5
Construction	65.1	56.0	62.8	73.7	84.5	-1.5	1.1	1.6	1.4	5.9	4.3	3.8	3.5	3.3
Services	771.6	922.4	1190.4	1506.8	1875.9	1.8	2.6	2.4	2.2	70.2	70.9	71.5	72.2	72.9
market services	311.7	362.1	477.7	614.5	777.2	1.5	2.8	2.5	2.4	28.3	27.8	28.7	29.4	30.2
non-market services	244.3	294.1	346.8	405.1	469.1	1.9	1.7	1.6	1.5	22.2	22.6	20.8	19.4	18.2
trade	215.6	266.2	365.8	487.3	629.6	2.1	3.2	2.9	2.6	19.6	20.5	22.0	23.3	24.5
Agriculture	35.6	41.7	43.4	46.1	48.6	1.6	0.4	0.6	0.5	3.2	3.2	2.6	2.2	1.9
Energy sector	33.5	40.5	45.6	50.3	54.5	1.9	1.2	1.0	0.8	3.0	3.1	2.7	2.4	2.1

Source: PRIMES

GERMANY: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	79.4	82.2	83.2	83.1	81.7	0.3	0.1	0.0	-0.2					
Average household size (persons)	2.4	2.2	2.1	2.0	1.9	-0.5	-0.7	-0.4	-0.4					
Number of households (Million)	33.8	36.7	39.8	41.5	42.6	0.8	0.8	0.4	0.2					
Gross Domestic product (in 000 MEuro'00)	**1733.7**	**2025.5**	**2494.5**	**3069.2**	**3723.1**	**1.6**	**2.1**	**2.1**	**1.9**					
Households expenditure (in 000 MEuro'00)	**954.9**	**1104.3**	**1335.1**	**1610.7**	**1885.0**	**1.5**	**1.9**	**1.9**	**1.6**					
Gross Value Added (in 000 MEuro'00)	**1614.9**	**1939.5**	**2422.4**	**3002.4**	**3663.1**	**1.8**	**2.2**	**2.2**	**2.0**					
Industry	414.3	419.3	518.8	652.0	809.8	0.1	2.2	2.3	2.2	25.7	21.6	21.4	21.7	22.1
iron and steel	15.7	12.0	11.8	12.3	12.5	-2.7	-0.2	0.4	0.2	1.0	0.6	0.5	0.4	0.3
non ferrous metals	6.1	7.5	11.7	16.2	21.7	2.2	4.5	3.3	3.0	0.4	0.4	0.5	0.5	0.6
chemicals	44.7	44.2	53.0	65.8	80.3	-0.1	1.8	2.2	2.0	2.8	2.3	2.2	2.2	2.2
petrochemicals.fertilisers and others	33.7	31.5	35.0	39.0	42.9	-0.7	1.1	1.1	1.0	2.1	1.6	1.4	1.3	1.2
pharmaceuticals and cosmetics	11.0	12.7	17.9	26.8	37.4	1.4	3.5	4.1	3.4	0.7	0.7	0.7	0.9	1.0
non metallic minerals	15.8	15.9	18.6	22.0	25.4	0.1	1.6	1.7	1.4	1.0	0.8	0.8	0.7	0.7
paper. pulp. printing	27.0	30.0	37.2	46.5	56.5	1.1	2.2	2.2	2.0	1.7	1.5	1.5	1.5	1.5
paper and pulp production	4.6	4.7	5.6	6.4	7.1	0.1	1.7	1.4	1.0	0.3	0.2	0.2	0.2	0.2
printing and publishing	22.3	25.3	31.7	40.1	49.4	1.2	2.3	2.4	2.1	1.4	1.3	1.3	1.3	1.3
food. drink. tobacco	29.9	31.8	37.7	46.4	55.9	0.6	1.7	2.1	1.9	1.9	1.6	1.6	1.5	1.5
textiles and leather	16.2	9.3	8.5	8.2	8.2	-5.4	-0.9	-0.3	-0.1	1.0	0.5	0.4	0.3	0.2
engineering	223.0	228.8	292.0	374.8	476.3	0.3	2.5	2.5	2.4	13.8	11.8	12.1	12.5	13.0
other industries	35.9	39.7	48.4	59.7	73.0	1.0	2.0	2.1	2.0	2.2	2.0	2.0	2.0	2.0
Construction	104.5	105.5	107.3	120.2	131.4	0.1	0.2	1.1	0.9	6.5	5.4	4.4	4.0	3.6
Services	1027.9	1342.9	1716.2	2141.4	2625.5	2.7	2.5	2.2	2.1	63.7	69.2	70.8	71.3	71.7
market services	403.9	590.8	823.7	1081.5	1376.8	3.9	3.4	2.8	2.4	25.0	30.5	34.0	36.0	37.6
non-market services	338.5	394.3	439.0	495.0	554.2	1.5	1.1	1.2	1.1	21.0	20.3	18.1	16.5	15.1
trade	285.6	357.7	453.5	564.9	694.5	2.3	2.4	2.2	2.1	17.7	18.4	18.7	18.8	19.0
Agriculture	20.3	24.9	28.8	32.2	34.1	2.1	1.5	1.1	0.6	1.3	1.3	1.2	1.1	0.9
Energy sector	47.8	46.9	51.2	56.7	62.3	-0.2	0.9	1.0	1.0	3.0	2.4	2.1	1.9	1.7

Source: PRIMES

GREECE: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	10.2	10.6	11.1	11.2	11.1	0.4	0.5	0.0	-0.1					
Average household size (persons)	3.0	2.8	2.7	2.6	2.6	-0.7	-0.4	-0.3	-0.3					
Number of households (Million)	3.3	3.7	4.1	4.3	4.3	1.1	0.9	0.4	0.2					
Gross Domestic product (in 000 MEuro'00)	**97.7**	**122.9**	**181.4**	**249.5**	**336.1**	**2.3**	**4.0**	**3.2**	**3.0**					
Households expenditure (in 000 MEuro'00)	**69.3**	**87.5**	**119.7**	**158.3**	**207.1**	**2.4**	**3.2**	**2.8**	**2.7**					
Gross Value Added (in 000 MEuro'00)	**92.8**	**113.6**	**170.5**	**237.2**	**322.3**	**2.0**	**4.1**	**3.4**	**3.1**					
Industry	10.8	12.8	19.4	26.7	35.4	1.7	4.2	3.3	2.9	11.7	11.3	11.4	11.3	11.0
iron and steel	0.2	0.3	0.4	0.5	0.5	4.0	2.7	2.0	1.5	0.2	0.3	0.2	0.2	0.2
non ferrous metals	0.6	0.5	0.9	1.2	1.6	-0.9	4.8	3.4	2.8	0.6	0.5	0.5	0.5	0.5
chemicals	1.1	1.3	2.1	2.9	4.1	1.5	4.9	3.6	3.3	1.2	1.1	1.2	1.2	1.3
petrochemicals.fertilisers and others	0.5	0.6	0.9	1.2	1.5	0.9	4.6	3.1	2.0	0.6	0.5	0.5	0.5	0.5
pharmaceuticals and cosmetics	0.6	0.7	1.2	1.7	2.6	1.9	5.1	3.9	4.2	0.6	0.6	0.7	0.7	0.8
non metallic minerals	0.6	1.3	2.1	2.7	3.2	8.1	5.0	2.4	1.6	0.6	1.1	1.2	1.1	1.0
paper. pulp. printing	0.8	0.9	1.3	1.7	2.1	0.9	4.0	2.8	1.9	0.9	0.8	0.8	0.7	0.6
paper and pulp production	0.1	0.1	0.1	0.1	0.1	-0.9	2.1	1.4	0.5	0.1	0.1	0.1	0.0	0.0
printing and publishing	0.7	0.8	1.2	1.6	2.0	1.1	4.2	2.9	2.0	0.8	0.7	0.7	0.7	0.6
food. drink. tobacco	2.7	3.5	5.4	7.4	9.5	2.6	4.3	3.2	2.6	2.9	3.1	3.2	3.1	3.0
textiles and leather	2.0	1.5	1.6	1.7	1.8	-2.5	0.7	0.6	0.5	2.1	1.3	1.0	0.7	0.6
engineering	1.6	2.5	4.1	6.6	10.3	4.7	5.1	4.8	4.6	1.7	2.2	2.4	2.8	3.2
other industries	1.3	1.0	1.5	1.9	2.3	-2.5	4.1	2.8	1.8	1.4	0.9	0.9	0.8	0.7
Construction	6.2	7.8	12.7	16.9	21.5	2.3	5.0	2.9	2.5	6.7	6.9	7.4	7.1	6.7
Services	61.1	78.8	121.1	170.9	237.5	2.6	4.4	3.5	3.3	65.8	69.4	71.1	72.0	73.7
market services	18.6	24.3	37.3	54.9	79.3	2.7	4.4	3.9	3.8	20.0	21.4	21.9	23.1	24.6
non-market services	18.5	19.9	26.8	34.5	42.9	0.8	3.0	2.6	2.2	19.9	17.5	15.7	14.5	13.3
trade	24.0	34.6	57.1	81.5	115.4	3.7	5.1	3.6	3.5	25.9	30.4	33.5	34.4	35.8
Agriculture	11.4	9.8	13.2	17.3	20.9	-1.5	3.0	2.7	1.9	12.2	8.6	7.8	7.3	6.5
Energy sector	3.3	4.4	4.1	5.5	6.9	2.8	-0.7	3.0	2.3	3.6	3.9	2.4	2.3	2.1

Source: PRIMES

APPENDIX 1

MAIN MACROECONOMIC AND DEMOGRAPHIC ASSUMPTIONS

IRELAND: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	3.5	3.8	4.2	4.5	4.7	0.8	1.0	0.7	0.4					
Average household size (persons)	3.4	3.0	2.8	2.7	2.4	-1.3	-0.6	-0.7	-0.8					
Number of households (Million)	1.0	1.3	1.5	1.7	1.9	2.1	1.6	1.4	1.3					
Gross Domestic product (in 000 MEuro'00)	**51.3**	**103.5**	**162.2**	**204.5**	**251.1**	**7.3**	**4.6**	**2.3**	**2.1**					
Households expenditure (in 000 MEuro'00)	**28.6**	**49.5**	**77.3**	**97.8**	**121.7**	**5.6**	**4.6**	**2.4**	**2.2**					
Gross Value Added (in 000 MEuro'00)	**48.5**	**93.2**	**146.8**	**185.4**	**227.7**	**6.7**	**4.6**	**2.4**	**2.1**					
Industry	12.1	31.1	48.9	61.6	74.5	9.9	4.6	2.3	1.9	24.9	33.4	33.3	33.2	32.7
iron and steel	0.0	0.1	0.1	0.1	0.1	4.4	3.5	1.1	0.4	0.1	0.1	0.1	0.1	0.1
non ferrous metals	0.1	0.2	0.4	0.5	0.6	8.7	9.8	2.7	1.9	0.1	0.2	0.3	0.3	0.3
chemicals	2.0	11.6	18.8	23.7	28.7	19.1	5.0	2.3	1.9	4.2	12.4	12.8	12.8	12.6
petrochemicals.fertilisers and others	1.6	9.1	12.4	13.2	13.6	19.3	3.2	0.6	0.3	3.2	9.8	8.5	7.1	6.0
pharmaceuticals and cosmetics	0.5	2.5	6.4	10.5	15.1	18.4	9.9	5.1	3.7	0.9	2.7	4.4	5.7	6.6
non metallic minerals	0.4	0.8	1.4	1.7	2.0	7.3	5.1	2.0	1.6	0.9	0.9	0.9	0.9	0.9
paper. pulp. printing	1.1	3.0	4.5	5.6	6.6	10.7	4.4	2.1	1.7	2.2	3.2	3.1	3.0	2.9
paper and pulp production	0.0	0.0	0.0	0.0	0.0	3.1	-0.8	-0.2	0.0	0.0	0.0	0.0	0.0	0.0
printing and publishing	1.1	2.9	4.5	5.6	6.6	10.7	4.4	2.1	1.7	2.2	3.2	3.1	3.0	2.9
food. drink. tobacco	3.9	5.2	8.0	9.8	11.7	2.8	4.5	2.0	1.8	8.1	5.5	5.5	5.3	5.1
textiles and leather	0.5	0.6	0.8	0.9	0.9	2.4	2.8	0.2	0.0	1.0	0.7	0.6	0.5	0.4
engineering	3.2	8.0	12.6	16.6	21.0	9.8	4.6	2.8	2.4	6.5	8.6	8.6	8.9	9.2
other industries	0.9	1.7	2.2	2.6	3.0	7.1	2.8	1.7	1.3	1.8	1.8	1.5	1.4	1.3
Construction	2.3	5.4	9.4	12.1	14.7	9.0	5.6	2.6	2.0	4.7	5.8	6.4	6.5	6.4
Services	28.7	50.2	80.8	103.3	129.2	5.7	4.9	2.5	2.3	59.2	53.9	55.1	55.7	56.7
market services	9.8	17.4	28.0	36.7	47.1	5.9	4.9	2.7	2.5	20.1	18.7	19.1	19.8	20.7
non-market services	10.5	18.6	26.2	31.2	36.7	5.9	3.5	1.8	1.6	21.6	20.0	17.8	16.8	16.1
trade	8.5	14.2	26.6	35.4	45.4	5.3	6.5	2.9	2.5	17.4	15.2	18.1	19.1	19.9
Agriculture	4.7	4.4	4.5	4.7	4.9	-0.6	0.2	0.5	0.4	9.6	4.7	3.0	2.5	2.1
Energy sector	0.8	2.1	3.2	3.8	4.4	9.9	4.4	1.9	1.4	1.7	2.2	2.2	2.1	1.9

Source: PRIMES

ITALY: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	56.7	57.8	57.9	56.6	54.6	0.2	0.0	-0.2	-0.4					
Average household size (persons)	2.6	2.4	2.2	2.0	1.8	-1.1	-0.9	-0.9	-0.7					
Number of households (Million)	21.5	24.4	26.8	28.7	29.8	1.3	1.0	0.7	0.4					
Gross Domestic product (in 000 MEuro'00)	**996.6**	**1164.8**	**1470.8**	**1836.4**	**2262.8**	**1.6**	**2.4**	**2.2**	**2.1**					
Households expenditure (in 000 MEuro'00)	**593.3**	**701.8**	**869.4**	**1078.1**	**1323.9**	**1.7**	**2.2**	**2.2**	**2.1**					
Gross Value Added (in 000 MEuro'00)	**937.0**	**1094.0**	**1384.6**	**1732.6**	**2135.6**	**1.6**	**2.4**	**2.3**	**2.1**					
Industry	205.3	234.3	279.8	342.6	418.3	1.3	1.8	2.0	2.0	21.9	21.4	20.2	19.8	19.6
iron and steel	8.3	8.6	8.1	7.8	7.8	0.4	-0.6	-0.3	-0.1	0.9	0.8	0.6	0.5	0.4
non ferrous metals	2.5	3.4	4.3	5.4	6.7	3.3	2.2	2.5	2.2	0.3	0.3	0.3	0.3	0.3
chemicals	20.7	23.4	28.0	34.8	42.8	1.2	1.8	2.2	2.1	2.2	2.1	2.0	2.0	2.0
petrochemicals.fertilisers and others	10.9	11.6	13.0	14.7	16.5	0.6	1.2	1.2	1.1	1.2	1.1	0.9	0.8	0.8
pharmaceuticals and cosmetics	9.8	11.8	14.9	20.1	26.3	1.9	2.4	3.0	2.7	1.0	1.1	1.1	1.2	1.2
non metallic minerals	12.4	12.1	14.0	16.4	18.8	-0.3	1.5	1.6	1.4	1.3	1.1	1.0	0.9	0.9
paper. pulp. printing	13.8	15.1	18.7	23.3	27.9	0.9	2.2	2.2	1.8	1.5	1.4	1.4	1.3	1.3
paper and pulp production	1.9	2.6	3.2	3.9	4.7	3.1	2.0	2.1	1.7	0.2	0.2	0.2	0.2	0.2
printing and publishing	11.9	12.5	15.5	19.3	23.3	0.5	2.2	2.2	1.9	1.3	1.1	1.1	1.1	1.1
food. drink. tobacco	18.5	21.1	26.2	32.5	39.9	1.3	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9
textiles and leather	25.9	25.6	25.6	25.2	24.2	-0.1	0.0	-0.2	-0.4	2.8	2.3	1.8	1.5	1.1
engineering	87.1	104.3	130.7	168.7	217.1	1.8	2.3	2.6	2.6	9.3	9.5	9.4	9.7	10.2
other industries	16.1	20.7	24.3	28.5	33.1	2.5	1.6	1.6	1.5	1.7	1.9	1.8	1.6	1.5
Construction	54.5	53.9	66.6	81.0	96.1	-0.1	2.1	2.0	1.7	5.8	4.9	4.8	4.7	4.5
Services	622.1	741.1	962.0	1220.9	1520.9	1.8	2.6	2.4	2.2	66.4	67.7	69.5	70.5	71.2
market services	218.5	271.5	376.8	503.8	655.4	2.2	3.3	2.9	2.7	23.3	24.8	27.2	29.1	30.7
non-market services	181.9	196.6	225.2	256.2	289.6	0.8	1.4	1.3	1.2	19.4	18.0	16.3	14.8	13.6
trade	221.6	273.0	360.0	461.0	575.8	2.1	2.8	2.5	2.2	23.7	25.0	26.0	26.6	27.0
Agriculture	28.8	34.6	38.0	41.3	44.2	1.9	0.9	0.8	0.7	3.1	3.2	2.7	2.4	2.1
Energy sector	26.3	30.1	38.1	46.8	56.1	1.4	2.4	2.1	1.8	2.8	2.8	2.8	2.7	2.6

Source: PRIMES

LUXEMBOURG: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	0.4	0.4	0.5	0.5	0.5	1.4	0.9	0.6	0.6					
Average household size (persons)	2.7	2.5	2.4	2.2	2.1	-0.6	-0.6	-0.7	-0.5					
Number of households (Million)	0.1	0.2	0.2	0.2	0.3	2.1	1.5	1.3	1.0					
Gross Domestic product (in 000 MEuro'00)	**12.4**	**20.5**	**31.5**	**42.0**	**52.6**	**5.1**	**4.4**	**2.9**	**2.3**					
Households expenditure (in 000 MEuro'00)	**6.3**	**8.2**	**11.6**	**15.0**	**18.0**	**2.7**	**3.5**	**2.5**	**1.9**					
Gross Value Added (in 000 MEuro'00)	**12.1**	**20.4**	**31.5**	**42.0**	**52.6**	**5.4**	**4.4**	**2.9**	**2.3**					
Industry	1.5	2.7	4.0	5.3	6.6	6.1	3.9	2.8	2.2	12.5	13.5	12.8	12.6	12.5
iron and steel	0.5	0.5	0.6	0.7	0.7	1.0	1.8	0.7	0.3	3.9	2.6	2.0	1.6	1.3
non ferrous metals	0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0	0.0	0.0
chemicals	0.1	0.2	0.3	0.4	0.6	14.6	4.6	3.1	2.4	0.4	1.0	1.0	1.0	1.1
petrochemicals.fertilisers and others	0.1	0.2	0.3	0.4	0.6	14.6	4.6	3.1	2.4	0.4	1.0	1.0	1.0	1.1
pharmaceuticals and cosmetics	0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0	0.0	0.0
non metallic minerals	0.2	0.3	0.5	0.6	0.7	6.6	4.4	2.6	1.9	1.4	1.5	1.5	1.5	1.4
paper. pulp. printing	0.1	0.2	0.3	0.4	0.4	10.5	4.6	3.0	2.1	0.5	0.8	0.8	0.8	0.8
paper and pulp production	0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0	0.0	0.0
printing and publishing	0.1	0.2	0.3	0.4	0.4	10.5	4.6	3.0	2.1	0.5	0.8	0.8	0.8	0.8
food. drink. tobacco	0.1	0.2	0.3	0.5	0.6	8.4	4.3	2.9	2.0	0.8	1.1	1.1	1.1	1.1
textiles and leather	0.1	0.2	0.3	0.4	0.4	12.1	3.8	2.2	1.5	0.6	1.1	1.0	0.9	0.9
engineering	0.4	0.6	1.0	1.5	2.1	5.9	4.7	4.0	3.4	2.9	3.1	3.2	3.5	4.0
other industries	0.2	0.5	0.7	0.9	1.1	7.0	3.6	2.7	2.1	1.9	2.3	2.1	2.1	2.0
Construction	0.9	1.3	1.9	2.5	3.1	4.0	4.0	2.5	2.1	7.4	6.4	6.2	6.0	5.9
Services	9.3	15.8	24.9	33.5	42.0	5.4	4.6	3.0	2.3	77.1	77.6	79.1	79.7	80.0
market services	4.8	7.5	11.5	15.6	20.1	4.6	4.3	3.1	2.6	39.8	36.9	36.5	37.1	38.2
non-market services	2.1	3.4	5.0	6.3	7.2	4.7	4.0	2.4	1.4	17.6	16.5	15.8	15.0	13.7
trade	2.4	4.9	8.4	11.6	14.8	7.5	5.5	3.2	2.4	19.8	24.3	26.8	27.7	28.1
Agriculture	0.1	0.2	0.2	0.2	0.2	3.9	0.8	0.4	0.1	1.0	0.9	0.6	0.5	0.4
Energy sector	0.2	0.3	0.4	0.5	0.6	2.9	2.6	2.4	2.1	2.0	1.6	1.3	1.3	1.2

Source: PRIMES

THE NETHERLANDS: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	14.9	15.9	16.8	17.4	17.9	0.6	0.5	0.3	0.3					
Average household size (persons)	2.5	2.4	2.2	2.0	1.9	-0.6	-0.8	-0.7	-0.5					
Number of households (Million)	6.0	6.8	7.8	8.6	9.3	1.2	1.4	1.1	0.8					
Gross Domestic product (in 000 MEuro'00)	**301.4**	**401.1**	**503.1**	**630.3**	**780.1**	**2.9**	**2.3**	**2.3**	**2.2**					
Households expenditure (in 000 MEuro'00)	**150.3**	**197.2**	**252.2**	**317.5**	**394.1**	**2.8**	**2.5**	**2.3**	**2.2**					
Gross Value Added (in 000 MEuro'00)	**282.8**	**372.7**	**472.0**	**592.9**	**733.6**	**2.8**	**2.4**	**2.3**	**2.2**					
Industry	53.4	66.3	77.4	94.3	113.8	2.2	1.6	2.0	1.9	18.9	17.8	16.4	15.9	15.5
iron and steel	1.8	1.7	1.6	1.5	1.5	-0.5	-0.6	-0.3	-0.1	0.6	0.5	0.3	0.3	0.2
non ferrous metals	0.8	1.0	1.4	1.8	2.3	3.0	2.8	2.7	2.2	0.3	0.3	0.3	0.3	0.3
chemicals	9.3	10.5	11.5	13.6	15.6	1.2	1.0	1.6	1.4	3.3	2.8	2.4	2.3	2.1
petrochemicals.fertilisers and others	8.2	8.0	8.2	8.7	9.2	-0.2	0.3	0.5	0.5	2.9	2.2	1.7	1.5	1.3
pharmaceuticals and cosmetics	1.1	2.4	3.3	4.8	6.5	7.9	3.1	4.0	2.9	0.4	0.6	0.7	0.8	0.9
non metallic minerals	2.1	2.8	3.1	3.7	4.2	2.9	0.9	1.8	1.5	0.7	0.8	0.6	0.6	0.6
paper. pulp. printing	6.2	8.4	10.1	12.2	14.4	3.1	1.8	1.9	1.7	2.2	2.2	2.1	2.1	2.0
paper and pulp production	0.7	0.9	1.1	1.2	1.4	2.3	1.5	1.3	1.0	0.3	0.3	0.2	0.2	0.2
printing and publishing	5.4	7.4	9.0	10.9	13.1	3.2	1.9	2.0	1.8	1.9	2.0	1.9	1.8	1.8
food. drink. tobacco	10.3	13.2	15.7	18.9	22.4	2.5	1.8	1.9	1.8	3.6	3.5	3.3	3.2	3.1
textiles and leather	1.6	1.3	1.2	1.2	1.2	-2.3	-0.5	-0.3	-0.1	0.6	0.3	0.3	0.2	0.2
engineering	17.8	22.5	27.1	34.7	44.2	2.4	1.9	2.5	2.5	6.3	6.0	5.7	5.8	6.0
other industries	3.6	4.9	5.8	6.9	7.9	3.2	1.7	1.6	1.4	1.3	1.3	1.2	1.2	1.1
Construction	17.8	19.1	23.7	28.4	33.6	0.7	2.2	1.8	1.7	6.3	5.1	5.0	4.8	4.6
Services	191.8	264.1	345.3	441.8	555.3	3.2	2.7	2.5	2.3	67.8	70.9	73.2	74.5	75.7
market services	59.9	91.8	121.3	157.7	201.2	4.4	2.8	2.7	2.5	21.2	24.6	25.7	26.6	27.4
non-market services	69.7	79.7	100.0	121.9	146.5	1.3	2.3	2.0	1.9	24.7	21.4	21.2	20.6	20.0
trade	62.2	92.6	124.0	162.2	207.6	4.1	3.0	2.7	2.5	22.0	24.9	26.3	27.4	28.3
Agriculture	9.4	11.9	13.1	14.3	15.2	2.3	1.0	0.9	0.6	3.3	3.2	2.8	2.4	2.1
Energy sector	10.2	11.4	12.4	14.1	15.7	1.1	0.9	1.2	1.1	3.6	3.1	2.6	2.4	2.1

Source: PRIMES

APPENDIX 1

MAIN MACROECONOMIC AND DEMOGRAPHIC ASSUMPTIONS

PORTUGAL: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	9.9	10.0	10.3	10.5	10.7	0.1	0.3	0.2	0.1					
Average household size (persons)	3.0	2.8	2.6	2.5	2.3	-0.9	-0.6	-0.6	-0.5					
Number of households (Million)	3.3	3.6	4.0	4.3	4.6	1.0	0.9	0.8	0.6					
Gross Domestic product (in 000 MEuro'00)	**87.7**	**115.0**	**155.2**	**221.8**	**312.4**	**2.8**	**3.0**	**3.6**	**3.5**					
Households expenditure (in 000 MEuro'00)	**53.1**	**70.8**	**92.2**	**130.4**	**181.4**	**2.9**	**2.7**	**3.5**	**3.4**					
Gross Value Added (in 000 MEuro'00)	**80.5**	**106.6**	**145.5**	**209.7**	**297.2**	**2.9**	**3.2**	**3.7**	**3.5**					
Industry	17.9	21.2	26.6	36.5	49.0	1.7	2.3	3.2	3.0	22.2	19.9	18.3	17.4	16.5
iron and steel	0.2	0.2	0.3	0.4	0.4	-1.1	2.2	3.1	2.1	0.3	0.2	0.2	0.2	0.1
non ferrous metals	0.2	0.1	0.1	0.2	0.2	-3.6	1.3	1.2	0.5	0.2	0.1	0.1	0.1	0.1
chemicals	0.9	1.2	1.5	2.1	2.9	3.2	2.0	3.5	3.3	1.1	1.1	1.0	1.0	1.0
petrochemicals.fertilisers and others	0.6	0.7	0.7	0.8	0.9	1.2	0.5	1.4	1.0	0.8	0.7	0.5	0.4	0.3
pharmaceuticals and cosmetics	0.3	0.5	0.8	1.3	2.0	6.6	3.9	5.2	4.6	0.3	0.5	0.5	0.6	0.7
non metallic minerals	0.9	2.2	2.9	3.9	4.9	9.3	2.7	2.9	2.4	1.1	2.1	2.0	1.9	1.7
paper. pulp. printing	1.7	1.9	2.4	3.2	4.2	1.1	2.1	3.1	2.8	2.2	1.8	1.6	1.5	1.4
paper and pulp production	0.4	0.5	0.7	0.9	1.2	3.7	2.8	3.0	2.4	0.4	0.5	0.5	0.4	0.4
printing and publishing	1.4	1.4	1.7	2.3	3.1	0.2	1.9	3.1	2.9	1.7	1.3	1.2	1.1	1.0
food. drink. tobacco	2.0	2.6	3.3	4.6	6.0	2.7	2.3	3.3	2.8	2.5	2.5	2.3	2.2	2.0
textiles and leather	5.4	4.2	4.8	6.0	7.4	-2.4	1.2	2.3	2.1	6.7	4.0	3.3	2.9	2.5
engineering	4.3	6.2	8.4	12.3	17.7	3.6	3.1	3.9	3.7	5.4	5.8	5.8	5.9	6.0
other industries	2.2	2.5	2.9	3.9	5.2	1.2	1.6	3.1	2.9	2.8	2.3	2.0	1.9	1.8
Construction	5.4	7.4	10.1	14.2	19.3	3.2	3.2	3.5	3.1	6.7	7.0	7.0	6.8	6.5
Services	50.8	70.3	99.6	148.0	215.8	3.3	3.5	4.0	3.8	63.1	66.0	68.5	70.6	72.6
market services	12.2	22.2	33.6	52.3	80.6	6.2	4.2	4.5	4.4	15.1	20.8	23.1	24.9	27.1
non-market services	18.5	23.0	30.5	42.0	55.7	2.2	2.9	3.3	2.9	23.0	21.6	21.0	20.0	18.8
trade	20.1	25.1	35.6	53.7	79.4	2.3	3.5	4.2	4.0	24.9	23.6	24.4	25.6	26.7
Agriculture	4.2	4.3	5.1	6.0	7.0	0.2	1.7	1.7	1.5	5.2	4.1	3.5	2.9	2.4
Energy sector	2.2	3.3	4.0	5.0	6.1	4.1	1.9	2.2	2.1	2.8	3.1	2.8	2.4	2.1

Source: PRIMES

SPAIN: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	38.9	39.9	41.1	40.8	39.8	0.3	0.3	-0.1	-0.2					
Average household size (persons)	3.2	2.9	2.7	2.6	2.4	-1.0	-0.5	-0.6	-0.6					
Number of households (Million)	12.3	14.0	15.2	16.0	16.5	1.3	0.8	0.5	0.3					
Gross Domestic product (in 000 MEuro'00)	**468.8**	**608.8**	**816.9**	**1084.5**	**1406.0**	**2.6**	**3.0**	**2.9**	**2.6**					
Households expenditure (in 000 MEuro'00)	**282.5**	**358.1**	**471.8**	**613.5**	**784.9**	**2.4**	**2.8**	**2.7**	**2.5**					
Gross Value Added (in 000 MEuro'00)	**464.0**	**576.2**	**782.8**	**1041.1**	**1349.8**	**2.2**	**3.1**	**2.9**	**2.6**					
Industry	90.6	109.8	149.8	199.1	254.2	1.9	3.2	2.9	2.5	19.5	19.0	19.1	19.1	18.8
iron and steel	3.8	3.6	3.8	4.0	4.1	-0.5	0.3	0.6	0.4	0.8	0.6	0.5	0.4	0.3
non ferrous metals	1.0	1.4	1.7	2.1	2.5	3.3	2.1	1.9	1.7	0.2	0.2	0.2	0.2	0.2
chemicals	8.5	10.9	15.2	21.3	28.9	2.6	3.4	3.5	3.1	1.8	1.9	1.9	2.0	2.1
petrochemicals.fertilisers and others	4.8	6.3	8.5	11.0	13.2	2.7	3.0	2.6	1.8	1.0	1.1	1.1	1.1	1.0
pharmaceuticals and cosmetics	3.6	4.6	6.7	10.4	15.8	2.4	3.9	4.4	4.3	0.8	0.8	0.9	1.0	1.2
non metallic minerals	7.1	8.3	11.0	14.1	17.5	1.6	2.9	2.5	2.2	1.5	1.4	1.4	1.4	1.3
paper. pulp. printing	7.0	10.1	14.8	20.1	25.6	3.7	4.0	3.1	2.5	1.5	1.7	1.9	1.9	1.9
paper and pulp production	0.8	1.1	1.6	2.2	2.7	3.6	3.8	2.9	2.3	0.2	0.2	0.2	0.2	0.2
printing and publishing	6.2	8.9	13.2	17.9	22.9	3.7	4.0	3.1	2.5	1.3	1.6	1.7	1.7	1.7
food. drink. tobacco	14.5	16.2	21.1	27.0	33.3	1.1	2.7	2.5	2.1	3.1	2.8	2.7	2.6	2.5
textiles and leather	8.2	7.5	8.7	9.7	10.4	-0.9	1.6	1.1	0.7	1.8	1.3	1.1	0.9	0.8
engineering	31.0	39.2	56.0	77.7	103.7	2.4	3.6	3.3	2.9	6.7	6.8	7.2	7.5	7.7
other industries	9.5	12.6	17.5	23.2	28.1	2.8	3.3	2.9	2.0	2.0	2.2	2.2	2.2	2.1
Construction	38.4	45.9	66.4	86.8	110.9	1.8	3.8	2.7	2.5	8.3	8.0	8.5	8.3	8.2
Services	299.3	375.7	509.7	683.9	898.0	2.3	3.1	3.0	2.8	64.5	65.2	65.1	65.7	66.5
market services	89.6	103.9	142.0	192.7	254.2	1.5	3.2	3.1	2.8	19.3	18.0	18.1	18.5	18.8
non-market services	88.0	114.6	148.2	193.5	248.9	2.7	2.6	2.7	2.5	19.0	19.9	18.9	18.6	18.4
trade	121.7	157.2	219.5	297.8	394.9	2.6	3.4	3.1	2.9	26.2	27.3	28.0	28.6	29.3
Agriculture	22.3	24.8	30.7	36.9	43.0	1.0	2.2	1.9	1.5	4.8	4.3	3.9	3.5	3.2
Energy sector	13.5	20.1	26.2	34.4	43.7	4.1	2.7	2.8	2.4	2.9	3.5	3.3	3.3	3.2

Source: PRIMES

SWEDEN: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	8.6	8.9	9.0	9.2	9.3	0.4	0.1	0.2	0.2					
Average household size (persons)	2.2	2.1	2.0	1.9	1.8	-0.4	-0.7	-0.6	-0.4					
Number of households (Million)	3.9	4.1	4.5	4.9	5.2	0.7	0.9	0.8	0.6					
Gross Domestic product (in 000 MEuro'00)	**208.5**	**248.5**	**311.1**	**384.1**	**470.1**	**1.8**	**2.3**	**2.1**	**2.0**					
Households expenditure (in 000 MEuro'00)	**106.1**	**120.1**	**150.4**	**188.2**	**231.8**	**1.2**	**2.3**	**2.3**	**2.1**					
Gross Value Added (in 000 MEuro'00)	**190.2**	**230.7**	**294.1**	**367.4**	**453.7**	**1.9**	**2.5**	**2.3**	**2.1**					
Industry	37.6	57.5	77.3	96.7	119.5	4.3	3.0	2.3	2.1	19.8	24.9	26.3	26.3	26.3
iron and steel	2.2	2.0	1.9	1.9	1.9	-1.3	-0.2	-0.1	0.0	1.2	0.9	0.7	0.5	0.4
non ferrous metals	0.4	0.4	0.5	0.6	0.6	-0.1	1.7	1.4	0.8	0.2	0.2	0.2	0.2	0.1
chemicals	2.6	5.3	7.5	9.8	12.4	7.2	3.6	2.7	2.4	1.4	2.3	2.6	2.7	2.7
petrochemicals.fertilisers and others	1.5	2.1	2.5	2.9	3.3	3.2	1.9	1.4	1.3	0.8	0.9	0.9	0.8	0.7
pharmaceuticals and cosmetics	1.1	3.2	5.0	6.9	9.2	11.2	4.6	3.2	2.9	0.6	1.4	1.7	1.9	2.0
non metallic minerals	1.4	1.1	1.3	1.5	1.7	-2.7	1.6	1.5	1.1	0.8	0.5	0.4	0.4	0.4
paper. pulp. printing	6.5	7.4	9.5	11.5	13.6	1.3	2.5	2.0	1.6	3.4	3.2	3.2	3.1	3.0
paper and pulp production	3.4	4.1	5.2	6.4	7.6	1.7	2.5	2.1	1.8	1.8	1.8	1.8	1.7	1.7
printing and publishing	3.1	3.4	4.3	5.2	6.0	0.9	2.4	1.8	1.5	1.6	1.5	1.5	1.4	1.3
food. drink. tobacco	3.5	4.2	5.3	6.6	7.9	1.9	2.5	2.1	1.9	1.8	1.8	1.8	1.8	1.7
textiles and leather	0.6	0.6	0.6	0.7	0.8	-1.4	1.4	1.1	0.7	0.3	0.2	0.2	0.2	0.2
engineering	16.2	31.8	44.3	56.6	72.0	7.0	3.4	2.5	2.4	8.5	13.8	15.1	15.4	15.9
other industries	4.1	4.7	6.2	7.4	8.7	1.4	2.8	1.8	1.5	2.2	2.1	2.1	2.0	1.9
Construction	10.5	9.0	10.8	13.0	15.2	-1.5	1.8	1.9	1.5	5.5	3.9	3.7	3.5	3.3
Services	129.3	153.7	194.8	245.0	304.8	1.7	2.4	2.3	2.2	68.0	66.6	66.2	66.7	67.2
market services	43.1	55.8	72.9	95.0	122.8	2.6	2.7	2.7	2.6	22.6	24.2	24.8	25.9	27.1
non-market services	50.6	50.9	57.7	66.4	75.2	0.1	1.3	1.4	1.3	26.6	22.1	19.6	18.1	16.6
trade	35.7	47.1	64.2	83.6	106.7	2.8	3.1	2.7	2.5	18.8	20.4	21.8	22.8	23.5
Agriculture	5.2	4.9	5.2	5.8	6.3	-0.6	0.5	1.0	0.8	2.8	2.1	1.8	1.6	1.4
Energy sector	7.5	5.5	6.0	6.9	7.9	-3.1	1.0	1.3	1.4	4.0	2.4	2.0	1.9	1.7

Source: PRIMES

UNITED KINGDOM: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	57.6	59.8	61.2	62.5	63.5	0.4	0.2	0.2	0.2					
Average household size (persons)	2.6	2.4	2.1	2.0	1.9	-0.8	-1.0	-0.8	-0.6					
Number of households (Million)	22.5	25.3	28.6	31.6	34.1	1.2	1.2	1.0	0.8					
Gross Domestic product (in 000 MEuro'00)	**1239.2**	**1559.4**	**1997.2**	**2550.3**	**3232.9**	**2.3**	**2.5**	**2.5**	**2.4**					
Households expenditure (in 000 MEuro'00)	**781.2**	**1025.9**	**1340.4**	**1690.9**	**2107.1**	**2.8**	**2.7**	**2.3**	**2.2**					
Gross Value Added (in 000 MEuro'00)	**1154.6**	**1454.4**	**1887.2**	**2426.5**	**3092.5**	**2.3**	**2.6**	**2.5**	**2.5**					
Industry	254.1	265.5	324.1	421.7	546.1	0.4	2.0	2.7	2.6	22.0	18.3	17.2	17.4	17.7
iron and steel	8.2	5.6	4.8	4.7	4.6	-3.8	-1.4	-0.2	-0.1	0.7	0.4	0.3	0.2	0.2
non ferrous metals	4.1	3.1	3.5	4.0	4.2	-2.7	1.4	1.2	0.5	0.4	0.2	0.2	0.2	0.1
chemicals	27.3	29.1	35.5	47.2	62.3	0.6	2.0	2.9	2.8	2.4	2.0	1.9	1.9	2.0
petrochemicals.fertilisers and others	16.2	15.0	17.7	22.3	26.7	-0.8	1.7	2.3	1.8	1.4	1.0	0.9	0.9	0.9
pharmaceuticals and cosmetics	11.1	14.1	17.8	24.9	35.7	2.4	2.3	3.4	3.6	1.0	1.0	0.9	1.0	1.2
non metallic minerals	10.4	8.3	8.8	10.8	13.0	-2.3	0.6	2.0	1.9	0.9	0.6	0.5	0.4	0.4
paper. pulp. printing	26.4	29.9	37.4	47.4	58.8	1.3	2.2	2.4	2.2	2.3	2.1	2.0	2.0	1.9
paper and pulp production	2.3	2.6	3.2	4.0	4.8	1.5	2.0	2.1	1.9	0.2	0.2	0.2	0.2	0.2
printing and publishing	24.2	27.3	34.1	43.4	54.0	1.2	2.3	2.4	2.2	2.1	1.9	1.8	1.8	1.7
food. drink. tobacco	34.7	43.4	53.9	69.9	88.5	2.3	2.2	2.6	2.4	3.0	3.0	2.9	2.9	2.9
textiles and leather	14.6	12.1	12.3	14.6	16.8	-1.8	0.2	1.7	1.4	1.3	0.8	0.7	0.6	0.5
engineering	106.1	114.2	145.6	197.2	266.2	0.7	2.5	3.1	3.0	9.2	7.9	7.7	8.1	8.6
other industries	22.3	19.8	22.3	25.9	31.7	-1.2	1.2	1.5	2.0	1.9	1.4	1.2	1.1	1.0
Construction	68.5	68.1	84.5	106.1	131.3	-0.1	2.2	2.3	2.1	5.9	4.7	4.5	4.4	4.2
Services	756.8	1022.3	1375.6	1779.7	2277.5	3.1	3.0	2.6	2.5	65.5	70.3	72.9	73.3	73.6
market services	274.4	388.0	547.9	729.1	960.2	3.5	3.5	2.9	2.8	23.8	26.7	29.0	30.0	31.1
non-market services	239.7	295.3	359.2	435.0	521.2	2.1	2.0	1.9	1.8	20.8	20.3	19.0	17.9	16.9
trade	242.6	339.0	468.6	615.6	796.0	3.4	3.3	2.8	2.6	21.0	23.3	24.8	25.4	25.7
Agriculture	22.6	22.1	22.6	22.9	23.1	-0.2	0.2	0.1	0.1	2.0	1.5	1.2	0.9	0.7
Energy sector	52.7	76.4	80.3	96.1	114.6	3.8	0.5	1.8	1.8	4.6	5.3	4.3	4.0	3.7

Source: PRIMES

APPENDIX 1

MAIN MACROECONOMIC AND DEMOGRAPHIC ASSUMPTIONS

EU - 15: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	366.0	378.7	387.8	390.4	389.0	0.3	0.2	0.1	0.0					
Average household size (persons)	2.6	2.4	2.2	2.1	2.0	-0.8	-0.8	-0.7	-0.5					
Number of households (Million)	141.3	157.7	174.2	187.3	197.1	1.1	1.0	0.7	0.5					
Gross Domestic product (in 000 MEuro'00)	**6982**	**8545**	**10859**	**13641**	**16920**	**2.0**	**2.4**	**2.3**	**2.2**					
Households expenditure (in 000 MEuro'00)	**3999**	**4863**	**6147**	**7644**	**9346**	**2.0**	**2.4**	**2.2**	**2.0**					
Value Added (in 000 MEuro'00)	**6538**	**8003**	**10283**	**12993**	**16174**	**2.0**	**2.5**	**2.4**	**2.2**					
Industry	1407	1610	2036	2574	3204	1.4	2.4	2.4	2.2	21.5	20.1	19.8	19.8	19.8
iron and steel	55	49	50	51	51	-1.0	0.1	0.2	0.1	0.8	0.6	0.5	0.4	0.3
chemicals	152	188	243	310	386	2.1	2.6	2.5	2.2	2.3	2.4	2.4	2.4	2.4
other industries	1201	1372	1743	2213	2767	1.3	2.4	2.4	2.3	18.4	17.1	17.0	17.0	17.1
Construction	408	418	501	608	723	0.3	1.8	2.0	1.7	6.2	5.2	4.9	4.7	4.5
Services	4331	5509	7220	9207	11565	2.4	2.7	2.5	2.3	66.2	68.8	70.2	70.9	71.5
Agriculture	179	202	224	248	269	1.2	1.1	1.0	0.8	2.7	2.5	2.2	1.9	1.7
Energy sector	213	265	302	356	414	2.2	1.3	1.7	1.5	3.3	3.3	2.9	2.7	2.6

Source: PRIMES & ACE Model

EU - 25: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	441.1	453.4	461.2	462.1	458.2	0.3	0.2	0.0	-0.1					
Average household size (persons)	2.6	2.4	2.3	2.1	2.0	-0.8	-0.8	-0.6	-0.5					
Number of households (Million)	167.0	185.8	204.2	217.9	227.6	1.1	1.0	0.6	0.4					
Gross Domestic product (in 000 MEuro'00)	**7315**	**8939**	**11433**	**14462**	**18020**	**2.0**	**2.5**	**2.4**	**2.2**					
Households expenditure (in 000 MEuro'00)	**4256**	**5161**	**6580**	**8278**	**10196**	**1.9**	**2.5**	**2.3**	**2.1**					
Value Added (in 000 MEuro'00)	**6833**	**8351**	**10793**	**13730**	**17165**	**2.0**	**2.6**	**2.4**	**2.3**					
Industry	1486	1698	2168	2758	3436	1.3	2.5	2.4	2.2	21.7	20.3	20.1	20.1	20.0
iron and steel	57	52	54	56	57	-0.9	0.3	0.3	0.2	0.8	0.6	0.5	0.4	0.3
chemicals	159	199	265	343	432	2.3	2.9	2.6	2.3	2.3	2.4	2.5	2.5	2.5
other industries	1270	1446	1849	2359	2948	1.3	2.5	2.5	2.3	18.6	17.3	17.1	17.2	17.2
Construction	431	439	532	653	783	0.2	1.9	2.1	1.8	6.3	5.3	4.9	4.8	4.6
Services	4482	5709	7525	9667	12210	2.4	2.8	2.5	2.4	65.6	68.4	69.7	70.4	71.1
Agriculture	198	222	247	275	298	1.1	1.1	1.1	0.8	2.9	2.7	2.3	2.0	1.7
Energy sector	236	283	322	377	437	1.8	1.3	1.6	1.5	3.5	3.4	3.0	2.7	2.5

Source: PRIMES & ACE Model

EUROPE - 30: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	540.2	563.1	578.2	585.6	587.4	0.4	0.3	0.1	0.0					
Average household size (persons)	2.8	2.6	2.4	2.3	2.2	-0.7	-0.8	-0.6	-0.5					
Number of households (Million)	193.6	217.3	241.2	259.4	273.1	1.2	1.0	0.7	0.5					
Gross Domestic product (in 000 MEuro'00)	**7886**	**9631**	**12334**	**15748**	**19799**	**2.0**	**2.5**	**2.5**	**2.3**					
Households expenditure (in 000 MEuro'00)	**4689**	**5689**	**7261**	**9259**	**11576**	**2.0**	**2.5**	**2.5**	**2.3**					
Value Added[1] (in 000 MEuro'00)	**7365**	**8989**	**11630**	**14941**	**18853**	**2.0**	**2.6**	**2.5**	**2.4**					
Industry	1600	1855	2373	3055	3841	1.5	2.5	2.6	2.3	21.7	20.6	20.4	20.4	20.4
iron and steel	60	56	58	60	62	-0.7	0.3	0.4	0.3	0.8	0.6	0.5	0.4	0.3
chemicals	173	216	287	374	473	2.2	2.9	2.7	2.4	2.4	2.4	2.5	2.5	2.5
other industries	1367	1583	2028	2620	3306	1.5	2.5	2.6	2.4	18.6	17.6	17.4	17.5	17.5
Construction	458	467	564	698	845	0.2	1.9	2.1	1.9	6.2	5.2	4.8	4.7	4.5
Services	4805	6092	8043	10421	13264	2.4	2.8	2.6	2.4	65.2	67.8	69.2	69.7	70.4
Agriculture	244	263	294	344	404	0.7	1.1	1.6	1.6	3.3	2.9	2.5	2.3	2.1
Energy sector	258	311	357	424	499	1.9	1.4	1.8	1.6	3.5	3.5	3.1	2.8	2.6

Source: PRIMES & ACE Model

ACCEDING EU COUNTRIES: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	75.1	74.7	73.4	71.7	69.1	-0.1	-0.2	-0.2	-0.4					
Average household size (persons)	2.9	2.7	2.4	2.3	2.3	-0.9	-0.8	-0.4	-0.3					
Number of households (Million)	25.7	28.1	30.0	30.5	30.5	0.9	0.7	0.2	0.0					
Gross Domestic product (in 000 MEuro'00)	**333**	**394**	**574**	**821**	**1100**	**1.7**	**3.8**	**3.6**	**3.0**					
in Purchasing Power Standards (PPS)	***651***	***751***	***1095***	***1561***	***2084***	***1.4***	***3.8***	***3.6***	***2.9***					
Households expenditure (in 000 MEuro'00)	**257**	**298**	**433**	**633**	**850**	**1.5**	**3.8**	**3.9**	**3.0**					
Value Added (in 000 MEuro'00)	**295**	**347**	**509**	**737**	**991**	**1.6**	**3.9**	**3.8**	**3.0**					
Industry	78	88	131	185	232	1.2	4.1	3.5	2.3	26.4	25.4	25.8	25.1	23.4
iron and steel	3	3	4	5	6	1.5	2.4	1.6	1.2	1.0	0.9	0.8	0.7	0.6
chemicals	6	11	21	33	46	5.6	6.6	4.6	3.3	2.2	3.2	4.2	4.5	4.6
other industries	69	74	106	147	181	0.7	3.7	3.3	2.1	23.3	21.3	20.8	19.9	18.2
Construction	24	21	31	45	60	-1.0	3.7	3.9	2.9	8.0	6.1	6.0	6.1	6.1
Services	152	199	305	460	646	2.8	4.3	4.2	3.5	51.3	57.4	59.8	62.3	65.2
Agriculture	19	20	23	26	30	0.5	1.3	1.5	1.3	6.4	5.7	4.5	3.6	3.0
Energy sector	23	18	20	21	23	-2.3	0.7	0.9	0.7	7.8	5.3	3.9	2.9	2.3

Source: ACE Model

EU CANDIDATE COUNTRIES + NORWAY + SWITZERLAND: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	174.2	184.5	190.4	195.1	198.4	0.6	0.3	0.2	0.2					
Average household size (persons)	3.3	3.1	2.8	2.7	2.6	-0.7	-0.8	-0.5	-0.4					
Number of households (Million)	52.3	59.6	67.0	72.1	76.0	1.3	1.2	0.7	0.5					
Gross Domestic product (in 000 MEuro'00)	**904.3**	**1086.1**	**1475.3**	**2107.1**	**2879.4**	**1.8**	**3.1**	**3.6**	**3.2**					
in Purchasing Power Standards (PPS)	***1416.3***	***1646.0***	***2320.9***	***3448.3***	***4846.5***	***1.5***	***3.5***	***4.0***	***3.5***					
Households expenditure (in 000 MEuro'00)	**690.4**	**826.0**	**1114.3**	**1614.5**	**2230.7**	**1.8**	**3.0**	**3.8**	**3.3**					
Value Added (in 000 MEuro'00)	**827.4**	**985.5**	**1346.7**	**1948.0**	**2678.7**	**1.8**	**3.2**	**3.8**	**3.2**					
Industry	192.9	245.8	336.6	481.2	636.8	2.5	3.2	3.6	2.8	23.3	24.9	25.0	24.7	23.8
iron and steel	5.5	6.9	8.1	9.5	11.0	2.3	1.6	1.6	1.5	0.7	0.7	0.6	0.5	0.4
chemicals	21.0	28.1	43.7	63.8	87.4	2.9	4.5	3.9	3.2	2.5	2.8	3.2	3.3	3.3
other industries	166.4	210.9	284.9	407.9	538.4	2.4	3.1	3.7	2.8	20.1	21.4	21.2	20.9	20.1
Construction	50.3	49.4	63.1	89.6	121.9	-0.2	2.5	3.6	3.1	6.1	5.0	4.7	4.6	4.6
Services	474.2	582.8	823.0	1213.3	1699.6	2.1	3.5	4.0	3.4	57.3	59.1	61.1	62.3	63.4
Agriculture	64.5	61.0	69.2	95.4	135.5	-0.6	1.3	3.3	3.6	7.8	6.2	5.1	4.9	5.1
Energy sector	45.5	46.5	54.7	68.5	84.9	0.2	1.6	2.3	2.2	5.5	4.7	4.1	3.5	3.2

Source: ACE Model

APPENDIX 1

MAIN MACROECONOMIC AND DEMOGRAPHIC ASSUMPTIONS

BULGARIA: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	8.7	8.2	7.4	6.7	5.9	-0.6	-1.0	-1.1	-1.1					
Average household size (persons)	2.9	2.6	2.3	2.1	1.9	-0.9	-1.2	-0.9	-0.9					
Number of households (Million)	3.0	3.1	3.2	3.2	3.1	0.3	0.2	-0.1	-0.3					
Gross Domestic product (in 000 MEuro'00)	**17.4**	**14.6**	**22.6**	**30.4**	**38.1**	**-1.7**	**4.4**	**3.0**	**2.3**					
in Purchasing Power Standards (PPS)	***59.6***	***48.9***	***75.5***	***101.9***	***127.6***	***-2.0***	***4.4***	***3.0***	***2.3***					
Households expenditure (in 000 MEuro'00)	**16.3**	**12.2**	**18.4**	**25.0**	**31.5**	**-2.9**	**4.2**	**3.1**	**2.3**					
Value Added (in 000 MEuro'00)	**19.6**	**13.1**	**20.4**	**27.7**	**34.8**	**-3.9**	**4.5**	**3.1**	**2.3**					
Industry	4.4	2.6	3.9	5.2	6.5	-5.2	4.4	2.9	2.1	22.4	19.5	19.3	18.9	18.6
iron and steel	0.1	0.1	0.1	0.2	0.2	-0.1	2.2	1.2	0.8	0.6	0.8	0.7	0.6	0.5
chemicals	0.9	0.5	0.7	1.0	1.4	-5.7	3.4	4.0	2.8	4.6	3.8	3.5	3.8	4.0
other industries	3.4	1.9	3.1	4.0	4.9	-5.3	4.7	2.7	2.0	17.2	14.8	15.1	14.6	14.1
Construction	0.9	0.5	0.7	1.0	1.3	-6.5	3.9	4.4	2.7	4.5	3.5	3.3	3.7	3.8
Services	7.6	7.8	13.0	17.8	22.4	0.3	5.2	3.2	2.3	38.9	59.8	63.7	64.0	64.3
Agriculture	5.9	1.8	2.1	2.7	3.4	-11.2	1.5	2.6	2.1	30.2	13.8	10.4	9.8	9.7
Energy sector	0.8	0.5	0.7	1.0	1.3	-5.2	4.4	3.6	2.5	3.9	3.4	3.4	3.6	3.6

Source: ACE Model

CYPRUS: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	0.7	0.8	0.8	0.8	0.9	1.1	0.7	0.5	0.3					
Average household size (persons)	4.6	4.7	4.5	4.5	4.6	0.1	-0.4	0.1	0.2					
Number of households (Million)	0.1	0.2	0.2	0.2	0.2	1.0	1.1	0.4	0.1					
Gross Domestic product (in 000 MEuro'00)	**6.5**	**9.8**	**14.0**	**19.2**	**25.1**	**4.2**	**3.6**	**3.2**	**2.7**					
in Purchasing Power Standards (PPS)	***7.9***	***11.8***	***16.8***	***23.1***	***30.1***	***4.1***	***3.6***	***3.2***	***2.7***					
Households expenditure (in 000 MEuro'00)	**5.2**	**8.3**	**11.9**	**16.1**	**20.9**	**4.7**	**3.7**	**3.1**	**2.6**					
Value Added (in 000 MEuro'00)	**6.1**	**9.2**	**13.1**	**18.1**	**23.6**	**4.1**	**3.7**	**3.2**	**2.7**					
Industry	0.5	1.0	1.4	2.0	2.6	6.7	3.8	3.4	2.7	8.4	10.7	10.9	11.1	11.0
iron and steel	0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0	0.0	0.0
chemicals	0.0	0.0	0.0	0.0	0.1	4.3	4.2	3.6	2.7	0.2	0.2	0.2	0.2	0.2
other industries	0.5	1.0	1.4	2.0	2.5	6.7	3.8	3.4	2.7	8.2	10.5	10.7	10.8	10.8
Construction	0.6	0.6	0.8	1.1	1.4	0.9	2.7	2.9	2.2	9.4	6.9	6.3	6.1	5.8
Services	4.6	6.9	10.1	14.0	18.5	4.1	3.9	3.3	2.8	75.6	75.5	77.0	77.6	78.2
Agriculture	0.3	0.4	0.4	0.4	0.5	3.8	0.1	0.7	1.4	4.3	4.1	2.9	2.3	2.0
Energy sector	0.1	0.3	0.4	0.5	0.7	6.4	4.1	3.4	2.9	2.2	2.8	2.9	3.0	3.0

Source: ACE Model

CZECH REPUBLIC: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	10.4	10.3	10.1	9.9	9.5	-0.1	-0.1	-0.2	-0.4					
Average household size (persons)	2.9	2.6	2.4	2.3	2.3	-0.9	-0.7	-0.4	-0.3					
Number of households (Million)	3.6	3.9	4.2	4.2	4.2	0.8	0.5	0.2	-0.1					
Gross Domestic product (in 000 MEuro'00)	**60.6**	**61.3**	**87.7**	**115.9**	**142.1**	**0.1**	**3.6**	**2.8**	**2.1**					
in Purchasing Power Standards (PPS)	***130.6***	***129.6***	***185.3***	***245.0***	***300.3***	***-0.1***	***3.6***	***2.8***	***2.1***					
Households expenditure (in 000 MEuro'00)	**44.1**	**44.3**	**64.1**	**85.6**	**104.4**	**0.0**	**3.8**	**2.9**	**2.0**					
Value Added (in 000 MEuro'00)	**54.5**	**57.7**	**82.5**	**109.3**	**134.0**	**0.6**	**3.6**	**2.9**	**2.1**					
Industry	15.8	16.4	23.6	30.4	36.3	0.3	3.7	2.6	1.8	29.1	28.5	28.6	27.8	27.1
iron and steel	0.7	0.8	1.1	1.3	1.5	2.3	3.1	1.8	1.4	1.2	1.4	1.4	1.2	1.1
chemicals	0.4	1.7	5.0	6.9	8.4	16.8	11.4	3.3	2.0	0.7	2.9	6.0	6.3	6.3
other industries	14.8	13.9	17.5	22.2	26.4	-0.7	2.4	2.4	1.7	27.2	24.1	21.3	20.3	19.7
Construction	6.3	2.6	3.2	4.4	5.6	-8.4	1.9	3.3	2.4	11.5	4.5	3.8	4.0	4.2
Services	23.6	31.4	47.5	65.9	83.5	2.9	4.2	3.3	2.4	43.3	54.5	57.6	60.3	62.3
Agriculture	1.9	3.3	4.2	4.4	4.4	5.5	2.3	0.5	0.1	3.5	5.7	5.0	4.0	3.3
Energy sector	6.8	3.9	4.1	4.2	4.3	-5.4	0.4	0.2	0.2	12.5	6.8	5.0	3.8	3.2

Source: ACE Model

ESTONIA: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	1.6	1.4	1.2	1.1	1.0	-1.3	-1.1	-1.1	-1.2					
Average household size (persons)	2.6	2.4	2.1	1.9	1.7	-0.6	-1.6	-1.0	-1.2					
Number of households (Million)	0.6	0.6	0.6	0.6	0.6	-0.7	0.5	-0.1	0.0					
Gross Domestic product (in 000 MEuro'00)	**6.8**	**5.9**	**8.9**	**11.6**	**13.8**	**-1.5**	**4.3**	**2.6**	**1.7**					
in Purchasing Power Standards (PPS)	***14.5***	***12.5***	***19.0***	***24.7***	***29.4***	***-1.4***	***4.3***	***2.6***	***1.7***					
Households expenditure (in 000 MEuro'00)	**5.4**	**4.8**	**7.2**	**9.3**	**11.0**	**-1.2**	**4.1**	**2.7**	**1.6**					
Value Added (in 000 MEuro'00)	**6.1**	**5.3**	**8.1**	**10.6**	**12.6**	**-1.4**	**4.3**	**2.7**	**1.8**					
Industry	1.5	1.1	1.8	2.3	2.7	-3.4	5.1	2.5	1.7	25.4	20.7	22.3	21.8	21.7
iron and steel	0.0	0.0	0.0	0.0	0.0	-39.1	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0
chemicals	0.2	0.1	0.2	0.3	0.3	-2.7	3.4	3.0	2.2	3.0	2.6	2.4	2.5	2.6
other industries	1.3	1.0	1.6	2.1	2.4	-3.3	5.3	2.5	1.6	22.0	18.1	19.9	19.4	19.1
Construction	0.4	0.4	0.6	0.8	0.9	-0.3	4.4	2.4	1.3	6.8	7.6	7.7	7.5	7.2
Services	2.4	3.2	5.0	6.8	8.3	2.8	4.6	3.1	2.0	39.9	60.8	62.4	64.4	65.7
Agriculture	1.3	0.4	0.4	0.4	0.4	-11.8	0.4	0.5	0.3	20.8	6.9	4.7	3.8	3.3
Energy sector	0.4	0.2	0.2	0.3	0.3	-6.9	1.3	0.9	0.5	7.1	4.0	3.0	2.5	2.2

Source: ACE Model

HUNGARY: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	10.4	10.0	9.5	9.1	8.6	-0.3	-0.5	-0.5	-0.6					
Average household size (persons)	2.6	2.4	2.2	2.1	2.0	-1.0	-0.7	-0.5	-0.3					
Number of households (Million)	4.0	4.2	4.3	4.3	4.2	0.7	0.2	0.0	-0.3					
Gross Domestic product (in 000 MEuro'00)	**51.6**	**55.7**	**81.2**	**106.9**	**130.0**	**0.8**	**3.8**	**2.8**	**2.0**					
in Purchasing Power Standards (PPS)	*105.7*	*114.5*	*167.0*	*219.8*	*267.4*	*0.8*	*3.8*	*2.8*	*2.0*					
Households expenditure (in 000 MEuro'00)	**39.9**	**39.3**	**56.1**	**74.6**	**90.1**	**-0.2**	**3.6**	**2.9**	**1.9**					
Value Added (in 000 MEuro'00)	**45.3**	**49.3**	**72.5**	**96.6**	**117.9**	**0.9**	**3.9**	**2.9**	**2.0**					
Industry	11.8	14.2	22.0	28.3	33.5	1.9	4.5	2.6	1.7	26.0	28.7	30.3	29.3	28.4
iron and steel	0.5	0.4	0.5	0.6	0.6	-1.4	1.9	1.1	0.6	1.1	0.9	0.7	0.6	0.5
chemicals	1.3	2.3	3.7	4.8	5.5	5.5	5.0	2.6	1.5	3.0	4.6	5.1	5.0	4.7
other industries	9.9	11.5	17.7	23.0	27.3	1.4	4.5	2.6	1.8	22.0	23.2	24.5	23.8	23.2
Construction	2.3	2.2	3.2	4.3	5.1	-0.5	3.7	3.0	1.9	5.1	4.5	4.4	4.4	4.4
Services	25.2	29.0	43.2	59.4	74.3	1.4	4.1	3.2	2.3	55.5	58.8	59.6	61.5	63.0
Agriculture	4.2	2.6	2.6	2.8	3.0	-4.8	0.3	0.7	0.5	9.3	5.2	3.6	2.9	2.5
Energy sector	1.8	1.4	1.5	1.7	2.0	-2.7	1.0	1.3	1.2	4.0	2.8	2.1	1.8	1.7

Source: ACE Model

LATVIA: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	2.7	2.4	2.2	2.1	2.0	-1.2	-0.6	-0.6	-0.7					
Average household size (persons)	2.7	2.6	2.4	2.3	2.2	-0.5	-0.6	-0.3	-0.5					
Number of households (Million)	1.0	0.9	0.9	0.9	0.9	-0.7	0.1	-0.3	-0.1					
Gross Domestic product (in 000 MEuro'00)	**12.4**	**7.9**	**13.0**	**17.8**	**21.8**	**-4.4**	**5.1**	**3.2**	**2.1**					
in Purchasing Power Standards (PPS)	**26.9**	**16.6**	**27.3**	**37.3**	**45.9**	**-4.7**	**5.1**	**3.2**	**2.1**					
Households expenditure (in 000 MEuro'00)	**9.5**	**6.4**	**10.1**	**14.1**	**17.4**	**-3.8**	**4.6**	**3.4**	**2.1**					
Value Added (in 000 MEuro'00)	**10.8**	**6.9**	**11.4**	**15.8**	**19.6**	**-4.4**	**5.2**	**3.4**	**2.1**					
Industry	2.6	1.5	2.4	3.4	4.2	-5.3	4.9	3.3	2.2	24.4	22.2	21.5	21.3	21.4
iron and steel	0.0	0.0	0.1	0.1	0.1	2.9	3.3	1.3	1.0	0.3	0.7	0.6	0.5	0.4
chemicals	0.1	0.0	0.0	0.0	0.0	-7.0	0.4	2.7	1.7	0.5	0.4	0.2	0.2	0.2
other industries	2.5	1.5	2.4	3.3	4.1	-5.5	5.0	3.3	2.2	23.6	21.1	20.7	20.6	20.8
Construction	1.4	0.4	0.7	0.9	1.1	-11.4	4.8	3.2	2.1	13.1	6.1	5.9	5.8	5.7
Services	5.3	4.1	7.4	10.6	13.2	-2.5	6.1	3.7	2.2	49.1	59.8	64.9	66.8	67.5
Agriculture	0.9	0.5	0.6	0.6	0.7	-4.8	0.9	0.7	0.4	8.2	7.9	5.2	4.0	3.3
Energy sector	0.6	0.3	0.3	0.3	0.4	-6.8	0.8	1.5	1.3	5.2	4.0	2.6	2.2	2.0

Source: ACE Model

LITHUANIA: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	3.7	3.5	3.4	3.3	3.2	-0.5	-0.3	-0.3	-0.4					
Average household size (persons)	2.9	2.8	2.4	2.3	2.1	-0.4	-1.2	-0.8	-0.6					
Number of households (Million)	1.3	1.3	1.4	1.5	1.5	-0.1	1.0	0.4	0.2					
Gross Domestic product (in 000 MEuro'00)	**18.5**	**12.6**	**20.0**	**29.1**	**38.1**	**-3.7**	**4.7**	**3.8**	**2.7**					
in Purchasing Power Standards (PPS)	***41.8***	***28.3***	***44.8***	***65.2***	***85.3***	***-3.8***	***4.7***	***3.8***	***2.7***					
Households expenditure (in 000 MEuro'00)	**16.1**	**11.8**	**18.9**	**26.9**	**34.8**	**-3.0**	**4.8**	**3.6**	**2.6**					
Value Added (in 000 MEuro'00)	**16.9**	**11.5**	**18.3**	**26.8**	**35.2**	**-3.8**	**4.7**	**3.9**	**2.7**					
Industry	3.2	2.6	4.1	6.2	8.1	-2.1	5.0	4.0	2.8	18.6	22.1	22.6	22.9	23.1
iron and steel	0.0	0.0	0.0	0.0	0.0		5.1	2.0	1.2	0.0	0.0	0.0	0.0	0.0
chemicals	0.3	0.2	0.2	0.3	0.4	-6.6	2.2	3.4	2.6	1.8	1.4	1.1	1.0	1.0
other industries	2.8	2.4	3.9	5.9	7.8	-1.7	5.1	4.1	2.9	16.8	20.7	21.5	21.9	22.1
Construction	1.3	0.6	0.9	1.2	1.6	-7.0	3.0	3.7	2.7	7.8	5.5	4.7	4.6	4.6
Services	9.2	6.7	11.4	17.2	23.0	-3.1	5.4	4.2	2.9	54.2	58.1	62.1	64.2	65.2
Agriculture	2.3	1.3	1.5	1.7	1.8	-5.6	1.6	1.1	0.9	13.5	11.1	8.2	6.3	5.2
Energy sector	1.0	0.4	0.4	0.5	0.6	-9.8	1.7	2.3	2.0	5.8	3.1	2.3	2.0	1.8

Source: ACE Model

MALTA: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	0.4	0.4	0.4	0.4	0.4	0.8	0.4	0.2	0.1					
Average household size (persons)	3.2	2.9	2.6	2.5	2.3	-0.8	-1.0	-0.7	-0.6					
Number of households (Million)	0.1	0.1	0.2	0.2	0.2	1.7	1.4	0.9	0.7					
Gross Domestic product (in 000 MEuro'00)	**2.5**	**4.1**	**5.6**	**8.4**	**11.4**	**4.9**	**3.3**	**4.1**	**3.2**					
in Purchasing Power Standards (PPS)	***2.9***	***4.6***	***6.4***	***9.6***	***13.1***	***4.8***	***3.3***	***4.1***	***3.2***					
Households expenditure (in 000 MEuro'00)	**2.1**	**3.3**	**4.6**	**7.0**	**9.6**	**4.8**	**3.4**	**4.2**	**3.2**					
Value Added (in 000 MEuro'00)	**2.2**	**3.6**	**5.0**	**7.6**	**10.4**	**4.9**	**3.3**	**4.2**	**3.2**					
Industry	0.6	0.8	1.1	1.6	2.2	3.6	3.5	3.7	3.1	25.3	22.5	22.8	21.7	21.5
iron and steel	0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0	0.0	0.0
chemicals	0.0	0.0	0.0	0.1	0.1		3.3	3.4	3.2	0.0	1.0	1.0	0.9	0.9
other industries	0.6	0.8	1.1	1.6	2.1	3.2	3.5	3.7	3.1	25.3	21.5	21.9	20.7	20.6
Construction	0.1	0.1	0.1	0.2	0.2	1.9	2.6	3.9	3.2	3.4	2.5	2.3	2.3	2.3
Services	1.5	2.6	3.6	5.6	7.7	5.5	3.4	4.5	3.3	66.9	71.0	71.5	73.4	73.9
Agriculture	0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0	0.0	0.0
Energy sector	0.1	0.1	0.2	0.2	0.2	3.6	1.5	1.9	1.5	4.5	4.0	3.3	2.7	2.3

Source: ACE Model

NORWAY: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	4.2	4.5	4.6	4.8	4.9	0.6	0.3	0.3	0.3					
Average household size (persons)	2.4	2.3	2.1	2.0	1.9	-0.5	-0.8	-0.8	-0.5					
Number of households (Million)	1.7	1.9	2.2	2.4	2.6	1.0	1.1	1.1	0.7					
Gross Domestic product (in 000 MEuro'00)	**128.7**	**185.0**	**231.4**	**291.5**	**353.4**	**3.7**	**2.3**	**2.3**	**1.9**					
in Purchasing Power Standards (PPS)	***107.3***	***148.6***	***185.8***	***234.1***	***283.8***	***3.3***	***2.3***	***2.3***	***1.9***					
Households expenditure (in 000 MEuro'00)	**95.1**	**130.9**	**165.5**	**210.9**	**258.2**	**3.2**	**2.4**	**2.5**	**2.0**					
Value Added (in 000 MEuro'00)	**117.0**	**163.9**	**206.5**	**263.4**	**320.3**	**3.4**	**2.3**	**2.5**	**2.0**					
Industry	25.7	38.0	46.0	58.2	70.2	4.0	1.9	2.4	1.9	21.9	23.2	22.3	22.1	21.9
iron and steel	0.9	1.2	1.3	1.5	1.6	3.1	1.1	1.0	0.9	0.8	0.7	0.7	0.6	0.5
chemicals	2.1	4.7	6.9	9.1	11.3	8.2	3.8	2.7	2.2	1.8	2.9	3.3	3.4	3.5
other industries	22.6	32.0	37.8	47.6	57.3	3.5	1.7	2.3	1.9	19.3	19.5	18.3	18.1	17.9
Construction	5.5	6.5	6.9	7.4	8.2	1.7	0.7	0.7	1.0	4.7	4.0	3.4	2.8	2.6
Services	77.6	107.8	140.3	182.3	224.0	3.3	2.7	2.7	2.1	66.3	65.7	67.9	69.2	69.9
Agriculture	3.2	4.2	4.3	4.4	4.7	2.9	0.1	0.4	0.5	2.7	2.6	2.1	1.7	1.5
Energy sector	5.1	7.5	9.0	11.0	13.3	4.0	1.8	2.1	1.9	4.3	4.6	4.4	4.2	4.2

Source: ACE Model

POLAND: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	38.1	38.6	38.3	37.7	36.6	0.1	-0.1	-0.2	-0.3					
Average household size (persons)	3.1	2.8	2.6	2.5	2.4	-1.0	-0.9	-0.3	-0.3					
Number of households (Million)	12.3	13.8	14.9	15.1	15.1	1.2	0.8	0.2	0.0					
Gross Domestic product (in 000 MEuro'00)	**135.8**	**194.6**	**282.4**	**429.6**	**613.9**	**3.7**	**3.8**	**4.3**	**3.6**					
in Purchasing Power Standards (PPS)	***241.3***	***345.9***	***502.1***	***763.8***	***1091.5***	***3.7***	***3.8***	***4.3***	***3.6***					
Households expenditure (in 000 MEuro'00)	**105.9**	**149.6**	**218.2**	**342.7**	**490.0**	**3.5**	**3.9**	**4.6**	**3.6**					
Value Added (in 000 MEuro'00)	**118.3**	**166.3**	**244.3**	**378.5**	**543.5**	**3.5**	**3.9**	**4.5**	**3.7**					
Industry	31.7	40.3	60.0	90.5	116.8	2.4	4.1	4.2	2.6	26.8	24.2	24.6	23.9	21.5
iron and steel	1.4	1.6	2.0	2.3	2.6	1.4	2.4	1.7	1.2	1.1	0.9	0.8	0.6	0.5
chemicals	4.1	6.5	11.5	19.9	29.9	4.7	5.9	5.7	4.1	3.5	3.9	4.7	5.3	5.5
other industries	26.3	32.3	46.6	68.2	84.2	2.1	3.7	3.9	2.1	22.2	19.4	19.1	18.0	15.5
Construction	9.2	12.6	18.9	29.0	39.9	3.2	4.2	4.4	3.2	7.8	7.6	7.8	7.7	7.3
Services	62.0	93.4	143.2	233.6	357.8	4.2	4.4	5.0	4.4	52.4	56.2	58.6	61.7	65.8
Agriculture	5.9	9.8	11.1	13.5	16.1	5.1	1.3	2.0	1.8	5.0	5.9	4.5	3.6	3.0
Energy sector	9.4	10.3	11.1	12.0	12.9	0.8	0.8	0.9	0.7	8.0	6.2	4.5	3.2	2.4

Source: ACE Model

ROMANIA: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	23.2	22.4	21.8	21.0	20.1	-0.3	-0.3	-0.4	-0.4					
Average household size (persons)	3.3	2.9	2.6	2.5	2.5	-1.3	-0.9	-0.3	-0.3					
Number of households (Million)	7.1	7.8	8.3	8.3	8.2	0.9	0.6	0.0	-0.2					
Gross Domestic product (in 000 MEuro'00)	**50.3**	**42.2**	**68.5**	**104.4**	**141.1**	**-1.7**	**5.0**	**4.3**	**3.1**					
in Purchasing Power Standards (PPS)	***150.3***	***122.6***	***199.1***	***303.4***	***410.1***	***-2.0***	***5.0***	***4.3***	***3.1***					
Households expenditure (in 000 MEuro'00)	**38.5**	**36.9**	**61.8**	**95.7**	**130.4**	**-0.4**	**5.3**	**4.5**	**3.1**					
Value Added (in 000 MEuro'00)	**46.7**	**39.5**	**64.3**	**98.2**	**132.8**	**-1.7**	**5.0**	**4.3**	**3.1**					
Industry	16.2	13.2	20.9	31.0	41.6	-2.0	4.7	4.0	3.0	34.7	33.5	32.5	31.6	31.3
iron and steel	0.7	0.5	0.6	0.7	0.8	-2.5	1.2	1.7	1.5	1.4	1.3	0.9	0.7	0.6
chemicals	3.8	2.2	2.6	3.8	5.6	-5.6	2.0	3.8	3.8	8.2	5.5	4.1	3.9	4.2
other industries	11.7	10.6	17.6	26.5	35.2	-1.0	5.3	4.2	2.9	25.1	26.7	27.5	27.0	26.5
Construction	2.3	2.4	3.6	5.5	7.3	0.4	4.0	4.5	2.9	4.9	6.1	5.5	5.6	5.5
Services	16.4	15.2	29.6	48.0	66.5	-0.7	6.9	5.0	3.3	35.1	38.6	46.0	48.9	50.1
Agriculture	9.6	6.4	7.5	10.3	13.4	-3.9	1.7	3.2	2.6	20.4	16.2	11.7	10.5	10.1
Energy sector	2.2	2.2	2.8	3.3	4.0	0.1	2.0	1.9	1.8	4.8	5.7	4.3	3.4	3.0

Source: ACE Model

SLOVAKIA: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	5.3	5.4	5.4	5.4	5.2	0.2	0.0	-0.1	-0.3					
Average household size (persons)	2.5	2.2	2.0	1.9	1.8	-1.3	-1.0	-0.5	-0.5					
Number of households (Million)	2.1	2.5	2.8	2.9	2.9	1.5	1.0	0.4	0.2					
Gross Domestic product (in 000 MEuro'00)	**21.4**	**22.1**	**32.5**	**46.7**	**61.6**	**0.3**	**3.9**	**3.7**	**2.8**					
in Purchasing Power Standards (PPS)	***53.9***	***56.6***	***83.2***	***119.4***	***157.6***	***0.5***	***3.9***	***3.7***	***2.8***					
Households expenditure (in 000 MEuro'00)	**17.0**	**14.7**	**20.7**	**30.2**	**40.1**	**-1.5**	**3.5**	**3.9**	**2.9**					
Value Added (in 000 MEuro'00)	**20.3**	**19.6**	**29.0**	**42.2**	**55.9**	**-0.3**	**4.0**	**3.8**	**2.9**					
Industry	5.4	5.2	7.5	10.8	14.5	-0.3	3.6	3.7	3.0	26.8	26.8	25.8	25.7	26.0
iron and steel	0.2	0.3	0.4	0.4	0.5	7.4	1.7	1.2	0.9	0.8	1.7	1.4	1.1	0.9
chemicals	0.0	0.1	0.2	0.2	0.3		4.8	3.8	2.8	0.0	0.5	0.6	0.6	0.6
other industries	5.3	4.8	6.9	10.1	13.7	-0.9	3.7	3.9	3.1	26.0	24.5	23.9	24.1	24.6
Construction	1.2	0.7	0.8	1.5	2.0	-5.8	2.0	5.8	3.0	6.1	3.5	2.9	3.5	3.5
Services	10.0	11.8	18.6	27.3	36.3	1.7	4.7	3.9	2.9	49.1	60.0	63.9	64.6	65.1
Agriculture	1.5	1.1	1.3	1.8	2.1	-3.5	2.3	2.8	1.9	7.5	5.4	4.6	4.2	3.8
Energy sector	2.1	0.9	0.8	0.9	0.9	-8.8	-0.5	0.6	0.4	10.5	4.4	2.8	2.0	1.6

Source: ACE Model

APPENDIX 1 MAIN MACROECONOMIC AND DEMOGRAPHIC ASSUMPTIONS

SLOVENIA: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	2.0	2.0	2.0	1.9	1.8	0.0	-0.2	-0.3	-0.5					
Average household size (persons)	3.3	3.1	2.8	2.7	2.7	-0.8	-0.8	-0.4	-0.3					
Number of households (Million)	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.0	-0.2					
Gross Domestic product (in 000 MEuro'00)	**16.9**	**20.3**	**28.6**	**35.9**	**42.6**	**1.8**	**3.5**	**2.3**	**1.7**					
in Purchasing Power Standards (PPS)	***25.3***	***30.4***	***42.7***	***53.5***	***63.6***	***1.8***	***3.5***	***2.3***	***1.7***					
Households expenditure (in 000 MEuro'00)	**11.8**	**15.2**	**21.3**	**26.9**	**32.1**	**2.6**	**3.4**	**2.4**	**1.8**					
Value Added (in 000 MEuro'00)	**15.0**	**17.6**	**25.0**	**31.9**	**38.0**	**1.6**	**3.6**	**2.5**	**1.8**					
Industry	4.9	5.1	7.3	9.2	10.8	0.4	3.6	2.4	1.6	33.0	29.1	29.2	29.0	28.4
iron and steel	0.1	0.1	0.1	0.1	0.1	-2.7	0.7	1.5	1.4	0.9	0.6	0.4	0.4	0.4
chemicals	0.1	0.3	0.4	0.6	0.7	6.8	3.4	4.1	3.0	0.9	1.5	1.5	1.7	2.0
other industries	4.7	4.8	6.8	8.5	9.9	0.2	3.7	2.3	1.5	31.3	27.1	27.3	26.8	26.1
Construction	0.9	1.1	1.6	1.9	2.2	2.5	3.8	2.0	1.5	5.7	6.2	6.3	6.1	5.9
Services	7.8	10.1	14.7	19.2	23.3	2.6	3.9	2.7	2.0	52.0	57.3	58.9	60.2	61.4
Agriculture	0.7	0.6	0.7	0.7	0.8	-1.0	0.4	0.9	0.8	4.7	3.6	2.6	2.3	2.1
Energy sector	0.7	0.7	0.7	0.8	0.8	-0.4	1.0	0.8	0.6	4.6	3.7	2.9	2.5	2.2

Source: ACE Model

SWITZERLAND: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	6.7	7.2	7.2	7.2	7.3	0.7	0.0	0.1	0.1					
Average household size (persons)	2.2	2.1	1.8	1.7	1.6	-0.8	-1.1	-0.7	-0.3					
Number of households (Million)	3.0	3.5	3.9	4.3	4.4	1.5	1.2	0.8	0.3					
Gross Domestic product (in 000 MEuro'00)	**249.8**	**272.3**	**332.0**	**415.1**	**508.0**	**0.9**	**2.0**	**2.3**	**2.0**					
in Purchasing Power Standards (PPS)	***179.9***	***196.0***	***238.9***	***298.7***	***365.6***	***0.9***	***2.0***	***2.3***	***2.0***					
Households expenditure (in 000 MEuro'00)	**179.9**	**201.0**	**242.1**	**305.1**	**377.2**	**1.1**	**1.9**	**2.3**	**2.1**					
Value Added (in 000 MEuro'00)	**218.6**	**238.2**	**293.1**	**371.8**	**456.6**	**0.9**	**2.1**	**2.4**	**2.1**					
Industry	41.9	63.8	79.4	101.6	123.1	4.3	2.2	2.5	1.9	19.2	26.8	27.1	27.3	27.0
iron and steel	0.0	0.3	0.4	0.5	0.6		2.1	2.3	2.0	0.0	0.1	0.1	0.1	0.1
chemicals	5.4	7.1	9.2	11.9	14.5	2.9	2.6	2.6	2.0	2.5	3.0	3.1	3.2	3.2
other industries	36.6	56.3	69.8	89.2	107.9	4.4	2.2	2.5	1.9	16.7	23.6	23.8	24.0	23.6
Construction	10.5	10.5	12.0	13.3	15.1	0.0	1.4	1.0	1.3	4.8	4.4	4.1	3.6	3.3
Services	151.6	149.1	184.4	235.8	293.5	-0.2	2.1	2.5	2.2	69.3	62.6	62.9	63.4	64.3
Agriculture	4.6	3.6	3.6	4.0	4.2	-2.5	0.1	1.0	0.6	2.1	1.5	1.2	1.1	0.9
Energy sector	10.0	11.3	13.7	17.1	20.8	1.2	2.0	2.3	2.0	4.6	4.7	4.7	4.6	4.5

Source: ACE Model

TURKEY: KEY DEMOGRAPHIC AND ECONOMIC ASSUMPTIONS

	1990	2000	2010	2020	2030	'90-'00	'00-'10	'10-'20	'20-'30	1990	2000	2010	2020	2030
						Annual % Change				% Structure of total value added				
Demographic Assumptions														
Population (Million)	56.2	67.5	76.0	83.8	91.0	1.8	1.2	1.0	0.8					
Average household size (persons)	4.8	4.5	3.9	3.6	3.3	-0.8	-1.3	-1.0	-0.7					
Number of households (Million)	11.6	15.1	19.3	23.4	27.3	2.6	2.5	2.0	1.5					
Gross Domestic product (in 000 MEuro'00)	**125.0**	**177.7**	**247.0**	**444.8**	**738.4**	**3.6**	**3.3**	**6.1**	**5.2**					
in Purchasing Power Standards (PPS)	***268.4***	***379.1***	***526.9***	***948.9***	***1575.3***	***3.5***	***3.3***	***6.1***	***5.2***					
Households expenditure (in 000 MEuro'00)	**103.7**	**147.3**	**193.5**	**344.4**	**583.2**	**3.6**	**2.8**	**5.9**	**5.4**					
Value Added (in 000 MEuro'00)	**130.0**	**183.7**	**253.2**	**449.6**	**743.7**	**3.5**	**3.3**	**5.9**	**5.2**					
Industry	26.5	40.1	55.0	100.4	163.7	4.2	3.2	6.2	5.0	20.4	21.8	21.7	22.3	22.0
iron and steel	1.0	1.4	1.5	1.7	2.3	3.8	0.1	1.8	2.9	0.8	0.8	0.6	0.4	0.3
chemicals	2.3	2.3	3.1	4.9	8.9	0.3	2.9	4.7	6.1	1.7	1.3	1.2	1.1	1.2
other industries	23.3	36.3	50.5	93.7	152.5	4.5	3.4	6.4	5.0	17.9	19.8	19.9	20.8	20.5
Construction	7.4	8.2	9.2	17.1	30.0	1.0	1.1	6.4	5.7	5.7	4.5	3.6	3.8	4.0
Services	69.4	103.6	151.1	269.9	447.5	4.1	3.8	6.0	5.2	53.4	56.4	59.7	60.0	60.2
Agriculture	22.2	25.1	29.0	47.7	80.1	1.2	1.5	5.1	5.3	17.1	13.6	11.5	10.6	10.8
Energy sector	4.4	6.7	8.9	14.6	22.4	4.4	2.8	5.1	4.4	3.4	3.7	3.5	3.2	3.0

Source: ACE Model

SUMMARY ENERGY BALANCES AND INDICATORS

APPENDIX 2

EU - 15: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)

Mtoe	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Primary Production	**708.1**	**739.5**	**761.3**	**768.4**	**743.0**	**689.2**	**635.5**	**589.5**	**572.9**	**0.7**	**-0.2**	**-1.6**	**-1.0**
Solids	209.9	138.0	99.4	85.5	70.3	57.0	56.1	47.4	43.0	-7.2	-3.4	-2.2	-2.6
Oil	117.7	159.2	160.4	146.0	129.2	109.6	99.6	91.4	84.2	3.2	-2.1	-2.6	-1.7
Natural gas	132.9	166.6	190.6	197.9	191.0	167.5	142.1	121.4	112.2	3.7	0.0	-2.9	-2.3
Nuclear	181.4	201.2	222.8	236.7	230.3	224.5	198.7	183.1	180.0	2.1	0.3	-1.5	-1.0
Renewable energy sources	66.3	74.4	88.1	102.3	122.2	130.5	138.9	146.2	153.6	2.9	3.3	1.3	1.0
Hydro	22.3	24.9	27.6	27.0	28.1	28.9	29.5	29.9	30.1	2.2	0.2	0.5	0.2
Biomass	29.7	30.8	36.1	43.0	51.2	54.2	58.6	62.5	65.7	2.0	3.6	1.4	1.2
Waste	11.9	15.6	18.7	22.5	24.3	25.6	26.2	25.3	25.4	4.7	2.6	0.8	-0.3
Wind	0.1	0.4	1.9	5.1	13.3	16.0	18.2	21.4	23.6	40.0	21.3	3.2	2.6
Solar and others	0.1	0.2	0.3	0.9	1.4	2.0	2.4	2.9	4.5	9.5	15.1	5.6	6.3
Geothermal	2.2	2.5	3.3	3.7	3.8	3.8	4.0	4.1	4.2	4.2	1.2	0.5	0.7
Net Imports	**645.4**	**651.3**	**737.9**	**803.3**	**882.3**	**978.6**	**1077.0**	**1143.7**	**1208.2**	**1.3**	**1.8**	**2.0**	**1.2**
Solids	89.9	94.4	107.2	97.5	97.1	96.6	123.4	144.9	179.5	1.8	-1.0	2.4	3.8
Oil	460.9	446.7	472.4	493.4	516.9	546.2	562.7	566.3	582.2	0.2	0.9	0.9	0.3
Crude oil and Feedstocks	436.8	434.7	455.5	475.1	503.6	536.5	558.0	566.5	586.7	0.4	1.0	1.0	0.5
Oil products	24.1	12.0	16.9	18.3	13.3	9.7	4.8	-0.2	-4.5	-3.5	-2.3	-9.8	
Natural gas	92.3	108.6	154.7	209.0	265.0	332.5	387.5	429.3	443.4	5.3	5.5	3.9	1.4
Electricity	2.3	1.5	3.7	3.4	3.3	3.3	3.3	3.2	3.2	4.6	-1.0	-0.1	-0.2
Gross Inland Consumption	**1320.6**	**1363.8**	**1452.5**	**1525.5**	**1575.7**	**1615.4**	**1657.2**	**1674.7**	**1719.5**	**1.0**	**0.8**	**0.5**	**0.4**
Solids	302.8	237.7	212.4	183.1	167.4	153.7	179.5	192.2	222.5	-3.5	-2.4	0.7	2.2
Oil	545.8	575.6	586.9	593.1	596.5	603.4	607.1	599.3	604.7	0.7	0.2	0.2	0.0
Natural gas	222.1	273.4	338.7	406.9	456.0	500.0	529.6	550.7	555.6	4.3	3.0	1.5	0.5
Nuclear	181.4	201.2	222.8	236.7	230.3	224.5	198.7	183.1	180.0	2.1	0.3	-1.5	-1.0
Electricity	2.3	1.5	3.7	3.4	3.3	3.3	3.3	3.2	3.2	4.6	-1.0	-0.1	-0.2
Renewable energy forms	66.3	74.4	88.1	102.3	122.2	130.5	138.9	146.2	153.6	2.9	3.3	1.3	1.0
as % in Gross Inland Consumption													
Solids	22.9	17.4	14.6	12.0	10.6	9.5	10.8	11.5	12.9				
Oil	41.3	42.2	40.4	38.9	37.9	37.4	36.6	35.8	35.2				
Natural gas	16.8	20.0	23.3	26.7	28.9	31.0	32.0	32.9	32.3				
Nuclear	13.7	14.8	15.3	15.5	14.6	13.9	12.0	10.9	10.5				
Renewable energy forms	5.0	5.5	6.1	6.7	7.8	8.1	8.4	8.7	8.9				
Electricity Generation in TWhe	**2139.1**	**2308.3**	**2574.1**	**2783.6**	**3027.1**	**3240.7**	**3450.5**	**3646.3**	**3846.1**	**1.9**	**1.6**	**1.3**	**1.1**
Nuclear	720.1	810.1	863.7	918.3	894.0	872.7	775.4	739.4	745.1	1.8	0.3	-1.4	-0.4
Hydro & wind	259.8	294.2	343.8	374.0	482.5	523.4	555.9	600.7	642.6	2.8	3.4	1.4	1.5
Thermal (incl. biomass)	1159.2	1204.0	1366.5	1491.2	1650.7	1844.6	2119.2	2306.2	2458.4	1.7	1.9	2.5	1.5
Fuel Inputs for Thermal Power Generation [1]	**291.8**	**295.1**	**318.3**	**326.5**	**337.8**	**357.1**	**397.0**	**420.3**	**444.8**	**0.9**	**0.6**	**1.6**	**1.1**
Solids	186.1	163.9	153.6	131.5	117.7	107.5	133.8	147.8	179.2	-1.9	-2.6	1.3	3.0
Oil (including refinery gas)	48.7	49.6	38.3	27.1	20.3	16.8	11.1	7.8	6.8	-2.4	-6.1	-5.8	-4.9
Gas	45.1	66.0	106.3	142.9	172.4	204.1	222.8	235.8	229.6	9.0	5.0	2.6	0.3
Biomass - Waste	10.0	13.5	17.1	21.6	24.0	25.3	25.6	25.2	25.3	5.5	3.4	0.7	-0.1
Geothermal heat	1.9	2.1	3.0	3.3	3.4	3.5	3.6	3.8	3.9	4.7	1.4	0.7	0.8
Hydrogen - Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Fuel Input in other transformation proc.	**704.2**	**705.1**	**722.9**	**723.6**	**741.1**	**752.9**	**771.8**	**777.1**	**793.9**	**0.3**	**0.2**	**0.4**	**0.3**
Refineries	594.6	635.8	665.7	670.6	683.6	697.1	709.9	711.3	725.3	1.1	0.3	0.4	0.2
District heating	12.4	11.0	6.0	5.4	6.2	5.1	5.2	5.8	6.0	-7.1	0.4	-1.7	1.3
Biofuels and hydrogen production	0.0	0.2	0.6	4.6	10.1	12.1	17.7	22.1	25.8		32.1	5.8	3.8
Others	97.1	58.1	50.6	43.0	41.2	38.6	38.9	37.9	36.9	-6.3	-2.0	-0.6	-0.5
Energy Branch Consumption	**63.2**	**68.4**	**69.5**	**67.6**	**67.4**	**67.2**	**67.3**	**67.1**	**67.9**	**1.0**	**-0.3**	**0.0**	**0.1**
Non-Energy Uses	**84.0**	**93.6**	**95.1**	**98.4**	**103.3**	**106.8**	**108.5**	**109.6**	**110.5**	**1.2**	**0.8**	**0.5**	**0.2**
Final Energy Demand	**859.5**	**895.2**	**955.1**	**1016.8**	**1076.6**	**1119.9**	**1164.8**	**1196.7**	**1229.0**	**1.1**	**1.2**	**0.8**	**0.5**
by sector													
Industry [1]	262.2	255.6	268.7	280.2	299.4	314.3	325.3	334.3	344.6	0.2	1.1	0.8	0.6
energy intensive industries	180.4	170.9	175.8	182.3	190.7	196.3	199.7	201.0	202.1	-0.3	0.8	0.5	0.1
other industrial sectors	81.9	84.7	92.9	97.9	108.7	118.0	125.6	133.3	142.5	1.3	1.6	1.5	1.3
Residential	228.1	236.0	244.7	258.4	270.9	279.1	284.4	287.2	291.0	0.7	1.0	0.5	0.2
Tertiary	115.3	127.9	132.7	139.8	149.2	156.7	165.7	175.4	186.6	1.4	1.2	1.1	1.2
Transport	253.8	275.7	309.1	338.4	357.2	369.8	389.4	399.8	406.7	2.0	1.5	0.9	0.4
by fuel [1]													
Solids	76.8	47.0	36.0	30.4	28.4	26.2	25.2	24.2	23.1	-7.3	-2.3	-1.2	-0.9
Oil	391.5	414.1	430.6	445.8	462.2	473.1	489.0	496.5	501.9	1.0	0.7	0.6	0.3
Gas	169.7	194.9	220.3	250.9	266.6	277.3	285.0	291.1	300.8	2.6	1.9	0.7	0.5
Electricity	156.0	169.4	191.6	207.4	228.3	246.4	263.8	279.9	296.3	2.1	1.8	1.5	1.2
Heat (from CHP and District Heating)	35.2	39.3	42.1	44.9	51.9	55.9	60.7	64.5	66.6	1.8	2.1	1.6	0.9
Other	30.3	30.6	34.5	37.4	39.3	41.0	41.0	40.7	40.3	1.3	1.3	0.4	-0.2
CO_2 Emissions (Mt of CO_2)	**3082.1**	**3051.7**	**3117.5**	**3150.9**	**3204.9**	**3266.0**	**3444.0**	**3538.1**	**3668.6**	**0.1**	**0.3**	**0.7**	**0.6**
Electricity and Steam production	997.6	947.7	948.3	960.6	951.9	970.2	1100.0	1174.5	1280.5	-0.5	-0.0	1.5	1.5
Energy Branch	129.8	144.4	145.4	137.4	135.2	133.1	131.6	128.6	127.6	1.1	-0.7	-0.3	-0.3
Industry	576.2	526.5	509.3	457.1	458.4	461.3	460.0	459.4	466.4	-1.2	-1.0	0.0	0.1
Residential	436.4	417.4	412.9	416.9	432.4	439.4	440.6	435.9	434.2	-0.6	0.5	0.2	-0.1
Tertiary	203.5	212.7	199.6	198.3	202.6	203.1	206.4	212.5	219.8	-0.2	0.2	0.2	0.6
Transport	738.5	802.9	902.2	980.5	1024.5	1058.8	1105.3	1127.1	1140.2	2.0	1.3	0.8	0.3
CO_2 Emissions Index (1990=100)	**100.0**	**99.0**	**101.2**	**102.2**	**104.0**	**106.0**	**111.7**	**114.8**	**119.0**				

See explanations on page 219

Source: PRIMES Model

EU - 15:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	366.0	373.4	378.7	384.6	387.8	389.6	390.4	390.3	389.0	0.3	0.2	0.1	0.0
GDP (in 000 MEuro'00)	6982	7494	8545	9612	10859	12194	13641	15212	16920	2.0	2.4	2.3	2.2
Gross Inl. Cons./GDP (toe/MEuro'00)	189.1	182.0	170.0	158.7	145.1	132.5	121.5	110.1	101.6	-1.1	-1.6	-1.8	-1.8
Gross Inl. Cons./Capita (toe/inhabitant)	3608	3652	3836	3967	4063	4146	4244	4291	4420	0.6	0.6	0.4	0.4
Electricity Generated/Capita (kWh/inhabitant)	5844	6182	6797	7238	7805	8317	8837	9342	9887	1.5	1.4	1.2	1.1
Carbon intensity (t of CO_2/toe of GIC)	2.33	2.24	2.15	2.07	2.03	2.02	2.08	2.11	2.13	-0.8	-0.5	0.2	0.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.4	8.2	8.2	8.2	8.3	8.4	8.8	9.1	9.4	-0.2	0.0	0.7	0.7
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	441.4	407.2	364.8	327.8	295.1	267.8	252.5	232.6	216.8	-1.9	-2.1	-1.5	-1.5
Import Dependency %	47.6	46.6	49.4	51.1	54.3	58.7	62.9	66.0	67.8				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	95.0	89.6	84.2	78.9	73.5	67.8	62.4	57.7	-1.1	-1.3	-1.5	-1.6
Residential (Energy on Private Income)	100.0	97.6	88.2	83.0	77.3	71.2	65.2	59.5	54.6	-1.2	-1.3	-1.7	-1.8
Tertiary (Energy on Value added)	100.0	101.8	90.9	83.7	78.4	72.9	68.5	64.7	61.7	-1.0	-1.5	-1.3	-1.0
Transport (Energy on GDP)	100.0	101.2	99.5	96.8	90.5	83.4	78.5	72.3	66.1	-0.1	-0.9	-1.4	-1.7
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.42	0.37	0.34	0.29	0.26	0.25	0.26	0.27	0.28	-2.3	-2.5	0.1	0.5
Final energy demand (t of CO_2/toe)	2.27	2.19	2.12	2.02	1.97	1.93	1.90	1.87	1.84	-0.7	-0.7	-0.3	-0.3
Industry	2.20	2.06	1.90	1.63	1.53	1.47	1.41	1.37	1.35	-1.5	-2.1	-0.8	-0.4
Residential	1.91	1.77	1.69	1.61	1.60	1.57	1.55	1.52	1.49	-1.3	-0.6	-0.3	-0.4
Tertiary	1.76	1.66	1.50	1.42	1.36	1.30	1.25	1.21	1.18	-1.6	-1.0	-0.9	-0.6
Transport	2.91	2.91	2.92	2.90	2.87	2.86	2.84	2.82	2.80	0.0	-0.2	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**538.8**	**578.6**	**631.9**	**688.7**	**750.3**	**812.6**	**882.8**	**951.0**		**1.8**	**1.7**	**1.6**
Nuclear		126.2	131.0	128.8	121.9	115.8	100.1	101.1	105.0		-0.7	-1.9	0.5
Hydro (pumping excluded)		87.1	89.8	93.9	97.0	99.5	101.0	103.0	103.7		0.8	0.4	0.3
Wind and solar		2.5	12.9	27.0	70.4	86.2	95.4	113.7	134.2		18.5	3.1	3.5
Thermal		322.9	344.8	382.2	399.5	448.9	516.1	565.0	608.1		1.5	2.6	1.7
of which cogeneration units		*59.3*	*77.1*	*89.8*	*102.3*	*118.1*	*129.9*	*138.3*	*146.4*		*2.9*	*2.4*	*1.2*
Open cycle(incl. biomass-waste)		281.8	276.9	266.6	214.7	162.1	135.8	114.4	113.3		-2.5	-4.5	-1.8
Supercritical Polyvalent/Clean Coal and Lignite		0.0	0.0	0.0	0.5	7.1	51.6	83.3	119.0			60.5	8.7
Gas Turbines Combined Cycle		20.0	46.0	91.1	157.3	238.3	279.3	313.9	323.0		13.1	5.9	1.5
Small Gas Turbines		20.3	21.0	23.3	25.9	40.2	48.2	52.0	51.4		2.1	6.4	0.6
Fuel Cells		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Geothermal heat		0.7	1.0	1.2	1.2	1.2	1.3	1.3	1.4		1.6	0.7	0.8
Indicators													
Efficiency for thermal electricity production (%)		36.6	37.8	41.0	43.9	46.5	48.0	49.3	49.7				
Load factor for gross electric capacities (%)		48.9	50.8	50.3	50.2	49.3	48.5	47.1	46.2				
CHP indicator (% of electricity from CHP)		9.2	10.3	11.9	12.6	13.0	13.8	14.0	14.1				
Non fossil fuels in electricity generation (%)		49.9	49.3	49.1	48.2	45.7	41.1	39.0	38.3				
nuclear		35.1	33.6	33.0	29.5	26.9	22.5	20.3	19.4				
renewable energy forms		14.8	15.8	16.2	18.7	18.8	18.6	18.8	18.9				
of which waste		*1.0*	*1.2*	*1.4*	*1.4*	*1.4*	*1.3*	*1.1*	*1.1*				
Transport sector													
Passenger transport activity (Gpkm)	**4196.4**	**4570.6**	**5021.9**	**5400.4**	**5817.1**	**6256.3**	**6700.4**	**7124.8**	**7540.2**	**1.8**	**1.5**	**1.4**	**1.2**
public road transport	368.8	382.2	412.6	417.7	422.7	435.6	448.4	458.4	465.2	1.1	0.2	0.6	0.4
private cars and motorcycles	3325.6	3634.5	3938.8	4252.1	4566.3	4873.5	5167.2	5444.5	5704.4	1.7	1.5	1.2	1.0
rail	316.4	320.9	356.0	353.8	366.7	393.0	421.1	442.6	462.8	1.2	0.3	1.4	0.9
aviation	157.3	201.5	281.5	340.1	421.7	511.6	617.7	729.7	854.5	6.0	4.1	3.9	3.3
inland navigation	28.3	31.4	33.0	36.7	39.7	42.6	46.0	49.6	53.3	1.5	1.9	1.5	1.5
travel per person (km per capita)	**11465**	**12240**	**13261**	**14043**	**14999**	**16057**	**17161**	**18254**	**19383**	**1.5**	**1.2**	**1.4**	**1.2**
Freight transport activity (Gtkm)	**1438.0**	**1601.7**	**1872.6**	**2095.1**	**2350.4**	**2614.9**	**2896.8**	**3190.2**	**3501.5**	**2.7**	**2.3**	**2.1**	**1.9**
trucks	946.0	1114.6	1327.2	1523.3	1742.7	1962.7	2197.3	2450.4	2720.1	3.4	2.8	2.3	2.2
rail	234.9	220.2	249.3	253.3	263.6	279.3	298.0	310.4	325.2	0.6	0.6	1.2	0.9
inland navigation	257.1	266.9	296.1	318.5	344.0	372.9	401.4	429.3	456.2	1.4	1.5	1.6	1.3
freight activity per unit of GDP (tkm/000 Euro'00)	**206**	**214**	**219**	**218**	**216**	**214**	**212**	**210**	**207**	**0.6**	**-0.1**	**-0.2**	**-0.3**
Energy demand in transport (Mtoe)	**253.8**	**275.7**	**309.1**	**338.4**	**357.2**	**369.8**	**389.4**	**399.8**	**406.7**	**2.0**	**1.5**	**0.9**	**0.4**
public road transport	6.3	5.9	5.8	6.0	6.0	6.0	5.8	5.6	5.3	-0.8	0.3	-0.3	-0.9
private cars and motorcycles	130.2	136.6	145.5	156.4	154.2	148.1	150.9	148.2	142.2	1.1	0.6	-0.2	-0.6
trucks	76.0	86.5	101.0	115.9	132.7	147.9	159.4	170.2	177.5	2.9	2.8	1.8	1.1
rail	6.9	7.5	7.7	7.4	6.9	6.1	5.6	5.3	5.3	1.1	-1.1	-2.1	-0.5
aviation	27.8	32.5	43.8	46.9	51.1	55.1	60.7	63.2	68.7	4.7	1.6	1.7	1.3
inland navigation	6.7	6.7	5.3	5.8	6.3	6.7	7.1	7.4	7.8	-2.2	1.6	1.2	0.9
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	40.7	39.8	40.2	40.0	37.4	34.3	33.2	31.2	29.4	-0.1	-0.7	-1.2	-1.2
freight transport (toe/Mtkm)	57.8	58.5	57.3	58.5	59.5	59.4	57.6	55.7	52.9	-0.1	0.4	-0.3	-0.8

Source: PRIMES Model

APPENDIX 2

SUMMARY ENERGY BALANCES AND INDICATORS

EU - 25: BASELINE SCENARIO — **SUMMARY ENERGY BALANCE AND INDICATORS (A)**

Mtoe	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Primary Production	**878.5**	**898.7**	**898.9**	**892.8**	**859.0**	**797.3**	**738.9**	**683.0**	**660.0**	**0.2**	**-0.5**	**-1.5**	**-1.1**
Solids	350.9	264.3	203.1	173.9	152.3	130.6	124.1	108.6	101.6	-5.3	-2.8	-2.0	-2.0
Oil	120.4	162.3	164.1	148.2	131.5	112.0	102.0	93.8	86.4	3.1	-2.2	-2.5	-1.6
Natural gas	139.6	174.0	196.7	203.8	196.9	173.2	147.6	126.6	117.1	3.5	0.0	-2.8	-2.3
Nuclear	197.1	215.5	237.8	254.3	245.4	239.5	213.7	193.7	185.2	1.9	0.3	-1.4	-1.4
Renewable energy sources	70.5	82.6	97.2	112.6	132.9	142.0	151.5	160.3	169.6	3.3	3.2	1.3	1.1
Hydro	23.4	26.3	29.0	28.5	29.6	30.5	31.1	31.5	31.7	2.2	0.2	0.5	0.2
Biomass	32.1	36.7	43.1	50.7	58.7	61.6	66.1	70.8	75.1	3.0	3.1	1.2	1.3
Waste	12.6	16.4	19.5	23.3	25.3	26.7	27.5	26.8	27.1	4.4	2.6	0.8	-0.1
Wind	0.1	0.4	1.9	5.4	13.9	17.1	19.9	23.5	26.1	40.0	21.9	3.6	2.8
Solar and others	0.1	0.3	0.4	1.0	1.6	2.3	2.9	3.6	5.3	10.6	15.6	6.0	6.2
Geothermal	2.2	2.5	3.3	3.7	3.8	3.8	4.0	4.1	4.2	4.2	1.2	0.5	0.7
Net Imports	**713.6**	**701.0**	**797.4**	**881.7**	**979.8**	**1095.8**	**1212.5**	**1295.6**	**1371.6**	**1.1**	**2.1**	**2.2**	**1.2**
Solids	75.1	73.3	91.1	87.3	91.0	95.2	128.2	156.3	194.5	1.9	0.0	3.5	4.3
Oil	512.8	491.1	517.8	544.8	573.6	608.7	632.1	641.2	662.0	0.1	1.0	1.0	0.5
Crude oil and Feedstocks	480.3	471.7	496.6	520.4	553.8	591.8	618.4	630.6	652.9	0.3	1.1	1.1	0.5
Oil products	32.5	19.4	21.2	24.4	19.9	16.9	13.7	10.6	9.1	-4.2	-0.6	-3.7	-4.0
Natural gas	123.5	135.3	186.4	247.5	312.9	389.6	450.4	495.6	512.7	4.2	5.3	3.7	1.3
Electricity	2.2	1.4	2.1	2.0	2.2	2.3	1.8	2.5	2.4	-0.1	0.4	-2.0	2.9
Gross Inland Consumption	**1558.4**	**1574.3**	**1650.2**	**1727.4**	**1788.3**	**1839.6**	**1895.0**	**1918.9**	**1968.4**	**0.6**	**0.8**	**0.6**	**0.4**
Solids	430.8	345.8	302.7	261.2	243.3	225.9	252.3	265.0	296.0	-3.5	-2.2	0.4	1.6
Oil	599.3	621.6	634.3	646.0	654.6	667.2	677.7	675.2	685.3	0.6	0.3	0.3	0.1
Natural gas	259.2	307.6	376.2	451.4	509.8	562.8	598.0	622.2	629.8	3.8	3.1	1.6	0.5
Nuclear	197.1	215.5	237.8	254.3	245.4	239.5	213.7	193.7	185.2	1.9	0.3	-1.4	-1.4
Electricity	1.5	1.4	2.1	2.0	2.2	2.3	1.8	2.5	2.4	3.5	0.4	-2.0	2.9
Renewable energy forms	70.4	82.5	97.0	112.6	132.9	142.0	151.5	160.3	169.6	3.3	3.2	1.3	1.1
as % in Gross Inland Consumption													
Solids	27.6	22.0	18.3	15.1	13.6	12.3	13.3	13.8	15.0				
Oil	38.5	39.5	38.4	37.4	36.6	36.3	35.8	35.2	34.8				
Natural gas	16.6	19.5	22.8	26.1	28.5	30.6	31.6	32.4	32.0				
Nuclear	12.6	13.7	14.4	14.7	13.7	13.0	11.3	10.1	9.4				
Renewable energy forms	4.5	5.2	5.9	6.5	7.4	7.7	8.0	8.4	8.6				
Electricity Generation in TWhe	**2463.5**	**2608.9**	**2898.3**	**3134.7**	**3430.6**	**3706.2**	**3987.7**	**4229.0**	**4476.9**	**1.6**	**1.7**	**1.5**	**1.2**
Nuclear	780.6	865.1	921.6	986.4	952.1	930.8	833.5	780.2	765.5	1.7	0.3	-1.3	-0.8
Hydro & wind	272.6	309.7	359.6	393.7	506.8	553.9	594.1	644.1	691.0	2.8	3.5	1.6	1.5
Thermal (incl. biomass)	1410.3	1434.1	1617.1	1754.6	1971.6	2221.5	2560.1	2804.7	3020.4	1.4	2.0	2.6	1.7
Fuel Inputs for Thermal Power Generation	**367.3**	**360.5**	**384.7**	**390.9**	**410.2**	**435.8**	**485.2**	**517.0**	**551.2**	**0.5**	**0.6**	**1.7**	**1.3**
Solids	249.5	220.7	210.2	181.6	170.4	160.6	191.0	207.4	241.7	-1.7	-2.1	1.1	2.4
Oil	54.1	53.9	41.8	30.9	24.7	22.3	18.8	18.4	20.8	-2.6	-5.1	-2.7	1.0
Gas	51.4	70.1	112.1	152.4	186.3	222.1	243.5	258.9	255.3	8.1	5.2	2.7	0.5
Biomass - Waste	10.4	13.7	17.7	22.6	25.4	27.3	28.2	28.6	29.5	5.5	3.7	1.1	0.5
Geothermal heat	1.9	2.1	3.0	3.3	3.4	3.5	3.6	3.8	3.9	4.7	1.4	0.7	0.8
Hydrogen - Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Fuel Input in other transformation proc.	**798.3**	**780.9**	**795.8**	**795.9**	**816.1**	**830.8**	**853.2**	**861.0**	**879.6**	**0.0**	**0.3**	**0.4**	**0.3**
Refineries	641.6	676.3	711.6	718.1	736.0	754.8	773.0	778.4	794.9	1.0	0.3	0.5	0.3
District heating	32.1	24.8	15.8	14.4	14.4	12.2	11.1	10.5	9.7	-6.8	-0.9	-2.6	-1.3
Biofuels and hydrogen production	0.0	0.2	0.6	4.6	10.2	12.2	18.3	23.2	27.9		32.2	6.0	4.3
Others	124.6	79.6	67.7	58.8	55.5	51.6	50.8	48.8	47.1	-5.9	-2.0	-0.9	-0.8
Energy Branch Consumption	**75.2**	**81.1**	**81.9**	**79.7**	**80.1**	**80.6**	**81.5**	**82.0**	**83.3**	**0.9**	**-0.2**	**0.2**	**0.2**
Non-Energy Uses	**96.1**	**103.5**	**106.0**	**110.2**	**115.9**	**120.1**	**122.3**	**124.0**	**125.4**	**1.0**	**0.9**	**0.5**	**0.2**
Final Energy Demand	**1014.2**	**1028.2**	**1076.6**	**1141.1**	**1209.1**	**1261.9**	**1316.1**	**1354.5**	**1391.8**	**0.6**	**1.2**	**0.9**	**0.6**
by sector													
Industry	328.4	306.5	310.2	319.2	338.1	353.4	364.8	374.5	385.5	-0.6	0.9	0.8	0.6
Residential	267.4	277.7	279.1	293.6	308.6	320.4	328.9	333.7	338.6	0.4	1.0	0.6	0.3
Tertiary	144.8	148.0	154.3	162.8	173.7	183.0	193.9	205.1	217.8	0.6	1.2	1.1	1.2
Transport	273.6	296.0	333.1	365.6	388.6	405.1	428.5	441.2	449.8	2.0	1.6	1.0	0.5
by fuel													
Solids	120.7	81.4	56.7	47.5	41.7	36.7	33.6	31.2	29.0	-7.3	-3.0	-2.1	-1.5
Oil	427.5	444.2	465.0	483.1	503.7	518.6	538.7	548.2	554.9	0.8	0.8	0.7	0.3
Gas	195.1	219.9	246.2	279.0	299.2	314.5	324.7	331.5	341.3	2.4	2.0	0.8	0.5
Electricity	176.6	187.9	211.3	229.0	253.6	275.8	297.7	317.4	337.1	1.8	1.8	1.6	1.3
Heat (from CHP and District Heating)	60.5	56.7	55.6	57.7	64.6	68.7	74.3	79.5	83.5	-0.8	1.5	1.4	1.2
Other	33.8	38.1	41.9	44.8	46.3	47.6	47.2	46.7	46.1	2.2	1.0	0.2	-0.2
CO_2 Emissions (Mt of CO_2)	**3804.5**	**3662.9**	**3671.1**	**3682.8**	**3763.1**	**3845.1**	**4057.0**	**4172.4**	**4324.2**	**-0.4**	**0.2**	**0.8**	**0.6**
Electricity and Steam production	1354.8	1248.7	1233.9	1227.3	1237.9	1266.2	1421.0	1515.3	1645.8	-0.9	-0.0	1.4	1.5
Energy Branch	143.1	163.2	162.9	154.1	151.8	149.8	148.4	145.1	143.6	1.3	-0.7	-0.2	-0.3
Industry	724.6	650.6	606.1	544.2	538.1	535.6	529.0	524.7	527.5	-1.8	-1.2	-0.2	0.0
Residential	518.7	489.1	461.0	463.5	481.1	492.6	497.2	492.7	489.6	-1.2	0.4	0.3	-0.2
Tertiary	269.3	251.2	236.5	235.1	239.5	240.8	244.2	249.9	256.7	-1.3	0.1	0.2	0.5
Transport	794.1	860.1	970.6	1058.6	1114.8	1160.1	1217.2	1244.6	1261.0	2.0	1.4	0.9	0.4
CO_2 Emissions Index (1990=100)	**100.0**	**96.3**	**96.5**	**96.8**	**98.9**	**101.1**	**106.6**	**109.7**	**113.7**				

See explanations on page 219

Source: PRIMES & ACE Models

EU - 25:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	441.1	448.6	453.4	458.7	461.2	462.3	462.1	461.0	458.2	0.3	0.2	0.0	-0.1
GDP (in 000 MEuro'00)	7315	7817	8939	10080	11433	12887	14462	16169	18020	2.0	2.5	2.4	2.2
Gross Inl. Cons./GDP (toe/MEuro'00)	213.0	201.4	184.6	171.4	156.4	142.8	131.0	118.7	109.2	-1.4	-1.6	-1.8	-1.8
Gross Inl. Cons./Capita (toe/inhabitant)	3533	3510	3639	3766	3877	3979	4101	4163	4296	0.3	0.6	0.6	0.5
Electricity Generated/Capita (kWh/inhabitant)	5585	5816	6392	6834	7438	8016	8629	9174	9771	1.4	1.5	1.5	1.3
Carbon intensity (t of CO_2/toe of GIC)	2.44	2.33	2.22	2.13	2.10	2.09	2.14	2.17	2.20	-0.9	-0.6	0.2	0.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.6	8.2	8.1	8.0	8.2	8.3	8.8	9.1	9.4	-0.6	0.1	0.7	0.7
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	520.1	468.6	410.7	365.4	329.1	298.4	280.5	258.0	240.0	-2.3	-2.2	-1.6	-1.5
Import Dependency %	44.8	43.6	47.1	49.7	53.3	57.9	62.1	65.5	67.5				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	91.7	82.7	76.2	70.6	65.2	59.8	54.9	50.8	-1.9	-1.6	-1.6	-1.6
Residential (Energy on Private Income)	100.0	98.5	86.1	80.4	74.7	68.9	63.2	57.7	52.9	-1.5	-1.4	-1.6	-1.8
Tertiary (Energy on Value added)	100.0	93.9	84.1	77.4	72.2	67.1	63.0	59.3	56.3	-1.7	-1.5	-1.4	-1.1
Transport (Energy on GDP)	100.0	101.3	99.6	97.0	90.9	84.0	79.2	73.0	66.7	0.0	-0.9	-1.4	-1.7
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.45	0.40	0.37	0.32	0.29	0.28	0.29	0.29	0.30	-1.9	-2.3	-0.1	0.3
Final energy demand (t of CO_2/toe)	2.27	2.19	2.11	2.02	1.96	1.92	1.89	1.85	1.82	-0.7	-0.7	-0.4	-0.4
Industry	2.21	2.12	1.95	1.71	1.59	1.52	1.45	1.40	1.37	-1.2	-2.0	-0.9	-0.6
Residential	1.94	1.76	1.65	1.58	1.56	1.54	1.51	1.48	1.45	-1.6	-0.6	-0.3	-0.4
Tertiary	1.86	1.70	1.53	1.44	1.38	1.32	1.26	1.22	1.18	-1.9	-1.1	-0.9	-0.7
Transport	2.90	2.91	2.91	2.90	2.87	2.86	2.84	2.82	2.80	0.0	-0.2	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**611.6**	**655.4**	**717.8**	**792.5**	**874.8**	**960.8**	**1046.8**	**1131.6**		**1.9**	**1.9**	**1.6**
Nuclear		134.7	140.3	138.9	129.8	123.7	108.0	106.6	107.8		-0.8	-1.8	0.0
Hydro (pumping excluded)		93.0	96.0	100.5	103.9	106.7	108.5	110.6	111.5		0.8	0.4	0.3
Wind and solar		2.5	13.0	28.6	74.0	92.6	105.3	126.4	149.4		19.0	3.6	3.6
Thermal		381.4	406.1	449.9	484.9	551.8	639.0	703.2	762.9		1.8	2.8	1.8
of which cogeneration units		*80.7*	*93.2*	*103.4*	*117.6*	*135.9*	*150.9*	*164.4*	*179.5*		*2.4*	*2.5*	*1.8*
Open cycle (incl. biomass-waste)		339.4	335.2	323.6	278.9	230.2	210.0	192.8	196.8		-1.8	-2.8	-0.6
Supercritical Polyvalent/Clean Coal and Lignite		0.0	0.0	0.0	0.9	9.0	56.1	91.7	131.8			51.9	8.9
Gas Turbines Combined Cycle		20.0	47.3	98.9	173.3	264.1	313.8	353.6	367.4		13.9	6.1	1.6
Small Gas Turbines		21.2	22.7	26.3	30.6	47.4	57.8	63.8	65.5		3.1	6.6	1.3
Fuel Cells		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Geothermal heat		0.7	1.0	1.2	1.2	1.2	1.3	1.3	1.4		1.6	0.7	0.8
Indicators													
Efficiency for thermal electricity production (%)		35.8	37.1	40.2	43.1	45.7	47.3	48.6	49.1				
Load factor for gross electric capacities (%)		48.7	50.5	49.8	49.4	48.4	47.4	46.1	45.2				
CHP indicator (% of electricity from CHP)		12.4	12.5	13.1	13.7	14.0	14.9	15.5	16.1				
Non fossil fuels in electricity generation (%)		46.9	46.4	46.5	45.1	42.6	38.2	36.0	34.8				
nuclear		33.2	31.8	31.5	27.8	25.1	20.9	18.4	17.1				
renewable energy forms		13.7	14.6	15.1	17.3	17.5	17.3	17.5	17.7				
of which waste		*0.9*	*1.1*	*1.3*	*1.3*	*1.3*	*1.2*	*1.1*	*1.1*				
Transport sector													
Passenger transport activity (Gpkm)	**4685.2**	**5038.8**	**5519.9**	**5943.2**	**6432.8**	**6964.2**	**7511.4**	**8035.9**	**8546.0**	**1.7**	**1.5**	**1.6**	**1.3**
public road transport	484.5	469.2	493.8	498.1	503.7	518.1	533.1	546.0	556.1	0.2	0.2	0.6	0.4
private cars and motorcycles	3593.6	3950.3	4291.6	4646.5	5024.9	5410.3	5788.2	6143.5	6475.2	1.8	1.6	1.4	1.1
rail	408.3	371.7	402.3	400.2	415.0	445.2	479.3	509.0	538.0	-0.1	0.3	1.5	1.2
aviation	170.0	215.7	298.5	361.1	448.8	547.3	664.0	787.1	922.7	5.8	4.2	4.0	3.3
inland navigation	28.7	31.9	33.6	37.3	40.4	43.3	46.8	50.4	54.1	1.6	1.8	1.5	1.5
travel per person (km per capita)	**10621**	**11233**	**12174**	**12957**	**13947**	**15063**	**16254**	**17433**	**18653**	**1.4**	**1.4**	**1.5**	**1.4**
Freight transport activity (Gtkm)	**1765.0**	**1859.8**	**2148.5**	**2398.2**	**2690.8**	**3004.3**	**3340.2**	**3686.7**	**4046.0**	**2.0**	**2.3**	**2.2**	**1.9**
trucks	1064.3	1233.6	1482.7	1710.5	1966.2	2232.3	2516.9	2819.1	3133.4	3.4	2.9	2.5	2.2
rail	440.2	358.0	368.0	367.5	378.8	397.3	420.1	436.3	454.4	-1.8	0.3	1.0	0.8
inland navigation	260.4	268.2	297.9	320.2	345.8	374.7	403.3	431.3	458.2	1.4	1.5	1.5	1.3
freight activity per unit of GDP (tkm/000 Euro'00)	**241**	**238**	**240**	**238**	**235**	**233**	**231**	**228**	**225**	**0.0**	**-0.2**	**-0.2**	**-0.3**
Energy demand in transport (Mtoe)	**273.6**	**296.0**	**333.1**	**365.6**	**388.6**	**405.1**	**428.5**	**441.2**	**449.8**	**2.0**	**1.6**	**1.0**	**0.5**
public road transport	7.6	6.9	7.0	7.1	7.1	7.1	7.0	6.7	6.4	-0.8	0.2	-0.2	-0.8
private cars and motorcycles	137.8	146.2	157.6	170.2	170.8	166.6	171.4	169.1	163.5	1.3	0.8	0.0	-0.5
trucks	82.6	93.2	108.9	125.2	143.2	160.0	172.9	185.3	193.8	2.8	2.8	1.9	1.1
rail	9.3	8.9	9.0	8.7	8.1	7.3	6.8	6.5	6.4	-0.3	-1.0	-1.8	-0.5
aviation	29.3	33.9	45.2	48.5	53.0	57.3	63.3	66.2	72.0	4.4	1.6	1.8	1.3
inland navigation	7.0	6.9	5.4	5.8	6.3	6.7	7.1	7.4	7.8	-2.6	1.6	1.2	0.9
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	38.9	38.6	39.3	39.2	36.9	34.0	33.0	30.8	29.0	0.1	-0.6	-1.1	-1.3
freight transport (toe/Mtkm)	51.6	54.5	53.9	55.3	56.1	55.9	54.2	52.5	50.0	0.4	0.4	-0.3	-0.8

Source: PRIMES & ACE Models

EUROPE - 30: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)

Mtoe	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Primary Production	**1084.3**	**1161.1**	**1200.1**	**1209.9**	**1191.5**	**1125.8**	**1053.2**	**977.6**	**944.0**	**1.0**	**-0.1**	**-1.2**	**-1.1**
Solids	377.6	290.4	226.8	201.0	180.8	157.8	147.0	127.3	117.8	-5.0	-2.2	-2.1	-2.2
Oil	216.0	314.8	338.3	322.3	301.8	264.9	233.2	198.8	176.5	4.6	-1.1	-2.5	-2.8
Natural gas	186.9	216.9	254.0	273.7	284.2	272.0	255.2	244.3	240.5	3.1	1.1	-1.1	-0.6
Nuclear	207.1	226.5	250.9	266.3	256.7	252.2	226.4	203.9	191.8	1.9	0.2	-1.3	-1.6
Renewable energy sources	96.8	112.5	130.2	146.6	168.0	178.9	191.4	203.4	217.5	3.0	2.6	1.3	1.3
Hydro	39.5	44.3	48.5	48.7	50.7	52.9	54.9	55.8	56.5	2.1	0.4	0.8	0.3
Biomass	41.4	47.0	54.6	62.7	70.6	73.1	77.6	83.2	89.5	2.8	2.6	0.9	1.4
Waste	13.3	17.7	20.8	24.4	26.6	28.2	29.4	29.3	30.1	4.6	2.5	1.0	0.2
Wind	0.1	0.4	1.9	5.5	14.3	18.0	21.7	26.1	29.7	40.0	22.2	4.2	3.2
Solar and others	0.2	0.3	0.7	1.3	2.0	2.8	3.9	5.0	7.5	15.3	11.6	6.7	6.9
Geothermal	2.4	2.7	3.7	3.9	3.8	3.8	4.0	4.1	4.2	4.6	0.2	0.5	0.7
Net Imports	**700.6**	**621.6**	**681.0**	**754.9**	**856.0**	**1000.9**	**1161.0**	**1294.6**	**1418.7**	**-0.3**	**2.3**	**3.1**	**2.0**
Solids	88.6	84.1	105.2	102.1	106.2	112.3	147.6	177.9	219.3	1.7	0.1	3.3	4.0
Oil	493.3	409.8	411.8	438.3	477.0	538.4	595.4	644.2	696.0	-1.8	1.5	2.2	1.6
Crude oil and Feedstocks	459.9	389.8	383.7	408.0	450.3	513.0	570.5	618.0	665.6	-1.8	1.6	2.4	1.6
Oil products	33.4	19.9	28.1	30.4	26.7	25.3	24.9	26.2	30.4	-1.7	-0.5	-0.7	2.0
Natural gas	117.0	127.7	164.2	214.9	272.9	350.4	418.4	472.2	503.0	3.4	5.2	4.4	1.9
Electricity	1.7	0.1	-0.3	-0.4	-0.1	-0.1	-0.4	0.2	0.3				
Gross Inland Consumption	**1748.8**	**1755.3**	**1834.9**	**1916.3**	**1995.4**	**2071.3**	**2155.5**	**2209.8**	**2296.6**	**0.5**	**0.8**	**0.8**	**0.6**
Solids	471.1	383.1	341.8	303.1	287.0	270.1	294.6	305.2	337.2	-3.2	-1.7	0.3	1.4
Oil	672.9	690.2	701.0	712.1	726.7	747.9	769.9	780.6	806.4	0.4	0.4	0.6	0.5
Natural gas	299.9	342.9	411.5	488.7	557.1	622.3	673.7	716.5	743.5	3.2	3.1	1.9	1.0
Nuclear	207.1	226.5	250.9	266.3	256.7	252.2	226.4	203.9	191.8	1.9	0.2	-1.3	-1.6
Electricity	1.1	0.1	-0.3	-0.4	-0.1	-0.1	-0.4	0.2	0.3				
Renewable energy forms	96.7	112.4	130.0	146.6	168.0	178.9	191.4	203.4	217.5	3.0	2.6	1.3	1.3
as % in Gross Inland Consumption													
Solids	26.9	21.8	18.6	15.8	14.4	13.0	13.7	13.8	14.7				
Oil	38.5	39.3	38.2	37.2	36.4	36.1	35.7	35.3	35.1				
Natural gas	17.1	19.5	22.4	25.5	27.9	30.0	31.3	32.4	32.4				
Nuclear	11.8	12.9	13.7	13.9	12.9	12.2	10.5	9.2	8.4				
Renewable energy forms	5.5	6.4	7.1	7.6	8.4	8.6	8.9	9.2	9.5				
Electricity Generation in TWhe	**2803.7**	**2979.5**	**3324.1**	**3592.4**	**3954.6**	**4306.7**	**4686.8**	**5021.8**	**5388.7**	**1.7**	**1.8**	**1.7**	**1.4**
Nuclear	819.3	907.8	972.3	1033.0	996.1	980.0	882.4	819.8	790.7	1.7	0.2	-1.2	-1.1
Hydro & wind	460.0	519.7	586.4	629.2	756.5	825.5	891.3	956.2	1022.0	2.5	2.6	1.7	1.4
Thermal (incl. biomass)	1524.4	1552.0	1765.4	1930.2	2202.0	2501.3	2913.1	3245.8	3576.0	1.5	2.2	2.8	2.1
Fuel Inputs for Thermal Power Generation	**410.4**	**399.5**	**424.5**	**432.8**	**460.7**	**493.7**	**553.2**	**598.0**	**648.8**	**0.3**	**0.8**	**1.8**	**1.6**
Solids	269.6	241.4	231.4	207.6	198.9	190.3	219.6	235.8	272.6	-1.5	-1.5	1.0	2.2
Oil	62.6	59.5	46.5	33.7	27.8	25.8	23.3	24.8	28.6	-2.9	-5.0	-1.8	2.1
Gas	65.4	81.6	125.0	164.5	203.6	244.6	275.0	299.5	306.4	6.7	5.0	3.1	1.1
Biomass - Waste	10.9	14.8	18.8	23.7	27.0	29.5	31.7	34.2	37.3	5.6	3.7	1.6	1.6
Geothermal heat	1.9	2.1	3.0	3.3	3.4	3.5	3.6	3.8	3.9	4.7	1.4	0.7	0.8
Hydrogen - Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Fuel Input in other transformation proc.	**884.5**	**862.3**	**865.9**	**866.2**	**891.4**	**913.0**	**944.3**	**961.7**	**991.7**	**-0.2**	**0.3**	**0.6**	**0.5**
Refineries	713.6	744.6	772.0	779.7	803.0	829.2	856.7	871.5	898.9	0.8	0.4	0.6	0.5
District heating	35.0	28.1	18.0	16.5	16.4	14.0	12.7	11.9	10.9	-6.4	-0.9	-2.5	-1.5
Biofuels and hydrogen production	0.0	0.2	0.6	4.7	10.5	12.8	19.1	24.7	30.3		32.6	6.2	4.7
Others	135.9	89.3	75.3	65.3	61.4	57.0	55.8	53.6	51.5	-5.7	-2.0	-0.9	-0.8
Energy Branch Consumption	**85.0**	**95.2**	**94.5**	**92.1**	**93.7**	**95.4**	**97.8**	**99.6**	**102.2**	**1.1**	**-0.1**	**0.4**	**0.4**
Non-Energy Uses	**103.7**	**112.5**	**115.6**	**120.0**	**126.1**	**130.7**	**133.5**	**135.6**	**137.5**	**1.1**	**0.9**	**0.6**	**0.3**
Final Energy Demand	**1148.6**	**1148.7**	**1201.7**	**1270.5**	**1351.5**	**1422.7**	**1499.7**	**1563.1**	**1630.2**	**0.5**	**1.2**	**1.0**	**0.8**
by sector													
Industry	384.9	351.2	355.0	361.9	382.3	401.2	416.2	428.8	442.8	-0.8	0.7	0.9	0.6
Residential	303.3	312.0	315.7	332.4	351.0	366.6	379.7	390.1	401.5	0.4	1.1	0.8	0.6
Tertiary	159.7	161.6	168.4	177.7	190.2	201.8	215.8	231.4	249.5	0.5	1.2	1.3	1.5
Transport	300.7	324.0	362.5	398.5	427.9	453.1	487.9	512.8	536.3	1.9	1.7	1.3	0.9
by fuel													
Solids	134.7	92.2	70.6	60.6	54.6	49.2	45.4	41.4	37.7	-6.3	-2.6	-1.8	-1.9
Oil	477.3	493.8	515.7	535.3	561.0	583.6	613.6	633.8	653.9	0.8	0.8	0.9	0.6
Gas	220.9	236.7	261.6	296.8	320.8	342.5	359.4	375.1	393.5	1.7	2.1	1.1	0.9
Electricity	200.5	212.2	238.4	258.5	287.5	315.0	343.6	369.7	397.7	1.7	1.9	1.8	1.5
Heat (from CHP and District Heating)	71.5	64.6	60.5	62.4	69.6	73.9	80.2	86.8	91.5	-1.7	1.4	1.4	1.3
Other	43.7	49.2	54.8	56.9	58.1	58.6	57.5	56.3	55.9	2.3	0.6	-0.1	-0.3
CO_2 Emissions (Mt of CO_2)	**4247.2**	**4064.4**	**4080.8**	**4108.9**	**4236.9**	**4374.2**	**4648.7**	**4835.8**	**5079.8**	**-0.4**	**0.4**	**0.9**	**0.9**
Electricity and Steam production	1506.7	1388.8	1372.4	1377.0	1411.1	1456.5	1629.6	1749.3	1917.5	-0.9	0.3	1.5	1.6
Energy Branch	162.5	189.3	188.2	178.6	178.4	178.7	179.8	178.9	179.5	1.5	-0.5	0.1	0.0
Industry	843.5	738.4	704.6	637.1	631.1	632.1	626.2	621.3	620.0	-1.8	-1.1	-0.1	-0.1
Residential	565.1	534.0	503.3	508.1	529.1	545.5	554.8	556.5	562.4	-1.2	0.5	0.5	0.1
Tertiary	296.9	272.6	256.8	254.6	258.9	262.5	269.8	279.7	292.4	-1.4	0.1	0.4	0.8
Transport	872.5	941.3	1055.5	1153.5	1228.3	1298.8	1388.4	1450.1	1508.0	1.9	1.5	1.2	0.8
CO_2 Emissions Index (1990=100)	**100.0**	**95.7**	**96.1**	**96.7**	**99.8**	**103.0**	**109.5**	**113.9**	**119.6**				

See explanations on page 219

Source: PRIMES & ACE Models

EUROPE - 30: BASELINE SCENARIO — **SUMMARY ENERGY BALANCE AND INDICATORS (B)**

	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	540.2	552.7	563.1	572.4	578.2	582.6	585.6	587.6	587.4	0.4	0.3	0.1	0.0
GDP (in 000 MEuro'00)	7886	8428	9631	10844	12334	13964	15748	17689	19799	2.0	2.5	2.5	2.3
Gross Inl. Cons./GDP (toe/MEuro'00)	221.7	208.3	190.5	176.7	161.8	148.3	136.9	124.9	116.0	-1.5	-1.6	-1.7	-1.6
Gross Inl. Cons./Capita (toe/inhabitant)	3237	3176	3258	3348	3451	3555	3681	3761	3910	0.1	0.6	0.6	0.6
Electricity Generated/Capita (kWh/inhabitant)	5190	5391	5903	6276	6839	7392	8004	8546	9174	1.3	1.5	1.6	1.4
Carbon intensity (t of CO_2/toe of GIC)	2.43	2.32	2.22	2.14	2.12	2.11	2.16	2.19	2.21	-0.9	-0.5	0.2	0.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	7.9	7.4	7.2	7.2	7.3	7.5	7.9	8.2	8.6	-0.8	0.1	0.8	0.9
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	538.5	482.3	423.7	378.9	343.5	313.2	295.2	273.4	256.6	-2.4	-2.1	-1.5	-1.4
Import Dependency %	39.3	34.7	36.2	38.4	41.8	47.1	52.4	57.0	60.0				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	88.4	79.6	72.7	67.0	61.7	56.7	51.9	47.9	-2.3	-1.7	-1.7	-1.7
Residential (Energy on Private Income)	100.0	97.4	85.8	80.4	74.7	68.9	63.4	58.1	53.6	-1.5	-1.4	-1.6	-1.7
Tertiary (Energy on Value added)	100.0	93.4	83.8	77.3	72.1	67.2	63.4	60.2	57.7	-1.8	-1.5	-1.3	-0.9
Transport (Energy on GDP)	100.0	100.8	98.7	96.4	91.0	85.1	81.3	76.0	71.0	-0.1	-0.8	-1.1	-1.3
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.43	0.39	0.36	0.31	0.29	0.28	0.29	0.29	0.29	-1.9	-2.0	-0.2	0.2
Final energy demand (t of CO_2/toe)	2.24	2.16	2.10	2.01	1.96	1.93	1.89	1.86	1.83	-0.7	-0.7	-0.3	-0.3
Industry	2.19	2.10	1.98	1.76	1.65	1.58	1.50	1.45	1.40	-1.0	-1.8	-0.9	-0.7
Residential	1.86	1.71	1.59	1.53	1.51	1.49	1.46	1.43	1.40	-1.5	-0.6	-0.3	-0.4
Tertiary	1.86	1.69	1.52	1.43	1.36	1.30	1.25	1.21	1.17	-2.0	-1.1	-0.8	-0.6
Transport	2.90	2.91	2.91	2.89	2.87	2.87	2.85	2.83	2.81	0.0	-0.1	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**709.8**	**764.1**	**843.1**	**936.8**	**1043.0**	**1158.9**	**1267.1**	**1381.6**		**2.1**	**2.2**	**1.8**
Nuclear		141.7	148.0	145.7	135.7	130.4	114.7	112.1	111.3		-0.9	-1.7	-0.3
Hydro (pumping excluded)		149.3	156.7	166.6	174.4	183.8	192.2	196.2	198.9		1.1	1.0	0.3
Wind and solar		2.5	13.0	29.1	76.3	97.9	116.1	141.9	171.9		19.4	4.3	4.0
Thermal		416.3	446.4	501.6	550.3	630.9	736.0	816.8	899.5		2.1	2.9	2.0
of which cogeneration units		*88.2*	*101.0*	*108.7*	*122.5*	*140.9*	*157.4*	*173.3*	*189.8*		*1.9*	*2.5*	*1.9*
Open cycle (incl. biomass-waste)		370.8	369.2	360.2	317.6	271.4	252.5	237.5	245.6		-1.5	-2.3	-0.3
Supercritical Polyvalent/Clean Coal and Lignite		0.0	0.0	0.1	1.1	9.8	58.5	97.2	142.5			48.9	9.3
Gas Turbines Combined Cycle		23.1	53.0	112.6	197.5	297.4	360.0	409.1	434.9		14.1	6.2	1.9
Small Gas Turbines		21.6	23.1	27.5	33.0	51.1	63.8	71.7	75.1		3.6	6.8	1.7
Fuel Cells		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Geothermal heat		0.7	1.0	1.2	1.2	1.2	1.3	1.3	1.4		1.4	0.7	0.8
Indicators													
Efficiency for thermal electricity production (%)		31.7	33.4	36.3	39.2	42.4	44.9	47.3	48.7				
Load factor for gross electric capacities (%)		47.9	49.7	48.7	48.2	47.1	46.2	45.2	44.5				
CHP indicator (% of electricity from CHP)		12.2	11.7	12.1	12.5	12.7	13.4	14.0	14.5				
Non fossil fuels in electricity generation (%)		49.6	48.9	48.6	46.7	44.3	40.2	37.8	36.2				
nuclear		30.5	29.2	28.7	25.2	22.8	18.8	16.3	14.7				
renewable energy forms		19.1	19.6	19.8	21.5	21.5	21.4	21.4	21.5				
of which waste		*0.8*	*1.0*	*1.2*	*1.2*	*1.2*	*1.2*	*1.1*	*1.1*				
Transport sector													
Passenger transport activity (Gpkm)	**5068.7**	**5411.8**	**5930.1**	**6404.3**	**6978.8**	**7637.1**	**8370.2**	**9146.3**	**10009.2**	**1.6**	**1.6**	**1.8**	**1.8**
public road transport	599.6	583.8	605.7	612.6	620.8	634.5	648.2	659.1	670.3	0.1	0.2	0.4	0.3
private cars and motorcycles	3785.2	4142.0	4529.7	4928.9	5381.1	5879.8	6423.5	7003.7	7647.2	1.8	1.7	1.8	1.8
rail	466.3	415.2	439.2	437.0	453.5	486.9	526.8	564.4	603.7	-0.6	0.3	1.5	1.4
aviation	183.6	233.5	315.8	382.2	476.4	585.5	716.8	860.0	1024.7	5.6	4.2	4.2	3.6
inland navigation	34.1	37.3	39.7	43.6	47.0	50.5	54.9	59.2	63.3	1.5	1.7	1.6	1.4
travel per person (km per capita)	**9383**	**9792**	**10530**	**11188**	**12069**	**13109**	**14294**	**15566**	**17040**	**1.2**	**1.4**	**1.7**	**1.8**
Freight transport activity (Gtkm)	**2076.8**	**2142.5**	**2459.2**	**2737.3**	**3100.7**	**3498.9**	**3927.0**	**4368.0**	**4823.8**	**1.7**	**2.3**	**2.4**	**2.1**
trucks	1248.5	1420.5	1699.0	1953.0	2275.0	2620.5	2992.4	3383.8	3788.9	3.1	3.0	2.8	2.4
rail	522.4	410.7	409.2	407.7	419.8	440.2	465.8	485.5	507.6	-2.4	0.3	1.0	0.9
inland navigation	305.8	311.3	351.0	376.6	405.9	438.1	468.8	498.7	527.3	1.4	1.5	1.5	1.2
freight activity per unit of GDP (tkm/000 Euro'00)	**263**	**254**	**255**	**252**	**251**	**251**	**249**	**247**	**244**	**-0.3**	**-0.2**	**-0.1**	**-0.2**
Energy demand in transport (Mtoe)	**300.7**	**324.0**	**362.5**	**398.5**	**427.9**	**453.1**	**487.9**	**512.8**	**536.3**	**1.9**	**1.7**	**1.3**	**0.9**
public road transport	9.1	8.4	8.6	8.8	8.8	8.8	8.6	8.3	8.0	-0.6	0.2	-0.3	-0.8
private cars and motorcycles	145.6	153.7	167.9	182.6	187.2	187.7	199.9	205.1	209.7	1.4	1.1	0.7	0.5
trucks	95.0	106.2	120.2	137.5	157.6	177.3	193.1	208.8	220.1	2.4	2.7	2.1	1.3
rail	10.3	10.2	10.2	9.9	9.3	8.5	8.0	7.8	7.8	-0.1	-1.0	-1.5	-0.2
aviation	32.1	37.5	49.1	52.8	57.6	63.0	70.0	74.3	81.8	4.4	1.6	2.0	1.6
inland navigation	8.5	7.8	6.4	6.9	7.4	7.9	8.3	8.6	9.0	-2.8	1.4	1.1	0.8
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	38.6	38.5	39.5	39.4	37.4	34.9	34.1	32.2	30.6	0.2	-0.5	-0.9	-1.1
freight transport (toe/Mtkm)	50.6	53.9	52.2	53.4	53.7	53.3	51.6	50.0	47.6	0.3	0.3	-0.4	-0.8

Source: PRIMES & ACE Models

AUSTRIA: BASELINE SCENARIO										SUMMARY ENERGY BALANCE AND INDICATORS (A)			
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**8.71**	**8.75**	**9.46**	**9.04**	**9.54**	**9.28**	**8.63**	**8.75**	**9.20**	**0.8**	**0.1**	**-1.0**	**0.6**
Solids	0.64	0.30	0.29	0.30	0.20	0.17	0.02	0.00	0.00	-7.6	-3.7	-22.0	
Oil	1.19	1.06	1.03	0.90	0.80	0.40	0.00	0.00	0.00	-1.4	-2.5		
Natural gas	1.11	1.26	1.53	0.88	0.85	0.68	0.50	0.37	0.27	3.3	-5.7	-5.2	-5.8
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	5.77	6.13	6.60	6.96	7.69	8.04	8.11	8.38	8.92	1.4	1.5	0.5	1.0
Hydro	2.71	3.19	3.58	3.65	3.98	4.04	4.08	4.06	4.14	2.8	1.1	0.3	0.1
Biomass	2.88	2.63	2.68	2.88	3.01	3.09	3.15	3.22	3.32	-0.7	1.2	0.5	0.5
Waste	0.16	0.27	0.28	0.30	0.39	0.39	0.30	0.27	0.38	5.6	3.2	-2.7	2.4
Wind	0.00	0.00	0.01	0.04	0.10	0.26	0.30	0.49	0.61		31.8	12.0	7.2
Solar and others	0.01	0.04	0.05	0.09	0.14	0.18	0.19	0.25	0.36	13.8	11.8	2.8	6.6
Geothermal	0.00	0.00	0.01	0.01	0.07	0.08	0.09	0.09	0.11	21.2	18.6	1.6	2.1
Net Imports	**17.28**	**17.41**	**18.86**	**21.38**	**22.11**	**23.50**	**25.79**	**26.35**	**26.85**	**0.9**	**1.6**	**1.6**	**0.4**
Solids	3.12	2.52	3.05	3.04	2.78	2.86	3.77	3.88	4.67	-0.2	-0.9	3.1	2.2
Oil	9.71	9.69	10.65	11.03	11.74	12.22	12.87	12.93	12.59	0.9	1.0	0.9	-0.2
Crude oil and Feedstocks	7.80	8.05	7.69	8.80	9.39	9.87	10.47	10.53	10.23	-0.1	2.0	1.1	-0.2
Oil products	1.91	1.64	2.96	2.23	2.34	2.35	2.40	2.41	2.37	4.5	-2.3	0.2	-0.1
Natural gas	4.49	5.42	5.27	7.39	7.63	8.46	9.20	9.59	9.64	1.6	3.8	1.9	0.5
Electricity	-0.04	-0.21	-0.11	-0.09	-0.05	-0.04	-0.05	-0.05	-0.05				
Gross Inland Consumption	**25.65**	**26.38**	**28.43**	**30.42**	**31.65**	**32.78**	**34.42**	**35.11**	**36.05**	**1.0**	**1.1**	**0.8**	**0.5**
Solids	4.16	3.22	3.56	3.34	2.98	3.03	3.78	3.88	4.67	-1.6	-1.7	2.4	2.1
Oil	10.52	10.92	11.85	11.93	12.54	12.62	12.87	12.93	12.59	1.2	0.6	0.3	-0.2
Natural gas	5.24	6.33	6.53	8.27	8.48	9.14	9.70	9.96	9.92	2.2	2.6	1.3	0.2
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	-0.04	-0.21	-0.11	-0.09	-0.05	-0.04	-0.05	-0.05	-0.05				
Renewable energy forms	5.77	6.13	6.60	6.96	7.69	8.04	8.11	8.38	8.92	1.4	1.5	0.5	1.0
as % in Gross Inland Consumption													
Solids	16.2	12.2	12.5	11.0	9.4	9.2	11.0	11.1	13.0				
Oil	41.0	41.4	41.7	39.2	39.6	38.5	37.4	36.8	34.9				
Natural gas	20.4	24.0	23.0	27.2	26.8	27.9	28.2	28.4	27.5				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	22.5	23.2	23.2	22.9	24.3	24.5	23.6	23.9	24.7				
Electricity Generation in TWhe	**49.41**	**55.17**	**59.91**	**64.53**	**70.79**	**75.77**	**82.71**	**87.15**	**94.74**	**1.9**	**1.7**	**1.6**	**1.4**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	31.49	37.06	41.66	42.87	47.41	50.07	51.08	53.49	57.04	2.8	1.3	0.7	1.1
Thermal (incl. biomass)	17.92	18.11	18.25	21.66	23.38	25.70	31.63	33.66	37.70	0.2	2.5	3.1	1.8
Fuel Inputs for Thermal Power Generation [1]	**4.67**	**4.70**	**4.56**	**5.39**	**5.37**	**5.82**	**6.80**	**7.12**	**7.90**	**-0.2**	**1.6**	**2.4**	**1.5**
Solids	1.47	1.05	1.26	1.28	0.98	1.05	1.82	1.89	2.66	-1.6	-2.5	6.4	3.9
Oil (including refinery gas)	0.58	0.68	0.41	0.08	0.26	0.15	0.12	0.11	0.10	-3.4	-4.5	-7.2	-1.7
Gas	2.16	2.26	2.23	3.36	3.44	3.91	4.23	4.52	4.43	0.3	4.4	2.1	0.5
Biomass - Waste	0.45	0.72	0.66	0.66	0.63	0.64	0.55	0.51	0.60	3.8	-0.4	-1.4	0.8
Geothermal heat	0.00	0.00	0.00	0.00	0.06	0.07	0.08	0.09	0.10			2.6	2.5
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**11.20**	**11.64**	**11.03**	**11.85**	**12.44**	**12.73**	**12.88**	**13.03**	**13.00**	**-0.1**	**1.2**	**0.3**	**0.1**
Refineries	8.80	9.12	8.79	9.73	10.24	10.34	10.63	10.76	10.58	0.0	1.5	0.4	0.0
District heating	0.36	0.76	0.44	0.38	0.53	0.76	0.55	0.46	0.50	2.1	1.9	0.3	-1.0
Biofuels and hydrogen production	0.00	0.01	0.02	0.05	0.07	0.11	0.23	0.37	0.52		11.7	12.4	8.5
Others	2.04	1.74	1.77	1.68	1.60	1.51	1.47	1.44	1.40	-1.4	-1.0	-0.8	-0.5
Energy Branch Consumption	**1.15**	**1.01**	**1.53**	**1.49**	**1.47**	**1.44**	**1.46**	**1.44**	**1.41**	**2.9**	**-0.4**	**-0.1**	**-0.4**
Non-Energy Uses	**1.57**	**1.03**	**2.14**	**2.37**	**2.58**	**2.73**	**2.86**	**2.98**	**3.10**	**3.1**	**1.9**	**1.0**	**0.8**
Final Energy Demand	**19.86**	**21.09**	**22.43**	**23.98**	**25.35**	**26.18**	**27.20**	**27.81**	**28.43**	**1.2**	**1.2**	**0.7**	**0.4**
by sector													
Industry[1]	5.69	5.75	6.13	6.38	6.71	6.91	7.12	7.22	7.40	0.7	0.9	0.6	0.4
energy intensive industries	4.39	4.56	4.37	4.62	4.81	4.88	4.96	4.94	4.97	0.0	1.0	0.3	0.0
other industrial sectors	1.30	1.19	1.75	1.76	1.90	2.02	2.16	2.29	2.43	3.0	0.8	1.3	1.2
Residential	6.77	7.04	6.51	6.71	6.91	6.97	6.95	6.86	6.83	-0.4	0.6	0.1	-0.2
Tertiary	2.01	2.07	3.02	3.46	3.88	4.13	4.51	4.85	5.25	4.2	2.5	1.5	1.5
Transport	5.40	6.23	6.77	7.43	7.85	8.17	8.62	8.87	8.95	2.3	1.5	0.9	0.4
by fuel [1],[2]													
Solids	1.75	1.39	0.67	0.44	0.39	0.35	0.31	0.27	0.25	-9.1	-5.4	-2.3	-1.9
Oil	7.99	8.72	9.47	9.82	10.16	10.36	10.67	10.81	10.79	1.7	0.7	0.5	0.1
Gas	2.83	3.50	4.01	4.82	4.82	4.70	5.14	5.20	5.23	3.5	1.9	0.6	0.2
Electricity	3.71	4.01	4.46	4.82	5.36	5.78	6.33	6.70	7.33	1.9	1.9	1.7	1.5
Heat (from CHP and District Heating)	1.04	1.34	1.74	1.78	2.09	2.40	2.20	2.30	2.37	5.2	1.9	0.5	0.7
Other	2.53	2.12	2.08	2.31	2.52	2.59	2.54	2.51	2.47	-2.0	2.0	0.1	-0.3
CO_2 Emissions (Mt of CO_2)	**55.1**	**56.7**	**57.1**	**60.3**	**60.7**	**62.2**	**66.7**	**67.5**	**69.6**	**0.4**	**0.6**	**1.0**	**0.4**
Electricity and Steam production	13.1	13.1	11.1	13.8	13.5	15.0	18.1	18.8	21.7	-1.7	2.0	3.0	1.8
Energy Branch	2.4	2.1	3.3	3.2	3.1	3.0	2.9	2.9	2.7	3.3	-0.7	-0.5	-0.8
Industry	12.0	11.0	10.6	9.6	9.3	8.7	9.5	9.3	9.2	-1.2	-1.3	0.2	-0.3
Residential	12.2	12.8	9.6	9.1	8.9	8.7	8.3	8.0	7.7	-2.3	-0.8	-0.7	-0.8
Tertiary	0.1	0.0	3.1	3.3	3.4	3.4	3.3	3.6	3.5	46.5	1.1	-0.2	0.5
Transport	15.3	17.7	19.4	21.3	22.5	23.4	24.5	25.0	24.9	2.4	1.5	0.8	0.1
CO_2 Emissions Index (1990=100)	**100.0**	**103.0**	**103.7**	**109.6**	**110.2**	**112.9**	**121.2**	**122.6**	**126.5**				

See explanations on page 219

Source: PRIMES Model

AUSTRIA: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (B)

	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	7.73	8.05	8.11	8.17	8.19	8.21	8.22	8.20	8.16	0.5	0.1	0.0	-0.1
GDP (in 000 MEuro'00)	163.0	180.4	204.8	226.7	252.1	279.7	309.3	340.7	374.3	2.3	2.1	2.1	1.9
Gross Inl. Cons./GDP (toe/MEuro'00)	157.4	146.2	138.8	134.2	125.5	117.2	111.3	103.1	96.3	-1.2	-1.0	-1.2	-1.4
Gross Inl. Cons./Capita (toe/inhabitant)	3.32	3.28	3.51	3.72	3.86	3.99	4.19	4.28	4.42	0.5	1.0	0.8	0.5
Electricity Generated/Capita (kWh/inhabitant)	6392	6855	7387	7901	8638	9229	10067	10622	11612	1.5	1.6	1.5	1.4
Carbon intensity (t of CO_2/toe of GIC)	2.15	2.15	2.01	1.98	1.92	1.90	1.94	1.92	1.93	-0.7	-0.5	0.1	0.0
CO_2 Emissions/Capita (t of CO_2/inhabitant)	7.12	7.05	7.04	7.39	7.41	7.57	8.12	8.22	8.53	-0.1	0.5	0.9	0.5
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	337.7	314.3	278.6	266.1	240.7	222.2	215.8	198.1	186.0	-1.9	-1.4	-1.1	-1.5
Import Dependency %	67.4	66.0	66.3	70.3	69.9	71.7	74.9	75.1	74.5				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	94.0	81.9	76.0	71.2	65.5	60.6	55.3	51.3	-2.0	-1.4	-1.6	-1.7
Residential (Energy on Private Income)	100.0	93.2	75.5	70.4	66.6	62.0	57.3	52.7	49.0	-2.8	-1.2	-1.5	-1.5
Tertiary (Energy on Value added)	100.0	91.4	119.4	122.5	122.6	117.0	114.7	111.4	109.2	1.8	0.3	-0.7	-0.5
Transport (Energy on GDP)	100.0	104.3	99.8	99.0	94.0	88.3	84.1	78.6	72.2	0.0	-0.6	-1.1	-1.5
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.23	0.20	0.15	0.16	0.14	0.14	0.17	0.16	0.18	-4.1	-0.7	1.7	0.6
Final energy demand (t of CO_2/toe)	1.99	1.97	1.90	1.81	1.74	1.69	1.68	1.65	1.59	-0.4	-0.9	-0.4	-0.5
Industry	2.11	1.92	1.73	1.51	1.38	1.26	1.33	1.28	1.25	-1.9	-2.2	-0.4	-0.7
Residential	1.80	1.82	1.48	1.36	1.29	1.24	1.20	1.17	1.12	-1.9	-1.4	-0.7	-0.6
Tertiary	0.03	0.00	1.01	0.96	0.88	0.82	0.74	0.73	0.67	40.6	-1.4	-1.7	-1.0
Transport	2.84	2.84	2.86	2.87	2.87	2.87	2.84	2.82	2.78	0.1	0.0	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**17.09**	**17.78**	**18.44**	**20.36**	**22.40**	**24.68**	**26.86**	**29.32**		**1.4**	**1.9**	**1.7**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		10.51	10.87	11.03	12.08	12.24	12.43	12.48	12.50		1.1	0.3	0.1
Wind and solar		0.03	0.08	0.19	0.51	1.33	1.58	3.06	4.41		19.7	12.1	10.8
Thermal		6.54	6.83	7.23	7.77	8.83	10.67	11.33	12.40		1.3	3.2	1.5
of which cogeneration units		*2.28*	*2.52*	*2.98*	*4.36*	*4.15*	*5.11*	*5.22*	*5.23*		*5.6*	*1.6*	*0.2*
Open cycle(incl. biomass-waste)		5.79	6.01	5.91	4.27	3.09	3.04	2.42	2.42		-3.4	-3.3	-2.3
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.00	1.07	2.13				
Gas Turbines Combined Cycle		0.31	0.38	0.87	2.52	3.03	4.39	4.56	4.58		20.8	5.7	0.4
Small Gas Turbines		0.44	0.44	0.44	0.97	2.69	3.21	3.25	3.25		8.1	12.8	0.1
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.03			2.6	2.5
Indicators													
Efficiency for thermal electricity production (%)		36.1	37.3	37.6	41.3	41.5	43.6	44.4	44.8				
Load factor for gross electric capacities (%)		36.9	38.5	39.9	39.7	38.6	38.3	37.0	36.9				
CHP indicator (% of electricity from CHP)		21.4	21.9	24.5	27.1	26.2	24.2	25.4	25.3				
Non fossil fuels in electricity generation (%)		71.5	73.2	69.6	70.0	69.1	64.3	63.6	62.6				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		71.5	73.2	69.6	70.0	69.1	64.3	63.6	62.6				
of which waste		*1.0*	*0.8*	*0.8*	*1.0*	*0.9*	*0.4*	*0.3*	*0.7*				
Transport sector													
Passenger transport activity (Gpkm)	**86.1**	**96.1**	**99.6**	**104.0**	**109.3**	**117.8**	**128.4**	**138.7**	**149.4**	**1.5**	**0.9**	**1.6**	**1.5**
public road transport	8.7	10.5	13.1	13.0	13.1	13.8	14.6	15.5	16.3	4.2	0.0	1.1	1.1
private cars and motorcycles	63.9	69.7	70.9	74.7	78.5	84.2	90.8	97.6	104.2	1.0	1.0	1.5	1.4
rail	10.8	12.2	11.0	10.8	11.1	11.7	12.8	13.4	14.4	0.1	0.1	1.5	1.2
aviation	2.6	3.7	4.6	5.5	6.6	8.1	10.1	12.1	14.5	5.9	3.6	4.3	3.7
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.4	0.2	0.3
travel per person (km per capita)	**11135**	**11939**	**12278**	**12728**	**13339**	**14346**	**15625**	**16906**	**18316**	**1.0**	**0.8**	**1.6**	**1.6**
Freight transport activity (Gtkm)	**29.2**	**34.0**	**45.0**	**50.9**	**56.6**	**62.6**	**69.3**	**75.8**	**83.0**	**4.4**	**2.3**	**2.0**	**1.8**
trucks	17.0	20.9	26.3	30.6	35.3	39.8	43.8	48.6	53.3	4.5	3.0	2.2	2.0
rail	12.2	13.1	16.3	17.8	18.6	20.1	22.7	24.4	26.9	3.0	1.3	2.0	1.7
inland navigation	0.0	0.0	2.4	2.6	2.7	2.8	2.8	2.9	2.9		0.9	0.5	0.2
freight activity per unit of GDP (tkm/000 Euro'00)	**179**	**188**	**220**	**225**	**224**	**224**	**224**	**223**	**222**	**2.1**	**0.2**	**0.0**	**-0.1**
Energy demand in transport (Mtoe)	**5.40**	**6.23**	**6.77**	**7.43**	**7.85**	**8.17**	**8.62**	**8.87**	**8.95**	**2.3**	**1.5**	**0.9**	**0.4**
public road transport	0.06	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.05	-1.2	-0.1	0.2	-0.7
private cars and motorcycles	2.81	3.04	3.22	3.39	3.27	3.15	3.27	3.31	3.24	1.4	0.1	0.0	-0.1
trucks	1.88	2.28	2.57	2.98	3.44	3.80	4.03	4.26	4.38	3.2	3.0	1.6	0.8
rail	0.32	0.38	0.33	0.32	0.32	0.30	0.29	0.28	0.28	0.3	-0.4	-0.9	-0.2
aviation	0.33	0.46	0.59	0.68	0.76	0.85	0.97	0.95	0.99	6.0	2.6	2.4	0.2
inland navigation	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.9	0.3	0.1
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	40.1	40.3	41.4	42.0	39.6	36.4	35.1	32.6	30.0	0.3	-0.5	-1.2	-1.5
freight transport (toe/Mtkm)	66.8	69.4	58.8	60.3	62.3	62.2	59.4	57.3	53.8	-1.3	0.6	-0.5	-1.0

Source: PRIMES Model

BELGIUM: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**12.45**	**11.29**	**13.35**	**12.77**	**13.46**	**13.19**	**10.70**	**6.94**	**2.23**	**0.7**	**0.1**	**-2.3**	**-14.5**
Solids	1.08	0.27	0.19	0.00	0.00	0.00	0.00	0.00	0.00	-16.0			
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-14.3			
Nuclear	10.71	10.34	12.42	11.73	11.93	11.61	8.88	5.04	0.00	1.5	-0.4	-2.9	
Renewable energy sources	0.65	0.68	0.73	1.04	1.53	1.59	1.82	1.90	2.23	1.2	7.7	1.7	2.1
Hydro	0.02	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	5.6	0.3	0.0	0.0
Biomass	0.47	0.49	0.51	0.73	1.10	1.19	1.36	1.49	1.58	0.6	8.1	2.1	1.5
Waste	0.15	0.16	0.18	0.22	0.34	0.29	0.34	0.27	0.33	2.0	6.5	0.0	-0.3
Wind	0.00	0.00	0.00	0.04	0.04	0.04	0.05	0.05	0.21	8.0	41.2	1.1	16.7
Solar and others	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.05	0.07	3.2	27.3	9.7	8.7
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.1	8.6	-1.4	-1.3
Net Imports	**38.86**	**43.69**	**48.54**	**51.77**	**53.35**	**54.71**	**57.69**	**61.28**	**65.10**	**2.3**	**0.9**	**0.8**	**1.2**
Solids	9.49	9.34	7.57	5.90	4.37	3.89	4.42	6.48	10.46	-2.2	-5.3	0.1	9.0
Oil	21.47	23.58	27.33	28.11	29.03	29.82	30.29	30.62	30.81	2.4	0.6	0.4	0.2
Crude oil and Feedstocks	26.12	25.67	32.64	29.79	30.61	31.75	32.16	32.95	33.38	2.3	-0.6	0.5	0.4
Oil products	-4.65	-2.10	-5.32	-1.68	-1.57	-1.92	-1.86	-2.33	-2.57				
Natural gas	8.22	10.42	13.28	17.37	19.56	20.59	22.58	23.79	23.44	4.9	3.9	1.4	0.4
Electricity	-0.32	0.35	0.37	0.39	0.39	0.39	0.39	0.39	0.39		0.5	0.0	0.0
Gross Inland Consumption	**47.18**	**50.33**	**57.04**	**59.07**	**61.03**	**61.87**	**62.15**	**61.74**	**60.61**	**1.9**	**0.7**	**0.2**	**-0.2**
Solids	10.24	8.55	8.20	5.90	4.37	3.89	4.42	6.48	10.46	-2.2	-6.1	0.1	9.0
Oil	17.73	19.79	21.95	22.65	23.25	23.80	24.06	24.14	24.09	2.2	0.6	0.3	0.0
Natural gas	8.17	10.61	13.37	17.37	19.56	20.59	22.58	23.79	23.44	5.0	3.9	1.4	0.4
Nuclear	10.71	10.34	12.42	11.73	11.93	11.61	8.88	5.04	0.00	1.5	-0.4	-2.9	
Electricity	-0.32	0.35	0.37	0.39	0.39	0.39	0.39	0.39	0.39		0.5	0.0	0.0
Renewable energy forms	0.65	0.68	0.73	1.04	1.53	1.59	1.82	1.90	2.23	1.2	7.7	1.7	2.1
as % in Gross Inland Consumption													
Solids	21.7	17.0	14.4	10.0	7.2	6.3	7.1	10.5	17.3				
Oil	37.6	39.3	38.5	38.3	38.1	38.5	38.7	39.1	39.7				
Natural gas	17.3	21.1	23.4	29.4	32.0	33.3	36.3	38.5	38.7				
Nuclear	22.7	20.5	21.8	19.9	19.5	18.8	14.3	8.2	0.0				
Renewable energy forms	1.4	1.4	1.3	1.8	2.5	2.6	2.9	3.1	3.7				
Electricity Generation in TWhe	**70.20**	**73.52**	**82.64**	**86.61**	**93.91**	**97.60**	**103.06**	**106.79**	**111.06**	**1.6**	**1.3**	**0.9**	**0.8**
Nuclear	42.71	41.35	48.15	45.48	46.26	45.01	34.45	19.57	0.00	1.2	-0.4	-2.9	
Hydro & wind	0.27	0.35	0.47	0.91	0.95	0.97	1.01	1.02	2.98	5.6	7.2	0.6	11.4
Thermal (incl. biomass)	27.21	31.83	34.02	40.21	46.70	51.61	67.60	86.19	108.08	2.3	3.2	3.8	4.8
Fuel Inputs for Thermal Power Generation (1)	**6.90**	**7.50**	**7.75**	**8.20**	**8.73**	**9.16**	**11.88**	**15.13**	**18.77**	**1.2**	**1.2**	**3.1**	**4.7**
Solids	3.91	3.79	3.04	1.82	0.75	0.64	1.39	3.70	7.92	-2.5	-13.1	6.4	19.0
Oil (including refinery gas)	0.53	0.38	0.25	0.06	0.07	0.04	0.03	0.03	0.03	-7.4	-11.6	-7.4	0.0
Gas	2.11	2.92	3.96	5.73	7.18	7.79	9.71	10.72	10.07	6.5	6.1	3.1	0.4
Biomass - Waste	0.35	0.41	0.50	0.59	0.73	0.70	0.75	0.68	0.75	3.6	3.9	0.3	0.0
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**35.15**	**32.95**	**40.71**	**36.43**	**37.75**	**38.48**	**39.21**	**39.65**	**39.83**	**1.5**	**-0.8**	**0.4**	**0.2**
Refineries	29.04	28.63	37.07	33.20	34.56	35.55	36.24	36.72	37.02	2.5	-0.7	0.5	0.2
District heating	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.13	0.49	0.56	0.73	0.88	0.96			4.2	2.7
Others	6.11	4.32	3.61	3.10	2.70	2.37	2.24	2.04	1.85	-5.1	-2.9	-1.9	-1.9
Energy Branch Consumption	**2.31**	**2.27**	**2.37**	**2.12**	**2.18**	**2.21**	**2.25**	**2.29**	**2.32**	**0.3**	**-0.9**	**0.3**	**0.3**
Non-Energy Uses	**2.74**	**3.29**	**5.72**	**6.42**	**7.20**	**7.62**	**7.80**	**7.79**	**7.71**	**7.6**	**2.3**	**0.8**	**-0.1**
Final Energy Demand	**31.24**	**34.41**	**36.91**	**38.13**	**39.20**	**39.87**	**40.58**	**41.02**	**41.57**	**1.7**	**0.6**	**0.3**	**0.2**
by sector													
Industry (1)	11.83	12.03	13.62	14.13	14.63	14.74	14.67	14.50	14.32	1.4	0.7	0.0	-0.2
energy intensive industries	9.27	9.08	10.08	10.26	10.39	10.20	9.95	9.58	9.19	0.8	0.3	-0.4	-0.8
other industrial sectors	2.56	2.95	3.54	3.87	4.24	4.53	4.72	4.92	5.13	3.3	1.8	1.1	0.8
Residential	8.34	9.30	9.47	9.49	9.47	9.45	9.29	9.08	8.87	1.3	0.0	-0.2	-0.5
Tertiary	3.37	4.60	4.16	4.17	4.41	4.65	5.00	5.46	6.10	2.1	0.6	1.3	2.0
Transport	7.70	8.48	9.66	10.33	10.69	11.04	11.62	11.98	12.28	2.3	1.0	0.8	0.6
by fuel (1)													
Solids	3.75	3.28	3.36	2.78	2.47	2.24	2.07	1.89	1.71	-1.1	-3.0	-1.8	-1.9
Oil	14.54	16.10	16.12	15.72	15.87	16.07	16.37	16.49	16.56	1.0	-0.2	0.3	0.1
Gas	7.12	8.32	9.84	11.62	12.12	12.44	12.37	12.56	12.84	3.3	2.1	0.2	0.4
Electricity	4.99	5.88	6.67	6.97	7.54	7.84	8.26	8.54	8.85	2.9	1.2	0.9	0.7
Heat (from CHP and District Heating)	0.57	0.57	0.73	0.79	0.94	1.01	1.24	1.24	1.28	2.5	2.6	2.8	0.3
Other	0.27	0.25	0.19	0.24	0.25	0.27	0.28	0.32	0.33	-3.4	2.4	1.3	1.7
CO_2 Emissions (Mt of CO_2)	**106.3**	**112.4**	**115.9**	**113.6**	**112.2**	**113.1**	**120.1**	**131.1**	**145.9**	**0.9**	**-0.3**	**0.7**	**2.0**
Electricity and Steam production	21.8	23.1	22.5	21.8	20.9	21.6	29.0	40.3	55.3	0.3	-0.8	3.3	6.7
Energy Branch	5.4	5.2	5.5	4.8	4.8	4.9	4.9	4.9	4.9	0.3	-1.4	0.2	0.0
Industry	30.3	28.7	31.0	29.7	28.6	27.6	26.3	25.5	24.8	0.2	-0.8	-0.8	-0.6
Residential	18.7	20.1	20.0	19.1	19.2	19.2	18.3	17.4	16.5	0.7	-0.4	-0.4	-1.1
Tertiary	7.5	10.4	8.2	8.0	8.1	8.4	8.7	9.2	10.0	0.8	0.0	0.7	1.4
Transport	22.6	24.9	28.6	30.3	30.7	31.6	32.9	33.7	34.4	2.4	0.7	0.7	0.4
CO_2 Emissions Index (1990=100)	**100.0**	**105.8**	**109.0**	**106.9**	**105.6**	**106.4**	**112.9**	**123.3**	**137.2**				

See explanations on page 219

Source: PRIMES Model

BELGIUM: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	9.97	10.14	10.25	10.37	10.44	10.51	10.57	10.62	10.63	0.3	0.2	0.1	0.1
GDP (in 000 MEuro'00)	199.8	216.2	248.3	276.3	308.1	337.7	367.4	398.7	432.1	2.2	2.2	1.8	1.6
Gross Inl. Cons./GDP (toe/MEuro'00)	236.2	232.8	229.7	213.8	198.1	183.2	169.2	154.9	140.3	-0.3	-1.5	-1.6	-1.9
Gross Inl. Cons./Capita (toe/inhabitant)	4.73	4.97	5.57	5.70	5.85	5.89	5.88	5.81	5.70	1.6	0.5	0.1	-0.3
Electricity Generated/Capita (kWh/inhabitant)	7043	7253	8066	8355	8996	9289	9749	10056	10450	1.4	1.1	0.8	0.7
Carbon intensity (t of CO_2/toe of GIC)	2.25	2.23	2.03	1.92	1.84	1.83	1.93	2.12	2.41	-1.0	-1.0	0.5	2.2
CO_2 Emissions/Capita (t of CO_2/inhabitant)	10.66	11.09	11.31	10.96	10.75	10.77	11.36	12.34	13.73	0.6	-0.5	0.6	1.9
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	532.2	520.0	466.6	411.2	364.2	335.0	326.8	328.7	337.6	-1.3	-2.4	-1.1	0.3
Import Dependency %	75.8	80.6	77.8	80.2	79.8	80.6	84.4	89.8	96.7				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	106.3	103.6	96.4	88.9	81.5	74.9	68.6	63.1	0.4	-1.5	-1.7	-1.7
Residential (Energy on Private Income)	100.0	102.7	92.9	84.5	76.1	69.0	61.8	55.4	49.7	-0.7	-2.0	-2.1	-2.2
Tertiary (Energy on Value added)	100.0	122.8	99.3	89.0	84.0	80.3	78.9	78.9	80.8	-0.1	-1.7	-0.6	0.2
Transport (Energy on GDP)	100.0	101.7	100.9	96.9	90.0	84.7	82.0	77.9	73.7	0.1	-1.1	-0.9	-1.1
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.30	0.30	0.25	0.23	0.20	0.20	0.25	0.33	0.44	-1.7	-2.5	2.2	5.9
Final energy demand (t of CO_2/toe)	2.53	2.45	2.38	2.29	2.21	2.17	2.12	2.09	2.06	-0.6	-0.7	-0.4	-0.3
Industry	2.56	2.39	2.38	2.10	1.95	1.87	1.79	1.76	1.73	-1.2	-1.5	-0.9	-0.3
Residential	2.24	2.16	2.11	2.01	2.02	2.03	1.97	1.92	1.86	-0.6	-0.4	-0.3	-0.6
Tertiary	2.23	2.27	1.96	1.91	1.84	1.80	1.74	1.69	1.64	-1.3	-0.6	-0.6	-0.6
Transport	2.94	2.94	2.96	2.94	2.87	2.86	2.83	2.81	2.80	0.1	-0.3	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**14.16**	**14.64**	**14.08**	**15.07**	**16.11**	**17.62**	**18.87**	**20.41**		**0.3**	**1.6**	**1.5**
Nuclear		5.88	6.03	6.03	6.03	6.03	4.27	2.37	0.00		0.0	-3.4	
Hydro (pumping excluded)		0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11		0.0	0.0	0.0
Wind and solar		0.01	0.02	0.14	0.16	0.18	0.19	0.19	0.81		26.8	1.7	15.5
Thermal		8.17	8.49	7.80	8.77	9.79	13.06	16.20	19.50		0.3	4.1	4.1
of which cogeneration units		*1.95*	*2.25*	*1.69*	*1.78*	*2.68*	*3.52*	*3.34*	*3.22*		*-2.3*	*7.0*	*-0.9*
Open cycle(incl. biomass-waste)		6.23	5.18	3.69	2.19	1.52	1.92	3.70	3.74		-8.2	-1.3	6.9
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.62				
Gas Turbines Combined Cycle		1.29	2.53	3.50	6.26	8.05	10.29	11.80	11.45		9.5	5.1	1.1
Small Gas Turbines		0.64	0.78	0.60	0.32	0.22	0.84	0.70	0.70		-8.4	10.1	-1.9
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		40.6	38.3	43.3	47.4	50.1	50.6	50.3	50.6				
Load factor for gross electric capacities (%)		59.3	64.4	70.2	71.1	69.2	66.8	64.6	62.1				
CHP indicator (% of electricity from CHP)		3.7	4.7	7.4	8.1	11.9	14.4	13.3	12.9				
Non fossil fuels in electricity generation (%)		58.6	60.9	55.8	52.8	49.3	36.5	21.2	4.8				
nuclear		56.2	58.3	52.5	49.3	46.1	33.4	18.3	0.0				
renewable energy forms		2.3	2.6	3.3	3.5	3.2	3.1	2.9	4.8				
of which waste		0.6	0.7	0.7	1.1	0.9	1.0	0.7	0.9				
Transport sector													
Passenger transport activity (Gpkm)	**112.0**	**123.1**	**135.1**	**139.7**	**145.9**	**158.3**	**173.7**	**189.3**	**205.9**	**1.9**	**0.8**	**1.8**	**1.7**
public road transport	10.9	12.5	12.4	12.9	12.7	13.4	14.1	14.8	15.5	1.3	0.3	1.0	0.9
private cars and motorcycles	90.4	98.8	107.4	110.2	114.9	124.2	135.4	146.8	158.7	1.7	0.7	1.7	1.6
rail	7.3	7.6	8.6	8.5	8.7	9.3	10.0	10.6	11.2	1.7	0.1	1.4	1.1
aviation	3.0	3.9	6.5	7.8	9.3	11.3	13.8	16.7	20.1	8.1	3.7	4.1	3.8
inland navigation	0.4	0.4	0.2	0.3	0.3	0.3	0.4	0.4	0.4	-5.2	1.7	2.0	2.0
travel per person (km per capita)	**11232**	**12147**	**13190**	**13479**	**13979**	**15070**	**16432**	**17826**	**19372**	**1.6**	**0.6**	**1.6**	**1.7**
Freight transport activity (Gtkm)	**39.0**	**47.8**	**46.5**	**51.4**	**57.2**	**62.3**	**67.2**	**72.2**	**77.1**	**1.8**	**2.1**	**1.6**	**1.4**
trucks	25.0	34.6	32.5	36.5	41.5	45.6	49.7	54.0	58.3	2.6	2.5	1.8	1.6
rail	8.4	7.3	7.7	8.1	8.4	8.9	9.5	9.8	10.1	-0.9	0.9	1.2	0.7
inland navigation	5.6	5.9	6.4	6.8	7.3	7.7	8.0	8.3	8.7	1.2	1.4	0.9	0.8
freight activity per unit of GDP (tkm/000 Euro'00)	**195**	**221**	**187**	**186**	**186**	**184**	**183**	**181**	**179**	**-0.4**	**-0.1**	**-0.1**	**-0.2**
Energy demand in transport (Mtoe)	**7.70**	**8.48**	**9.66**	**10.33**	**10.69**	**11.04**	**11.62**	**11.98**	**12.28**	**2.3**	**1.0**	**0.8**	**0.6**
public road transport	0.08	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	-2.1	0.2	0.2	-0.8
private cars and motorcycles	3.98	4.40	4.29	4.38	4.20	4.08	4.28	4.29	4.22	0.7	-0.2	0.2	-0.1
trucks	2.38	2.62	3.46	3.90	4.41	4.79	5.02	5.21	5.28	3.8	2.4	1.3	0.5
rail	0.18	0.20	0.18	0.18	0.17	0.17	0.13	0.12	0.12	0.4	-0.6	-3.0	-0.8
aviation	0.96	0.95	1.52	1.67	1.68	1.77	1.96	2.13	2.44	4.8	1.0	1.5	2.2
inland navigation	0.13	0.25	0.14	0.15	0.16	0.16	0.17	0.17	0.17	0.5	1.4	0.7	0.2
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	45.9	45.2	44.5	44.7	41.7	38.2	36.9	34.8	33.1	-0.3	-0.7	-1.2	-1.1
freight transport (toe/Mtkm)	65.6	61.1	78.3	79.5	80.7	80.2	77.5	74.8	70.9	1.8	0.3	-0.4	-0.9

Source: PRIMES Model

DENMARK: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**10.74**	**15.76**	**27.69**	**21.47**	**15.29**	**9.88**	**9.24**	**7.44**	**7.61**	**9.9**	**-5.8**	**-4.9**	**-1.9**
Solids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	6.06	9.31	18.13	10.00	7.00	3.50	3.50	3.44	3.39	11.6	-9.1	-6.7	-0.3
Natural gas	2.74	4.65	7.41	8.68	5.00	3.00	2.00	0.00	0.00	10.5	-3.9	-8.8	
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	1.95	1.81	2.14	2.79	3.29	3.38	3.74	4.00	4.22	1.0	4.4	1.3	1.2
Hydro	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.7	6.2	-0.1	0.1
Biomass	1.74	1.57	1.63	1.94	2.11	2.12	2.41	2.55	2.64	-0.7	2.6	1.3	0.9
Waste	0.15	0.13	0.12	0.16	0.22	0.22	0.23	0.23	0.22	-2.1	6.2	0.2	-0.4
Wind	0.05	0.10	0.38	0.66	0.90	0.96	0.99	1.10	1.20	22.0	8.9	1.0	2.0
Solar and others	0.00	0.01	0.01	0.03	0.05	0.07	0.10	0.12	0.15	16.5	20.6	7.1	3.8
Geothermal	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	1.9	17.5	1.7	0.9
Net Imports	**9.08**	**7.92**	**-7.14**	**-0.64**	**5.63**	**11.40**	**12.78**	**15.09**	**15.36**			**8.6**	**1.9**
Solids	6.23	7.65	3.78	3.15	3.05	2.57	1.43	1.35	1.51	-4.9	-2.1	-7.3	0.6
Oil	3.16	1.83	-8.10	-0.43	1.97	5.45	5.46	5.38	5.31			10.7	-0.3
Crude oil and Feedstocks	2.03	0.80	-9.61	-1.41	1.05	4.52	4.54	4.47	4.41			15.8	-0.3
Oil products	1.13	1.03	1.51	0.98	0.92	0.92	0.92	0.91	0.90	2.9	-4.8	0.0	-0.3
Natural gas	-0.93	-1.49	-2.88	-3.47	0.50	3.27	5.78	8.25	8.43			27.7	3.8
Electricity	0.61	-0.07	0.06	0.10	0.11	0.11	0.11	0.11	0.11	-21.0	6.5	0.4	-0.2
Gross Inland Consumption	**19.00**	**20.88**	**19.70**	**19.45**	**19.51**	**19.84**	**20.50**	**20.95**	**21.32**	**0.4**	**-0.1**	**0.5**	**0.4**
Solids	6.11	6.44	4.02	3.15	3.05	2.57	1.43	1.35	1.51	-4.1	-2.7	-7.3	0.6
Oil	8.55	9.58	9.04	8.19	7.56	7.49	7.44	7.24	7.05	0.6	-1.8	-0.2	-0.5
Natural gas	1.79	3.12	4.45	5.21	5.50	6.27	7.78	8.25	8.43	9.6	2.1	3.5	0.8
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.61	-0.07	0.06	0.10	0.11	0.11	0.11	0.11	0.11	-21.0	6.5	0.4	-0.2
Renewable energy forms	1.95	1.81	2.14	2.79	3.29	3.38	3.74	4.00	4.22	1.0	4.4	1.3	1.2
as % in Gross Inland Consumption													
Solids	32.2	30.9	20.4	16.2	15.6	13.0	7.0	6.5	7.1				
Oil	45.0	45.9	45.9	42.1	38.7	37.8	36.3	34.5	33.1				
Natural gas	9.4	14.9	22.6	26.8	28.2	31.6	37.9	39.4	39.5				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	10.3	8.6	10.9	14.4	16.9	17.1	18.2	19.1	19.8				
Electricity Generation in TWhe	**25.75**	**36.78**	**36.23**	**37.29**	**38.78**	**41.25**	**44.46**	**47.90**	**50.80**	**3.5**	**0.7**	**1.4**	**1.3**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	0.66	1.21	4.47	7.68	10.49	11.18	11.54	12.92	14.41	21.1	8.9	1.0	2.2
Thermal (incl. biomass)	25.10	35.58	31.76	29.61	28.28	30.07	32.92	34.98	36.39	2.4	-1.2	1.5	1.0
Fuel Inputs for Thermal Power Generation [1]	**6.35**	**8.53**	**7.86**	**7.26**	**6.93**	**7.06**	**7.45**	**7.79**	**8.02**	**2.2**	**-1.3**	**0.7**	**0.8**
Solids	5.55	6.05	3.70	2.90	2.87	2.43	1.37	1.31	1.50	-4.0	-2.5	-7.1	0.9
Oil (including refinery gas)	0.25	0.97	1.34	0.62	0.06	0.10	0.12	0.13	0.09	18.2	-26.5	6.7	-2.6
Gas	0.14	0.91	2.12	2.90	3.12	3.64	4.84	5.13	5.20	31.6	3.9	4.5	0.7
Biomass - Waste	0.41	0.60	0.70	0.84	0.88	0.88	1.12	1.21	1.23	5.4	2.3	2.4	1.0
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**9.32**	**10.72**	**9.02**	**9.33**	**8.94**	**8.95**	**9.26**	**9.34**	**9.32**	**-0.3**	**-0.1**	**0.4**	**0.1**
Refineries	8.01	9.91	8.45	8.56	8.05	8.05	8.10	8.01	7.96	0.5	-0.5	0.1	-0.2
District heating	1.31	0.81	0.57	0.77	0.85	0.84	1.03	1.13	1.08	-8.0	4.0	1.9	0.5
Biofuels and hydrogen production	0.00	0.00	0.00	0.01	0.04	0.07	0.14	0.19	0.27			12.2	6.8
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Energy Branch Consumption	**0.71**	**1.07**	**1.17**	**1.25**	**1.14**	**1.11**	**1.11**	**1.05**	**0.98**	**5.2**	**-0.3**	**-0.2**	**-1.2**
Non-Energy Uses	**0.30**	**0.29**	**0.28**	**0.28**	**0.31**	**0.33**	**0.35**	**0.37**	**0.39**	**-0.9**	**1.0**	**1.4**	**1.1**
Final Energy Demand	**14.34**	**15.13**	**14.56**	**15.02**	**15.48**	**15.91**	**16.38**	**16.75**	**17.18**	**0.2**	**0.6**	**0.6**	**0.5**
by sector													
Industry [1]	2.88	3.05	2.93	2.99	3.22	3.38	3.47	3.55	3.62	0.2	1.0	0.7	0.4
energy intensive industries	1.50	1.35	1.20	1.24	1.32	1.35	1.35	1.34	1.34	-2.2	1.0	0.2	-0.1
other industrial sectors	1.38	1.71	1.73	1.75	1.90	2.02	2.12	2.21	2.28	2.3	1.0	1.1	0.7
Residential	4.13	4.58	4.11	4.21	4.22	4.31	4.40	4.54	4.72	-0.1	0.3	0.4	0.7
Tertiary	2.82	2.86	2.80	2.79	2.90	3.12	3.37	3.66	3.98	-0.1	0.4	1.5	1.7
Transport	4.50	4.64	4.72	5.02	5.13	5.11	5.15	5.00	4.87	0.5	0.8	0.0	-0.6
by fuel [1]													
Solids	0.46	0.39	0.31	0.25	0.18	0.14	0.06	0.04	0.01	-4.0	-5.2	-11.0	-13.2
Oil	7.59	7.57	6.95	6.85	6.83	6.76	6.71	6.52	6.38	-0.9	-0.2	-0.2	-0.5
Gas	1.13	1.67	1.67	1.67	1.81	2.06	2.17	2.31	2.58	4.0	0.8	1.9	1.7
Electricity	2.52	2.69	2.79	2.92	3.06	3.28	3.54	3.82	4.07	1.0	0.9	1.4	1.4
Heat (from CHP and District Heating)	2.10	2.23	2.25	2.67	2.86	2.93	3.12	3.28	3.37	0.7	2.4	0.9	0.8
Other	0.54	0.59	0.59	0.66	0.74	0.75	0.78	0.77	0.77	0.9	2.3	0.5	-0.2
CO_2 Emissions (Mt of CO_2)	**52.8**	**60.4**	**52.6**	**48.4**	**46.6**	**46.3**	**45.0**	**45.2**	**45.6**	**0.0**	**-1.2**	**-0.3**	**0.1**
Electricity and Steam production	23.9	29.9	24.1	20.5	19.1	18.7	17.7	18.5	19.2	0.1	-2.3	-0.7	0.8
Energy Branch	1.4	2.0	2.4	2.3	2.1	2.0	2.0	1.8	1.7	5.1	-1.3	-0.3	-1.9
Industry	5.6	5.9	5.5	4.7	4.3	4.4	4.1	4.0	4.2	-0.3	-2.4	-0.6	0.2
Residential	5.2	5.3	3.9	3.2	3.1	3.1	3.2	3.2	3.4	-3.0	-2.2	0.2	0.7
Tertiary	3.3	3.6	2.9	2.9	3.0	3.1	3.2	3.3	3.4	-1.2	0.3	0.7	0.8
Transport	13.4	13.7	13.9	14.8	15.0	15.0	14.9	14.3	13.8	0.4	0.8	-0.1	-0.8
CO_2 Emissions Index (1990=100)	**100.0**	**114.5**	**99.7**	**91.8**	**88.3**	**87.7**	**85.4**	**85.6**	**86.4**				

See explanations on page 219

Source: PRIMES Model

DENMARK: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	5.14	5.22	5.34	5.43	5.49	5.53	5.56	5.61	5.65	0.4	0.3	0.1	0.2
GDP (in 000 MEuro'00)	138.3	152.5	173.9	191.2	215.2	236.5	258.8	282.7	307.5	2.3	2.2	1.9	1.7
Gross Inl. Cons./GDP (toe/MEuro'00)	137.4	136.9	113.3	101.7	90.6	83.9	79.2	74.1	69.3	-1.9	-2.2	-1.3	-1.3
Gross Inl. Cons./Capita (toe/inhabitant)	3.70	4.00	3.69	3.58	3.56	3.59	3.68	3.73	3.77	0.0	-0.4	0.4	0.2
Electricity Generated/Capita (kWh/inhabitant)	5012	7044	6787	6870	7067	7467	7990	8533	8986	3.1	0.4	1.2	1.2
Carbon intensity (t of CO_2/toe of GIC)	2.78	2.89	2.67	2.49	2.39	2.33	2.20	2.16	2.14	-0.4	-1.1	-0.8	-0.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	10.27	11.57	9.85	8.92	8.49	8.37	8.09	8.04	8.06	-0.4	-1.5	-0.5	0.0
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	381.4	396.1	302.4	253.3	216.5	195.6	174.0	159.7	148.2	-2.3	-3.3	-2.2	-1.6
Import Dependency %	45.5	35.3	-33.9	-3.1	26.9	53.6	58.0	67.0	66.9				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	97.7	87.6	81.4	77.5	73.8	69.3	64.8	60.5	-1.3	-1.2	-1.1	-1.3
Residential (Energy on Private Income)	100.0	98.8	82.3	77.5	69.7	63.8	58.6	54.7	51.8	-1.9	-1.7	-1.7	-1.2
Tertiary (Energy on Value added)	100.0	94.3	79.7	71.2	65.1	63.3	62.1	61.5	61.2	-2.2	-2.0	-0.5	-0.1
Transport (Energy on GDP)	100.0	93.5	83.5	80.8	73.3	66.4	61.1	54.4	48.7	-1.8	-1.3	-1.8	-2.3
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.43	0.43	0.35	0.27	0.24	0.22	0.20	0.20	0.20	-2.1	-3.7	-1.7	-0.2
Final energy demand (t of CO_2/toe)	1.92	1.88	1.80	1.70	1.64	1.61	1.54	1.48	1.44	-0.6	-0.9	-0.6	-0.7
Industry	1.95	1.93	1.87	1.58	1.33	1.32	1.17	1.12	1.15	-0.4	-3.3	-1.3	-0.2
Residential	1.27	1.15	0.94	0.75	0.74	0.73	0.72	0.71	0.72	-2.9	-2.5	-0.2	0.0
Tertiary	1.16	1.25	1.03	1.03	1.02	0.98	0.94	0.90	0.86	-1.1	-0.1	-0.8	-0.9
Transport	2.97	2.95	2.95	2.94	2.93	2.93	2.89	2.86	2.83	-0.1	-0.1	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**11.15**	**13.16**	**13.59**	**13.47**	**14.09**	**14.90**	**16.24**	**17.44**		**0.2**	**1.0**	**1.6**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.0	0.0	0.0
Wind and solar		0.59	2.30	3.46	4.54	4.81	4.82	5.44	6.09		7.0	0.6	2.4
Thermal		10.55	10.85	10.12	8.92	9.28	10.07	10.79	11.34		-1.9	1.2	1.2
of which cogeneration units		*6.96*	*7.76*	*7.24*	*6.64*	*6.49*	*6.89*	*7.13*	*7.81*		*-1.6*	*0.4*	*1.3*
Open cycle(incl. biomass-waste)		9.10	9.40	8.08	6.64	5.41	3.83	3.35	3.36		-3.4	-5.4	-1.3
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Gas Turbines Combined Cycle		0.25	0.25	0.86	1.29	2.22	4.19	4.92	5.42		18.0	12.5	2.6
Small Gas Turbines		1.20	1.21	1.18	0.99	1.65	2.05	2.52	2.56		-1.9	7.5	2.2
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		38.9	39.2	38.3	38.5	40.2	41.6	42.2	42.6				
Load factor for gross electric capacities (%)		37.6	31.4	31.3	32.9	33.4	34.1	33.7	33.3				
CHP indicator (% of electricity from CHP)		69.0	61.0	53.9	52.8	51.0	53.8	54.0	54.8				
Non fossil fuels in electricity generation (%)		8.0	17.9	27.0	33.5	33.1	33.4	34.6	35.8				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		8.0	17.9	27.0	33.5	33.1	33.4	34.6	35.8				
of which waste		*0.4*	*0.5*	*0.6*	*0.8*	*0.7*	*0.7*	*0.6*	*0.6*				
Transport sector													
Passenger transport activity (Gpkm)	**68.6**	**77.3**	**92.8**	**98.4**	**103.2**	**106.6**	**108.9**	**110.5**	**111.6**	**3.1**	**1.1**	**0.5**	**0.2**
public road transport	9.3	10.6	11.3	11.4	11.3	11.2	11.2	11.1	11.0	1.9	0.0	-0.1	-0.2
private cars and motorcycles	48.2	54.7	67.3	71.4	74.5	76.6	77.5	78.1	78.2	3.4	1.0	0.4	0.1
rail	4.9	4.8	5.3	5.6	5.6	5.9	6.0	6.1	6.1	0.9	0.6	0.6	0.1
aviation	3.5	4.5	6.3	7.3	8.7	9.9	11.0	12.1	13.2	6.0	3.3	2.4	1.8
inland navigation	2.7	2.7	2.6	2.8	3.0	3.1	3.2	3.2	3.2	-0.2	1.2	0.6	0.3
travel per person (km per capita)	**13351**	**14801**	**17393**	**18131**	**18800**	**19292**	**19572**	**19690**	**19746**	**2.7**	**0.8**	**0.4**	**0.1**
Freight transport activity (Gtkm)	**17.3**	**19.0**	**21.3**	**22.6**	**23.9**	**25.6**	**28.0**	**30.3**	**32.6**	**2.1**	**1.1**	**1.6**	**1.5**
trucks	13.7	14.7	17.8	19.0	20.3	21.9	24.1	26.2	28.4	2.7	1.3	1.7	1.6
rail	1.7	2.0	2.1	2.0	2.0	2.0	2.1	2.3	2.4	1.9	-0.6	0.9	1.0
inland navigation	1.9	2.3	1.5	1.6	1.6	1.7	1.8	1.8	1.9	-2.4	0.7	0.9	0.7
freight activity per unit of GDP (tkm/000 Euro'00)	**125**	**124**	**123**	**118**	**111**	**108**	**108**	**107**	**106**	**-0.2**	**-1.0**	**-0.3**	**-0.2**
Energy demand in transport (Mtoe)	**4.50**	**4.64**	**4.72**	**5.02**	**5.13**	**5.11**	**5.15**	**5.00**	**4.87**	**0.5**	**0.8**	**0.0**	**-0.6**
public road transport	0.13	0.14	0.13	0.13	0.13	0.13	0.12	0.11	0.10	0.4	-0.2	-0.9	-1.8
private cars and motorcycles	1.64	1.87	1.97	2.09	1.99	1.84	1.78	1.66	1.52	1.8	0.1	-1.1	-1.6
trucks	1.43	1.53	1.57	1.68	1.80	1.91	2.03	2.11	2.14	1.0	1.3	1.2	0.6
rail	0.12	0.12	0.10	0.10	0.10	0.09	0.06	0.06	0.05	-1.2	-0.7	-4.5	-1.0
aviation	0.70	0.77	0.82	0.90	0.99	1.01	1.02	0.92	0.91	1.6	1.9	0.3	-1.1
inland navigation	0.48	0.21	0.12	0.12	0.13	0.13	0.13	0.14	0.14	-13.3	1.0	0.6	0.1
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	39.4	38.7	33.2	33.3	31.7	29.3	28.0	25.5	23.8	-1.7	-0.5	-1.2	-1.6
freight transport (toe/Mtkm)	103.7	86.7	76.7	77.4	78.0	77.5	74.8	72.0	67.8	-3.0	0.2	-0.4	-1.0

Source: PRIMES Model

FINLAND: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)													
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**11.84**	**13.19**	**14.99**	**16.87**	**19.93**	**19.35**	**19.40**	**18.28**	**18.38**	**2.4**	**2.9**	**-0.3**	**-0.5**
Solids	1.46	2.06	1.21	1.60	1.29	0.69	0.69	0.80	0.70	-1.9	0.7	-6.1	0.2
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	5.01	4.96	5.80	5.80	8.70	8.80	9.08	8.18	8.23	1.5	4.1	0.4	-1.0
Renewable energy sources	5.37	6.17	7.98	9.46	9.94	9.86	9.63	9.30	9.46	4.0	2.2	-0.3	-0.2
Hydro	0.93	1.11	1.26	1.15	1.15	1.15	1.15	1.15	1.15	3.0	-0.9	0.0	0.0
Biomass	1.49	1.57	1.79	2.33	2.54	2.46	2.52	2.36	2.44	1.8	3.6	-0.1	-0.3
Waste	2.94	3.49	4.92	5.97	6.20	6.12	5.82	5.57	5.61	5.3	2.3	-0.6	-0.4
Wind	0.00	0.00	0.01	0.01	0.05	0.12	0.15	0.21	0.24		21.7	12.0	5.1
Solar and others	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01			7.0	3.3
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**18.03**	**15.42**	**18.54**	**18.56**	**18.08**	**19.01**	**19.39**	**20.33**	**20.29**	**0.3**	**-0.2**	**0.7**	**0.5**
Solids	4.38	3.77	3.53	3.55	2.61	4.53	5.08	5.99	6.15	-2.1	-3.0	6.9	1.9
Oil	10.48	8.21	10.56	9.96	9.99	9.95	9.83	9.62	9.41	0.1	-0.6	-0.2	-0.4
Crude oil and Feedstocks	8.89	8.55	12.14	10.61	10.65	10.63	10.56	10.36	10.17	3.2	-1.3	-0.1	-0.4
Oil products	1.59	-0.34	-1.58	-0.65	-0.67	-0.68	-0.72	-0.75	-0.76				
Natural gas	2.26	2.84	3.42	4.29	4.92	3.97	3.92	4.16	4.17	4.2	3.7	-2.2	0.6
Electricity	0.92	0.60	1.02	0.76	0.56	0.56	0.56	0.56	0.56	1.1	-5.8	0.0	0.0
Gross Inland Consumption	**28.56**	**28.84**	**32.61**	**34.70**	**37.24**	**37.56**	**37.96**	**37.74**	**37.77**	**1.3**	**1.3**	**0.2**	**-0.1**
Solids	5.07	5.95	5.05	5.16	3.90	5.22	5.76	6.79	6.85	-0.1	-2.5	4.0	1.7
Oil	9.94	8.33	9.34	9.24	9.21	9.15	9.00	8.75	8.51	-0.6	-0.1	-0.2	-0.6
Natural gas	2.26	2.84	3.42	4.29	4.92	3.97	3.92	4.16	4.17	4.2	3.7	-2.2	0.6
Nuclear	5.01	4.96	5.80	5.80	8.70	8.80	9.08	8.18	8.23	1.5	4.1	0.4	-1.0
Electricity	0.92	0.60	1.02	0.76	0.56	0.56	0.56	0.56	0.56	1.1	-5.8	0.0	0.0
Renewable energy forms	5.37	6.17	7.98	9.46	9.94	9.86	9.63	9.30	9.46	4.0	2.2	-0.3	-0.2
as % in Gross Inland Consumption													
Solids	17.8	20.6	15.5	14.9	10.5	13.9	15.2	18.0	18.1				
Oil	34.8	28.9	28.6	26.6	24.7	24.4	23.7	23.2	22.5				
Natural gas	7.9	9.8	10.5	12.4	13.2	10.6	10.3	11.0	11.0				
Nuclear	17.5	17.2	17.8	16.7	23.4	23.4	23.9	21.7	21.8				
Renewable energy forms	18.8	21.4	24.5	27.3	26.7	26.2	25.4	24.6	25.0				
Electricity Generation in TWhe	**54.37**	**63.87**	**69.98**	**78.05**	**86.29**	**89.03**	**92.90**	**95.50**	**98.03**	**2.6**	**2.1**	**0.7**	**0.5**
Nuclear	19.21	19.21	22.48	22.54	34.03	34.45	36.36	33.65	33.94	1.6	4.2	0.7	-0.7
Hydro & wind	10.86	12.92	14.74	13.49	13.89	14.74	15.07	15.82	16.19	3.1	-0.6	0.8	0.7
Thermal (incl. biomass)	24.30	31.74	32.77	42.02	38.38	39.84	41.46	46.03	47.90	3.0	1.6	0.8	1.5
Fuel Inputs for Thermal Power Generation (1)	**6.67**	**8.31**	**8.88**	**9.49**	**9.09**	**9.64**	**9.93**	**10.89**	**11.04**	**2.9**	**0.2**	**0.9**	**1.1**
Solids	3.05	3.90	3.17	3.43	2.16	3.52	4.07	5.16	5.30	0.4	-3.8	6.6	2.7
Oil (including refinery gas)	0.48	0.34	0.15	0.02	0.03	0.04	0.04	0.03	0.03	-10.9	-13.6	0.6	-1.6
Gas	1.06	1.60	2.13	1.86	2.46	1.89	1.96	2.31	2.31	7.2	1.4	-2.2	1.6
Biomass - Waste	2.09	2.47	3.42	4.18	4.44	4.19	3.86	3.39	3.40	5.1	2.6	-1.4	-1.2
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**12.10**	**13.99**	**15.34**	**14.73**	**14.77**	**13.95**	**13.89**	**13.73**	**13.61**	**2.4**	**-0.4**	**-0.6**	**-0.2**
Refineries	10.69	12.03	13.22	12.13	12.23	12.21	12.13	11.91	11.72	2.2	-0.8	-0.1	-0.3
District heating	0.61	0.54	0.79	1.29	1.19	0.39	0.28	0.28	0.29	2.5	4.3	-13.4	0.2
Biofuels and hydrogen production	0.00	0.00	0.00	0.01	0.04	0.07	0.13	0.20	0.28			11.6	7.7
Others	0.80	1.43	1.33	1.31	1.31	1.28	1.35	1.34	1.32	5.2	-0.1	0.3	-0.2
Energy Branch Consumption	**0.78**	**0.95**	**1.20**	**1.19**	**1.23**	**1.17**	**1.17**	**1.21**	**1.19**	**4.4**	**0.2**	**-0.5**	**0.2**
Non-Energy Uses	**1.41**	**0.83**	**0.84**	**0.86**	**0.92**	**0.95**	**0.96**	**0.97**	**0.98**	**-5.0**	**0.9**	**0.4**	**0.2**
Final Energy Demand	**21.05**	**21.77**	**24.11**	**25.29**	**26.29**	**26.70**	**26.93**	**26.85**	**26.85**	**1.4**	**0.9**	**0.2**	**0.0**
by sector													
Industry (1)	8.98	9.71	11.71	12.07	12.40	12.62	12.53	12.30	12.09	2.7	0.6	0.1	-0.4
energy intensive industries	7.74	8.30	9.81	10.07	10.17	10.23	10.04	9.75	9.46	2.4	0.4	-0.1	-0.6
other industrial sectors	1.25	1.41	1.91	2.00	2.24	2.39	2.49	2.55	2.63	4.3	1.6	1.1	0.6
Residential	5.48	5.61	4.92	5.14	5.36	5.51	5.58	5.65	5.78	-1.1	0.9	0.4	0.3
Tertiary	2.32	2.35	3.09	3.32	3.59	3.63	3.79	3.95	4.13	2.9	1.5	0.6	0.8
Transport	4.27	4.11	4.39	4.76	4.93	4.94	5.03	4.95	4.85	0.3	1.2	0.2	-0.4
by fuel (1)													
Solids	1.53	1.29	1.07	0.93	0.94	0.94	0.93	0.88	0.81	-3.5	-1.3	0.0	-1.4
Oil	7.87	7.65	7.81	7.62	7.77	7.71	7.63	7.43	7.25	-0.1	-0.1	-0.2	-0.5
Gas	1.46	1.49	1.36	1.91	1.92	2.38	2.38	2.28	2.35	-0.7	3.5	2.1	-0.1
Electricity	5.07	5.62	6.49	6.87	7.33	7.54	7.84	8.00	8.20	2.5	1.2	0.7	0.5
Heat (from CHP and District Heating)	2.94	3.23	4.31	4.05	4.33	4.07	4.07	4.16	4.12	3.9	0.1	-0.6	0.1
Other	2.19	2.50	3.07	3.89	3.99	4.06	4.09	4.10	4.12	3.5	2.7	0.2	0.1
CO_2 Emissions (Mt of CO_2)	**53.2**	**56.2**	**54.5**	**55.4**	**51.4**	**54.0**	**55.7**	**59.6**	**59.0**	**0.2**	**-0.6**	**0.8**	**0.6**
Electricity and Steam production	16.9	21.8	20.2	21.4	17.1	19.0	21.1	26.3	26.8	1.8	-1.6	2.2	2.4
Energy Branch	1.4	1.7	2.3	2.2	2.1	1.9	1.8	1.8	1.6	5.5	-1.0	-1.4	-1.4
Industry	13.9	12.9	12.6	13.0	12.8	13.7	13.4	12.7	12.4	-0.9	0.1	0.4	-0.8
Residential	6.4	6.1	3.5	3.0	3.0	3.0	2.9	2.8	2.7	-5.8	-1.5	-0.3	-0.7
Tertiary	2.1	1.8	2.9	2.0	2.0	1.9	1.8	1.8	1.8	3.3	-3.7	-0.8	-0.3
Transport	12.5	12.0	12.9	14.0	14.5	14.5	14.6	14.2	13.7	0.3	1.1	0.1	-0.6
CO_2 Emissions Index (1990=100)	**100.0**	**105.6**	**102.4**	**104.2**	**96.7**	**101.5**	**104.7**	**112.1**	**111.0**				

See explanations on page 219

Source: PRIMES Model

FINLAND: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	4.99	5.11	5.18	5.23	5.27	5.30	5.31	5.32	5.29	0.4	0.2	0.1	0.0
GDP (in 000 MEuro'00)	106.0	102.5	131.1	148.0	167.9	182.7	197.8	213.6	230.1	2.1	2.5	1.6	1.5
Gross Inl. Cons./GDP (toe/MEuro'00)	269.4	281.4	248.7	234.4	221.8	205.6	191.9	176.7	164.2	-0.8	-1.1	-1.4	-1.6
Gross Inl. Cons./Capita (toe/inhabitant)	5.73	5.65	6.30	6.64	7.07	7.09	7.14	7.10	7.14	1.0	1.2	0.1	0.0
Electricity Generated/Capita (kWh/inhabitant)	10904	12505	13519	14931	16381	16811	17481	17956	18521	2.2	1.9	0.7	0.6
Carbon intensity (t of CO_2/toe of GIC)	1.86	1.95	1.67	1.60	1.38	1.44	1.47	1.58	1.56	-1.1	-1.9	0.6	0.6
CO_2 Emissions/Capita (t of CO_2/inhabitant)	10.67	10.99	10.52	10.61	9.77	10.20	10.48	11.21	11.15	-0.1	-0.7	0.7	0.6
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	501.7	547.8	415.2	374.5	306.4	295.6	281.5	279.0	256.5	-1.9	-3.0	-0.8	-0.9
Import Dependency %	61.9	52.9	55.7	52.4	47.6	49.6	50.0	52.7	52.5				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	95.6	77.8	69.6	62.3	58.0	53.4	48.7	44.6	-2.5	-2.2	-1.5	-1.8
Residential (Energy on Private Income)	100.0	107.4	78.5	73.3	67.8	62.7	57.6	53.3	50.1	-2.4	-1.5	-1.6	-1.4
Tertiary (Energy on Value added)	100.0	105.4	113.1	107.4	101.8	94.3	90.4	86.4	83.2	1.2	-1.0	-1.2	-0.8
Transport (Energy on GDP)	100.0	99.6	83.2	79.9	73.0	67.3	63.2	57.7	52.4	-1.8	-1.3	-1.4	-1.9
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.22	0.24	0.19	0.17	0.12	0.14	0.15	0.18	0.18	-1.1	-4.4	1.9	2.0
Final energy demand (t of CO_2/toe)	1.66	1.50	1.33	1.26	1.23	1.24	1.21	1.17	1.14	-2.2	-0.8	-0.1	-0.6
Industry	1.55	1.32	1.08	1.07	1.03	1.09	1.07	1.03	1.02	-3.5	-0.4	0.3	-0.4
Residential	1.17	1.08	0.72	0.58	0.56	0.55	0.53	0.50	0.47	-4.8	-2.4	-0.7	-1.0
Tertiary	0.90	0.75	0.93	0.59	0.55	0.53	0.48	0.46	0.43	0.4	-5.1	-1.3	-1.1
Transport	2.94	2.93	2.94	2.94	2.93	2.92	2.90	2.87	2.83	0.0	0.0	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**15.69**	**17.24**	**16.48**	**18.29**	**19.04**	**20.09**	**21.20**	**22.16**		**0.6**	**0.9**	**1.0**
Nuclear		3.01	3.36	3.36	4.66	4.66	4.81	4.93	4.93		3.3	0.3	0.2
Hydro (pumping excluded)		2.95	3.06	3.06	3.08	3.09	3.09	3.09	3.09		0.1	0.0	0.0
Wind and solar		0.00	0.04	0.04	0.24	0.61	0.75	1.06	1.22		19.7	11.8	5.0
Thermal		9.72	10.78	10.02	10.30	10.69	11.45	12.13	12.93		-0.5	1.1	1.2
of which cogeneration units		*5.93*	*6.44*	*5.80*	*5.60*	*7.00*	*7.63*	*7.73*	*7.92*		*-1.4*	*3.1*	*0.4*
Open cycle(incl. biomass-waste)		8.10	8.70	8.05	6.02	4.23	3.65	3.02	3.12		-3.6	-4.9	-1.6
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.07	1.61	2.58	3.36	4.06			44.5	4.6
Gas Turbines Combined Cycle		0.62	1.09	1.09	1.82	2.50	2.74	3.34	3.34		5.3	4.2	2.0
Small Gas Turbines		1.00	1.00	0.88	2.40	2.35	2.48	2.41	2.41		9.2	0.3	-0.3
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		38.7	42.3	41.0	39.7	39.2	39.6	40.0	41.0				
Load factor for gross electric capacities (%)		46.5	46.3	54.1	53.9	53.4	52.8	51.4	50.5				
CHP indicator (% of electricity from CHP)		33.5	36.6	33.2	34.4	39.4	39.4	41.2	41.0				
Non fossil fuels in electricity generation (%)		62.1	68.0	66.1	74.5	72.5	70.4	64.1	63.5				
nuclear		30.1	32.1	28.9	39.4	38.7	39.1	35.2	34.6				
renewable energy forms		32.0	35.9	37.2	35.1	33.8	31.3	28.9	28.9				
of which waste		*10.3*	*13.0*	*17.0*	*15.9*	*14.7*	*12.5*	*10.7*	*10.7*				
Transport sector													
Passenger transport activity (Gpkm)	**70.7**	**69.6**	**77.2**	**81.5**	**85.4**	**89.3**	**93.2**	**97.0**	**100.8**	**0.9**	**1.0**	**0.9**	**0.8**
public road transport	8.5	8.0	7.7	7.5	7.3	7.2	7.1	7.1	7.0	-1.0	-0.5	-0.3	-0.2
private cars and motorcycles	52.0	50.9	56.6	59.9	62.6	65.0	67.3	69.4	71.3	0.9	1.0	0.7	0.6
rail	3.7	3.6	3.9	4.0	3.9	4.0	4.2	4.2	4.4	0.6	0.1	0.5	0.5
aviation	3.7	3.9	5.7	6.5	7.7	8.9	10.3	11.8	13.3	4.3	3.1	3.0	2.6
inland navigation	2.8	3.3	3.4	3.6	3.9	4.1	4.3	4.6	4.8	1.9	1.4	1.1	1.1
travel per person (km per capita)	**14176**	**13626**	**14923**	**15583**	**16216**	**16853**	**17532**	**18245**	**19051**	**0.5**	**0.8**	**0.8**	**0.8**
Freight transport activity (Gtkm)	**37.8**	**36.0**	**40.5**	**45.1**	**50.2**	**54.2**	**58.4**	**62.8**	**67.4**	**0.7**	**2.2**	**1.5**	**1.4**
trucks	26.3	23.2	27.5	31.7	36.6	40.1	43.9	47.9	52.1	0.4	2.9	1.8	1.7
rail	8.4	9.6	10.1	10.4	10.6	11.0	11.4	11.7	12.2	1.9	0.4	0.8	0.7
inland navigation	3.2	3.2	2.9	2.9	3.1	3.1	3.1	3.1	3.1	-0.7	0.5	0.0	0.0
freight activity per unit of GDP (tkm/000 Euro'00)	**357**	**351**	**309**	**304**	**299**	**297**	**295**	**294**	**293**	**-1.4**	**-0.3**	**-0.1**	**-0.1**
Energy demand in transport (Mtoe)	**4.27**	**4.11**	**4.39**	**4.76**	**4.93**	**4.94**	**5.03**	**4.95**	**4.85**	**0.3**	**1.2**	**0.2**	**-0.4**
public road transport	0.17	0.15	0.12	0.11	0.11	0.11	0.10	0.09	0.08	-3.8	-0.7	-1.1	-1.7
private cars and motorcycles	2.30	2.20	2.29	2.42	2.31	2.15	2.14	2.05	1.93	0.0	0.1	-0.8	-1.0
trucks	1.15	1.15	1.26	1.45	1.67	1.81	1.90	1.98	2.02	0.9	2.9	1.3	0.6
rail	0.10	0.10	0.09	0.09	0.08	0.07	0.05	0.05	0.04	-0.6	-1.3	-4.8	-1.4
aviation	0.46	0.41	0.51	0.56	0.63	0.67	0.71	0.66	0.65	0.9	2.2	1.3	-0.9
inland navigation	0.07	0.09	0.12	0.12	0.13	0.13	0.13	0.13	0.13	5.2	0.7	0.1	-0.2
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	42.7	40.9	38.8	38.9	36.6	33.6	32.3	29.5	27.1	-1.0	-0.6	-1.2	-1.8
freight transport (toe/Mtkm)	32.9	35.0	34.4	35.2	35.9	35.8	34.5	33.3	31.5	0.4	0.4	-0.4	-0.9

Source: PRIMES Model

FRANCE: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**108.06**	**123.15**	**130.45**	**140.54**	**141.08**	**146.91**	**146.84**	**150.64**	**154.51**	**1.9**	**0.8**	**0.4**	**0.5**
Solids	7.63	5.36	2.27	2.31	0.24	0.14	0.03	0.01	0.00	-11.4	-20.2	-17.8	-19.9
Oil	3.49	3.29	2.47	1.25	1.00	0.50	0.00	0.00	0.00	-3.4	-8.7		
Natural gas	2.42	2.79	1.50	0.55	0.00	0.00	0.00	0.00	0.00	-4.7			
Nuclear	79.13	93.99	107.09	117.92	119.69	125.67	125.56	129.09	133.06	3.1	1.1	0.5	0.6
Renewable energy sources	15.39	17.72	17.12	18.51	20.15	20.60	21.24	21.54	21.45	1.1	1.6	0.5	0.1
Hydro	4.64	6.32	5.80	5.81	6.24	6.20	6.23	5.88	5.81	2.3	0.7	0.0	-0.7
Biomass	9.12	9.35	9.28	10.17	10.67	10.87	10.91	11.23	11.25	0.2	1.4	0.2	0.3
Waste	1.50	1.90	1.87	2.33	2.45	2.70	2.73	2.74	2.52	2.3	2.7	1.1	-0.8
Wind	0.00	0.00	0.01	0.04	0.63	0.66	1.18	1.39	1.30		57.7	6.5	1.0
Solar and others	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.13	0.40	7.7	1.9	0.7	28.3
Geothermal	0.12	0.13	0.12	0.13	0.14	0.14	0.17	0.16	0.16	-0.1	1.1	1.8	-0.1
Net Imports	**119.76**	**115.30**	**132.81**	**146.63**	**155.82**	**161.51**	**171.81**	**171.28**	**174.96**	**1.0**	**1.6**	**1.0**	**0.2**
Solids	13.00	9.01	13.19	12.41	14.05	13.99	19.28	18.64	21.17	0.1	0.6	3.2	0.9
Oil	86.56	85.42	90.44	98.64	98.44	100.54	102.07	101.02	103.31	0.4	0.9	0.4	0.1
Crude oil and Feedstocks	76.01	78.82	84.37	88.54	88.65	90.60	92.55	91.62	93.99	1.0	0.5	0.4	0.2
Oil products	10.55	6.60	6.07	10.10	9.79	9.94	9.52	9.40	9.32	-5.4	4.9	-0.3	-0.2
Natural gas	24.10	26.88	35.15	40.91	48.22	51.75	55.17	56.30	55.16	3.8	3.2	1.4	0.0
Electricity	-3.91	-6.01	-5.97	-5.33	-4.89	-4.78	-4.72	-4.69	-4.67				
Gross Inland Consumption	**222.86**	**235.45**	**256.93**	**283.94**	**293.51**	**304.87**	**314.93**	**318.02**	**325.38**	**1.4**	**1.3**	**0.7**	**0.3**
Solids	19.96	15.29	15.18	14.72	14.29	14.13	19.32	18.66	21.17	-2.7	-0.6	3.1	0.9
Oil	87.67	85.50	88.37	96.66	96.06	97.49	98.36	97.12	99.21	0.1	0.8	0.2	0.1
Natural gas	24.61	28.96	35.14	41.46	48.22	51.75	55.17	56.30	55.16	3.6	3.2	1.4	0.0
Nuclear	79.13	93.99	107.09	117.92	119.69	125.67	125.56	129.09	133.06	3.1	1.1	0.5	0.6
Electricity	-3.91	-6.01	-5.97	-5.33	-4.89	-4.78	-4.72	-4.69	-4.67				
Renewable energy forms	15.39	17.72	17.12	18.51	20.15	20.60	21.24	21.54	21.45	1.1	1.6	0.5	0.1
as % in Gross Inland Consumption													
Solids	9.0	6.5	5.9	5.2	4.9	4.6	6.1	5.9	6.5				
Oil	39.3	36.3	34.4	34.0	32.7	32.0	31.2	30.5	30.5				
Natural gas	11.0	12.3	13.7	14.6	16.4	17.0	17.5	17.7	17.0				
Nuclear	35.5	39.9	41.7	41.5	40.8	41.2	39.9	40.6	40.9				
Renewable energy forms	6.9	7.5	6.7	6.5	6.9	6.8	6.7	6.8	6.6				
Electricity Generation in TWhe	**416.08**	**490.05**	**535.68**	**582.77**	**624.93**	**661.43**	**709.02**	**738.92**	**774.40**	**2.6**	**1.6**	**1.3**	**0.9**
Nuclear	314.02	377.16	415.09	457.78	464.77	488.08	489.23	520.09	549.98	2.8	1.1	0.5	1.2
Hydro & wind	53.91	73.44	67.58	68.04	79.90	79.81	86.14	85.78	87.01	2.3	1.7	0.8	0.1
Thermal (incl. biomass)	48.14	39.45	53.02	56.95	80.25	93.54	133.66	133.05	137.41	1.0	4.2	5.2	0.3
Fuel Inputs for Thermal Power Generation [1]	**13.94**	**11.12**	**15.35**	**16.37**	**19.76**	**21.36**	**27.33**	**27.19**	**28.44**	**1.0**	**2.6**	**3.3**	**0.4**
Solids	7.67	5.60	6.37	6.58	6.08	6.67	11.93	11.50	14.36	-1.8	-0.5	7.0	1.9
Oil (including refinery gas)	2.57	1.21	1.61	1.76	1.38	0.61	0.33	0.18	0.07	-4.6	-1.5	-13.3	-14.4
Gas	2.24	2.20	5.25	5.39	10.16	11.66	12.60	12.99	11.70	8.9	6.8	2.2	-0.7
Biomass - Waste	1.46	2.12	2.13	2.63	2.14	2.41	2.46	2.50	2.30	3.8	0.1	1.4	-0.7
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02				0.0
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**88.53**	**90.43**	**97.36**	**103.31**	**104.61**	**106.24**	**108.54**	**108.27**	**110.77**	**1.0**	**0.7**	**0.4**	**0.2**
Refineries	79.63	83.25	90.35	95.86	96.10	97.84	99.35	98.76	101.21	1.3	0.6	0.3	0.2
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.10	0.37	1.21	2.04	2.34	3.08	3.61	3.95		18.7	4.2	2.5
Others	8.90	7.08	6.65	6.24	6.47	6.06	6.11	5.91	5.60	-2.9	-0.3	-0.6	-0.9
Energy Branch Consumption	**9.09**	**10.33**	**10.66**	**11.13**	**11.20**	**11.42**	**11.67**	**11.95**	**12.39**	**1.6**	**0.5**	**0.4**	**0.6**
Non-Energy Uses	**13.08**	**16.59**	**15.65**	**16.44**	**17.05**	**17.56**	**17.72**	**17.77**	**17.74**	**1.8**	**0.9**	**0.4**	**0.0**
Final Energy Demand	**135.67**	**141.03**	**149.75**	**162.33**	**171.59**	**178.25**	**185.59**	**189.91**	**193.62**	**1.0**	**1.4**	**0.8**	**0.4**
by sector													
Industry [1]	36.65	36.89	35.08	39.10	42.40	44.81	46.84	48.11	49.27	-0.4	1.9	1.0	0.5
energy intensive industries	24.62	22.21	22.24	24.64	26.24	27.18	27.88	28.01	27.92	-1.0	1.7	0.6	0.0
other industrial sectors	12.03	14.68	12.83	14.47	16.16	17.64	18.96	20.11	21.36	0.6	2.3	1.6	1.2
Residential	36.54	36.29	38.47	40.91	43.03	44.64	45.88	46.35	46.76	0.5	1.1	0.6	0.2
Tertiary	20.58	23.88	24.93	26.61	28.31	29.23	30.62	31.55	32.55	1.9	1.3	0.8	0.6
Transport	41.91	43.97	51.27	55.71	57.85	59.57	62.26	63.89	65.04	2.0	1.2	0.7	0.4
by fuel [1]													
Solids	8.71	6.75	5.50	5.18	5.19	4.62	4.50	4.31	4.05	-4.5	-0.6	-1.4	-1.0
Oil	66.92	67.61	71.13	73.75	75.70	77.49	79.26	80.34	80.76	0.6	0.6	0.5	0.2
Gas	22.88	26.12	29.21	35.54	37.48	39.56	41.81	42.74	42.95	2.5	2.5	1.1	0.3
Electricity	25.96	29.46	33.11	37.01	41.01	44.15	48.02	50.31	53.04	2.5	2.2	1.6	1.0
Heat (from CHP and District Heating)	1.91	1.92	1.95	1.98	3.06	3.34	3.52	3.94	4.90	0.2	4.6	1.4	3.3
Other	9.29	9.18	8.85	8.87	9.16	9.09	8.48	8.27	7.92	-0.5	0.3	-0.8	-0.7
CO_2 Emissions (Mt of CO_2)	**354.1**	**345.2**	**368.9**	**389.9**	**406.4**	**417.2**	**447.9**	**449.6**	**457.3**	**0.4**	**1.0**	**1.0**	**0.2**
Electricity and Steam production	40.1	27.6	39.3	45.0	53.1	56.4	78.5	77.2	85.0	-0.2	3.1	4.0	0.8
Energy Branch	16.8	19.1	19.5	19.6	19.2	19.1	19.1	18.7	18.9	1.5	-0.2	0.0	-0.1
Industry	80.6	76.3	65.9	68.2	69.8	71.6	73.8	74.0	73.0	-2.0	0.6	0.6	-0.1
Residential	57.6	52.7	53.7	54.9	57.3	58.9	60.3	59.9	59.7	-0.7	0.6	0.5	-0.1
Tertiary	36.9	40.9	40.8	41.3	41.7	41.0	39.5	39.2	37.5	1.0	0.2	-0.5	-0.5
Transport	122.1	128.7	149.7	161.0	165.4	170.2	176.7	180.5	183.3	2.1	1.0	0.7	0.4
CO_2 Emissions Index (1990=100)	**100.0**	**97.5**	**104.2**	**110.1**	**114.8**	**117.8**	**126.5**	**126.9**	**129.1**				

See explanations on page 219

Source: PRIMES Model

FRANCE: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	58.17	59.43	60.59	61.98	63.05	63.90	64.56	65.07	65.42	0.4	0.4	0.2	0.1
GDP (in 000 MEuro'00)	1177.7	1241.6	1416.9	1598.6	1791.9	2004.7	2235.2	2482.4	2748.8	1.9	2.4	2.2	2.1
Gross Inl. Cons./GDP (toe/MEuro'00)	189.2	189.6	181.3	177.6	163.8	152.1	140.9	128.1	118.4	-0.4	-1.0	-1.5	-1.7
Gross Inl. Cons./Capita (toe/inhabitant)	3.83	3.96	4.24	4.58	4.65	4.77	4.88	4.89	4.97	1.0	0.9	0.5	0.2
Electricity Generated/Capita (kWh/inhabitant)	7153	8246	8841	9403	9911	10351	10982	11355	11838	2.1	1.1	1.0	0.8
Carbon intensity (t of CO_2/toe of GIC)	1.59	1.47	1.44	1.37	1.38	1.37	1.42	1.41	1.41	-1.0	-0.4	0.3	-0.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	6.09	5.81	6.09	6.29	6.45	6.53	6.94	6.91	6.99	0.0	0.6	0.7	0.1
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	300.7	278.0	260.4	243.9	226.8	208.1	200.4	181.1	166.4	-1.4	-1.4	-1.2	-1.8
Import Dependency %	53.1	48.5	51.1	51.1	52.5	52.4	53.9	53.2	53.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	95.6	77.0	73.6	69.6	65.0	60.3	55.5	51.2	-2.6	-1.0	-1.4	-1.6
Residential (Energy on Private Income)	100.0	96.0	91.7	86.0	80.9	75.4	70.2	64.3	59.3	-0.9	-1.2	-1.4	-1.7
Tertiary (Energy on Value added)	100.0	110.5	101.5	95.3	90.0	82.7	77.3	71.5	66.3	0.1	-1.2	-1.5	-1.5
Transport (Energy on GDP)	100.0	99.5	101.7	97.9	90.7	83.5	78.3	72.3	66.5	0.2	-1.1	-1.5	-1.6
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.10	0.06	0.07	0.07	0.08	0.08	0.10	0.10	0.10	-2.7	0.9	2.7	-0.2
Final energy demand (t of CO_2/toe)	2.19	2.12	2.07	2.00	1.95	1.92	1.89	1.86	1.83	-0.6	-0.6	-0.3	-0.3
Industry	2.20	2.07	1.88	1.74	1.65	1.60	1.58	1.54	1.48	-1.6	-1.3	-0.4	-0.6
Residential	1.58	1.45	1.40	1.34	1.33	1.32	1.31	1.29	1.28	-1.2	-0.5	-0.1	-0.3
Tertiary	1.79	1.71	1.64	1.55	1.47	1.40	1.29	1.24	1.15	-0.9	-1.0	-1.3	-1.1
Transport	2.91	2.93	2.92	2.89	2.86	2.86	2.84	2.83	2.82	0.0	-0.2	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**108.18**	**114.95**	**117.82**	**125.51**	**133.24**	**147.28**	**158.03**	**171.94**		**0.9**	**1.6**	**1.6**
Nuclear		60.85	65.68	65.68	65.68	65.68	62.95	70.97	77.21		0.0	-0.4	2.1
Hydro (pumping excluded)		21.27	21.27	21.33	21.42	21.42	21.58	21.58	21.58		0.1	0.1	0.0
Wind and solar		0.01	0.08	0.22	2.87	3.16	6.32	8.27	10.08		43.7	8.2	4.8
Thermal		26.05	27.92	30.59	35.54	42.98	56.43	57.20	63.06		2.4	4.7	1.1
of which cogeneration units		*1.66*	*2.86*	*4.52*	*11.21*	*13.37*	*13.60*	*14.87*	*18.75*		*14.7*	*1.9*	*3.3*
Open cycle(incl. biomass-waste)		24.47	25.68	25.68	21.78	23.73	23.92	23.23	24.17		-1.6	0.9	0.1
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.37	3.04	14.84	14.84	18.31			44.8	2.1
Gas Turbines Combined Cycle		0.12	0.26	1.43	8.26	10.24	12.08	13.39	16.32		41.4	3.9	3.1
Small Gas Turbines		1.47	1.99	3.48	5.13	5.96	5.59	5.74	4.25		10.0	0.9	-2.7
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01				0.0
Indicators													
Efficiency for thermal electricity production (%)		34.9	30.4	31.4	36.5	39.3	43.6	43.8	43.4				
Load factor for gross electric capacities (%)		51.7	53.2	56.5	56.8	56.7	55.0	53.4	51.4				
CHP indicator (% of electricity from CHP)		1.8	2.5	3.3	5.3	5.5	5.3	5.7	6.4				
Non fossil fuels in electricity generation (%)		93.2	91.3	91.3	88.1	86.9	82.2	83.1	83.2				
nuclear		77.0	77.5	78.6	74.4	73.8	69.0	70.4	71.0				
renewable energy forms		16.3	13.8	12.7	13.8	13.1	13.2	12.7	12.2				
of which waste		*0.7*	*0.7*	*0.6*	*0.7*	*0.9*	*0.8*	*0.8*	*0.7*				
Transport sector													
Passenger transport activity (Gpkm)	**735.1**	**781.9**	**868.7**	**937.4**	**998.4**	**1061.5**	**1127.7**	**1194.7**	**1263.8**	**1.7**	**1.4**	**1.2**	**1.1**
public road transport	41.3	41.6	45.3	41.3	42.1	44.2	46.1	48.2	50.3	0.9	-0.7	0.9	0.9
private cars and motorcycles	599.8	652.5	711.9	779.3	830.5	878.8	925.6	974.0	1020.4	1.7	1.6	1.1	1.0
rail	73.5	63.6	79.7	82.5	84.8	88.9	96.0	101.0	108.2	0.8	0.6	1.3	1.2
aviation	18.0	21.2	29.0	31.2	37.6	46.0	55.9	67.1	80.2	4.9	2.6	4.0	3.7
inland navigation	2.5	3.0	2.8	3.1	3.4	3.6	3.9	4.3	4.7	1.0	1.8	1.6	1.7
travel per person (km per capita)	**12637**	**13156**	**14337**	**15125**	**15835**	**16613**	**17466**	**18359**	**19319**	**1.3**	**1.0**	**1.0**	**1.0**
Freight transport activity (Gtkm)	**258.5**	**287.3**	**336.1**	**372.0**	**410.6**	**452.8**	**499.9**	**550.2**	**604.7**	**2.7**	**2.0**	**2.0**	**1.9**
trucks	193.9	227.1	266.5	300.5	336.6	374.9	416.6	463.2	512.1	3.2	2.4	2.2	2.1
rail	50.7	48.1	55.4	57.6	59.4	62.2	66.4	69.0	73.4	0.9	0.7	1.1	1.0
inland navigation	13.9	12.1	14.2	13.8	14.6	15.7	16.8	18.0	19.2	0.2	0.3	1.4	1.3
freight activity per unit of GDP (tkm/000 Euro'00)	**219**	**231**	**237**	**233**	**229**	**226**	**224**	**222**	**220**	**0.8**	**-0.3**	**-0.2**	**-0.2**
Energy demand in transport (Mtoe)	**41.91**	**43.97**	**51.27**	**55.71**	**57.85**	**59.57**	**62.26**	**63.89**	**65.04**	**2.0**	**1.2**	**0.7**	**0.4**
public road transport	0.78	0.78	0.80	0.73	0.73	0.74	0.73	0.71	0.67	0.3	-0.9	0.0	-0.9
private cars and motorcycles	19.97	20.20	22.37	24.41	23.81	22.68	22.98	22.38	21.39	1.1	0.6	-0.4	-0.7
trucks	15.42	16.32	19.24	21.67	24.24	26.68	28.49	30.29	31.32	2.2	2.3	1.6	1.0
rail	1.15	1.22	1.37	1.38	1.25	1.19	1.07	1.00	1.01	1.8	-0.9	-1.6	-0.5
aviation	3.87	4.72	6.71	6.75	7.01	7.42	8.09	8.57	9.67	5.7	0.4	1.5	1.8
inland navigation	0.72	0.73	0.77	0.76	0.81	0.86	0.90	0.94	0.98	0.8	0.4	1.1	0.9
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	34.7	34.1	35.6	35.2	32.6	29.9	29.0	27.2	25.8	0.3	-0.9	-1.2	-1.2
freight transport (toe/Mtkm)	63.3	60.1	60.4	61.1	61.7	61.4	59.2	57.0	53.7	-0.5	0.2	-0.4	-1.0

Source: PRIMES Model

GERMANY: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)

Mtoe	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Primary Production	**185.90**	**140.46**	**132.07**	**127.01**	**114.73**	**97.73**	**79.21**	**64.74**	**63.66**	**-3.4**	**-1.4**	**-3.6**	**-2.2**
Solids	125.04	78.80	59.57	53.39	46.36	37.93	38.41	31.56	28.83	-7.1	-2.5	-1.9	-2.8
Oil	3.75	3.21	3.45	2.20	1.70	1.25	0.98	0.77	0.60	-0.8	-6.8	-5.4	-4.8
Natural gas	13.73	14.81	15.80	14.60	13.00	11.85	10.60	9.00	7.90	1.4	-1.9	-2.0	-2.9
Nuclear	37.67	37.32	43.75	44.41	37.56	28.22	8.10	0.00	0.00	1.5	-1.5	-14.2	
Renewable energy sources	5.71	6.31	9.50	12.41	16.11	18.48	21.12	23.41	26.32	5.2	5.4	2.7	2.2
Hydro	1.38	1.70	1.99	2.04	2.06	2.24	2.27	2.28	2.29	3.7	0.3	1.0	0.1
Biomass	2.72	2.79	4.97	6.02	6.75	7.63	8.87	10.92	12.64	6.2	3.1	2.8	3.6
Waste	1.58	1.62	1.64	2.23	2.65	2.91	3.21	2.70	2.66	0.4	4.9	1.9	-1.9
Wind	0.01	0.15	0.80	1.76	4.08	4.89	5.77	6.41	7.31	62.9	17.6	3.5	2.4
Solar and others	0.01	0.04	0.08	0.37	0.56	0.79	1.00	1.09	1.42	25.0	21.6	5.9	3.6
Geothermal	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	3.2	-2.8	-6.3	-5.9
Net Imports	**166.85**	**195.15**	**201.85**	**221.62**	**235.25**	**249.12**	**265.49**	**278.36**	**281.63**	**1.9**	**1.5**	**1.2**	**0.6**
Solids	4.84	10.99	18.76	24.52	29.56	31.21	38.28	44.19	47.83	14.5	4.7	2.6	2.3
Oil	120.13	130.81	125.96	127.40	128.97	129.03	129.81	127.42	122.81	0.5	0.2	0.1	-0.6
Crude oil and Feedstocks	88.50	101.17	101.80	100.30	102.48	103.09	104.51	103.31	99.84	1.4	0.1	0.2	-0.5
Oil products	31.62	29.64	24.17	27.10	26.49	25.94	25.30	24.11	22.96	-2.7	0.9	-0.5	-1.0
Natural gas	41.82	52.93	56.87	69.34	76.27	88.34	96.84	106.19	110.41	3.1	3.0	2.4	1.3
Electricity	0.07	0.41	0.26	0.36	0.44	0.54	0.55	0.56	0.57	14.5	5.4	2.1	0.4
Gross Inland Consumption	**355.58**	**336.21**	**336.18**	**346.38**	**347.57**	**344.32**	**342.03**	**340.29**	**342.33**	**-0.6**	**0.3**	**-0.2**	**0.0**
Solids	133.10	92.17	80.95	77.91	75.91	69.14	76.69	75.75	76.67	-4.9	-0.6	0.1	0.0
Oil	124.04	133.57	129.86	127.34	128.27	127.74	128.12	125.39	120.46	0.5	-0.1	0.0	-0.6
Natural gas	55.00	66.42	71.85	83.94	89.27	100.19	107.44	115.19	118.31	2.7	2.2	1.9	1.0
Nuclear	37.67	37.32	43.75	44.41	37.56	28.22	8.10	0.00	0.00	1.5	-1.5	-14.2	
Electricity	0.07	0.41	0.26	0.36	0.44	0.54	0.55	0.56	0.57	14.5	5.4	2.1	0.4
Renewable energy forms	5.71	6.31	9.50	12.41	16.11	18.48	21.12	23.41	26.32	5.2	5.4	2.7	2.2
as % in Gross Inland Consumption													
Solids	37.4	27.4	24.1	22.5	21.8	20.1	22.4	22.3	22.4				
Oil	34.9	39.7	38.6	36.8	36.9	37.1	37.5	36.8	35.2				
Natural gas	15.5	19.8	21.4	24.2	25.7	29.1	31.4	33.9	34.6				
Nuclear	10.6	11.1	13.0	12.8	10.8	8.2	2.4	0.0	0.0				
Renewable energy forms	1.6	1.9	2.8	3.6	4.6	5.4	6.2	6.9	7.7				
Electricity Generation in TWhe	**546.23**	**531.68**	**568.69**	**593.30**	**611.65**	**632.63**	**650.27**	**671.74**	**697.05**	**0.4**	**0.7**	**0.6**	**0.7**
Nuclear	152.44	154.06	169.58	172.12	145.59	109.38	31.38	0.00	0.00	1.1	-1.5	-14.2	
Hydro & wind	16.17	21.46	32.55	44.20	71.58	83.26	93.82	101.39	114.81	7.2	8.2	2.7	2.0
Thermal (incl. biomass)	377.62	356.16	366.57	376.98	394.47	439.99	525.07	570.35	582.25	-0.3	0.7	2.9	1.0
Fuel Inputs for Thermal Power Generation [1]	**94.98**	**89.34**	**84.65**	**89.32**	**89.07**	**91.84**	**104.29**	**107.95**	**108.27**	**-1.1**	**0.5**	**1.6**	**0.4**
Solids	77.96	70.20	65.25	63.13	61.71	55.68	63.64	63.00	64.17	-1.8	-0.6	0.3	0.1
Oil (including refinery gas)	3.65	2.99	1.70	0.64	1.23	0.26	0.26	0.25	0.24	-7.3	-3.2	-14.5	-0.6
Gas	11.73	14.23	16.35	23.60	23.87	33.11	37.01	40.65	39.39	3.4	3.9	4.5	0.6
Biomass - Waste	1.63	1.92	1.34	1.95	2.25	2.79	3.38	4.05	4.47	-1.9	5.3	4.2	2.8
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**167.17**	**143.15**	**137.55**	**124.84**	**126.16**	**125.36**	**127.72**	**127.48**	**125.72**	**-1.9**	**-0.9**	**0.1**	**-0.2**
Refineries	106.66	116.75	119.95	111.08	112.21	112.15	113.39	111.93	108.74	1.2	-0.7	0.1	-0.4
District heating	8.97	6.37	2.09	0.71	1.36	0.87	1.00	1.35	1.46	-13.5	-4.2	-3.0	3.8
Biofuels and hydrogen production	0.00	0.05	0.13	0.45	0.70	1.08	2.26	3.40	4.84		18.2	12.4	7.9
Others	51.54	19.99	15.37	12.61	11.89	11.25	11.07	10.80	10.68	-11.4	-2.5	-0.7	-0.4
Energy Branch Consumption	**15.14**	**15.42**	**14.23**	**13.24**	**12.78**	**12.36**	**12.01**	**11.62**	**11.26**	**-0.6**	**-1.1**	**-0.6**	**-0.6**
Non-Energy Uses	**22.80**	**22.82**	**25.17**	**24.95**	**25.42**	**25.69**	**25.66**	**25.45**	**25.19**	**1.0**	**0.1**	**0.1**	**-0.2**
Final Energy Demand	**226.32**	**220.70**	**219.97**	**228.65**	**237.57**	**243.81**	**251.16**	**256.25**	**261.70**	**-0.3**	**0.8**	**0.6**	**0.4**
by sector													
Industry [1]	70.55	61.32	59.06	60.89	63.77	66.26	67.87	69.45	71.22	-1.8	0.8	0.6	0.5
energy intensive industries	49.52	42.77	41.15	41.98	43.13	43.92	44.09	44.15	44.16	-1.8	0.5	0.2	0.0
other industrial sectors	21.03	18.54	17.91	18.91	20.64	22.34	23.78	25.29	27.07	-1.6	1.4	1.4	1.3
Residential	57.95	63.00	62.17	62.49	63.39	63.90	64.01	64.25	64.75	0.7	0.2	0.1	0.1
Tertiary	39.01	33.51	32.98	33.58	34.67	35.69	37.25	38.97	41.25	-1.7	0.5	0.7	1.0
Transport	58.82	62.88	65.77	71.68	75.75	77.96	82.03	83.59	84.48	1.1	1.4	0.8	0.3
by fuel [1]													
Solids	34.72	13.84	10.53	8.96	8.64	8.14	7.74	7.48	7.15	-11.3	-2.0	-1.1	-0.8
Oil	96.02	103.33	97.32	99.24	101.88	103.69	106.92	107.41	107.85	0.1	0.5	0.5	0.1
Gas	41.08	49.81	55.18	59.29	61.37	62.21	63.48	65.21	68.09	3.0	1.1	0.3	0.7
Electricity	38.39	38.91	41.50	43.76	46.08	48.30	50.02	51.98	54.14	0.8	1.1	0.8	0.8
Heat (from CHP and District Heating)	13.43	12.31	10.88	11.77	13.36	14.74	16.10	17.26	17.67	-2.1	2.1	1.9	0.9
Other	2.68	2.50	4.57	5.63	6.24	6.73	6.90	6.90	6.80	5.5	3.2	1.0	-0.2
CO_2 Emissions (Mt of CO_2)	**943.0**	**863.2**	**809.8**	**815.6**	**823.6**	**820.0**	**869.8**	**877.2**	**881.1**	**-1.5**	**0.2**	**0.5**	**0.1**
Electricity and Steam production	373.2	335.5	302.9	315.3	313.0	305.5	347.1	353.1	354.9	-2.1	0.3	1.0	0.2
Energy Branch	25.6	28.8	27.1	23.8	23.0	22.4	22.0	21.3	20.2	0.6	-1.6	-0.4	-0.9
Industry	165.5	129.6	117.9	105.0	103.8	101.9	98.6	96.4	96.8	-3.3	-1.3	-0.5	-0.2
Residential	128.0	126.4	117.6	110.9	110.9	110.5	109.8	108.5	107.8	-0.8	-0.6	-0.1	-0.2
Tertiary	80.8	61.2	53.8	53.1	54.1	55.1	57.8	61.2	65.3	-4.0	0.1	0.7	1.2
Transport	169.9	181.8	190.6	207.5	218.8	224.7	234.4	236.6	236.3	1.2	1.4	0.7	0.1
CO_2 Emissions Index (1990=100)	**100.0**	**91.5**	**85.9**	**86.5**	**87.3**	**87.0**	**92.2**	**93.0**	**93.4**				

See explanations on page 219

Source: PRIMES Model

GERMANY: BASELINE SCENARIO	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
SUMMARY ENERGY BALANCE AND INDICATORS (B)										Annual % Change			
Main Energy System Indicators													
Population (Million)	79.43	81.66	82.19	82.76	83.20	83.24	83.06	82.58	81.75	0.3	0.1	0.0	-0.2
GDP (in 000 MEuro'00)	1733.7	1853.5	2025.5	2233.0	2494.5	2773.1	3069.2	3385.4	3723.1	1.6	2.1	2.1	1.9
Gross Inl. Cons./GDP (toe/MEuro'00)	205.1	181.4	166.0	155.1	139.3	124.2	111.4	100.5	91.9	-2.1	-1.7	-2.2	-1.9
Gross Inl. Cons./Capita (toe/inhabitant)	4.48	4.12	4.09	4.19	4.18	4.14	4.12	4.12	4.19	-0.9	0.2	-0.1	0.2
Electricity Generated/Capita (kWh/inhabitant)	6877	6511	6919	7169	7352	7600	7829	8134	8527	0.1	0.6	0.6	0.9
Carbon intensity (t of CO_2/toe of GIC)	2.65	2.57	2.41	2.35	2.37	2.38	2.54	2.58	2.57	-1.0	-0.2	0.7	0.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	11.87	10.57	9.85	9.86	9.90	9.85	10.47	10.62	10.78	-1.8	0.0	0.6	0.3
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	543.9	465.7	399.8	365.3	330.2	295.7	283.4	259.1	236.7	-3.0	-1.9	-1.5	-1.8
Import Dependency %	46.6	57.7	59.7	63.6	67.2	71.8	77.0	81.1	81.6				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	91.5	82.7	77.2	72.2	66.7	61.1	56.0	51.6	-1.9	-1.4	-1.6	-1.7
Residential (Energy on Private Income)	100.0	101.3	92.8	86.2	78.2	71.4	65.5	60.6	56.6	-0.7	-1.7	-1.8	-1.4
Tertiary (Energy on Value added)	100.0	76.2	64.8	58.5	53.4	49.1	46.1	43.5	41.7	-4.2	-1.9	-1.5	-1.0
Transport (Energy on GDP)	100.0	100.0	95.7	94.6	89.5	82.9	78.8	72.8	66.9	-0.4	-0.7	-1.3	-1.6
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.56	0.52	0.46	0.43	0.40	0.38	0.41	0.40	0.39	-1.9	-1.3	0.2	-0.5
Final energy demand (t of CO_2/toe)	2.40	2.26	2.18	2.08	2.05	2.02	1.99	1.96	1.93	-1.0	-0.6	-0.3	-0.3
Industry	2.35	2.11	2.00	1.73	1.63	1.54	1.45	1.39	1.36	-1.6	-2.0	-1.1	-0.7
Residential	2.21	2.01	1.89	1.77	1.75	1.73	1.72	1.69	1.66	-1.5	-0.8	-0.2	-0.3
Tertiary	2.07	1.83	1.63	1.58	1.56	1.54	1.55	1.57	1.58	-2.4	-0.4	-0.1	0.2
Transport	2.89	2.89	2.90	2.89	2.89	2.88	2.86	2.83	2.80	0.0	0.0	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe	**115.66**	**121.17**	**125.14**	**132.07**	**142.97**	**149.95**	**157.73**	**166.66**		**0.9**	**1.3**	**1.1**	
Nuclear	23.67	23.67	22.64	18.47	13.87	4.24	0.00	0.00		-2.5	-13.7		
Hydro (pumping excluded)	3.44	3.46	3.80	3.86	4.30	4.36	4.39	4.41		1.1	1.2	0.1	
Wind and solar	1.14	6.20	10.44	22.00	26.09	28.53	31.49	37.46		13.5	2.6	2.8	
Thermal	87.41	87.85	88.26	87.74	98.71	112.82	121.86	124.80		0.0	2.5	1.0	
of which cogeneration units	20.44	23.50	25.10	24.44	21.37	20.21	19.30	19.78		0.4	-1.9	-0.2	
Open cycle(incl. biomass-waste)	80.33	77.59	75.41	66.04	46.50	36.84	25.79	20.18		-1.6	-5.7	-5.8	
Supercritical Polyvalent/Clean Coal and Lignite	0.00	0.00	0.00	0.00	0.82	13.67	26.02	35.56				10.0	
Gas Turbines Combined Cycle	2.38	5.36	7.98	16.91	41.83	49.94	56.93	56.04		12.2	11.4	1.2	
Small Gas Turbines	4.70	4.89	4.88	4.79	9.56	12.37	13.12	13.01		-0.2	10.0	0.5	
Fuel Cells	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Indicators													
Efficiency for thermal electricity production (%)	34.2	35.5	37.5	39.5	42.9	44.9	47.2	48.0					
Load factor for gross electric capacities (%)	52.5	53.6	54.1	52.9	50.5	49.5	48.6	47.7					
CHP indicator (% of electricity from CHP)	9.0	9.2	10.7	11.8	11.5	11.5	11.5	12.4					
Non fossil fuels in electricity generation (%)	34.1	36.2	37.5	36.5	31.6	20.4	16.3	17.6					
nuclear	29.0	29.8	29.0	23.8	17.3	4.8	0.0	0.0					
renewable energy forms	5.1	6.4	8.4	12.7	14.3	15.6	16.3	17.6					
of which waste	*0.8*	*0.5*	*0.7*	*0.7*	*0.7*	*0.7*	*0.5*	*0.4*					
Transport sector													
Passenger transport activity (Gpkm)	**870.5**	**931.9**	**939.6**	**995.9**	**1099.7**	**1209.1**	**1315.8**	**1421.7**	**1525.5**	**0.8**	**1.6**	**1.8**	**1.5**
public road transport	73.1	68.5	69.0	67.7	70.5	74.6	78.3	81.7	84.9	-0.6	0.2	1.1	0.8
private cars and motorcycles	698.4	743.3	740.1	794.5	879.6	962.2	1042.0	1120.5	1195.3	0.6	1.7	1.7	1.4
rail	76.2	89.4	89.7	87.3	91.5	101.4	109.3	115.6	121.3	1.6	0.2	1.8	1.1
aviation	20.9	28.7	39.0	44.6	55.9	68.6	83.6	101.0	120.8	6.4	3.7	4.1	3.7
inland navigation	2.0	2.0	1.8	1.9	2.1	2.4	2.6	2.9	3.1	-0.9	1.7	2.0	1.8
travel per person (km per capita)	**10960**	**11411**	**11432**	**12035**	**13218**	**14525**	**15843**	**17216**	**18662**	**0.4**	**1.5**	**1.8**	**1.7**
Freight transport activity (Gtkm)	**357.9**	**413.9**	**491.4**	**547.9**	**612.7**	**681.0**	**750.1**	**819.6**	**892.2**	**3.2**	**2.2**	**2.0**	**1.8**
trucks	221.8	279.7	347.2	405.8	463.5	520.6	579.5	640.5	704.9	4.6	2.9	2.3	2.0
rail	81.0	69.5	76.8	75.8	78.6	84.1	88.2	90.7	92.9	-0.5	0.2	1.2	0.5
inland navigation	55.1	64.7	67.4	66.3	70.6	76.3	82.4	88.4	94.4	2.0	0.5	1.6	1.4
freight activity per unit of GDP (tkm/000 Euro'00)	**206**	**223**	**243**	**245**	**246**	**246**	**244**	**242**	**240**	**1.6**	**0.1**	**-0.1**	**-0.2**
Energy demand in transport (Mtoe)	**58.82**	**62.88**	**65.77**	**71.68**	**75.75**	**77.96**	**82.03**	**83.59**	**84.48**	**1.1**	**1.4**	**0.8**	**0.3**
public road transport	0.80	0.87	0.80	0.77	0.80	0.82	0.81	0.77	0.72	0.1	-0.1	0.1	-1.1
private cars and motorcycles	36.32	36.30	37.40	39.99	40.58	39.77	41.26	40.65	39.34	0.3	0.8	0.2	-0.5
trucks	13.30	17.04	17.99	21.01	23.95	26.49	28.31	29.89	30.81	3.1	2.9	1.7	0.8
rail	2.12	2.13	1.94	1.84	1.71	1.60	1.50	1.43	1.41	-0.9	-1.3	-1.3	-0.6
aviation	5.63	5.99	7.36	7.80	8.43	8.97	9.83	10.49	11.82	2.7	1.4	1.5	1.9
inland navigation	0.66	0.55	0.28	0.27	0.29	0.31	0.34	0.36	0.38	-8.2	0.5	1.4	1.2
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	51.2	48.2	50.2	50.3	46.5	42.1	40.4	37.4	34.8	-0.2	-0.8	-1.4	-1.5
freight transport (toe/Mtkm)	39.9	43.3	37.9	39.4	40.1	39.8	38.5	37.2	35.2	-0.5	0.6	-0.4	-0.9

Source: PRIMES Model

GREECE: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)													
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**9.15**	**9.70**	**9.95**	**11.10**	**11.92**	**11.70**	**11.89**	**11.70**	**11.32**	**0.8**	**1.8**	**0.0**	**-0.5**
Solids	7.08	7.91	8.22	8.95	9.43	8.90	8.88	8.45	7.88	1.5	1.4	-0.6	-1.2
Oil	0.83	0.46	0.28	0.00	0.00	0.00	0.00	0.00	0.00	-10.3			
Natural gas	0.14	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	-11.1			
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	1.10	1.29	1.40	2.16	2.50	2.80	3.01	3.25	3.44	2.4	5.9	1.9	1.3
Hydro	0.15	0.30	0.32	0.48	0.51	0.48	0.48	0.54	0.54	7.6	4.9	-0.6	1.2
Biomass	0.77	0.77	0.79	1.21	1.38	1.49	1.61	1.74	1.83	0.3	5.7	1.6	1.3
Waste	0.12	0.12	0.15	0.17	0.20	0.19	0.19	0.18	0.17	2.3	2.6	-0.7	-1.1
Wind	0.00	0.00	0.04	0.13	0.16	0.32	0.36	0.41	0.50	74.3	15.5	8.3	3.2
Solar and others	0.06	0.08	0.10	0.15	0.23	0.30	0.36	0.37	0.38	5.8	8.9	4.4	0.7
Geothermal	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	-4.7	22.2	1.5	0.4
Net Imports	**15.37**	**18.21**	**21.98**	**25.71**	**28.60**	**31.32**	**32.99**	**34.14**	**36.01**	**3.6**	**2.7**	**1.4**	**0.9**
Solids	0.99	0.92	0.77	0.80	0.69	0.66	0.70	1.03	2.14	-2.5	-1.0	0.1	11.8
Oil	14.32	17.21	19.53	20.63	21.73	22.80	23.90	24.66	25.13	3.1	1.1	1.0	0.5
Crude oil and Feedstocks	14.71	16.95	20.44	19.43	20.63	21.78	23.09	23.85	24.37	3.3	0.1	1.1	0.5
Oil products	-0.39	0.26	-0.91	1.20	1.10	1.01	0.81	0.81	0.75			-3.1	-0.7
Natural gas	0.00	0.00	1.69	4.28	6.17	7.85	8.37	8.43	8.72		13.8	3.1	0.4
Electricity	0.06	0.07	0.00	0.00	0.01	0.01	0.02	0.02	0.02			4.7	1.1
Gross Inland Consumption	**22.25**	**24.14**	**28.08**	**32.69**	**36.05**	**38.21**	**39.74**	**40.36**	**41.50**	**2.4**	**2.5**	**1.0**	**0.4**
Solids	8.09	8.78	9.04	9.74	10.12	9.56	9.58	9.48	10.03	1.1	1.1	-0.5	0.5
Oil	12.85	13.95	15.93	16.51	17.25	17.99	18.76	19.17	19.30	2.2	0.8	0.8	0.3
Natural gas	0.14	0.04	1.70	4.28	6.17	7.85	8.37	8.43	8.72	28.6	13.7	3.1	0.4
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.06	0.07	0.00	0.00	0.01	0.01	0.02	0.02	0.02			4.7	1.1
Renewable energy forms	1.10	1.29	1.40	2.16	2.50	2.80	3.01	3.25	3.44	2.4	5.9	1.9	1.3
as % in Gross Inland Consumption													
Solids	36.4	36.4	32.2	29.8	28.1	25.0	24.1	23.5	24.2				
Oil	57.8	57.8	56.7	50.5	47.9	47.1	47.2	47.5	46.5				
Natural gas	0.6	0.2	6.1	13.1	17.1	20.5	21.1	20.9	21.0				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	5.0	5.3	5.0	6.6	6.9	7.3	7.6	8.1	8.3				
Electricity Generation in TWhe	**34.77**	**41.29**	**53.14**	**65.70**	**75.72**	**83.06**	**87.72**	**94.17**	**99.46**	**4.3**	**3.6**	**1.5**	**1.3**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	1.77	3.56	4.14	7.07	7.85	9.34	9.82	11.13	12.38	8.9	6.6	2.3	2.3
Thermal (incl. biomass)	33.00	37.73	49.00	58.62	67.86	73.72	77.91	83.03	87.08	4.0	3.3	1.4	1.1
Fuel Inputs for Thermal Power Generation [1]	**8.88**	**10.04**	**11.73**	**13.19**	**14.73**	**15.32**	**15.44**	**15.41**	**15.99**	**2.8**	**2.3**	**0.5**	**0.4**
Solids	6.89	7.79	8.23	8.93	9.45	8.95	9.07	9.03	9.64	1.8	1.4	-0.4	0.6
Oil (including refinery gas)	1.91	2.19	2.16	1.75	1.68	1.59	1.59	1.48	1.34	1.2	-2.5	-0.6	-1.7
Gas	0.03	0.02	1.29	2.44	3.47	4.60	4.61	4.68	4.77	44.7	10.4	2.9	0.3
Biomass - Waste	0.04	0.05	0.06	0.07	0.13	0.16	0.17	0.21	0.24	2.7	8.2	2.7	3.8
Geothermal heat	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01			0.0	0.0
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**16.69**	**17.91**	**22.43**	**21.01**	**22.44**	**23.60**	**24.91**	**25.83**	**26.41**	**3.0**	**0.0**	**1.1**	**0.6**
Refineries	16.62	17.86	22.40	20.91	22.16	23.28	24.47	25.32	25.84	3.0	-0.1	1.0	0.5
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.08	0.27	0.31	0.43	0.51	0.57			4.8	3.0
Others	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.00	0.00	-8.8	-10.4	-5.8	-14.7
Energy Branch Consumption	**1.04**	**1.17**	**1.61**	**1.65**	**1.75**	**1.81**	**1.87**	**1.92**	**1.95**	**4.5**	**0.8**	**0.7**	**0.4**
Non-Energy Uses	**0.64**	**0.44**	**0.65**	**0.90**	**1.04**	**1.17**	**1.29**	**1.41**	**1.53**	**0.2**	**4.8**	**2.1**	**1.8**
Final Energy Demand	**14.51**	**15.79**	**18.48**	**21.77**	**24.14**	**26.08**	**27.76**	**28.68**	**29.44**	**2.4**	**2.7**	**1.4**	**0.6**
by sector													
Industry [1]	3.93	4.09	4.40	5.49	6.02	6.45	6.82	7.16	7.48	1.1	3.2	1.3	0.9
energy intensive industries	2.72	2.68	2.72	3.56	3.81	3.96	4.08	4.18	4.31	0.0	3.4	0.7	0.6
other industrial sectors	1.21	1.41	1.68	1.93	2.21	2.48	2.75	2.97	3.18	3.4	2.7	2.2	1.5
Residential	3.21	3.33	4.48	5.03	5.71	6.28	6.65	6.72	6.81	3.4	2.5	1.5	0.2
Tertiary	1.55	1.94	2.40	2.89	3.38	3.75	4.09	4.31	4.65	4.5	3.5	1.9	1.3
Transport	5.82	6.43	7.20	8.35	9.04	9.60	10.20	10.50	10.50	2.2	2.3	1.2	0.3
by fuel [1]													
Solids	1.07	1.08	0.89	0.82	0.67	0.61	0.51	0.45	0.39	-1.8	-2.8	-2.6	-2.7
Oil	9.94	10.68	12.46	12.95	13.75	14.45	15.16	15.61	15.80	2.3	1.0	1.0	0.4
Gas	0.01	0.01	0.24	1.64	2.46	2.97	3.46	3.44	3.62	32.9	26.2	3.5	0.5
Electricity	2.45	2.93	3.71	4.63	5.44	6.06	6.45	6.99	7.45	4.2	3.9	1.7	1.4
Heat (from CHP and District Heating)	0.13	0.14	0.19	0.32	0.40	0.46	0.57	0.60	0.58	3.7	7.6	3.6	0.3
Other	0.91	0.94	0.99	1.40	1.43	1.53	1.60	1.60	1.59	0.9	3.8	1.1	-0.1
CO_2 Emissions (Mt of CO_2)	**71.1**	**78.2**	**89.2**	**97.8**	**105.6**	**109.0**	**112.2**	**112.7**	**115.4**	**2.3**	**1.7**	**0.6**	**0.3**
Electricity and Steam production	34.3	38.9	43.6	48.3	52.6	52.9	53.4	53.0	55.0	2.4	1.9	0.1	0.3
Energy Branch	2.1	2.3	3.4	3.3	3.5	3.7	3.8	3.9	3.9	4.8	0.3	0.8	0.3
Industry	9.4	10.0	10.1	11.5	11.9	12.3	12.3	12.5	12.9	0.7	1.6	0.3	0.5
Residential	5.1	4.8	7.4	6.3	6.8	7.4	7.8	7.5	7.4	3.8	-0.9	1.5	-0.5
Tertiary	2.9	3.2	3.3	3.9	4.6	5.0	5.6	5.8	6.3	1.6	3.3	2.0	1.1
Transport	17.2	19.0	21.2	24.5	26.2	27.7	29.3	30.0	29.9	2.1	2.1	1.1	0.2
CO_2 Emissions Index (1990=100)	**100.0**	**110.0**	**125.4**	**137.5**	**148.5**	**153.2**	**157.8**	**158.5**	**162.3**				

See explanations on page 219

Source: PRIMES Model

GREECE: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	10.16	10.45	10.56	11.03	11.15	11.20	11.18	11.14	11.09	0.4	0.5	0.0	-0.1
GDP (in 000 MEuro'00)	97.7	103.9	122.9	152.5	181.4	213.0	249.5	290.6	336.1	2.3	4.0	3.2	3.0
Gross Inl. Cons./GDP (toe/MEuro'00)	227.7	232.2	228.5	214.3	198.8	179.4	159.3	138.9	123.5	0.0	-1.4	-2.2	-2.5
Gross Inl. Cons./Capita (toe/inhabitant)	2.19	2.31	2.66	2.96	3.23	3.41	3.55	3.62	3.74	2.0	2.0	0.9	0.5
Electricity Generated/Capita (kWh/inhabitant)	3422	3950	5033	5954	6794	7419	7844	8455	8973	3.9	3.0	1.4	1.4
Carbon intensity (t of CO_2/toe of GIC)	3.20	3.24	3.18	2.99	2.93	2.85	2.82	2.79	2.78	-0.1	-0.8	-0.4	-0.2
CO_2 Emissions/Capita (t of CO_2/inhabitant)	7.00	7.48	8.44	8.86	9.47	9.73	10.03	10.12	10.41	1.9	1.2	0.6	0.4
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	727.7	752.6	725.6	641.0	582.2	511.6	449.9	387.9	343.4	0.0	-2.2	-2.5	-2.7
Import Dependency %	62.1	65.8	69.5	69.8	70.6	72.8	73.5	74.5	76.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	90.6	94.5	92.6	85.8	78.1	70.5	63.7	58.2	-0.6	-1.0	-1.9	-1.9
Residential (Energy on Private Income)	100.0	95.0	110.4	104.7	102.8	98.3	90.6	80.0	71.0	1.0	-0.7	-1.3	-2.4
Tertiary (Energy on Value added)	100.0	121.3	126.5	120.9	117.3	109.8	101.4	90.8	83.9	2.4	-0.8	-1.4	-1.9
Transport (Energy on GDP)	100.0	103.9	98.4	92.0	83.7	75.7	68.7	60.7	52.5	-0.2	-1.6	-2.0	-2.7
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.99	0.94	0.82	0.70	0.66	0.60	0.57	0.52	0.52	-1.9	-2.2	-1.4	-0.9
Final energy demand (t of CO_2/toe)	2.39	2.34	2.28	2.12	2.05	2.01	1.98	1.95	1.92	-0.5	-1.1	-0.3	-0.3
Industry	2.40	2.44	2.29	2.09	1.97	1.90	1.80	1.75	1.72	-0.5	-1.5	-0.9	-0.4
Residential	1.59	1.43	1.66	1.25	1.18	1.17	1.18	1.12	1.09	0.4	-3.3	-0.1	-0.8
Tertiary	1.84	1.65	1.39	1.34	1.37	1.34	1.38	1.35	1.35	-2.7	-0.1	0.0	-0.2
Transport	2.96	2.96	2.95	2.93	2.89	2.89	2.87	2.86	2.85	0.0	-0.2	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**9.31**	**10.97**	**13.85**	**16.47**	**19.50**	**20.83**	**22.72**	**24.33**		**4.1**	**2.4**	**1.6**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		2.24	2.41	2.63	2.81	2.87	2.87	3.26	3.27		1.6	0.2	1.3
Wind and solar		0.03	0.19	0.74	0.96	1.99	2.28	2.60	3.28		17.6	9.0	3.7
Thermal		7.04	8.38	10.48	12.70	14.64	15.67	16.86	17.78		4.3	2.1	1.3
of which cogeneration units		*0.44*	*0.67*	*0.79*	*0.78*	*0.78*	*0.78*	*0.78*	*0.54*		*1.5*	*0.0*	*-3.6*
Open cycle(incl. biomass-waste)		6.54	7.17	7.60	7.46	7.18	6.53	4.89	4.14		0.4	-1.3	-4.4
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.02	0.05	1.41	3.77	4.94			51.5	13.4
Gas Turbines Combined Cycle		0.28	0.85	2.02	4.17	6.16	6.48	6.76	6.97		17.3	4.5	0.7
Small Gas Turbines		0.22	0.36	0.86	1.05	1.26	1.26	1.44	1.73		11.3	1.8	3.2
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0	0.0	0.0
Indicators													
Efficiency for thermal electricity production (%)		33.1	36.6	38.5	39.9	41.7	43.7	46.6	47.1				
Load factor for gross electric capacities (%)		50.6	55.3	54.1	52.5	48.6	48.1	47.3	46.7				
CHP indicator (% of electricity from CHP)		2.1	2.1	3.7	3.4	3.7	3.1	3.2	2.9				
Non fossil fuels in electricity generation (%)		8.9	8.2	11.1	10.9	11.9	11.8	12.6	13.2				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		8.9	8.2	11.1	10.9	11.9	11.8	12.6	13.2				
of which waste		*0.2*	*0.2*	*0.2*	*0.3*	*0.2*	*0.3*	*0.3*	*0.2*				
Transport sector													
Passenger transport activity (Gpkm)	**91.5**	**115.1**	**147.6**	**156.7**	**163.5**	**173.2**	**186.2**	**198.8**	**211.6**	**4.9**	**1.0**	**1.3**	**1.3**
public road transport	17.7	20.2	21.7	22.5	21.3	21.1	21.5	21.8	22.1	2.0	-0.2	0.1	0.3
private cars and motorcycles	55.4	72.0	96.3	96.3	96.7	100.1	105.7	111.4	117.4	5.7	0.0	0.9	1.1
rail	2.8	2.3	3.1	3.2	3.2	3.3	3.5	3.7	3.9	0.9	0.5	0.9	1.1
aviation	11.9	16.1	20.7	27.8	34.9	40.9	47.1	52.7	58.1	5.7	5.4	3.0	2.1
inland navigation	3.6	4.6	5.9	6.9	7.3	7.8	8.5	9.2	10.0	5.0	2.2	1.5	1.7
travel per person (km per capita)	**9002**	**11014**	**13984**	**14205**	**14667**	**15469**	**16653**	**17851**	**19086**	**4.5**	**0.5**	**1.3**	**1.4**
Freight transport activity (Gtkm)	**18.1**	**22.2**	**27.5**	**33.4**	**38.8**	**44.4**	**50.6**	**57.2**	**63.8**	**4.3**	**3.5**	**2.7**	**2.3**
trucks	10.9	14.8	18.4	22.7	26.9	31.1	35.8	40.8	45.9	5.4	3.9	2.9	2.5
rail	0.6	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	-3.5	-1.5	1.4	1.3
inland navigation	6.6	7.1	8.7	10.3	11.5	12.9	14.4	15.9	17.4	2.8	2.8	2.2	1.9
freight activity per unit of GDP (tkm/000 Euro'00)	**185**	**214**	**224**	**219**	**214**	**209**	**203**	**197**	**190**	**1.9**	**-0.4**	**-0.5**	**-0.7**
Energy demand in transport (Mtoe)	**5.82**	**6.43**	**7.20**	**8.35**	**9.04**	**9.60**	**10.20**	**10.50**	**10.50**	**2.2**	**2.3**	**1.2**	**0.3**
public road transport	0.12	0.14	0.10	0.10	0.10	0.09	0.09	0.09	0.08	-1.9	-0.3	-0.6	-1.3
private cars and motorcycles	1.89	2.26	2.79	2.88	2.65	2.46	2.46	2.42	2.30	4.0	-0.5	-0.8	-0.7
trucks	1.89	2.18	2.43	3.00	3.55	4.07	4.48	4.87	5.11	2.5	3.9	2.3	1.3
rail	0.07	0.06	0.06	0.05	0.03	0.03	0.03	0.02	0.02	-2.2	-5.6	-2.8	-0.6
aviation	1.27	1.25	1.32	1.74	2.08	2.27	2.40	2.30	2.12	0.4	4.6	1.5	-1.2
inland navigation	0.57	0.54	0.49	0.58	0.63	0.68	0.74	0.80	0.87	-1.4	2.5	1.7	1.6
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	39.1	34.4	30.6	32.2	31.5	29.8	28.5	26.1	23.2	-2.4	0.3	-1.0	-2.0
freight transport (toe/Mtkm)	123.5	111.2	97.5	98.8	100.1	99.7	96.4	92.8	87.6	-2.3	0.3	-0.4	-1.0

Source: PRIMES Model

IRELAND: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)

Mtoe	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Primary Production	**3.50**	**4.26**	**2.28**	**2.39**	**2.45**	**2.56**	**2.59**	**1.73**	**1.79**	**-4.2**	**0.7**	**0.6**	**-3.6**
Solids	1.43	1.78	1.06	0.76	0.52	0.42	0.31	0.20	0.17	-2.9	-6.9	-5.0	-5.7
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	1.89	2.25	0.96	1.00	1.00	1.00	1.00	0.00	0.00	-6.6	0.4	0.0	
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	0.17	0.22	0.26	0.63	0.94	1.14	1.28	1.53	1.62	4.4	13.7	3.2	2.4
Hydro	0.06	0.06	0.07	0.08	0.08	0.07	0.07	0.08	0.08	2.0	0.4	-0.4	0.7
Biomass	0.07	0.10	0.10	0.41	0.53	0.65	0.81	0.93	0.98	3.0	18.1	4.3	1.9
Waste	0.03	0.06	0.06	0.07	0.13	0.15	0.10	0.11	0.07	6.6	7.6	-2.5	-3.5
Wind	0.00	0.00	0.02	0.07	0.17	0.23	0.26	0.36	0.39		23.4	4.1	4.3
Solar and others	0.00	0.00	0.00	0.01	0.03	0.03	0.04	0.06	0.10	14.3	64.2	4.7	8.8
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-0.9	-6.2	-6.1
Net Imports	**7.08**	**7.60**	**12.26**	**14.28**	**15.61**	**16.26**	**17.27**	**18.24**	**18.56**	**5.6**	**2.4**	**1.0**	**0.7**
Solids	2.08	1.83	1.63	1.54	1.31	0.95	1.00	1.51	1.71	-2.4	-2.2	-2.6	5.5
Oil	5.00	5.68	8.15	8.31	8.80	8.77	9.13	9.01	8.93	5.0	0.8	0.4	-0.2
Crude oil and Feedstocks	2.02	2.26	3.07	3.28	3.44	3.38	3.61	3.52	3.45	4.3	1.1	0.5	-0.4
Oil products	2.99	3.43	5.08	5.03	5.37	5.39	5.52	5.49	5.48	5.5	0.6	0.3	-0.1
Natural gas	0.00	0.08	2.48	4.41	5.49	6.53	7.13	7.71	7.91		8.3	2.6	1.0
Electricity	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.4	0.7	1.0
Gross Inland Consumption	**10.25**	**11.02**	**14.03**	**16.49**	**17.87**	**18.61**	**19.64**	**19.74**	**20.11**	**3.2**	**2.4**	**0.9**	**0.2**
Solids	3.53	2.90	2.65	2.30	1.83	1.37	1.31	1.71	1.88	-2.8	-3.7	-3.2	3.7
Oil	4.65	5.57	7.68	8.14	8.61	8.56	8.90	8.78	8.69	5.1	1.1	0.3	-0.2
Natural gas	1.89	2.33	3.44	5.41	6.49	7.53	8.13	7.71	7.91	6.1	6.6	2.3	-0.3
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.4	0.7	1.0
Renewable energy forms	0.17	0.22	0.26	0.63	0.94	1.14	1.28	1.53	1.62	4.4	13.7	3.2	2.4
as % in Gross Inland Consumption													
Solids	34.5	26.3	18.9	14.0	10.2	7.4	6.7	8.6	9.4				
Oil	45.4	50.5	54.7	49.3	48.2	46.0	45.3	44.5	43.2				
Natural gas	18.5	21.2	24.5	32.8	36.3	40.4	41.4	39.1	39.3				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	1.6	2.0	1.8	3.8	5.2	6.1	6.5	7.8	8.0				
Electricity Generation in TWhe	**14.23**	**17.60**	**23.67**	**28.52**	**33.02**	**36.36**	**39.63**	**41.60**	**43.86**	**5.2**	**3.4**	**1.8**	**1.0**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	0.70	0.73	1.09	1.70	2.87	3.50	3.83	5.06	5.79	4.6	10.2	2.9	4.2
Thermal (incl. biomass)	13.53	16.87	22.58	26.82	30.14	32.86	35.81	36.54	38.08	5.3	2.9	1.7	0.6
Fuel Inputs for Thermal Power Generation [1]	**3.00**	**3.94**	**4.87**	**5.26**	**5.42**	**5.61**	**5.95**	**5.83**	**5.97**	**5.0**	**1.1**	**0.9**	**0.0**
Solids	1.78	2.11	1.92	1.90	1.58	1.24	1.24	1.67	1.86	0.7	-1.9	-2.4	4.1
Oil (including refinery gas)	0.35	0.64	1.04	0.27	0.19	0.04	0.04	0.03	0.05	11.6	-15.6	-14.2	2.2
Gas	0.86	1.17	1.87	3.00	3.54	4.17	4.59	4.04	4.00	8.0	6.6	2.6	-1.4
Biomass - Waste	0.01	0.01	0.04	0.08	0.10	0.16	0.08	0.09	0.06	18.6	9.6	-2.4	-2.3
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**1.93**	**2.41**	**3.44**	**3.69**	**3.88**	**3.86**	**4.30**	**4.32**	**4.31**	**6.0**	**1.2**	**1.0**	**0.0**
Refineries	1.74	2.25	3.31	3.44	3.64	3.61	3.92	3.88	3.84	6.6	0.9	0.8	-0.2
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.15	0.20	0.23	0.36	0.43	0.47			6.3	2.7
Others	0.18	0.16	0.13	0.10	0.05	0.02	0.01	0.01	0.00	-3.4	-8.8	-13.5	-10.6
Energy Branch Consumption	**0.16**	**0.18**	**0.27**	**0.26**	**0.29**	**0.30**	**0.32**	**0.33**	**0.33**	**5.4**	**0.6**	**1.1**	**0.5**
Non-Energy Uses	**0.61**	**0.54**	**0.56**	**0.70**	**0.81**	**0.86**	**0.88**	**0.90**	**0.91**	**-1.0**	**3.8**	**0.9**	**0.3**
Final Energy Demand	**7.13**	**7.82**	**10.38**	**12.42**	**13.86**	**14.66**	**15.40**	**15.72**	**16.10**	**3.8**	**2.9**	**1.1**	**0.4**
by sector													
Industry [1]	1.83	1.84	2.17	2.66	3.10	3.31	3.43	3.43	3.47	1.8	3.6	1.0	0.1
energy intensive industries	0.97	0.96	1.09	1.47	1.71	1.80	1.84	1.82	1.84	1.2	4.6	0.8	0.0
other industrial sectors	0.86	0.88	1.08	1.19	1.39	1.51	1.58	1.60	1.63	2.3	2.6	1.3	0.3
Residential	2.19	2.19	2.49	2.79	3.03	3.18	3.35	3.48	3.62	1.3	2.0	1.0	0.8
Tertiary	1.14	1.61	1.83	2.09	2.31	2.45	2.58	2.72	2.86	4.8	2.4	1.1	1.0
Transport	1.97	2.18	3.89	4.87	5.42	5.73	6.04	6.10	6.14	7.1	3.4	1.1	0.2
by fuel [1]													
Solids	1.55	0.88	0.56	0.39	0.24	0.13	0.07	0.04	0.02	-9.6	-8.1	-11.2	-10.3
Oil	3.85	4.75	6.71	7.60	8.21	8.37	8.64	8.62	8.58	5.7	2.0	0.5	-0.1
Gas	0.55	0.71	1.16	1.92	2.40	2.78	2.95	3.09	3.34	7.7	7.5	2.1	1.2
Electricity	1.02	1.28	1.74	2.11	2.47	2.75	3.02	3.19	3.39	5.5	3.6	2.0	1.2
Heat (from CHP and District Heating)	0.05	0.05	0.08	0.13	0.15	0.17	0.19	0.17	0.14	6.2	5.7	2.5	-2.8
Other	0.10	0.15	0.12	0.27	0.39	0.47	0.53	0.62	0.62	2.0	12.4	3.0	1.6
CO_2 Emissions (Mt of CO_2)	**29.7**	**33.1**	**41.1**	**44.6**	**46.5**	**47.0**	**48.7**	**49.0**	**50.0**	**3.3**	**1.3**	**0.5**	**0.3**
Electricity and Steam production	10.2	13.2	15.3	15.7	15.3	15.0	15.9	16.2	16.9	4.2	0.0	0.3	0.6
Energy Branch	0.2	0.2	0.4	0.3	0.3	0.3	0.4	0.4	0.4	7.8	-2.0	0.8	0.0
Industry	4.2	3.7	4.1	4.7	5.2	5.3	5.3	5.3	5.6	-0.4	2.5	0.2	0.5
Residential	6.5	5.8	5.8	5.6	5.6	5.5	5.6	5.5	5.5	-1.2	-0.4	0.0	-0.1
Tertiary	2.7	3.9	3.9	4.1	4.3	4.3	4.3	4.4	4.4	3.8	0.9	0.0	0.2
Transport	5.8	6.4	11.6	14.2	15.7	16.6	17.2	17.2	17.2	7.2	3.1	0.9	0.0
CO_2 Emissions Index (1990=100)	**100.0**	**111.6**	**138.5**	**150.5**	**156.8**	**158.5**	**164.1**	**165.2**	**168.6**				

See explanations on page 219

Source: PRIMES Model

IRELAND: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	3.51	3.60	3.79	4.00	4.18	4.33	4.46	4.57	4.66	0.8	1.0	0.7	0.4
GDP (in 000 MEuro'00)	51.3	64.6	103.5	135.8	162.2	183.7	204.5	226.8	251.1	7.3	4.6	2.3	2.1
Gross Inl. Cons./GDP (toe/MEuro'00)	199.8	170.7	135.6	121.4	110.1	101.3	96.0	87.0	80.1	-3.8	-2.1	-1.4	-1.8
Gross Inl. Cons./Capita (toe/inhabitant)	2.92	3.06	3.70	4.12	4.28	4.30	4.40	4.32	4.32	2.4	1.5	0.3	-0.2
Electricity Generated/Capita (kWh/inhabitant)	4058	4888	6250	7122	7906	8395	8877	9099	9421	4.4	2.4	1.2	0.6
Carbon intensity (t of CO_2/toe of GIC)	2.89	3.00	2.93	2.71	2.60	2.53	2.48	2.48	2.49	0.1	-1.2	-0.5	0.0
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.46	9.20	10.85	11.15	11.14	10.86	10.90	10.72	10.74	2.5	0.3	-0.2	-0.1
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	578.1	512.9	396.9	328.7	286.8	255.9	238.0	216.0	199.2	-3.7	-3.2	-1.8	-1.8
Import Dependency %	69.0	68.2	86.5	85.6	86.4	86.4	86.9	91.3	91.2				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	69.3	46.1	43.2	41.9	39.5	36.9	33.4	30.8	-7.4	-1.0	-1.3	-1.8
Residential (Energy on Private Income)	100.0	85.8	65.7	55.9	51.1	47.5	44.6	41.4	38.8	-4.1	-2.5	-1.3	-1.4
Tertiary (Energy on Value added)	100.0	122.3	97.5	85.4	79.1	73.8	69.7	65.9	62.3	-0.2	-2.1	-1.2	-1.1
Transport (Energy on GDP)	100.0	88.3	98.3	93.7	87.2	81.4	77.1	70.2	63.8	-0.2	-1.2	-1.2	-1.9
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.71	0.75	0.65	0.52	0.44	0.39	0.38	0.37	0.37	-1.0	-3.7	-1.5	-0.2
Final energy demand (t of CO_2/toe)	2.71	2.52	2.45	2.30	2.23	2.16	2.11	2.06	2.03	-1.0	-0.9	-0.6	-0.3
Industry	2.33	1.99	1.88	1.78	1.69	1.60	1.55	1.55	1.61	-2.1	-1.1	-0.9	0.3
Residential	2.98	2.63	2.32	2.01	1.84	1.74	1.66	1.58	1.52	-2.5	-2.3	-1.0	-0.9
Tertiary	2.38	2.41	2.16	1.94	1.87	1.77	1.68	1.63	1.55	-1.0	-1.4	-1.1	-0.8
Transport	2.95	2.95	2.97	2.91	2.90	2.89	2.85	2.82	2.81	0.1	-0.3	-0.2	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**4.19**	**4.80**	**5.80**	**7.03**	**8.13**	**9.10**	**9.94**	**10.97**		**3.9**	**2.6**	**1.9**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23		0.0	0.0	0.4
Wind and solar		0.02	0.12	0.33	0.78	1.26	1.44	1.70	2.08		20.5	6.3	3.8
Thermal		3.95	4.45	5.25	6.02	6.64	7.44	8.01	8.66		3.1	2.1	1.5
of which cogeneration units		*0.06*	*0.07*	*0.08*	*0.17*	*0.21*	*0.52*	*0.52*	*0.53*		*8.7*	*12.0*	*0.2*
Open cycle(incl. biomass-waste)		3.17	3.34	3.24	2.61	1.73	1.39	0.32	0.34		-2.4	-6.1	-13.2
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.13	1.63	1.85				30.8
Gas Turbines Combined Cycle		0.42	0.74	1.63	3.03	3.81	4.63	4.31	4.69		15.2	4.3	0.1
Small Gas Turbines		0.36	0.38	0.38	0.38	1.11	1.30	1.74	1.78		0.0	13.0	3.2
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		36.6	38.8	44.0	48.1	50.7	52.1	54.2	55.1				
Load factor for gross electric capacities (%)		47.9	56.3	56.1	53.6	51.1	49.7	47.8	45.6				
CHP indicator (% of electricity from CHP)		1.5	1.5	1.5	2.5	2.6	5.0	4.0	3.6				
Non fossil fuels in electricity generation (%)		4.5	5.3	6.8	9.7	10.9	10.4	12.9	13.7				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		4.5	5.3	6.8	9.7	10.9	10.4	12.9	13.7				
of which waste		*0.2*	*0.4*	*0.4*	*0.4*	*0.5*	*0.1*	*0.1*	*0.1*				
Transport sector													
Passenger transport activity (Gpkm)	**25.9**	**33.4**	**47.1**	**55.6**	**61.2**	**66.8**	**72.8**	**79.1**	**85.8**	**6.1**	**2.7**	**1.7**	**1.7**
public road transport	3.9	5.2	6.1	6.1	5.9	5.9	6.0	6.1	6.1	4.7	-0.3	0.1	0.2
private cars and motorcycles	18.4	23.5	33.7	40.1	43.5	46.8	50.4	54.1	57.9	6.3	2.6	1.5	1.4
rail	1.2	1.3	1.4	1.7	1.8	1.9	2.0	2.2	2.4	1.3	2.5	1.4	1.5
aviation	2.0	2.8	5.1	6.8	8.9	10.9	13.0	15.3	17.8	10.1	5.7	3.8	3.2
inland navigation	0.6	0.7	0.7	0.9	1.1	1.2	1.3	1.4	1.6	2.9	3.6	2.2	1.8
travel per person (km per capita)	**7401**	**9286**	**12425**	**13892**	**14654**	**15413**	**16295**	**17304**	**18423**	**5.3**	**1.7**	**1.1**	**1.2**
Freight transport activity (Gtkm)	**4.7**	**6.4**	**7.6**	**10.0**	**12.0**	**13.6**	**15.1**	**16.4**	**17.8**	**4.8**	**4.7**	**2.3**	**1.7**
trucks	3.9	5.5	6.5	8.7	10.6	12.1	13.4	14.7	16.0	5.2	5.0	2.4	1.7
rail	0.6	0.6	0.5	0.6	0.7	0.7	0.8	0.8	0.9	-1.8	3.0	1.4	1.1
inland navigation	0.2	0.3	0.6	0.7	0.7	0.8	0.9	0.9	1.0	9.3	2.8	1.6	1.3
freight activity per unit of GDP (tkm/000 Euro'00)	**92**	**99**	**73**	**74**	**74**	**74**	**74**	**73**	**71**	**-2.3**	**0.1**	**0.0**	**-0.4**
Energy demand in transport (Mtoe)	**1.97**	**2.18**	**3.89**	**4.87**	**5.42**	**5.73**	**6.04**	**6.10**	**6.14**	**7.1**	**3.4**	**1.1**	**0.2**
public road transport	0.02	0.03	0.10	0.10	0.09	0.09	0.09	0.08	0.08	14.9	-0.5	-0.9	-1.4
private cars and motorcycles	0.93	1.14	1.56	1.85	1.82	1.76	1.81	1.79	1.75	5.3	1.6	0.0	-0.4
trucks	0.59	0.56	1.50	2.00	2.44	2.72	2.91	3.04	3.09	9.7	5.0	1.8	0.6
rail	0.05	0.05	0.13	0.14	0.13	0.11	0.09	0.07	0.07	10.2	0.1	-3.5	-2.4
aviation	0.36	0.38	0.58	0.73	0.89	0.99	1.08	1.06	1.09	4.7	4.5	1.9	0.1
inland navigation	0.01	0.03	0.04	0.05	0.05	0.05	0.06	0.06	0.06	18.4	2.8	1.4	0.7
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	52.0	47.2	49.0	49.6	46.8	43.2	41.3	37.2	34.1	-0.6	-0.4	-1.2	-1.9
freight transport (toe/Mtkm)	130.4	94.5	210.4	211.5	212.6	209.5	201.3	191.9	180.2	4.9	0.1	-0.5	-1.1

Source: PRIMES Model

ITALY: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**27.24**	**30.71**	**30.61**	**30.51**	**28.67**	**25.44**	**22.88**	**22.30**	**21.84**	**1.2**	**-0.7**	**-2.2**	**-0.5**
Solids	0.34	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-36.6			
Oil	4.70	5.29	4.61	3.88	3.62	3.56	3.41	3.26	3.26	-0.2	-2.4	-0.6	-0.4
Natural gas	14.03	16.35	13.62	13.00	10.00	6.00	3.00	2.00	1.00	-0.3	-3.0	-11.3	-10.4
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	8.17	8.97	12.38	13.64	15.05	15.88	16.47	17.04	17.57	4.2	2.0	0.9	0.7
Hydro	2.72	3.25	3.81	3.95	3.80	3.82	3.84	3.85	3.86	3.4	0.0	0.1	0.1
Biomass	2.74	2.79	4.52	4.67	5.46	5.45	5.54	5.89	5.92	5.1	1.9	0.1	0.7
Waste	0.64	0.60	0.88	0.94	1.25	1.64	1.72	1.62	1.61	3.3	3.6	3.2	-0.6
Wind	0.00	0.00	0.05	0.56	1.03	1.40	1.69	1.86	2.19	73.1	35.7	5.1	2.6
Solar and others	0.01	0.01	0.01	0.02	0.03	0.04	0.06	0.08	0.11	9.0	9.1	6.8	6.8
Geothermal	2.07	2.32	3.10	3.49	3.47	3.53	3.63	3.75	3.88	4.1	1.1	0.4	0.7
Net Imports	**131.96**	**134.69**	**152.59**	**149.94**	**157.90**	**165.03**	**171.63**	**174.22**	**180.58**	**1.5**	**0.3**	**0.8**	**0.5**
Solids	13.79	12.99	13.19	11.74	11.13	10.77	13.63	15.74	20.91	-0.4	-1.7	2.0	4.4
Oil	89.88	89.96	88.58	84.00	78.51	77.51	74.33	71.06	71.71	-0.1	-1.2	-0.5	-0.4
Crude oil and Feedstocks	84.28	82.83	90.36	74.96	70.00	69.19	66.29	63.34	64.08	0.7	-2.5	-0.5	-0.3
Oil products	5.60	7.13	-1.79	9.04	8.52	8.33	8.04	7.72	7.63			-0.6	-0.5
Natural gas	25.31	28.53	47.01	51.01	65.45	74.18	81.20	85.06	85.64	6.4	3.4	2.2	0.5
Electricity	2.98	3.22	3.81	3.20	2.81	2.57	2.47	2.35	2.32	2.5	-3.0	-1.3	-0.6
Gross Inland Consumption	**154.63**	**162.60**	**175.69**	**177.52**	**183.47**	**187.20**	**191.07**	**192.92**	**198.64**	**1.3**	**0.4**	**0.4**	**0.4**
Solids	14.64	12.33	12.66	11.74	11.13	10.77	13.63	15.74	20.91	-1.4	-1.3	2.0	4.4
Oil	89.82	93.43	88.90	84.94	79.02	77.80	74.31	70.72	71.21	-0.1	-1.2	-0.6	-0.4
Natural gas	39.02	44.65	57.94	64.01	75.45	80.18	84.20	87.06	86.64	4.0	2.7	1.1	0.3
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	2.98	3.22	3.81	3.20	2.81	2.57	2.47	2.35	2.32	2.5	-3.0	-1.3	-0.6
Renewable energy forms	8.17	8.97	12.38	13.64	15.05	15.88	16.47	17.04	17.57	4.2	2.0	0.9	0.7
as % in Gross Inland Consumption													
Solids	9.5	7.6	7.2	6.6	6.1	5.8	7.1	8.2	10.5				
Oil	58.1	57.5	50.6	47.8	43.1	41.6	38.9	36.7	35.8				
Natural gas	25.2	27.5	33.0	36.1	41.1	42.8	44.1	45.1	43.6				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	5.3	5.5	7.0	7.7	8.2	8.5	8.6	8.8	8.8				
Electricity Generation in TWhe	**213.40**	**237.31**	**270.02**	**291.86**	**320.29**	**341.86**	**364.24**	**392.37**	**419.43**	**2.4**	**1.7**	**1.3**	**1.4**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	31.62	37.79	44.89	52.58	56.28	60.82	64.42	66.64	70.88	3.6	2.3	1.4	1.0
Thermal (incl. biomass)	181.78	199.53	225.13	239.28	264.00	281.04	299.82	325.73	348.55	2.2	1.6	1.3	1.5
Fuel Inputs for Thermal Power Generation (1)	**44.57**	**49.02**	**54.81**	**49.23**	**51.57**	**53.17**	**55.19**	**58.31**	**61.67**	**2.1**	**-0.6**	**0.7**	**1.1**
Solids	7.08	5.35	5.83	6.17	5.67	5.49	8.16	10.40	15.65	-1.9	-0.3	3.7	6.7
Oil (including refinery gas)	23.11	26.30	20.12	14.87	9.47	8.33	4.56	3.06	2.99	-1.4	-7.3	-7.1	-4.1
Gas	11.56	14.39	24.53	23.47	31.06	33.34	36.44	38.69	36.78	7.8	2.4	1.6	0.1
Biomass - Waste	0.94	0.87	1.43	1.44	2.08	2.66	2.55	2.53	2.47	4.3	3.8	2.0	-0.3
Geothermal heat	1.87	2.11	2.89	3.28	3.28	3.36	3.48	3.62	3.77	4.4	1.3	0.6	0.8
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**99.61**	**99.18**	**103.01**	**87.60**	**84.22**	**83.38**	**81.48**	**78.85**	**79.72**	**0.3**	**-2.0**	**-0.3**	**-0.2**
Refineries	91.90	92.79	96.95	81.89	77.39	76.56	73.83	70.89	71.71	0.5	-2.2	-0.5	-0.3
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.02	0.10	0.49	1.59	1.80	2.36	2.80	3.00		31.3	4.0	2.5
Others	7.71	6.36	5.96	5.22	5.23	5.03	5.29	5.15	5.01	-2.5	-1.3	0.1	-0.5
Energy Branch Consumption	**7.34**	**7.55**	**7.39**	**6.41**	**6.22**	**6.17**	**6.06**	**5.99**	**6.11**	**0.1**	**-1.7**	**-0.3**	**0.1**
Non-Energy Uses	**9.84**	**13.88**	**11.02**	**11.19**	**11.33**	**11.44**	**11.50**	**11.62**	**11.76**	**1.1**	**0.3**	**0.1**	**0.2**
Final Energy Demand	**109.73**	**115.80**	**125.11**	**133.68**	**140.22**	**144.33**	**148.16**	**150.54**	**152.80**	**1.3**	**1.1**	**0.6**	**0.3**
by sector													
Industry (1)	36.22	36.31	39.08	40.22	42.24	43.72	44.96	45.93	47.09	0.8	0.8	0.6	0.5
energy intensive industries	25.56	24.99	24.55	25.02	25.80	26.28	26.61	26.57	26.56	-0.4	0.5	0.3	0.0
other industrial sectors	10.66	11.32	14.53	15.20	16.44	17.44	18.35	19.36	20.54	3.1	1.2	1.1	1.1
Residential	33.15	32.92	36.18	38.76	40.71	41.73	41.76	41.42	41.37	0.9	1.2	0.3	-0.1
Tertiary	6.96	8.93	8.59	9.23	10.15	11.06	12.13	13.46	14.83	2.1	1.7	1.8	2.0
Transport	33.40	37.64	41.26	45.47	47.11	47.81	49.32	49.73	49.51	2.1	1.3	0.5	0.0
by fuel (1)													
Solids	4.27	4.13	3.51	3.13	3.00	2.99	3.10	3.07	3.12	-2.0	-1.5	0.3	0.1
Oil	53.11	52.83	55.14	56.30	57.01	57.10	58.01	57.66	56.96	0.4	0.3	0.2	-0.2
Gas	27.02	30.28	33.15	39.79	43.48	45.84	46.70	47.26	48.65	2.1	2.7	0.7	0.4
Electricity	18.41	20.44	23.43	24.76	26.80	28.45	30.26	32.45	34.57	2.4	1.4	1.2	1.3
Heat (from CHP and District Heating)	4.28	5.40	5.78	5.75	6.62	7.04	7.38	7.44	6.98	3.0	1.4	1.1	-0.5
Other	2.64	2.72	4.09	3.95	3.30	2.92	2.72	2.66	2.52	4.5	-2.1	-1.9	-0.8
CO_2 Emissions (Mt of CO_2)	**390.8**	**405.1**	**421.4**	**416.7**	**422.2**	**428.1**	**437.4**	**445.2**	**461.7**	**0.8**	**0.0**	**0.4**	**0.5**
Electricity and Steam production	118.8	126.0	131.1	127.6	126.3	127.3	133.2	142.6	158.6	1.0	-0.4	0.5	1.8
Energy Branch	17.8	17.8	17.1	14.0	13.1	12.7	12.1	11.5	11.4	-0.4	-2.7	-0.8	-0.6
Industry	79,2	75.3	76.5	62.7	62.5	62.9	63.6	63.5	65.5	-0.3	-2.0	0.2	0.3
Residential	68.9	64.5	67.7	72.5	77.5	80.0	79.4	77.8	76.9	-0.2	1.4	0.2	-0.3
Tertiary	9.1	12.5	9.5	8.5	8.9	9.4	10.0	10.3	10.6	0.4	-0.6	1.1	0.7
Transport	97.1	108.8	119.5	131.3	133.9	135.8	139.2	139.5	138.6	2.1	1.1	0.4	0.0
CO_2 Emissions Index (1990=100)	**100.0**	**103.6**	**107.8**	**106.6**	**108.0**	**109.5**	**111.9**	**113.9**	**118.1**				

See explanations on page 219

Source: PRIMES Model

ITALY: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	56.72	57.30	57.76	58.11	57.92	57.40	56.61	55.69	54.65	0.2	0.0	-0.2	-0.4
GDP (in 000 MEuro'00)	996.6	1061.6	1164.8	1307.6	1470.8	1647.1	1836.4	2041.5	2262.8	1.6	2.4	2.2	2.1
Gross Inl. Cons./GDP (toe/MEuro'00)	155.2	153.2	150.8	135.8	124.7	113.7	104.0	94.5	87.8	-0.3	-1.9	-1.8	-1.7
Gross Inl. Cons./Capita (toe/inhabitant)	2.73	2.84	3.04	3.05	3.17	3.26	3.38	3.46	3.64	1.1	0.4	0.6	0.7
Electricity Generated/Capita (kWh/inhabitant)	3762	4142	4675	5022	5530	5956	6434	7046	7675	2.2	1.7	1.5	1.8
Carbon intensity (t of CO_2/toe of GIC)	2.53	2.49	2.40	2.35	2.30	2.29	2.29	2.31	2.32	-0.5	-0.4	-0.1	0.2
CO_2 Emissions/Capita (t of CO_2/inhabitant)	6.89	7.07	7.29	7.17	7.29	7.46	7.73	7.99	8.45	0.6	0.0	0.6	0.9
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	392.2	381.6	361.8	318.6	287.1	259.9	238.2	218.1	204.0	-0.8	-2.3	-1.8	-1.5
Import Dependency %	83.9	81.6	85.5	83.1	84.6	86.6	88.2	88.7	89.2				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	92.9	94.5	90.1	85.6	80.0	74.4	68.7	63.8	-0.6	-1.0	-1.4	-1.5
Residential (Energy on Private Income)	100.0	95.2	92.2	89.3	83.8	77.0	69.3	62.0	55.9	-0.8	-1.0	-1.9	-2.1
Tertiary (Energy on Value added)	100.0	119.6	103.6	97.9	95.0	91.8	89.9	89.4	88.7	0.4	-0.9	-0.5	-0.1
Transport (Energy on GDP)	100.0	105.8	105.7	103.7	95.6	86.6	80.1	72.7	65.3	0.6	-1.0	-1.7	-2.0
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.56	0.53	0.49	0.36	0.32	0.30	0.30	0.30	0.32	-1.4	-4.1	-0.7	0.7
Final energy demand (t of CO_2/toe)	2.32	2.26	2.18	2.06	2.02	2.00	1.97	1.93	1.91	-0.6	-0.8	-0.2	-0.3
Industry	2.19	2.07	1.96	1.56	1.48	1.44	1.41	1.38	1.39	-1.1	-2.8	-0.5	-0.2
Residential	2.08	1.96	1.87	1.87	1.90	1.92	1.90	1.88	1.86	-1.0	0.2	0.0	-0.2
Tertiary	1.30	1.40	1.10	0.92	0.88	0.85	0.82	0.77	0.72	-1.7	-2.2	-0.7	-1.3
Transport	2.91	2.89	2.90	2.89	2.84	2.84	2.82	2.81	2.80	0.0	-0.2	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**61.11**	**68.84**	**77.27**	**76.32**	**80.13**	**85.86**	**92.55**	**99.56**		**1.0**	**1.2**	**1.5**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		12.93	14.32	15.25	15.38	15.46	15.51	15.54	15.59		0.7	0.1	0.1
Wind and solar		0.04	0.45	2.38	4.31	5.84	7.06	7.86	9.39		25.3	5.1	2.9
Thermal		48.15	54.07	59.64	56.63	58.83	63.29	69.15	74.58		0.5	1.1	1.7
of which cogeneration units		*5.79*	*10.01*	*9.47*	*8.84*	*11.86*	*13.49*	*13.41*	*13.62*		*-1.2*	*4.3*	*0.1*
Open cycle(incl. biomass-waste)		43.40	43.53	38.70	29.46	23.37	16.36	13.85	13.91		-3.8	-5.7	-1.6
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.27	3.06	6.64	12.60				15.2
Gas Turbines Combined Cycle		1.20	6.69	16.96	23.28	32.18	39.06	42.95	42.22		13.3	5.3	0.8
Small Gas Turbines		2.84	2.84	2.80	2.72	1.81	3.57	4.41	4.52		-0.4	2.8	2.4
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.71	1.01	1.17	1.17	1.20	1.25	1.30	1.35		1.5	0.6	0.8
Indicators													
Efficiency for thermal electricity production (%)		37.1	37.8	45.9	48.3	50.0	51.4	52.7	53.1				
Load factor for gross electric capacities (%)		44.3	44.8	43.1	47.9	48.7	48.4	48.4	48.1				
CHP indicator (% of electricity from CHP)		13.4	14.9	14.9	14.7	16.9	18.1	16.4	14.5				
Non fossil fuels in electricity generation (%)		19.1	21.0	22.0	21.8	22.3	21.9	21.0	20.6				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		19.1	21.0	22.0	21.8	22.3	21.9	21.0	20.6				
of which waste		*0.8*	*1.3*	*1.1*	*1.2*	*1.4*	*1.4*	*1.2*	*1.1*				
Transport sector													
Passenger transport activity (Gpkm)	**733.6**	**832.5**	**902.8**	**961.6**	**1009.0**	**1052.0**	**1092.4**	**1129.5**	**1163.1**	**2.1**	**1.1**	**0.8**	**0.6**
public road transport	84.0	87.1	94.0	92.9	91.9	91.0	90.2	88.5	84.8	1.1	-0.2	-0.2	-0.6
private cars and motorcycles	582.7	674.6	732.1	791.5	832.1	867.5	897.8	925.8	950.5	2.3	1.3	0.8	0.6
rail	49.3	49.1	49.2	44.2	45.8	46.9	48.6	49.1	49.3	0.0	-0.7	0.6	0.1
aviation	14.4	18.1	23.6	28.7	34.6	41.7	50.7	60.9	73.1	5.1	3.9	3.9	3.7
inland navigation	3.3	3.5	4.0	4.3	4.7	4.9	5.1	5.3	5.4	2.0	1.6	0.9	0.6
travel per person (km per capita)	**12934**	**14528**	**15630**	**16546**	**17421**	**18329**	**19297**	**20284**	**21284**	**1.9**	**1.1**	**1.0**	**1.0**
Freight transport activity (Gtkm)	**190.6**	**208.7**	**259.6**	**291.9**	**327.8**	**362.7**	**399.4**	**435.8**	**473.7**	**3.1**	**2.4**	**2.0**	**1.7**
trucks	135.5	151.6	184.8	212.2	241.5	270.0	300.0	330.6	363.0	3.2	2.7	2.2	1.9
rail	19.4	21.7	22.8	22.3	24.3	25.8	27.7	29.1	30.5	1.7	0.6	1.3	0.9
inland navigation	35.8	35.4	52.0	57.4	62.0	66.8	71.6	76.1	80.2	3.8	1.8	1.5	1.1
freight activity per unit of GDP (tkm/000 Euro'00)	**191**	**197**	**223**	**223**	**223**	**220**	**217**	**213**	**209**	**1.5**	**0.0**	**-0.2**	**-0.4**
Energy demand in transport (Mtoe)	**33.40**	**37.64**	**41.26**	**45.47**	**47.11**	**47.81**	**49.32**	**49.73**	**49.51**	**2.1**	**1.3**	**0.5**	**0.0**
public road transport	0.76	0.67	0.74	0.73	0.71	0.68	0.64	0.59	0.52	-0.2	-0.4	-1.0	-2.1
private cars and motorcycles	18.22	21.38	22.56	24.33	23.50	22.11	21.95	21.35	20.12	2.2	0.4	-0.7	-0.9
trucks	11.41	11.89	13.43	15.40	17.49	19.31	20.61	21.70	22.30	1.6	2.7	1.7	0.8
rail	0.74	0.82	0.83	0.75	0.72	0.63	0.57	0.53	0.50	1.2	-1.5	-2.3	-1.2
aviation	1.88	2.42	3.50	4.04	4.44	4.82	5.28	5.29	5.76	6.4	2.4	1.7	0.9
inland navigation	0.39	0.45	0.20	0.22	0.24	0.26	0.27	0.28	0.30	-6.3	1.7	1.2	0.9
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	29.5	30.5	30.4	30.9	29.0	26.7	25.9	24.5	23.0	0.3	-0.5	-1.1	-1.2
freight transport (toe/Mtkm)	61.6	58.8	53.1	54.0	54.5	54.3	52.6	50.7	47.9	-1.5	0.3	-0.4	-0.9

Source: PRIMES Model

LUXEMBURG: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)													
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**0.05**	**0.05**	**0.06**	**0.09**	**0.17**	**0.18**	**0.22**	**0.26**	**0.28**	**1.9**	**11.8**	**2.6**	**2.5**
Solids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	0.05	0.05	0.06	0.09	0.17	0.18	0.22	0.26	0.28	1.9	11.8	2.6	2.5
Hydro	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	5.8	0.8	0.0	0.0
Biomass	0.03	0.03	0.03	0.06	0.14	0.15	0.18	0.21	0.23	0.6	16.2	3.0	2.5
Waste	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	1.0	3.9	0.7	0.3
Wind	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01		7.1	0.5	11.7
Solar and others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			3.6	2.5
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**3.52**	**3.26**	**3.62**	**4.16**	**4.55**	**4.72**	**4.91**	**5.03**	**5.29**	**0.3**	**2.3**	**0.8**	**0.7**
Solids	1.13	0.51	0.13	0.10	0.13	0.13	0.17	0.21	0.79	-19.7	0.6	2.7	16.4
Oil	1.62	1.76	2.33	2.63	2.71	2.74	2.79	2.81	2.86	3.7	1.5	0.3	0.2
Crude oil and Feedstocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil products	1.62	1.76	2.33	2.63	2.71	2.74	2.79	2.81	2.86	3.7	1.5	0.3	0.2
Natural gas	0.43	0.56	0.67	0.99	1.29	1.44	1.54	1.61	1.24	4.5	6.8	1.8	-2.2
Electricity	0.34	0.43	0.49	0.44	0.42	0.41	0.41	0.40	0.40	3.9	-1.6	-0.3	-0.1
Gross Inland Consumption	**3.55**	**3.34**	**3.63**	**4.25**	**4.73**	**4.90**	**5.13**	**5.29**	**5.58**	**0.2**	**2.7**	**0.8**	**0.8**
Solids	1.13	0.51	0.13	0.10	0.13	0.13	0.17	0.21	0.79	-19.7	0.6	2.7	16.4
Oil	1.61	1.79	2.28	2.63	2.71	2.74	2.79	2.81	2.86	3.6	1.7	0.3	0.2
Natural gas	0.43	0.56	0.67	0.99	1.29	1.44	1.54	1.61	1.24	4.5	6.8	1.8	-2.2
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.34	0.43	0.49	0.44	0.42	0.41	0.41	0.40	0.40	3.9	-1.6	-0.3	-0.1
Renewable energy forms	0.05	0.05	0.06	0.09	0.17	0.18	0.22	0.26	0.28	1.9	11.8	2.6	2.5
as % in Gross Inland Consumption													
Solids	31.8	15.4	3.5	2.4	2.8	2.7	3.4	4.0	14.2				
Oil	45.3	53.6	62.9	61.8	57.4	55.9	54.4	53.1	51.3				
Natural gas	12.1	16.7	18.5	23.2	27.3	29.4	30.0	30.4	22.2				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	1.3	1.4	1.6	2.2	3.6	3.7	4.3	4.9	5.1				
Electricity Generation in TWhe	**0.63**	**0.50**	**0.43**	**2.32**	**3.47**	**3.73**	**4.34**	**4.98**	**5.71**	**-3.6**	**23.1**	**2.3**	**2.8**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	0.07	0.08	0.15	0.19	0.19	0.19	0.20	0.29	0.31	8.0	2.6	0.4	4.8
Thermal (incl. biomass)	0.56	0.41	0.29	2.14	3.28	3.54	4.14	4.70	5.40	-6.5	27.6	2.4	2.7
Fuel Inputs for Thermal Power Generation [1]	**0.19**	**0.13**	**0.08**	**0.38**	**0.55**	**0.58**	**0.67**	**0.77**	**0.96**	**-7.9**	**20.6**	**2.1**	**3.6**
Solids	0.00	0.00	0.00	0.00	0.03	0.03	0.07	0.12	0.71		84.9	9.3	25.2
Oil (including refinery gas)	0.00	0.00	0.01	0.12	0.06	0.02	0.01	0.01	0.01	7.7	26.6	-14.5	0.0
Gas	0.16	0.11	0.05	0.22	0.42	0.50	0.56	0.61	0.21	-11.1	23.6	2.9	-9.2
Biomass - Waste	0.03	0.02	0.03	0.04	0.04	0.03	0.03	0.03	0.03	1.0	2.6	-1.7	-0.1
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**0.38**	**0.14**	**0.00**	**0.05**	**0.19**	**0.22**	**0.29**	**0.34**	**0.38**			**4.2**	**2.8**
Refineries	0.00	0.00	0.00	0.02	0.08	0.09	0.12	0.14	0.16			4.1	2.9
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.03	0.11	0.13	0.17	0.20	0.22			4.3	2.8
Others	0.38	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Energy Branch Consumption	**0.03**	**0.03**	**0.03**	**0.01**	**0.02**	**0.02**	**0.02**	**0.03**	**0.03**	**-1.8**	**-3.8**	**2.4**	**3.8**
Non-Energy Uses	**0.02**	**0.02**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.03**	**-3.9**	**3.7**	**1.6**	**1.3**
Final Energy Demand	**3.32**	**3.15**	**3.54**	**3.98**	**4.36**	**4.57**	**4.76**	**4.86**	**5.00**	**0.6**	**2.1**	**0.9**	**0.5**
by sector													
Industry [1]	1.72	1.18	0.95	1.10	1.23	1.33	1.39	1.44	1.50	-5.8	2.6	1.2	0.7
energy intensive industries	1.52	0.88	0.52	0.57	0.63	0.65	0.65	0.65	0.65	-10.2	1.9	0.4	-0.1
other industrial sectors	0.20	0.30	0.43	0.52	0.61	0.68	0.74	0.79	0.85	7.8	3.4	2.0	1.4
Residential	0.52	0.56	0.60	0.64	0.66	0.67	0.66	0.65	0.64	1.5	1.0	0.1	-0.5
Tertiary	0.07	0.10	0.11	0.12	0.12	0.14	0.15	0.17	0.19	4.3	0.8	1.9	2.5
Transport	1.01	1.31	1.88	2.12	2.35	2.44	2.55	2.60	2.68	6.4	2.3	0.9	0.5
by fuel [1]													
Solids	0.75	0.37	0.12	0.10	0.10	0.10	0.10	0.09	0.09	-16.7	-1.7	-0.3	-1.1
Oil	1.58	1.75	2.26	2.51	2.71	2.79	2.88	2.91	2.98	3.6	1.8	0.6	0.3
Gas	0.62	0.58	0.62	0.76	0.87	0.94	0.98	0.99	1.02	0.0	3.5	1.1	0.4
Electricity	0.35	0.43	0.49	0.55	0.62	0.68	0.72	0.77	0.83	3.3	2.3	1.6	1.3
Heat (from CHP and District Heating)	0.00	0.00	0.03	0.04	0.05	0.06	0.06	0.07	0.08		3.6	2.2	2.3
Other	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.3	-3.0	2.3	0.6
CO_2 Emissions (Mt of CO_2)	**10.6**	**8.7**	**8.8**	**10.6**	**11.6**	**12.1**	**12.6**	**13.0**	**14.6**	**-1.8**	**2.8**	**0.8**	**1.4**
Electricity and Steam production	0.7	0.4	0.1	0.9	1.3	1.4	1.6	1.9	3.3	-17.0	27.9	2.4	7.3
Energy Branch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			16.1	2.9
Industry	5.7	3.1	1.7	1.8	2.0	2.1	2.1	2.2	2.2	-11.6	1.7	0.9	0.4
Residential	1.3	1.3	1.4	1.5	1.5	1.5	1.5	1.4	1.4	1.1	0.9	-0.2	-0.9
Tertiary	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	17.3	1.0	-0.2	1.4
Transport	3.0	3.9	5.6	6.2	6.8	7.0	7.3	7.3	7.5	6.5	1.9	0.7	0.4
CO_2 Emissions Index (1990=100)	**100.0**	**82.0**	**83.1**	**99.3**	**109.6**	**113.5**	**118.8**	**122.0**	**137.0**				

See explanations on page 219

Source: PRIMES Model

LUXEMBURG: BASELINE SCENARIO										SUMMARY ENERGY BALANCE AND INDICATORS (B)			
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	0.38	0.41	0.44	0.47	0.48	0.50	0.51	0.53	0.54	1.4	0.9	0.6	0.6
GDP (in 000 MEuro'00)	12.4	15.0	20.5	25.7	31.5	36.8	42.0	47.3	52.6	5.1	4.4	2.9	2.3
Gross Inl. Cons./GDP (toe/MEuro'00)	285.7	221.8	177.3	165.6	150.2	133.0	122.3	111.9	106.1	-4.7	-1.6	-2.0	-1.4
Gross Inl. Cons./Capita (toe/inhabitant)	9.30	8.08	8.23	9.11	9.78	9.84	10.01	10.01	10.27	-1.2	1.7	0.2	0.3
Electricity Generated/Capita (kWh/inhabitant)	1641	1206	982	4975	7177	7494	8457	9436	10520	-5.0	22.0	1.7	2.2
Carbon intensity (t of CO_2/toe of GIC)	2.99	2.61	2.43	2.48	2.46	2.46	2.46	2.45	2.61	-2.0	0.1	0.0	0.6
CO_2 Emissions/Capita (t of CO_2/inhabitant)	27.82	21.09	20.03	22.60	24.09	24.23	24.62	24.54	26.81	-3.2	1.9	0.2	0.9
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	854.7	579.3	431.6	411.0	370.1	327.6	300.8	274.3	276.9	-6.6	-1.5	-2.1	-0.8
Import Dependency %	99.0	97.7	99.8	97.8	96.4	96.3	95.7	95.1	94.9				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	47.7	30.4	28.5	27.0	25.1	23.1	21.3	20.0	-11.2	-1.2	-1.5	-1.5
Residential (Energy on Private Income)	100.0	97.5	88.6	77.2	68.8	60.5	53.8	47.7	42.7	-1.2	-2.5	-2.4	-2.3
Tertiary (Energy on Value added)	100.0	109.3	89.7	75.6	62.2	58.2	55.7	55.7	56.5	-1.1	-3.6	-1.1	0.2
Transport (Energy on GDP)	100.0	107.3	113.3	101.9	92.1	81.9	75.1	68.0	63.1	1.3	-2.0	-2.0	-1.7
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	1.13	0.79	0.15	0.32	0.32	0.31	0.32	0.33	0.50	-18.4	7.9	0.1	4.5
Final energy demand (t of CO_2/toe)	2.98	2.64	2.46	2.42	2.37	2.34	2.31	2.27	2.24	-1.9	-0.4	-0.3	-0.3
Industry	3.28	2.60	1.73	1.63	1.58	1.55	1.53	1.50	1.47	-6.2	-0.9	-0.3	-0.4
Residential	2.45	2.39	2.35	2.36	2.34	2.30	2.27	2.22	2.18	-0.4	0.0	-0.3	-0.4
Tertiary	0.21	0.51	0.68	0.71	0.69	0.60	0.56	0.53	0.50	12.5	0.2	-2.0	-1.1
Transport	2.95	2.96	2.97	2.95	2.88	2.88	2.84	2.82	2.81	0.1	-0.3	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**0.17**	**0.13**	**0.53**	**0.56**	**0.61**	**0.72**	**0.87**	**1.00**		**15.9**	**2.5**	**3.4**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04		0.0	0.0	0.0
Wind and solar		0.00	0.01	0.03	0.03	0.03	0.03	0.07	0.08		8.9	1.3	9.8
Thermal		0.13	0.08	0.46	0.49	0.54	0.64	0.75	0.88		20.6	2.8	3.2
of which cogeneration units		*0.02*	*0.03*	*0.05*	*0.06*	*0.07*	*0.10*	*0.12*	*0.15*		*8.4*	*5.3*	*4.2*
Open cycle(incl. biomass-waste)		0.02	0.03	0.09	0.10	0.09	0.12	0.14	0.17		11.9	1.9	3.5
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41				
Gas Turbines Combined Cycle		0.10	0.04	0.37	0.36	0.41	0.50	0.57	0.22		25.1	3.2	-7.8
Small Gas Turbines		0.01	0.00	0.00	0.03	0.03	0.03	0.04	0.08		19.7	-0.1	10.6
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		28.1	34.8	49.1	52.7	53.7	54.1	54.1	49.5				
Load factor for gross electric capacities (%)		34.4	38.6	50.2	70.9	70.2	69.1	65.7	65.2				
CHP indicator (% of electricity from CHP)		0.0	49.0	13.4	10.2	11.0	11.7	12.5	13.2				
Non fossil fuels in electricity generation (%)		37.2	61.3	14.0	9.5	7.8	6.9	7.8	7.3				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		37.2	61.3	14.0	9.5	7.8	6.9	7.8	7.3				
of which waste		*9.6*	*12.9*	*2.5*	*1.8*	*1.6*	*1.3*	*1.2*	*1.0*				
Transport sector													
Passenger transport activity (Gpkm)	**5.4**	**6.3**	**6.9**	**7.5**	**7.8**	**8.1**	**8.5**	**9.0**	**9.6**	**2.4**	**1.2**	**0.9**	**1.2**
public road transport	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.0	0.2	-0.3	-0.3
private cars and motorcycles	4.0	4.8	5.1	5.6	5.8	6.0	6.3	6.6	7.0	2.5	1.3	0.7	1.1
rail	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	4.8	-0.5	0.7	0.7
aviation	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.2	1.3	6.0	3.2	3.2	3.0
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
travel per person (km per capita)	**14228**	**15308**	**15651**	**15961**	**16126**	**16249**	**16608**	**17046**	**17609**	**1.0**	**0.3**	**0.3**	**0.6**
Freight transport activity (Gtkm)	**1.9**	**2.4**	**3.0**	**3.7**	**4.8**	**5.6**	**6.3**	**7.0**	**7.6**	**4.7**	**4.8**	**2.7**	**2.0**
trucks	1.3	1.9	2.4	2.8	3.7	4.3	4.8	5.4	5.9	6.3	4.5	2.8	2.0
rail	0.6	0.5	0.6	0.9	1.1	1.3	1.5	1.6	1.7	0.3	6.0	2.5	1.8
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
freight activity per unit of GDP (tkm/000 Euro'00)	**152**	**160**	**146**	**146**	**152**	**151**	**149**	**147**	**145**	**-0.4**	**0.4**	**-0.2**	**-0.3**
Energy demand in transport (Mtoe)	**1.01**	**1.31**	**1.88**	**2.12**	**2.35**	**2.44**	**2.55**	**2.60**	**2.68**	**6.4**	**2.3**	**0.9**	**0.5**
public road transport	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	2.7	0.0	-1.3	-1.8
private cars and motorcycles	0.50	0.61	0.76	0.82	0.78	0.72	0.72	0.70	0.69	4.2	0.2	-0.8	-0.4
trucks	0.35	0.48	0.76	0.91	1.16	1.31	1.40	1.47	1.54	8.0	4.3	1.9	0.9
train transport	0.00	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	12.9	0.6	-3.5	-0.2
rail	0.13	0.19	0.32	0.35	0.37	0.38	0.40	0.40	0.43	9.3	1.4	0.9	0.6
inland navigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.0	0.0
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	120.5	130.2	161.7	161.9	151.6	139.6	134.6	125.0	119.1	3.0	-0.6	-1.2	-1.2
freight transport (toe/Mtkm)	186.1	201.5	255.2	243.8	243.3	236.2	224.4	212.0	202.8	3.2	-0.5	-0.8	-1.0

Source: PRIMES Model

THE NETHERLANDS: BASELINE SCENARIO										SUMMARY ENERGY BALANCE AND INDICATORS (A)			
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**60.29**	**65.95**	**56.91**	**62.18**	**65.55**	**60.30**	**55.12**	**50.11**	**48.18**	**-0.6**	**1.4**	**-1.7**	**-1.3**
Solids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	4.03	3.56	2.37	2.86	2.90	2.33	1.75	1.32	0.99	-5.2	2.0	-4.9	-5.5
Natural gas	54.61	60.46	51.90	56.02	60.00	55.00	50.00	45.00	43.00	-0.5	1.5	-1.8	-1.5
Nuclear	0.88	1.04	1.01	0.94	0.00	0.00	0.00	0.00	0.00	1.4			
Renewable energy sources	0.77	0.90	1.62	2.35	2.65	2.97	3.37	3.80	4.19	7.7	5.0	2.4	2.2
Hydro	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	5.3	-0.1	-0.7	0.7
Biomass	0.54	0.60	1.01	1.35	1.59	1.76	2.06	2.31	2.44	6.4	4.7	2.6	1.7
Waste	0.22	0.26	0.52	0.68	0.68	0.77	0.81	0.81	0.81	9.2	2.7	1.7	-0.1
Wind	0.00	0.03	0.07	0.29	0.34	0.39	0.45	0.61	0.85	30.9	16.9	2.7	6.6
Solar and others	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.05	0.09	18.3	13.4	4.0	6.2
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**17.39**	**16.34**	**34.24**	**29.65**	**30.82**	**39.29**	**48.20**	**57.03**	**64.07**	**7.0**	**-1.0**	**4.6**	**2.9**
Solids	9.52	8.90	8.17	5.38	5.64	5.22	4.96	7.82	12.54	-1.5	-3.6	-1.3	9.7
Oil	30.88	32.83	41.63	41.15	42.47	44.85	47.28	49.40	51.48	3.0	0.2	1.1	0.9
Crude oil and Feedstocks	47.96	59.28	60.93	73.78	78.40	83.39	88.95	93.51	98.38	2.4	2.6	1.3	1.0
Oil products	-17.08	-26.45	-19.30	-32.63	-35.93	-38.54	-41.67	-44.11	-46.90				
Natural gas	-23.80	-26.37	-17.19	-18.56	-19.01	-12.52	-5.80	-1.96	-1.73				
Electricity	0.79	0.98	1.63	1.68	1.71	1.74	1.76	1.77	1.77	7.5	0.5	0.2	0.1
Gross Inland Consumption	**66.82**	**73.32**	**75.36**	**76.72**	**80.03**	**82.21**	**85.01**	**87.76**	**91.75**	**1.2**	**0.6**	**0.6**	**0.8**
Solids	9.15	9.08	7.98	5.38	5.64	5.22	4.96	7.82	12.54	-1.4	-3.4	-1.3	9.7
Oil	24.42	27.24	28.41	28.91	29.03	29.80	30.72	31.33	31.98	1.5	0.2	0.6	0.4
Natural gas	30.81	34.09	34.71	37.46	40.99	42.48	44.20	43.04	41.27	1.2	1.7	0.8	-0.7
Nuclear	0.88	1.04	1.01	0.94	0.00	0.00	0.00	0.00	0.00	1.4			
Electricity	0.79	0.98	1.63	1.68	1.71	1.74	1.76	1.77	1.77	7.5	0.5	0.2	0.1
Renewable energy forms	0.77	0.90	1.62	2.35	2.65	2.97	3.37	3.80	4.19	7.7	5.0	2.4	2.2
as % in Gross Inland Consumption													
Solids	13.7	12.4	10.6	7.0	7.1	6.3	5.8	8.9	13.7				
Oil	36.5	37.2	37.7	37.7	36.3	36.2	36.1	35.7	34.8				
Natural gas	46.1	46.5	46.1	48.8	51.2	51.7	52.0	49.0	45.0				
Nuclear	1.3	1.4	1.3	1.2	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	1.2	1.2	2.2	3.1	3.3	3.6	4.0	4.3	4.6				
Electricity Generation in TWhe	**71.82**	**81.05**	**89.60**	**96.62**	**114.25**	**128.46**	**141.41**	**153.50**	**164.33**	**2.2**	**2.5**	**2.2**	**1.5**
Nuclear	3.50	4.02	3.93	3.66	0.00	0.00	0.00	0.00	0.00	1.1			
Hydro & wind	0.14	0.41	0.97	3.55	4.13	4.76	5.38	7.27	10.38	21.3	15.6	2.7	6.8
Thermal (incl. biomass)	68.18	76.63	84.70	89.41	110.11	123.70	136.03	146.23	153.95	2.2	2.7	2.1	1.2
Fuel Inputs for Thermal Power Generation [1]	**16.70**	**18.87**	**19.41**	**19.18**	**21.64**	**22.43**	**23.59**	**25.10**	**27.53**	**1.5**	**1.1**	**0.9**	**1.6**
Solids	5.77	5.92	5.15	2.26	1.94	1.45	1.10	3.90	8.59	-1.1	-9.3	-5.5	22.9
Oil (including refinery gas)	1.22	1.36	0.92	0.46	0.66	0.58	0.59	0.61	0.60	-2.8	-3.3	-1.1	0.2
Gas	9.20	10.96	12.08	14.85	17.67	18.88	20.29	18.92	16.69	2.8	3.9	1.4	-1.9
Biomass - Waste	0.52	0.63	1.26	1.62	1.38	1.53	1.62	1.67	1.65	9.3	0.9	1.6	0.2
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**72.28**	**83.70**	**85.03**	**98.93**	**103.29**	**107.39**	**111.98**	**116.06**	**120.13**	**1.6**	**2.0**	**0.8**	**0.7**
Refineries	68.77	80.01	82.16	95.74	99.08	103.11	107.36	111.20	115.15	1.8	1.9	0.8	0.7
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.18	0.66	0.79	1.07	1.30	1.45			4.8	3.1
Others	3.51	3.69	2.87	3.01	3.55	3.50	3.56	3.56	3.53	-2.0	2.1	0.0	-0.1
Energy Branch Consumption	**5.41**	**6.25**	**5.48**	**5.45**	**5.54**	**5.65**	**5.78**	**5.91**	**6.06**	**0.1**	**0.1**	**0.4**	**0.5**
Non-Energy Uses	**9.33**	**9.33**	**9.45**	**9.33**	**9.32**	**9.29**	**9.21**	**9.14**	**9.08**	**0.1**	**-0.1**	**-0.1**	**-0.1**
Final Energy Demand	**42.64**	**47.16**	**49.59**	**52.86**	**55.93**	**58.48**	**61.12**	**63.21**	**65.32**	**1.5**	**1.2**	**0.9**	**0.7**
by sector													
Industry [1]	12.89	12.43	13.60	13.66	13.97	14.37	14.63	14.86	15.11	0.5	0.3	0.5	0.3
energy intensive industries	9.90	8.78	9.48	9.39	9.37	9.43	9.42	9.39	9.33	-0.4	-0.1	0.1	-0.1
other industrial sectors	2.99	3.65	4.12	4.27	4.61	4.94	5.21	5.47	5.77	3.3	1.1	1.2	1.0
Residential	9.77	11.12	10.28	10.94	11.67	12.24	12.68	13.01	13.42	0.5	1.3	0.8	0.6
Tertiary	9.66	11.20	11.89	12.62	13.41	13.98	14.57	15.14	15.65	2.1	1.2	0.8	0.7
Transport	10.32	12.40	13.82	15.64	16.88	17.88	19.24	20.19	21.13	3.0	2.0	1.3	0.9
by fuel [1]													
Solids	1.64	1.39	1.25	1.19	1.18	1.19	1.14	1.10	1.06	-2.6	-0.6	-0.4	-0.8
Oil	12.60	14.20	16.20	18.34	19.46	20.55	21.93	22.81	23.76	2.5	1.9	1.2	0.8
Gas	19.70	21.02	19.99	20.17	20.67	20.91	21.08	21.27	21.62	0.2	0.3	0.2	0.3
Electricity	6.32	7.14	8.42	8.93	10.33	11.44	12.45	13.37	14.19	2.9	2.1	1.9	1.3
Heat (from CHP and District Heating)	2.14	3.17	3.45	3.97	4.03	4.12	4.24	4.36	4.39	4.9	1.6	0.5	0.4
Other	0.24	0.24	0.28	0.26	0.26	0.28	0.28	0.30	0.30	1.4	-0.6	0.6	0.6
CO_2 Emissions (Mt of CO_2)	**152.9**	**167.2**	**165.6**	**164.6**	**174.0**	**178.4**	**184.4**	**194.9**	**211.5**	**0.8**	**0.5**	**0.6**	**1.4**
Electricity and Steam production	43.3	49.1	48.9	45.5	51.5	52.2	54.1	62.1	75.3	1.2	0.5	0.5	3.4
Energy Branch	13.6	15.8	13.1	12.9	12.9	13.0	13.2	13.4	13.6	-0.4	-0.1	0.2	0.3
Industry	27.8	24.8	24.7	20.5	20.4	20.6	20.5	20.2	20.2	-1.2	-1.9	0.1	-0.1
Residential	19.2	20.6	18.9	19.9	20.9	21.6	22.1	22.3	22.5	-0.2	1.0	0.5	0.2
Tertiary	19.0	20.7	19.5	20.2	20.1	20.0	20.0	20.3	20.6	0.3	0.3	-0.1	0.3
Transport	30.0	36.2	40.5	45.5	48.2	51.0	54.4	56.7	59.2	3.1	1.8	1.2	0.8
CO_2 Emissions Index (1990=100)	**100.0**	**109.3**	**108.3**	**107.7**	**113.8**	**116.7**	**120.6**	**127.5**	**138.3**				

See explanations on page 219

Source: PRIMES Model

THE NETHERLANDS BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (B)

	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	14.95	15.46	15.92	16.45	16.82	17.13	17.40	17.66	17.86	0.6	0.5	0.3	0.3
GDP (in 000 MEuro'00)	301.4	334.8	401.1	446.9	503.1	564.0	630.3	702.5	780.1	2.9	2.3	2.3	2.2
Gross Inl. Cons./GDP (toe/MEuro'00)	221.7	219.0	187.9	171.7	159.1	145.8	134.9	124.9	117.6	-1.6	-1.7	-1.6	-1.4
Gross Inl. Cons./Capita (toe/inhabitant)	4.47	4.74	4.73	4.67	4.76	4.80	4.88	4.97	5.14	0.6	0.1	0.3	0.5
Electricity Generated/Capita (kWh/inhabitant)	4805	5243	5627	5875	6793	7501	8125	8694	9203	1.6	1.9	1.8	1.3
Carbon intensity (t of CO_2/toe of GIC)	2.29	2.28	2.20	2.15	2.17	2.17	2.17	2.22	2.31	-0.4	-0.1	0.0	0.6
CO_2 Emissions/Capita (t of CO_2/inhabitant)	10.23	10.81	10.40	10.01	10.35	10.42	10.59	11.04	11.85	0.2	-0.1	0.2	1.1
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	507.3	499.3	412.9	368.4	345.9	316.4	292.5	277.5	271.2	-2.0	-1.8	-1.7	-0.8
Import Dependency %	22.4	19.3	38.6	32.3	32.0	39.5	46.6	53.2	57.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	88.2	85.1	80.0	74.8	69.5	64.3	59.5	55.0	-1.6	-1.3	-1.5	-1.5
Residential (Energy on Private Income)	100.0	105.4	80.2	75.3	71.2	66.5	61.4	56.5	52.4	-2.2	-1.2	-1.5	-1.6
Tertiary (Energy on Value added)	100.0	103.7	89.7	83.7	77.9	71.9	66.5	61.7	57.1	-1.1	-1.4	-1.6	-1.5
Transport (Energy on GDP)	100.0	108.2	100.7	102.3	98.0	92.6	89.2	84.0	79.2	0.1	-0.3	-0.9	-1.2
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.58	0.49	0.41	0.31	0.31	0.29	0.28	0.30	0.34	-3.4	-2.7	-1.1	2.1
Final energy demand (t of CO_2/toe)	2.25	2.17	2.09	2.01	1.96	1.94	1.91	1.89	1.88	-0.7	-0.6	-0.2	-0.2
Industry	2.15	2.00	1.81	1.50	1.46	1.44	1.40	1.36	1.34	-1.7	-2.2	-0.4	-0.4
Residential	1.96	1.85	1.84	1.82	1.79	1.77	1.74	1.71	1.68	-0.7	-0.2	-0.3	-0.4
Tertiary	1.97	1.85	1.64	1.60	1.50	1.43	1.37	1.34	1.32	-1.8	-0.9	-0.9	-0.4
Transport	2.91	2.92	2.93	2.91	2.85	2.85	2.83	2.81	2.80	0.1	-0.3	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**21.02**	**22.75**	**26.55**	**28.15**	**32.61**	**36.53**	**39.69**	**43.08**		**2.2**	**2.6**	**1.7**
Nuclear		0.54	0.54	0.48	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04		0.0	0.0	0.0
Wind and solar		0.29	0.46	1.05	1.24	1.64	2.14	2.26	3.38		10.5	5.6	4.6
Thermal		20.15	21.72	24.99	26.87	30.94	34.34	37.40	39.67		2.2	2.5	1.5
of which cogeneration units		*6.85*	*8.87*	*10.05*	*9.60*	*9.22*	*8.65*	*7.44*	*8.51*		*0.8*	*-1.0*	*-0.2*
Open cycle(incl. biomass-waste)		15.05	13.26	13.19	11.41	7.84	6.28	6.75	9.95		-1.5	-5.8	4.7
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.00	2.81	4.89				
Gas Turbines Combined Cycle		4.49	7.96	11.30	15.14	19.95	23.80	23.10	19.81		6.6	4.6	-1.8
Small Gas Turbines		0.61	0.50	0.50	0.33	3.15	4.26	4.74	5.02		-4.1	29.3	1.7
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		36.3	36.9	42.2	45.5	49.1	51.3	51.7	50.0				
Load factor for gross electric capacities (%)		44.0	45.0	41.5	46.3	45.0	44.2	44.1	43.5				
CHP indicator (% of electricity from CHP)		36.3	44.1	43.5	31.7	23.9	21.3	16.5	20.7				
Non fossil fuels in electricity generation (%)		8.1	10.4	12.3	7.1	6.9	6.8	7.3	8.6				
nuclear		5.0	4.4	3.8	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		3.1	6.0	8.5	7.1	6.9	6.8	7.3	8.6				
of which waste		*1.0*	*1.9*	*1.8*	*1.6*	*1.4*	*1.2*	*1.1*	*1.0*				
Transport sector													
Passenger transport activity (Gpkm)	**169.7**	**179.0**	**193.3**	**210.9**	**232.7**	**258.8**	**285.5**	**312.8**	**340.8**	**1.3**	**1.9**	**2.1**	**1.8**
public road transport	11.1	11.8	12.6	15.5	16.0	16.9	17.9	18.8	19.6	1.3	2.4	1.1	0.9
private cars and motorcycles	141.4	145.3	154.3	167.0	183.8	203.6	223.6	243.7	264.0	0.9	1.8	2.0	1.7
rail	12.3	15.4	16.2	15.6	16.8	18.7	20.2	21.9	23.5	2.8	0.4	1.9	1.5
aviation	4.1	5.8	9.6	12.3	15.4	18.8	22.9	27.3	32.5	9.0	4.8	4.0	3.6
inland navigation	0.8	0.7	0.6	0.6	0.7	0.8	0.9	1.0	1.1	-2.8	2.2	2.4	2.2
travel per person (km per capita)	**11351**	**11577**	**12139**	**12824**	**13837**	**15113**	**16403**	**17715**	**19088**	**0.7**	**1.3**	**1.7**	**1.5**
Freight transport activity (Gtkm)	**70.5**	**80.7**	**90.8**	**103.2**	**117.1**	**130.0**	**142.8**	**155.7**	**168.8**	**2.6**	**2.6**	**2.0**	**1.7**
trucks	31.8	42.2	45.7	55.1	64.8	73.9	83.5	93.7	104.6	3.7	3.5	2.6	2.3
rail	3.1	3.1	3.8	3.7	4.0	4.2	4.4	4.5	4.6	2.2	0.4	1.0	0.6
inland navigation	35.7	35.5	41.3	44.5	48.4	51.9	54.9	57.5	59.5	1.5	1.6	1.3	0.8
freight activity per unit of GDP (tkm/000 Euro'00)	**234**	**241**	**226**	**231**	**233**	**231**	**227**	**222**	**216**	**-0.3**	**0.3**	**-0.3**	**-0.5**
Energy demand in transport (Mtoe)	**10.32**	**12.40**	**13.82**	**15.64**	**16.88**	**17.88**	**19.24**	**20.19**	**21.13**	**3.0**	**2.0**	**1.3**	**0.9**
public road transport	0.10	0.07	0.09	0.11	0.11	0.11	0.11	0.10	0.10	-1.8	2.3	0.1	-0.9
private cars and motorcycles	5.04	5.55	5.29	5.69	5.74	5.70	6.01	6.07	6.00	0.5	0.8	0.5	0.0
trucks	2.90	3.33	4.25	5.12	6.01	6.77	7.34	7.86	8.20	3.9	3.5	2.0	1.1
rail	0.11	0.16	0.18	0.16	0.16	0.15	0.14	0.13	0.14	4.8	-1.2	-1.3	0.0
aviation	1.61	2.60	3.35	3.85	4.09	4.33	4.78	5.15	5.81	7.6	2.0	1.6	2.0
inland navigation	0.56	0.70	0.67	0.72	0.78	0.83	0.87	0.88	0.89	1.8	1.6	1.1	0.3
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	40.4	46.8	46.0	46.4	43.3	39.7	38.7	36.6	35.4	1.3	-0.6	-1.1	-0.9
freight transport (toe/Mtkm)	49.0	49.8	54.3	56.6	58.0	58.4	57.4	56.1	53.8	1.0	0.7	-0.1	-0.7

Source: PRIMES Model

PORTUGAL: BASELINE SCENARIO										SUMMARY ENERGY BALANCE AND INDICATORS (A)			
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**2.66**	**2.61**	**3.13**	**3.52**	**4.11**	**4.60**	**5.00**	**5.56**	**5.97**	**1.6**	**2.8**	**2.0**	**1.8**
Solids	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	2.54	2.61	3.13	3.52	4.11	4.60	5.00	5.56	5.97	2.1	2.8	2.0	1.8
Hydro	0.79	0.72	0.97	1.12	1.16	1.23	1.21	1.44	1.44	2.1	1.8	0.4	1.8
Biomass	1.60	1.67	1.83	2.02	2.39	2.67	3.01	3.22	3.51	1.4	2.7	2.3	1.5
Waste	0.15	0.17	0.22	0.26	0.40	0.37	0.35	0.33	0.31	4.3	5.8	-1.1	-1.4
Wind	0.00	0.00	0.01	0.05	0.07	0.21	0.26	0.35	0.41	66.2	17.3	13.8	4.7
Solar and others	0.01	0.02	0.02	0.03	0.06	0.08	0.12	0.19	0.26	5.4	11.6	7.8	8.4
Geothermal	0.00	0.04	0.07	0.04	0.04	0.04	0.04	0.04	0.04	36.5	-6.3	0.0	0.0
Net Imports	**15.16**	**17.88**	**21.59**	**23.03**	**25.96**	**28.27**	**30.85**	**32.36**	**35.15**	**3.6**	**1.9**	**1.7**	**1.3**
Solids	2.79	3.80	3.91	3.47	3.66	3.59	4.21	4.55	5.37	3.4	-0.7	1.4	2.5
Oil	12.37	14.00	15.55	16.26	16.51	17.40	18.45	19.24	20.83	2.3	0.6	1.1	1.2
Crude oil and Feedstocks	11.36	13.55	12.02	15.71	15.94	16.80	17.82	18.59	20.12	0.6	2.9	1.1	1.2
Oil products	1.01	0.45	3.54	0.55	0.57	0.60	0.63	0.65	0.71	13.4	-16.7	1.0	1.2
Natural gas	0.00	0.00	2.04	3.22	5.72	7.21	8.13	8.50	8.88		10.9	3.6	0.9
Electricity	0.00	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	38.1	-1.0	-0.6	-0.4
Gross Inland Consumption	**16.74**	**19.62**	**24.13**	**25.85**	**29.30**	**32.03**	**34.92**	**36.91**	**40.02**	**3.7**	**2.0**	**1.8**	**1.4**
Solids	2.58	3.49	3.80	3.47	3.66	3.59	4.21	4.55	5.37	4.0	-0.4	1.4	2.5
Oil	11.61	13.44	15.08	15.56	15.73	16.55	17.52	18.23	19.73	2.6	0.4	1.1	1.2
Natural gas	0.00	0.00	2.03	3.22	5.72	7.21	8.13	8.50	8.88		10.9	3.6	0.9
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.00	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	38.1	-1.0	-0.6	-0.4
Renewable energy forms	2.54	2.61	3.13	3.52	4.11	4.60	5.00	5.56	5.97	2.1	2.8	2.0	1.8
as % in Gross Inland Consumption													
Solids	15.4	17.8	15.8	13.4	12.5	11.2	12.0	12.3	13.4				
Oil	69.4	68.5	62.5	60.2	53.7	51.7	50.2	49.4	49.3				
Natural gas	0.0	0.0	8.4	12.5	19.5	22.5	23.3	23.0	22.2				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	15.2	13.3	13.0	13.6	14.0	14.4	14.3	15.1	14.9				
Electricity Generation in TWhe	**28.35**	**33.15**	**43.36**	**48.68**	**56.99**	**64.66**	**71.78**	**79.99**	**86.77**	**4.3**	**2.8**	**2.3**	**1.9**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	9.16	8.36	11.49	13.68	14.33	16.75	17.15	21.02	21.96	2.3	2.2	1.8	2.5
Thermal (incl. biomass)	19.19	24.79	31.88	35.00	42.66	47.92	54.63	58.97	64.81	5.2	3.0	2.5	1.7
Fuel Inputs for Thermal Power Generation [1]	**5.06**	**6.22**	**7.22**	**7.36**	**8.39**	**8.97**	**10.15**	**10.46**	**11.55**	**3.6**	**1.5**	**1.9**	**1.3**
Solids	2.03	2.92	3.20	3.03	3.15	3.06	3.65	3.96	4.77	4.7	-0.2	1.5	2.7
Oil (including refinery gas)	2.58	2.75	2.02	1.66	0.94	0.38	0.16	0.16	0.18	-2.4	-7.4	-16.0	1.1
Gas	0.02	0.02	1.25	1.80	3.42	4.61	5.39	5.37	5.50	51.7	10.6	4.6	0.2
Biomass - Waste	0.44	0.50	0.68	0.84	0.85	0.89	0.92	0.93	1.06	4.6	2.1	0.8	1.5
Geothermal heat	0.00	0.04	0.07	0.04	0.04	0.04	0.04	0.04	0.04	36.5	-6.3	0.0	0.0
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**11.48**	**14.05**	**12.70**	**16.16**	**16.96**	**17.94**	**19.26**	**20.31**	**22.09**	**1.0**	**2.9**	**1.3**	**1.4**
Refineries	11.15	13.58	12.25	15.82	16.27	17.19	18.32	19.19	20.83	0.9	2.9	1.2	1.3
District heating	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.05	0.32	0.40	0.55	0.69	0.81			5.5	3.9
Others	0.33	0.46	0.45	0.29	0.36	0.35	0.39	0.43	0.46	3.1	-2.1	0.7	1.5
Energy Branch Consumption	**0.66**	**0.87**	**0.88**	**1.10**	**1.18**	**1.26**	**1.36**	**1.46**	**1.57**	**3.0**	**2.9**	**1.5**	**1.5**
Non-Energy Uses	**2.10**	**1.87**	**2.33**	**2.37**	**2.42**	**2.48**	**2.54**	**2.64**	**2.75**	**1.0**	**0.4**	**0.5**	**0.8**
Final Energy Demand	**10.94**	**12.92**	**16.81**	**18.45**	**21.37**	**23.93**	**26.24**	**28.40**	**30.46**	**4.4**	**2.4**	**2.1**	**1.5**
by sector													
Industry [1]	3.87	4.13	5.40	5.50	6.28	6.92	7.45	8.02	8.59	3.4	1.5	1.7	1.4
energy intensive industries	2.45	2.70	3.35	3.55	4.04	4.38	4.64	4.91	5.16	3.2	1.9	1.4	1.1
other industrial sectors	1.42	1.43	2.05	1.95	2.24	2.54	2.81	3.11	3.44	3.7	0.9	2.3	2.0
Residential	2.29	2.59	2.80	3.15	3.85	4.50	5.12	5.64	6.11	2.0	3.2	2.9	1.8
Tertiary	1.05	1.35	2.09	2.43	2.88	3.21	3.45	3.75	4.02	7.1	3.2	1.8	1.5
Transport	3.73	4.85	6.52	7.37	8.37	9.30	10.22	10.98	11.74	5.7	2.5	2.0	1.4
by fuel [1]													
Solids	0.62	0.55	0.47	0.33	0.33	0.33	0.33	0.33	0.32	-2.8	-3.5	0.0	-0.1
Oil	6.21	7.81	10.12	10.68	11.72	13.04	14.21	15.25	16.26	5.0	1.5	1.9	1.4
Gas	0.10	0.10	0.84	1.50	2.42	2.74	2.90	3.32	3.58	23.4	11.2	1.8	2.1
Electricity	2.02	2.48	3.30	3.71	4.36	4.97	5.53	6.15	6.70	5.0	2.8	2.4	1.9
Heat (from CHP and District Heating)	0.67	0.64	0.71	0.80	0.87	1.00	1.21	1.21	1.37	0.5	2.1	3.4	1.2
Other	1.32	1.35	1.39	1.44	1.68	1.86	2.06	2.15	2.23	0.5	1.9	2.0	0.8
CO_2 Emissions (Mt of CO_2)	**39.0**	**48.3**	**58.5**	**61.2**	**67.9**	**73.2**	**80.4**	**85.6**	**92.8**	**4.1**	**1.5**	**1.7**	**1.4**
Electricity and Steam production	14.8	19.2	20.9	21.5	23.5	24.0	27.5	28.7	32.2	3.5	1.2	1.6	1.6
Energy Branch	1.5	2.2	2.3	2.9	3.0	3.1	3.3	3.4	3.7	4.3	2.6	1.1	1.1
Industry	8.2	8.4	10.8	9.4	10.5	11.5	12.0	13.0	13.6	2.8	-0.2	1.3	1.3
Residential	1.6	2.0	2.0	2.3	3.0	3.6	4.2	4.8	5.3	2.0	4.1	3.5	2.3
Tertiary	1.9	2.1	3.2	3.3	3.8	4.1	4.3	4.5	4.8	5.4	1.8	1.3	1.1
Transport	11.0	14.4	19.4	21.8	24.2	26.8	29.2	31.2	33.2	5.8	2.2	1.9	1.3
CO2 Emissions Index (1990=100)	**100.0**	**123.7**	**149.9**	**156.8**	**174.0**	**187.5**	**206.1**	**219.2**	**237.7**				

See explanations on page 219

Source: PRIMES Model

PORTUGAL: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	9.90	9.92	10.01	10.16	10.33	10.46	10.55	10.62	10.70	0.1	0.3	0.2	0.1
GDP (in 000 MEuro'00)	87.7	95.4	115.0	128.7	155.2	185.8	221.8	264.0	312.4	2.8	3.0	3.6	3.5
Gross Inl. Cons./GDP (toe/MEuro'00)	190.9	205.5	209.7	200.9	188.8	172.3	157.5	139.8	128.1	0.9	-1.0	-1.8	-2.0
Gross Inl. Cons./Capita (toe/inhabitant)	1.69	1.98	2.41	2.54	2.84	3.06	3.31	3.47	3.74	3.6	1.6	1.6	1.2
Electricity Generated/Capita (kWh/inhabitant)	2864	3343	4333	4790	5518	6184	6806	7530	8109	4.2	2.4	2.1	1.8
Carbon intensity (t of CO_2/toe of GIC)	2.33	2.46	2.43	2.37	2.32	2.29	2.30	2.32	2.32	0.4	-0.5	-0.1	0.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	3.94	4.87	5.85	6.02	6.58	7.00	7.63	8.06	8.67	4.0	1.2	1.5	1.3
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	445.1	506.1	508.6	475.9	437.6	394.0	362.7	324.2	297.1	1.3	-1.5	-1.9	-2.0
Import Dependency %	87.4	89.0	87.1	86.7	86.3	86.0	86.1	85.3	85.5				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	107.7	117.5	112.8	109.0	102.2	94.2	87.3	80.9	1.6	-0.8	-1.4	-1.5
Residential (Energy on Private Income)	100.0	102.1	91.7	94.5	96.7	94.9	91.0	84.8	78.0	-0.9	0.5	-0.6	-1.5
Tertiary (Energy on Value added)	100.0	115.6	146.7	148.8	143.6	131.9	117.0	105.4	94.3	3.9	-0.2	-2.0	-2.1
Transport (Energy on GDP)	100.0	119.6	133.3	134.8	127.0	117.8	108.4	97.9	88.4	2.9	-0.5	-1.6	-2.0
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.52	0.57	0.47	0.37	0.35	0.32	0.32	0.30	0.31	-1.0	-2.8	-0.9	-0.2
Final energy demand (t of CO_2/toe)	2.08	2.08	2.10	2.00	1.94	1.92	1.89	1.88	1.87	0.1	-0.8	-0.3	-0.1
Industry	2.12	2.02	2.00	1.71	1.68	1.66	1.61	1.62	1.58	-0.6	-1.7	-0.4	-0.2
Residential	0.71	0.77	0.71	0.75	0.78	0.81	0.82	0.85	0.86	0.0	0.9	0.5	0.5
Tertiary	1.77	1.59	1.51	1.35	1.31	1.28	1.24	1.20	1.19	-1.6	-1.4	-0.5	-0.4
Transport	2.95	2.96	2.97	2.95	2.89	2.88	2.86	2.84	2.83	0.1	-0.3	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**8.87**	**10.35**	**11.00**	**12.61**	**15.10**	**16.78**	**19.19**	**21.33**		**2.0**	**2.9**	**2.4**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		3.86	4.01	4.09	4.28	4.63	4.75	5.32	5.35		0.7	1.1	1.2
Wind and solar		0.00	0.10	0.29	0.38	1.26	1.54	1.96	2.27		14.3	15.0	4.0
Thermal		5.02	6.24	6.63	7.95	9.21	10.49	11.92	13.72		2.4	2.8	2.7
of which cogeneration units		*0.67*	*0.75*	*1.18*	*1.67*	*2.27*	*2.97*	*3.12*	*3.63*		*8.4*	*5.9*	*2.0*
Open cycle(incl. biomass-waste)		4.30	4.15	3.95	3.60	3.06	3.00	1.91	2.09		-1.4	-1.8	-3.5
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.14	2.28	2.89				35.7
Gas Turbines Combined Cycle		0.00	0.99	1.61	3.43	5.51	6.74	7.59	8.56		13.2	7.0	2.4
Small Gas Turbines		0.71	1.09	1.06	0.91	0.63	0.60	0.12	0.15		-1.9	-4.1	-12.7
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.0	0.0	0.0
Indicators													
Efficiency for thermal electricity production (%)		38.9	43.6	42.2	45.1	47.3	48.1	50.4	50.1				
Load factor for gross electric capacities (%)		42.6	47.8	50.5	51.6	48.9	48.8	47.6	46.4				
CHP indicator (% of electricity from CHP)		9.0	7.6	11.6	14.1	14.1	17.3	16.6	17.0				
Non fossil fuels in electricity generation (%)		30.4	32.0	33.6	29.9	30.5	28.3	30.5	29.7				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		30.4	32.0	33.6	29.9	30.5	28.3	30.5	29.7				
of which waste		*1.2*	*1.3*	*1.2*	*1.6*	*1.3*	*1.2*	*1.0*	*0.9*				
Transport sector													
Passenger transport activity (Gpkm)	**68.4**	**90.1**	**118.4**	**131.5**	**145.4**	**160.0**	**173.9**	**187.2**	**198.1**	**5.7**	**2.1**	**1.8**	**1.3**
public road transport	10.3	11.3	11.8	11.7	11.7	11.9	12.0	12.0	11.8	1.4	-0.1	0.3	-0.2
private cars and motorcycles	46.3	66.5	93.5	102.7	112.4	122.2	131.0	139.1	145.0	7.3	1.9	1.5	1.0
rail	6.3	5.3	4.2	4.9	5.2	5.6	5.9	6.1	6.1	-4.0	2.1	1.3	0.4
aviation	5.2	6.8	8.6	12.0	15.7	19.9	24.6	29.6	34.7	5.1	6.2	4.6	3.5
inland navigation	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	2.5	2.3	1.9	1.5
travel per person (km per capita)	**6906**	**9089**	**11834**	**12934**	**14074**	**15299**	**16487**	**17625**	**18515**	**5.5**	**1.7**	**1.6**	**1.2**
Freight transport activity (Gtkm)	**19.1**	**20.0**	**23.5**	**26.1**	**31.2**	**36.9**	**43.5**	**51.0**	**59.3**	**2.1**	**2.9**	**3.4**	**3.2**
trucks	15.8	16.5	20.5	23.0	27.9	33.3	39.6	46.8	54.9	2.7	3.2	3.6	3.3
rail	1.5	2.0	2.2	2.2	2.4	2.6	2.8	3.0	3.2	4.1	0.9	1.5	1.4
inland navigation	1.9	1.4	0.8	0.9	0.9	1.0	1.1	1.2	1.3	-7.9	1.1	1.8	1.6
freight activity per unit of GDP (tkm/000 Euro'00)	**218**	**209**	**204**	**203**	**201**	**199**	**196**	**193**	**190**	**-0.6**	**-0.1**	**-0.3**	**-0.3**
Energy demand in transport (Mtoe)	**3.73**	**4.85**	**6.52**	**7.37**	**8.37**	**9.30**	**10.22**	**10.98**	**11.74**	**5.7**	**2.5**	**2.0**	**1.4**
public road transport	0.07	0.06	0.10	0.10	0.10	0.10	0.09	0.09	0.08	4.2	-0.2	-0.5	-1.8
private cars and motorcycles	1.57	2.12	2.34	2.55	2.56	2.50	2.56	2.57	2.44	4.0	0.9	0.0	-0.5
trucks	1.39	1.93	3.15	3.51	4.25	5.03	5.72	6.44	7.34	8.6	3.0	3.0	2.5
rail	0.08	0.08	0.09	0.10	0.09	0.09	0.06	0.06	0.05	0.6	0.7	-4.5	-0.9
aviation	0.58	0.62	0.79	1.06	1.31	1.53	1.73	1.77	1.76	3.2	5.2	2.8	0.2
inland navigation	0.04	0.05	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.0	1.6	1.7	1.3
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	33.6	31.9	28.0	29.0	28.0	26.4	25.7	24.0	22.0	-1.8	0.0	-0.9	-1.5
freight transport (toe/Mtkm)	74.9	98.9	136.2	136.2	137.7	137.6	132.5	127.1	124.4	6.2	0.1	-0.4	-0.6

Source: PRIMES Model

SPAIN: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)													
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**33.41**	**31.44**	**31.15**	**30.20**	**33.94**	**34.31**	**36.27**	**37.98**	**39.92**	**-0.7**	**0.9**	**0.7**	**1.0**
Solids	11.68	10.17	7.74	5.41	3.70	3.15	3.40	2.12	1.32	-4.0	-7.1	-0.8	-9.0
Oil	0.79	0.78	0.23	0.25	0.18	0.09	0.00	0.00	0.00	-11.8	-2.2		
Natural gas	1.27	0.38	0.15	0.15	0.13	0.00	0.00	0.00	0.00	-19.4	-1.3		
Nuclear	13.70	14.30	16.05	16.05	15.95	15.68	16.45	17.95	20.29	1.6	-0.1	0.3	2.1
Renewable energy sources	5.96	5.80	6.99	8.35	13.98	15.39	16.42	17.92	18.31	1.6	7.2	1.6	1.1
Hydro	2.18	1.99	2.53	3.10	3.38	3.64	3.86	4.08	4.22	1.5	2.9	1.3	0.9
Biomass	3.53	3.52	3.75	4.24	7.57	7.77	8.03	8.05	7.92	0.6	7.3	0.6	-0.1
Waste	0.23	0.24	0.26	0.38	0.48	0.80	1.31	1.54	1.53	1.5	6.3	10.5	1.5
Wind	0.00	0.02	0.41	0.54	2.37	2.89	2.85	3.84	3.86	79.0	19.3	1.9	3.1
Solar and others	0.02	0.02	0.03	0.08	0.18	0.27	0.35	0.40	0.78	4.3	18.5	7.2	8.3
Geothermal	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	12.3	1.6	-0.2	-0.2
Net Imports	**59.86**	**75.42**	**98.34**	**111.24**	**119.74**	**129.89**	**136.16**	**138.64**	**144.87**	**5.1**	**2.0**	**1.3**	**0.6**
Solids	7.04	9.15	12.64	7.39	7.26	6.18	7.11	9.30	16.00	6.0	-5.4	-0.2	8.5
Oil	49.17	58.36	69.86	73.07	76.70	80.37	81.54	81.29	84.12	3.6	0.9	0.6	0.3
Crude oil and Feedstocks	53.26	55.36	58.38	69.42	72.94	76.52	77.71	77.53	80.18	0.9	2.3	0.6	0.3
Oil products	-4.09	3.00	11.48	3.65	3.76	3.84	3.83	3.77	3.94		-10.6	0.2	0.3
Natural gas	3.69	7.52	15.47	30.61	35.69	43.26	47.44	47.96	44.68	15.4	8.7	2.9	-0.6
Electricity	-0.04	0.39	0.38	0.17	0.09	0.08	0.08	0.07	0.07		-13.4	-1.6	-0.6
Gross Inland Consumption	**89.09**	**102.29**	**122.50**	**134.92**	**146.76**	**156.84**	**164.64**	**168.31**	**175.94**	**3.2**	**1.8**	**1.2**	**0.7**
Solids	18.94	19.52	20.64	12.79	10.95	9.33	10.51	11.42	17.32	0.9	-6.1	-0.4	5.1
Oil	45.55	54.56	63.21	66.80	69.96	73.09	73.75	72.99	75.27	3.3	1.0	0.5	0.2
Natural gas	4.97	7.72	15.22	30.76	35.82	43.26	47.44	47.96	44.68	11.8	8.9	2.8	-0.6
Nuclear	13.70	14.30	16.05	16.05	15.95	15.68	16.45	17.95	20.29	1.6	-0.1	0.3	2.1
Electricity	-0.04	0.39	0.38	0.17	0.09	0.08	0.08	0.07	0.07		-13.4	-1.6	-0.6
Renewable energy forms	5.96	5.80	6.99	8.35	13.98	15.39	16.42	17.92	18.31	1.6	7.2	1.6	1.1
as % in Gross Inland Consumption													
Solids	21.3	19.1	16.9	9.5	7.5	5.9	6.4	6.8	9.8				
Oil	51.1	53.3	51.6	49.5	47.7	46.6	44.8	43.4	42.8				
Natural gas	5.6	7.5	12.4	22.8	24.4	27.6	28.8	28.5	25.4				
Nuclear	15.4	14.0	13.1	11.9	10.9	10.0	10.0	10.7	11.5				
Renewable energy forms	6.7	5.7	5.7	6.2	9.5	9.8	10.0	10.6	10.4				
Electricity Generation in TWhe	**150.94**	**165.58**	**222.77**	**261.68**	**303.59**	**340.51**	**364.43**	**383.59**	**402.04**	**4.0**	**3.1**	**1.8**	**1.0**
Nuclear	54.26	55.45	62.19	62.21	61.82	61.07	64.11	72.84	84.87	1.4	-0.1	0.4	2.8
Hydro & wind	25.41	23.38	34.19	42.36	66.85	76.05	78.19	92.14	97.95	3.0	6.9	1.6	2.3
Thermal (incl. biomass)	71.28	86.76	126.39	157.11	174.91	203.40	222.12	218.61	219.23	5.9	3.3	2.4	-0.1
Fuel Inputs for Thermal Power Generation [1]	**18.55**	**21.17**	**29.41**	**31.69**	**33.78**	**37.63**	**39.11**	**38.36**	**39.35**	**4.7**	**1.4**	**1.5**	**0.1**
Solids	13.94	13.64	18.28	10.39	8.48	7.09	8.14	9.03	14.95	2.8	-7.4	-0.4	6.3
Oil (including refinery gas)	2.82	4.54	5.19	3.70	3.14	3.48	2.15	1.28	0.62	6.3	-4.9	-3.7	-11.7
Gas	0.99	1.91	4.67	15.78	18.25	23.20	25.06	24.68	20.93	16.7	14.6	3.2	-1.8
Biomass - Waste	0.80	1.08	1.27	1.81	3.90	3.86	3.77	3.36	2.85	4.8	11.9	-0.4	-2.8
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**57.88**	**58.96**	**63.07**	**73.82**	**79.67**	**83.37**	**85.65**	**86.34**	**89.60**	**0.9**	**2.4**	**0.7**	**0.5**
Refineries	53.75	56.04	60.04	71.31	75.78	79.47	80.94	81.12	84.07	1.1	2.4	0.7	0.4
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.23	1.55	1.83	2.45	2.93	3.26			4.7	2.9
Others	4.13	2.92	3.03	2.28	2.34	2.08	2.25	2.28	2.27	-3.0	-2.6	-0.4	0.1
Energy Branch Consumption	**4.76**	**5.47**	**6.10**	**6.96**	**7.27**	**7.54**	**7.75**	**7.75**	**8.01**	**2.5**	**1.8**	**0.6**	**0.3**
Non-Energy Uses	**5.85**	**8.01**	**9.09**	**10.04**	**11.10**	**11.98**	**12.64**	**13.27**	**13.76**	**4.5**	**2.0**	**1.3**	**0.9**
Final Energy Demand	**56.18**	**63.11**	**78.85**	**89.65**	**100.17**	**108.57**	**115.56**	**120.11**	**123.87**	**3.4**	**2.4**	**1.4**	**0.7**
by sector													
Industry [1]	19.41	20.04	24.95	27.00	29.84	32.57	35.02	36.98	38.97	2.5	1.8	1.6	1.1
energy intensive industries	13.90	14.07	16.94	18.30	20.00	21.58	23.05	24.12	25.18	2.0	1.7	1.4	0.9
other industrial sectors	5.50	5.97	8.01	8.71	9.84	10.99	11.97	12.87	13.79	3.8	2.1	2.0	1.4
Residential	9.26	10.00	11.87	14.21	16.59	18.42	19.60	20.08	20.54	2.5	3.4	1.7	0.5
Tertiary	5.19	7.00	9.25	11.16	12.92	13.96	14.41	14.97	15.40	5.9	3.4	1.1	0.7
Transport	22.33	26.07	32.78	37.28	40.82	43.62	46.53	48.07	48.96	3.9	2.2	1.3	0.5
by fuel [1]													
Solids	3.47	2.18	1.64	1.34	1.27	1.20	1.28	1.27	1.25	-7.2	-2.5	0.1	-0.3
Oil	32.94	38.08	45.06	48.66	52.53	55.17	57.85	59.33	60.30	3.2	1.5	1.0	0.4
Gas	4.40	5.92	10.54	14.47	16.71	18.30	19.64	20.55	21.11	9.1	4.7	1.6	0.7
Electricity	10.82	12.12	16.20	18.76	22.22	25.31	27.34	29.10	30.73	4.1	3.2	2.1	1.2
Heat (from CHP and District Heating)	1.58	2.10	2.62	3.72	4.62	5.34	5.81	5.99	6.55	5.2	5.8	2.3	1.2
Other	2.98	2.71	2.78	2.70	2.82	3.24	3.64	3.88	3.94	-0.7	0.1	2.6	0.8
CO_2 Emissions (Mt of CO_2)	**203.8**	**225.8**	**283.3**	**292.6**	**302.6**	**320.9**	**335.7**	**341.0**	**357.3**	**3.3**	**0.7**	**1.0**	**0.6**
Electricity and Steam production	63.6	68.2	94.1	89.9	86.0	93.2	97.4	97.3	109.8	4.0	-0.9	1.3	1.2
Energy Branch	11.5	13.1	13.5	15.5	16.2	16.8	17.0	16.8	17.3	1.6	1.8	0.4	0.2
Industry	42.0	43.4	49.0	41.7	42.4	43.2	44.8	46.6	48.0	1.5	-1.4	0.6	0.7
Residential	12.8	13.6	16.4	20.2	24.1	26.2	27.4	27.2	26.8	2.5	3.9	1.3	-0.2
Tertiary	8.1	10.5	13.0	15.2	16.3	16.3	16.4	16.8	17.2	4.8	2.2	0.1	0.4
Transport	65.6	76.9	97.3	110.1	117.7	125.3	132.7	136.3	138.3	4.0	1.9	1.2	0.4
CO_2 Emissions Index (1990=100)	**100.0**	**110.8**	**139.0**	**143.6**	**148.5**	**157.4**	**164.7**	**167.3**	**175.3**				

See explanations on page 219

Source: PRIMES Model

SPAIN: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	38.85	39.22	39.93	40.91	41.12	41.08	40.78	40.33	39.83	0.3	0.3	-0.1	-0.2
GDP (in 000 MEuro'00)	468.8	505.1	608.8	703.9	816.9	943.3	1084.5	1239.1	1406.0	2.6	3.0	2.9	2.6
Gross Inl. Cons./GDP (toe/MEuro'00)	190.0	202.5	201.2	191.7	179.7	166.3	151.8	135.8	125.1	0.6	-1.1	-1.7	-1.9
Gross Inl. Cons./Capita (toe/inhabitant)	2.29	2.61	3.07	3.30	3.57	3.82	4.04	4.17	4.42	3.0	1.5	1.2	0.9
Electricity Generated/Capita (kWh/inhabitant)	3885	4222	5579	6397	7384	8289	8937	9512	10095	3.7	2.8	1.9	1.2
Carbon intensity (t of CO2/toe of GIC)	2.29	2.21	2.31	2.17	2.06	2.05	2.04	2.03	2.03	0.1	-1.1	-0.1	0.0
CO2 Emissions/Capita (t of CO2/inhabitant)	5.25	5.76	7.10	7.15	7.36	7.81	8.23	8.45	8.97	3.1	0.4	1.1	0.9
CO2 Emissions to GDP (t of CO2/MEuro'00)	434.8	447.0	465.3	415.6	370.5	340.2	309.5	275.2	254.2	0.7	-2.3	-1.8	-2.0
Import Dependency %	64.4	71.5	76.6	78.6	77.9	79.1	79.0	78.5	78.4				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	103.0	106.1	98.0	92.9	87.4	82.1	76.4	71.5	0.6	-1.3	-1.2	-1.4
Residential (Energy on Private Income)	100.0	102.2	101.1	105.4	107.3	104.3	97.5	88.1	79.9	0.1	0.6	-1.0	-2.0
Tertiary (Energy on Value added)	100.0	126.4	143.1	149.1	148.2	138.5	123.9	112.4	101.4	3.6	0.4	-1.8	-2.0
Transport (Energy on GDP)	100.0	108.4	113.1	111.2	104.9	97.1	90.1	81.5	73.1	1.2	-0.7	-1.5	-2.1
Carbon Intensity indicators													
Electricity and Steam production (t of CO2/MWh)	0.42	0.41	0.42	0.29	0.24	0.23	0.23	0.21	0.23	0.0	-5.5	-0.6	0.2
Final energy demand (t of CO2/toe)	2.29	2.29	2.23	2.09	2.00	1.94	1.91	1.89	1.86	-0.3	-1.1	-0.4	-0.3
Industry	2.17	2.17	1.96	1.55	1.42	1.33	1.28	1.26	1.23	-1.0	-3.2	-1.0	-0.4
Residential	1.39	1.36	1.38	1.42	1.45	1.42	1.40	1.35	1.30	0.0	0.5	-0.4	-0.7
Tertiary	1.56	1.51	1.41	1.36	1.26	1.16	1.14	1.12	1.11	-1.1	-1.1	-1.0	-0.2
Transport	2.94	2.95	2.97	2.95	2.88	2.87	2.85	2.83	2.83	0.1	-0.3	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**44.10**	**49.22**	**65.99**	**77.88**	**87.60**	**94.73**	**106.52**	**112.25**		**4.7**	**2.0**	**1.7**
Nuclear		7.80	7.80	7.80	7.64	7.78	8.00	9.59	11.54		-0.2	0.5	3.7
Hydro (pumping excluded)		12.38	12.87	15.10	16.27	17.38	18.29	19.19	19.76		2.4	1.2	0.8
Wind and solar		0.12	2.25	3.50	14.98	18.30	18.01	24.21	26.87		20.9	1.9	4.1
Thermal		23.81	26.30	39.59	38.98	44.14	50.43	53.53	54.08		4.0	2.6	0.7
of which cogeneration units		*1.77*	*5.29*	*6.54*	*8.10*	*11.38*	*12.60*	*13.74*	*15.07*		*4.4*	*4.5*	*1.8*
Open cycle(incl. biomass-waste)		22.49	24.93	23.61	18.86	12.40	6.62	6.23	6.18		-2.8	-9.9	-0.7
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	8.17	9.74	14.79				6.1
Gas Turbines Combined Cycle		0.14	0.18	14.97	18.68	29.11	32.75	34.17	29.72		59.1	5.8	-1.0
Small Gas Turbines		1.18	1.19	1.01	1.45	2.63	2.88	3.39	3.39		1.9	7.1	1.6
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		37.8	36.9	44.1	46.1	48.2	50.6	50.8	49.7				
Load factor for gross electric capacities (%)		42.9	51.7	45.3	44.5	44.4	43.9	41.1	40.9				
CHP indicator (% of electricity from CHP)		5.9	7.6	11.7	13.0	13.3	14.0	14.1	14.9				
Non fossil fuels in electricity generation (%)		49.8	45.2	42.3	46.4	43.8	42.2	45.7	47.7				
nuclear		33.5	27.9	23.8	20.4	17.9	17.6	19.0	21.1				
renewable energy forms		16.3	17.2	18.5	26.1	25.9	24.6	26.7	26.6				
of which waste		*0.3*	*0.3*	*0.2*	*0.2*	*0.4*	*0.6*	*0.6*	*0.6*				
Transport sector													
Passenger transport activity (Gpkm)	**317.0**	**377.3**	**482.5**	**541.8**	**598.6**	**651.1**	**696.9**	**730.9**	**762.0**	**4.3**	**2.2**	**1.5**	**0.9**
public road transport	33.4	39.6	50.6	51.8	53.2	55.0	56.0	56.1	55.4	4.3	0.5	0.5	-0.1
private cars and motorcycles	232.4	275.7	345.9	386.8	418.9	443.6	459.6	466.6	470.0	4.1	1.9	0.9	0.2
rail	19.9	20.8	25.4	26.1	27.8	30.4	32.4	32.9	33.1	2.5	0.9	1.6	0.2
aviation	30.3	40.1	59.3	75.6	97.1	120.4	147.0	173.2	201.2	6.9	5.1	4.2	3.2
inland navigation	1.1	1.2	1.3	1.5	1.6	1.8	1.9	2.1	2.2	2.1	2.4	1.7	1.2
travel per person (km per capita)	**8160**	**9620**	**12084**	**13244**	**14558**	**15849**	**17089**	**18125**	**19132**	**4.0**	**1.9**	**1.6**	**1.1**
Freight transport activity (Gtkm)	**123.5**	**143.0**	**176.2**	**199.5**	**225.1**	**253.8**	**285.7**	**320.2**	**358.3**	**3.6**	**2.5**	**2.4**	**2.3**
trucks	78.9	94.6	133.1	151.7	173.7	198.2	225.6	256.2	290.0	5.4	2.7	2.6	2.5
rail	11.6	10.4	12.2	13.0	13.6	14.6	15.8	16.5	17.3	0.5	1.1	1.5	0.9
inland navigation	33.0	38.0	31.0	34.8	37.8	41.0	44.2	47.5	51.1	-0.6	2.0	1.6	1.4
freight activity per unit of GDP (tkm/000 Euro'00)	**264**	**283**	**289**	**283**	**276**	**269**	**263**	**258**	**255**	**0.9**	**-0.5**	**-0.5**	**-0.3**
Energy demand in transport (Mtoe)	**22.33**	**26.07**	**32.78**	**37.28**	**40.82**	**43.62**	**46.53**	**48.07**	**48.96**	**3.9**	**2.2**	**1.3**	**0.5**
public road transport	0.30	0.28	0.35	0.36	0.36	0.37	0.35	0.33	0.29	1.7	0.4	-0.3	-1.9
private cars and motorcycles	7.75	8.79	10.35	11.54	11.43	10.90	10.84	10.44	9.62	2.9	1.0	-0.5	-1.2
trucks	9.63	11.40	15.36	17.50	20.01	22.56	24.64	26.73	28.23	4.8	2.7	2.1	1.4
rail	0.53	0.63	0.85	0.82	0.74	0.51	0.49	0.47	0.46	4.8	-1.3	-4.1	-0.6
aviation	2.47	3.10	4.50	5.52	6.60	7.48	8.31	8.14	8.29	6.2	3.9	2.3	0.0
inland navigation	1.66	1.87	1.38	1.55	1.68	1.80	1.89	1.97	2.07	-1.8	2.0	1.2	0.9
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	34.7	33.9	33.0	33.5	31.8	29.6	28.7	26.5	24.5	-0.5	-0.4	-1.0	-1.6
freight transport (toe/Mtkm)	91.6	92.9	95.5	95.9	96.7	96.0	92.8	89.5	84.5	0.4	0.1	-0.4	-0.9

Source: PRIMES Model

SWEDEN: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)													
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**29.61**	**32.19**	**30.57**	**32.50**	**33.53**	**33.19**	**30.31**	**22.36**	**17.65**	**0.3**	**0.9**	**-1.0**	**-5.3**
Solids	0.27	0.31	0.24	0.00	0.00	0.00	0.00	0.00	0.00	-1.3			
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	17.76	18.04	14.78	17.37	17.37	16.09	12.84	4.94	0.00	-1.8	1.6	-3.0	
Renewable energy sources	11.57	13.83	15.55	15.13	16.16	17.10	17.47	17.42	17.65	3.0	0.4	0.8	0.1
Hydro	6.23	5.86	6.79	5.11	5.23	5.57	5.82	6.08	6.02	0.9	-2.6	1.1	0.3
Biomass	1.46	1.76	1.57	1.65	2.32	2.81	2.71	2.37	2.65	0.8	4.0	1.5	-0.2
Waste	3.88	6.20	7.15	8.25	8.18	8.18	8.32	8.24	8.19	6.3	1.4	0.2	-0.2
Wind	0.00	0.01	0.04	0.11	0.42	0.53	0.61	0.70	0.69	53.8	27.1	3.7	1.2
Solar and others	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.04	0.10	4.9	2.4	0.9	29.7
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**17.82**	**19.12**	**19.37**	**22.16**	**22.71**	**23.63**	**26.97**	**33.29**	**37.67**	**0.8**	**1.6**	**1.7**	**3.4**
Solids	2.33	2.66	2.33	2.59	2.78	3.62	5.95	10.20	12.31	0.0	1.7	7.9	7.5
Oil	15.11	15.93	15.94	16.42	16.58	16.30	16.30	16.25	16.23	0.5	0.4	-0.2	0.0
Crude oil and Feedstocks	16.93	17.81	20.37	16.11	16.44	15.97	16.06	15.98	15.84	1.9	-2.1	-0.2	-0.1
Oil products	-1.82	-1.89	-4.43	0.31	0.14	0.33	0.24	0.27	0.39			5.4	5.1
Natural gas	0.53	0.68	0.70	2.78	2.98	3.36	4.36	6.49	8.78	2.8	15.6	3.9	7.3
Electricity	-0.15	-0.14	0.40	0.37	0.37	0.36	0.36	0.35	0.35		-0.8	-0.5	-0.1
Gross Inland Consumption	**46.94**	**50.97**	**48.33**	**53.08**	**54.57**	**55.07**	**55.45**	**53.75**	**53.31**	**0.3**	**1.2**	**0.2**	**-0.4**
Solids	2.73	2.90	2.59	2.59	2.78	3.62	5.95	10.20	12.31	-0.6	0.7	7.9	7.5
Oil	14.50	15.67	14.31	14.84	14.90	14.54	14.48	14.34	14.23	-0.1	0.4	-0.3	-0.2
Natural gas	0.53	0.68	0.70	2.78	2.98	3.36	4.36	6.49	8.78	2.8	15.6	3.9	7.3
Nuclear	17.76	18.04	14.78	17.37	17.37	16.09	12.84	4.94	0.00	-1.8	1.6	-3.0	
Electricity	-0.15	-0.14	0.40	0.37	0.37	0.36	0.36	0.35	0.35		-0.8	-0.5	-0.1
Renewable energy forms	11.57	13.83	15.55	15.13	16.16	17.10	17.47	17.42	17.65	3.0	0.4	0.8	0.1
as % in Gross Inland Consumption													
Solids	5.8	5.7	5.4	4.9	5.1	6.6	10.7	19.0	23.1				
Oil	30.9	30.7	29.6	28.0	27.3	26.4	26.1	26.7	26.7				
Natural gas	1.1	1.3	1.4	5.2	5.5	6.1	7.9	12.1	16.5				
Nuclear	37.8	35.4	30.6	32.7	31.8	29.2	23.2	9.2	0.0				
Renewable energy forms	24.6	27.1	32.2	28.5	29.6	31.0	31.5	32.4	33.1				
Electricity Generation in TWhe	**145.95**	**148.27**	**145.85**	**149.21**	**155.24**	**161.15**	**171.09**	**178.95**	**186.53**	**0.0**	**0.6**	**1.0**	**0.9**
Nuclear	68.17	69.92	57.29	67.34	67.34	62.38	49.77	19.14	0.00	-1.7	1.6	-3.0	
Hydro & wind	72.50	68.20	79.38	60.68	65.72	70.94	74.85	79.18	79.09	0.9	-1.9	1.3	0.6
Thermal (incl. biomass)	5.28	10.15	9.18	21.19	22.18	27.84	46.47	80.63	107.44	5.7	9.2	7.7	8.7
Fuel Inputs for Thermal Power Generation [1]	**1.63**	**2.92**	**3.07**	**5.82**	**5.97**	**7.28**	**10.95**	**17.31**	**21.14**	**6.5**	**6.9**	**6.3**	**6.8**
Solids	0.63	0.70	0.48	0.78	1.11	2.12	4.61	9.04	11.16	-2.8	8.8	15.3	9.2
Oil (including refinery gas)	0.26	0.72	0.27	0.21	0.18	0.15	0.10	0.06	0.06	0.2	-3.7	-5.6	-5.4
Gas	0.26	0.40	0.40	1.81	2.04	2.50	3.71	5.83	7.64	4.3	17.7	6.2	7.5
Biomass - Waste	0.48	1.10	1.92	3.02	2.63	2.50	2.53	2.38	2.28	15.0	3.2	-0.4	-1.0
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**20.60**	**23.57**	**25.41**	**22.71**	**22.92**	**22.46**	**22.70**	**22.93**	**23.20**	**2.1**	**-1.0**	**-0.1**	**0.2**
Refineries	17.98	19.47	21.62	19.04	19.28	18.98	19.06	19.08	19.17	1.9	-1.1	-0.1	0.1
District heating	1.20	2.47	2.07	2.24	2.29	2.23	2.36	2.55	2.63	5.6	1.0	0.3	1.1
Biofuels and hydrogen production	0.00	0.00	0.00	0.01	0.08	0.11	0.23	0.35	0.50			11.7	8.2
Others	1.42	1.62	1.72	1.41	1.28	1.14	1.06	0.95	0.89	2.0	-2.9	-1.9	-1.7
Energy Branch Consumption	**1.76**	**1.63**	**1.51**	**1.54**	**1.51**	**1.48**	**1.52**	**1.55**	**1.59**	**-1.5**	**0.0**	**0.1**	**0.5**
Non-Energy Uses	**1.87**	**1.96**	**2.01**	**2.15**	**2.28**	**2.38**	**2.45**	**2.52**	**2.59**	**0.8**	**1.2**	**0.7**	**0.5**
Final Energy Demand	**30.20**	**33.41**	**32.90**	**34.04**	**35.65**	**36.71**	**37.87**	**38.67**	**39.68**	**0.9**	**0.8**	**0.6**	**0.5**
by sector													
Industry [1]	11.59	12.36	12.89	13.48	14.93	15.83	16.36	16.69	17.17	1.1	1.5	0.9	0.5
energy intensive industries	8.19	8.61	9.30	9.79	10.74	11.31	11.58	11.69	11.91	1.3	1.4	0.8	0.3
other industrial sectors	3.40	3.75	3.59	3.69	4.20	4.52	4.78	5.00	5.26	0.5	1.6	1.3	1.0
Residential	6.84	7.78	7.29	7.48	7.73	7.76	7.84	7.89	7.97	0.6	0.6	0.1	0.2
Tertiary	4.54	5.60	5.04	4.80	4.64	4.69	4.93	5.26	5.68	1.1	-0.8	0.6	1.4
Transport	7.23	7.66	7.67	8.28	8.35	8.42	8.73	8.82	8.87	0.6	0.9	0.4	0.2
by fuel [1]													
Solids	1.22	1.32	1.12	0.92	0.89	0.84	0.75	0.70	0.65	-0.9	-2.3	-1.8	-1.4
Oil	11.96	12.32	11.43	11.87	11.89	11.52	11.57	11.44	11.42	-0.5	0.4	-0.3	-0.1
Gas	0.58	0.57	0.65	0.97	1.11	1.20	0.98	0.96	1.44	1.2	5.5	-1.3	3.9
Electricity	10.35	10.71	11.04	11.33	11.91	12.47	13.33	14.03	14.73	0.6	0.8	1.1	1.0
Heat (from CHP and District Heating)	1.77	3.62	3.56	3.82	4.04	4.47	5.31	6.16	5.96	7.3	1.2	2.8	1.2
Other	4.33	4.87	5.09	5.14	5.81	6.22	5.95	5.39	5.49	1.6	1.3	0.2	-0.8
CO_2 Emissions (Mt of CO_2)	**50.6**	**53.6**	**47.7**	**52.6**	**54.0**	**57.1**	**68.3**	**89.7**	**102.8**	**-0.6**	**1.3**	**2.4**	**4.2**
Electricity and Steam production	6.4	7.7	5.3	9.2	10.4	14.9	27.2	49.4	62.0	-1.9	7.1	10.0	8.6
Energy Branch	1.5	1.8	1.8	1.8	1.7	1.6	1.6	1.5	1.5	1.8	-0.8	-0.8	-0.3
Industry	11.6	12.4	10.9	11.0	11.2	9.8	8.8	8.1	8.9	-0.7	0.3	-2.4	0.2
Residential	4.8	3.8	2.9	2.5	2.6	2.8	2.5	2.4	2.4	-4.9	-0.9	-0.4	-0.6
Tertiary	5.6	6.1	5.0	4.4	4.2	3.9	3.5	3.4	3.4	-1.2	-1.7	-1.7	-0.4
Transport	20.6	21.8	21.8	23.7	23.9	24.1	24.8	24.8	24.5	0.6	0.9	0.4	-0.1
CO_2 Emissions Index (1990=100)	**100.0**	**106.0**	**94.2**	**104.0**	**106.8**	**112.9**	**135.1**	**177.3**	**203.2**				

See explanations on page 219

Source: PRIMES Model

SWEDEN: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	8.56	8.83	8.87	8.94	8.99	9.06	9.15	9.25	9.30	0.4	0.1	0.2	0.2
GDP (in 000 MEuro'00)	208.5	214.7	248.5	276.2	311.1	346.0	384.1	425.6	470.1	1.8	2.3	2.1	2.0
Gross Inl. Cons./GDP (toe/MEuro'00)	225.1	237.4	194.5	192.2	175.4	159.1	144.4	126.3	113.4	-1.5	-1.0	-1.9	-2.4
Gross Inl. Cons./Capita (toe/inhabitant)	5.48	5.77	5.45	5.94	6.07	6.08	6.06	5.81	5.73	-0.1	1.1	0.0	-0.5
Electricity Generated/Capita (kWh/inhabitant)	17052	16797	16441	16687	17267	17795	18688	19338	20061	-0.4	0.5	0.8	0.7
Carbon intensity (t of CO_2/toe of GIC)	1.08	1.05	0.99	0.99	0.99	1.04	1.23	1.67	1.93	-0.9	0.0	2.2	4.6
CO_2 Emissions/Capita (t of CO_2/inhabitant)	5.91	6.07	5.37	5.88	6.01	6.30	7.47	9.69	11.05	-0.9	1.1	2.2	4.0
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	242.5	249.7	191.8	190.4	173.5	165.0	177.9	210.7	218.6	-2.3	-1.0	0.2	2.1
Import Dependency %	37.4	36.8	39.0	40.5	40.4	41.6	47.1	59.8	68.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	88.8	72.8	65.4	62.8	59.4	54.9	50.3	46.6	-3.1	-1.5	-1.3	-1.6
Residential (Energy on Private Income)	100.0	115.2	94.2	87.8	79.8	71.5	64.7	58.5	53.4	-0.6	-1.7	-2.1	-1.9
Tertiary (Energy on Value added)	100.0	119.8	94.3	80.6	68.8	62.1	58.4	55.8	54.1	-0.6	-3.1	-1.6	-0.8
Transport (Energy on GDP)	100.0	102.9	89.0	86.5	77.4	70.2	65.5	59.8	54.4	-1.2	-1.4	-1.6	-1.9
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.04	0.04	0.03	0.05	0.05	0.07	0.12	0.20	0.24	-3.1	6.3	8.5	7.6
Final energy demand (t of CO_2/toe)	1.41	1.32	1.23	1.22	1.17	1.11	1.05	1.00	0.99	-1.3	-0.5	-1.1	-0.6
Industry	1.00	1.00	0.84	0.82	0.75	0.62	0.54	0.49	0.52	-1.7	-1.2	-3.2	-0.3
Residential	0.71	0.49	0.40	0.34	0.34	0.36	0.32	0.31	0.30	-5.6	-1.5	-0.6	-0.8
Tertiary	1.23	1.09	0.98	0.91	0.90	0.84	0.71	0.65	0.60	-2.2	-0.9	-2.3	-1.8
Transport	2.85	2.85	2.84	2.86	2.86	2.86	2.84	2.81	2.77	0.0	0.1	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**34.08**	**33.22**	**37.82**	**40.43**	**39.83**	**43.16**	**47.49**	**50.90**		**2.0**	**0.7**	**1.7**
Nuclear		10.29	9.67	9.06	9.06	7.97	6.26	2.41	0.00		-0.7	-3.6	
Hydro (pumping excluded)		15.78	15.78	15.78	15.95	16.27	16.33	16.35	16.36		0.1	0.2	0.0
Wind and solar		0.04	0.23	0.65	3.07	3.43	3.83	5.18	5.66		29.4	2.2	4.0
Thermal		7.97	7.54	12.34	12.36	12.16	16.75	23.56	28.89		5.1	3.1	5.6
of which cogeneration units		*2.99*	*2.88*	*7.44*	*8.04*	*9.91*	*11.48*	*12.01*	*12.48*		*10.8*	*3.6*	*0.8*
Open cycle(incl. biomass-waste)		6.57	6.14	9.58	9.24	7.07	6.41	6.93	7.37		4.2	-3.6	1.4
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	1.27	4.34	7.16	7.86				6.1
Gas Turbines Combined Cycle		0.07	0.07	0.33	1.27	2.35	4.53	8.01	13.26		33.9	13.6	11.3
Small Gas Turbines		1.33	1.33	2.43	1.85	1.47	1.47	1.46	0.39		3.3	-2.2	-12.3
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		38.3	40.4	35.1	35.8	36.7	39.8	42.7	46.0				
Load factor for gross electric capacities (%)		49.7	50.1	45.0	43.8	46.2	45.3	43.0	41.8				
CHP indicator (% of electricity from CHP)		5.4	5.3	12.8	13.3	15.9	19.7	23.4	21.0				
Non fossil fuels in electricity generation (%)		95.6	98.0	92.6	91.5	88.0	77.9	59.6	46.7				
nuclear		47.2	39.3	45.1	43.4	38.7	29.1	10.7	0.0				
renewable energy forms		48.4	58.8	47.5	48.1	49.3	48.8	48.9	46.7				
of which waste		*2.2*	*3.8*	*5.9*	*5.5*	*5.2*	*5.0*	*4.6*	*4.3*				
Transport sector													
Passenger transport activity (Gpkm)	**117.4**	**120.9**	**132.7**	**136.9**	**139.0**	**145.5**	**156.9**	**169.1**	**182.5**	**1.2**	**0.5**	**1.2**	**1.5**
public road transport	9.7	10.1	11.1	11.7	11.1	11.1	11.4	11.7	12.0	1.4	0.0	0.3	0.6
private cars and motorcycles	86.2	89.0	93.7	96.0	96.4	99.7	105.5	111.9	118.2	0.8	0.3	0.9	1.1
rail	8.4	8.3	10.4	9.0	9.0	9.2	10.3	11.1	12.1	2.2	-1.5	1.4	1.6
aviation	8.8	9.0	12.6	14.7	16.9	19.5	23.1	27.4	32.5	3.6	3.0	3.2	3.5
inland navigation	4.3	4.4	4.9	5.5	5.7	6.0	6.5	7.1	7.7	1.4	1.5	1.3	1.7
travel per person (km per capita)	**13713**	**13691**	**14962**	**15309**	**15460**	**16071**	**17134**	**18274**	**19628**	**0.9**	**0.3**	**1.0**	**1.4**
Freight transport activity (Gtkm)	**54.6**	**57.5**	**59.3**	**63.7**	**68.9**	**74.5**	**81.1**	**87.8**	**94.9**	**0.8**	**1.5**	**1.6**	**1.6**
trucks	27.2	30.3	32.4	39.0	44.0	49.1	53.8	59.4	65.4	1.8	3.1	2.0	2.0
rail	19.1	19.4	20.0	17.7	17.8	18.0	19.7	20.5	21.4	0.5	-1.1	1.0	0.8
inland navigation	8.3	7.9	6.9	7.0	7.1	7.4	7.6	7.9	8.1	-1.8	0.3	0.7	0.7
freight activity per unit of GDP (tkm/000 Euro'00)	**262**	**268**	**239**	**231**	**222**	**215**	**211**	**206**	**202**	**-0.9**	**-0.7**	**-0.5**	**-0.4**
Energy demand in transport (Mtoe)	**7.23**	**7.66**	**7.67**	**8.28**	**8.35**	**8.42**	**8.73**	**8.82**	**8.87**	**0.6**	**0.9**	**0.4**	**0.2**
public road transport	0.23	0.27	0.16	0.17	0.16	0.15	0.15	0.14	0.13	-3.3	-0.2	-0.7	-1.1
private cars and motorcycles	4.00	4.09	4.03	4.11	3.79	3.51	3.54	3.53	3.44	0.1	-0.6	-0.7	-0.3
trucks	1.85	2.07	2.14	2.57	2.89	3.18	3.35	3.53	3.64	1.5	3.1	1.5	0.8
rail	0.25	0.27	0.29	0.25	0.22	0.20	0.19	0.19	0.19	1.4	-2.7	-1.5	0.2
aviation	0.76	0.86	0.93	1.07	1.17	1.26	1.37	1.30	1.32	2.0	2.3	1.6	-0.4
inland navigation	0.14	0.10	0.12	0.12	0.12	0.12	0.13	0.13	0.13	-2.0	0.3	0.5	0.3
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	44.1	44.9	40.2	40.4	37.9	34.8	33.2	30.3	27.7	-0.9	-0.6	-1.3	-1.8
freight transport (toe/Mtkm)	37.6	38.9	39.3	43.2	44.6	45.1	43.5	42.2	40.2	0.4	1.3	-0.3	-0.8

Source: PRIMES Model

UNITED KINGDOM: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)													
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**204.49**	**249.96**	**268.66**	**268.25**	**248.61**	**220.59**	**197.17**	**180.67**	**170.36**	**2.8**	**-0.8**	**-2.3**	**-1.5**
Solids	53.11	30.96	18.58	12.80	8.60	5.63	4.35	4.22	4.13	-10.0	-7.4	-6.6	-0.5
Oil	92.80	132.26	127.88	124.70	112.00	98.00	90.00	82.65	75.91	3.3	-1.3	-2.2	-1.7
Natural gas	40.92	63.60	97.65	103.00	101.00	90.00	75.00	65.00	60.00	9.1	0.3	-2.9	-2.2
Nuclear	16.57	21.25	21.94	22.50	19.13	18.43	17.79	17.93	18.40	2.8	-1.4	-0.7	0.3
Renewable energy sources	1.08	1.90	2.62	5.25	7.88	8.53	10.04	10.86	11.93	9.2	11.6	2.4	1.7
Hydro	0.44	0.42	0.44	0.48	0.48	0.43	0.43	0.43	0.43	0.1	0.8	-1.0	0.0
Biomass	0.53	1.13	1.64	3.38	3.65	4.13	5.39	6.00	6.41	12.0	8.3	4.0	1.7
Waste	0.11	0.31	0.45	0.54	0.73	0.79	0.80	0.66	0.97	15.1	4.9	0.9	2.0
Wind	0.00	0.03	0.08	0.81	2.96	3.10	3.31	3.66	3.85	59.4	43.3	1.1	1.5
Solar and others	0.01	0.01	0.01	0.04	0.06	0.08	0.10	0.12	0.26	7.5	18.7	5.8	9.7
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.3	15.6	3.3	0.3
Net Imports	**7.34**	**-36.11**	**-39.58**	**-36.16**	**-13.85**	**20.97**	**55.04**	**78.03**	**101.86**				**6.3**
Solids	9.12	10.38	14.58	11.96	8.04	6.47	13.43	13.95	15.91	4.8	-5.8	5.3	1.7
Oil	-8.99	-48.53	-46.06	-43.80	-27.27	-11.51	-1.32	5.57	16.66				
Crude oil and Feedstocks	-3.11	-36.37	-39.12	-34.22	-17.03	-1.01	9.67	16.93	28.24				11.3
Oil products	-5.88	-12.17	-6.95	-9.58	-10.23	-10.50	-10.98	-11.35	-11.58				
Natural gas	6.18	0.64	-9.31	-5.55	4.14	24.76	41.67	57.25	68.02			26.0	5.0
Electricity	1.03	1.40	1.22	1.23	1.24	1.25	1.26	1.26	1.26	1.7	0.2	0.1	0.0
Gross Inland Consumption	**211.54**	**218.45**	**229.91**	**229.96**	**232.45**	**239.09**	**249.56**	**255.86**	**269.16**	**0.8**	**0.1**	**0.7**	**0.8**
Solids	63.31	46.61	35.95	24.76	16.64	12.10	17.77	18.17	20.04	-5.5	-7.4	0.7	1.2
Oil	82.35	82.30	80.69	78.78	82.43	84.02	86.03	85.38	89.51	-0.2	0.2	0.4	0.4
Natural gas	47.20	65.00	87.49	97.45	105.14	114.76	116.67	122.25	128.02	6.4	1.9	1.0	0.9
Nuclear	16.57	21.25	21.94	22.50	19.13	18.43	17.79	17.93	18.40	2.8	-1.4	-0.7	0.3
Electricity	1.03	1.40	1.22	1.23	1.24	1.25	1.26	1.26	1.26	1.7	0.2	0.1	0.0
Renewable energy forms	1.08	1.90	2.62	5.25	7.88	8.53	10.04	10.86	11.93	9.2	11.6	2.4	1.7
as % in Gross Inland Consumption													
Solids	29.9	21.3	15.6	10.8	7.2	5.1	7.1	7.1	7.4				
Oil	38.9	37.7	35.1	34.3	35.5	35.1	34.5	33.4	33.3				
Natural gas	22.3	29.8	38.1	42.4	45.2	48.0	46.8	47.8	47.6				
Nuclear	7.8	9.7	9.5	9.8	8.2	7.7	7.1	7.0	6.8				
Renewable energy forms	0.5	0.9	1.1	2.3	3.4	3.6	4.0	4.2	4.4				
Electricity Generation in TWhe	**316.94**	**332.44**	**372.14**	**396.43**	**438.19**	**483.20**	**523.40**	**569.12**	**611.83**	**1.6**	**1.6**	**1.8**	**1.6**
Nuclear	65.74	88.95	85.05	87.21	74.13	72.34	70.07	74.08	76.30	2.6	-1.4	-0.6	0.9
Hydro & wind	5.08	5.23	6.05	15.03	40.00	41.00	43.45	47.53	51.40	1.8	20.8	0.8	1.7
Thermal (incl. biomass)	246.12	238.26	281.04	294.20	324.06	369.86	409.89	447.52	484.13	1.3	1.4	2.4	1.7
Fuel Inputs for Thermal Power Generation (1)	**59.67**	**53.26**	**58.68**	**58.36**	**56.77**	**61.27**	**68.24**	**72.68**	**78.21**	**-0.2**	**-0.3**	**1.9**	**1.4**
Solids	48.33	34.89	27.72	18.92	11.72	8.04	13.52	14.03	16.00	-5.4	-8.2	1.4	1.7
Oil (including refinery gas)	8.41	4.49	1.16	0.84	0.98	1.07	1.04	0.32	0.35	-17.9	-1.7	0.6	-10.3
Gas	2.53	12.91	28.10	36.73	42.26	50.29	51.83	56.68	59.95	27.2	4.2	2.1	1.5
Biomass - Waste	0.40	0.97	1.69	1.87	1.81	1.87	1.85	1.64	1.91	15.4	0.7	0.2	0.3
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**99.85**	**102.24**	**96.83**	**99.12**	**102.86**	**104.92**	**109.76**	**110.63**	**115.82**	**-0.3**	**0.6**	**0.7**	**0.5**
Refineries	89.87	94.12	89.16	91.84	96.49	98.67	102.09	102.43	107.28	-0.1	0.8	0.6	0.5
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	1.53	1.97	2.23	3.53	4.22	4.66			6.0	2.8
Others	9.97	8.12	7.66	5.76	4.40	4.03	4.14	3.98	3.87	-2.6	-5.4	-0.6	-0.7
Energy Branch Consumption	**12.89**	**14.18**	**15.09**	**13.77**	**13.65**	**13.23**	**12.93**	**12.63**	**12.64**	**1.6**	**-1.0**	**-0.5**	**-0.2**
Non-Energy Uses	**11.85**	**12.69**	**10.16**	**10.34**	**11.53**	**12.35**	**12.62**	**12.81**	**13.02**	**-1.5**	**1.3**	**0.9**	**0.3**
Final Energy Demand	**136.33**	**141.95**	**151.75**	**156.56**	**165.44**	**171.84**	**180.03**	**187.97**	**196.98**	**1.1**	**0.9**	**0.8**	**0.9**
by sector													
Industry (1)	34.21	34.47	36.72	35.51	38.65	41.07	42.71	44.63	47.30	0.7	0.5	1.0	1.0
energy intensive industries	18.11	18.96	18.99	17.84	18.52	19.10	19.56	19.87	20.18	0.5	-0.2	0.6	0.3
other industrial sectors	16.10	15.51	17.73	17.67	20.13	21.97	23.15	24.77	27.12	1.0	1.3	1.4	1.6
Residential	41.64	39.71	43.05	46.47	48.56	49.56	50.58	51.60	52.85	0.3	1.2	0.4	0.4
Tertiary	15.04	20.88	20.49	20.49	21.59	22.99	24.88	27.17	30.10	3.1	0.5	1.4	1.9
Transport	45.45	46.89	51.49	54.08	56.65	58.22	61.86	64.56	66.74	1.3	1.0	0.9	0.8
by fuel (1)													
Solids	11.28	8.16	5.02	3.64	2.89	2.38	2.34	2.25	2.19	-7.8	-5.4	-2.1	-0.7
Oil	58.38	60.67	62.38	63.87	66.68	68.03	71.19	73.84	76.23	0.7	0.7	0.7	0.7
Gas	40.21	44.81	51.85	54.81	56.96	58.32	58.97	59.88	62.41	2.6	0.9	0.3	0.6
Electricity	23.60	25.27	28.28	30.30	33.75	37.40	40.70	44.47	48.06	1.8	1.8	1.9	1.7
Heat (from CHP and District Heating)	2.62	2.56	3.82	3.33	4.44	4.72	5.72	6.32	6.87	3.8	1.5	2.6	1.8
Other	0.24	0.48	0.41	0.60	0.72	1.00	1.11	1.21	1.22	5.5	5.8	4.4	1.0
CO_2 Emissions (Mt of CO_2)	**569.1**	**537.6**	**543.3**	**526.9**	**519.4**	**527.6**	**559.0**	**577.0**	**604.0**	**-0.5**	**-0.4**	**0.7**	**0.8**
Electricity and Steam production	216.4	174.2	169.0	164.3	148.3	153.3	178.0	189.0	204.5	-2.4	-1.3	1.8	1.4
Energy Branch	28.5	32.2	33.6	30.8	30.1	28.7	27.5	26.2	25.9	1.7	-1.1	-0.9	-0.6
Industry	80.2	81.0	78.1	63.5	63.7	65.6	65.0	66.2	69.0	-0.3	-2.0	0.2	0.6
Residential	88.1	77.8	82.0	85.7	88.1	87.5	87.3	87.2	88.2	-0.7	0.7	-0.1	0.1
Tertiary	23.6	35.8	30.5	28.2	28.0	27.3	27.9	28.6	31.0	2.6	-0.9	0.0	1.1
Transport	132.4	136.6	150.1	154.3	161.1	165.2	173.3	179.8	185.4	1.3	0.7	0.7	0.7
CO_2 Emissions Index (1990=100)	**100.0**	**94.5**	**95.5**	**92.6**	**91.3**	**92.7**	**98.2**	**101.4**	**106.1**				

See explanations on page 219

Source: PRIMES Model

UNITED KINGDOM: BASELINE SCENARIO — **SUMMARY ENERGY BALANCE AND INDICATORS (B)**

	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	57.56	58.61	59.76	60.58	61.21	61.82	62.50	63.13	63.51	0.4	0.2	0.2	0.2
GDP (in 000 MEuro'00)	1239.2	1352.0	1559.4	1760.9	1997.2	2259.6	2550.3	2871.4	3232.9	2.3	2.5	2.5	2.4
Gross Inl. Cons./GDP (toe/MEuro'00)	170.7	161.6	147.4	130.6	116.4	105.8	97.9	89.1	83.3	-1.5	-2.3	-1.7	-1.6
Gross Inl. Cons./Capita (toe/inhabitant)	3.68	3.73	3.85	3.80	3.80	3.87	3.99	4.05	4.24	0.5	-0.1	0.5	0.6
Electricity Generated/Capita (kWh/inhabitant)	5506	5672	6228	6544	7159	7816	8374	9015	9633	1.2	1.4	1.6	1.4
Carbon intensity (t of CO_2/toe of GIC)	2.69	2.46	2.36	2.29	2.23	2.21	2.24	2.26	2.24	-1.3	-0.6	0.0	0.0
CO_2 Emissions/Capita (t of CO_2/inhabitant)	9.89	9.17	9.09	8.70	8.49	8.53	8.94	9.14	9.51	-0.8	-0.7	0.5	0.6
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	459.2	397.6	348.4	299.2	260.1	233.5	219.2	200.9	186.8	-2.7	-2.9	-1.7	-1.6
Import Dependency %	3.4	-16.3	-17.1	-15.6	-5.9	8.7	21.8	30.2	37.4				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	98.8	102.7	96.3	88.6	82.3	75.2	69.1	64.3	0.3	-1.5	-1.6	-1.6
Residential (Energy on Private Income)	100.0	89.4	78.7	73.6	68.0	61.6	56.1	51.2	47.1	-2.4	-1.5	-1.9	-1.7
Tertiary (Energy on Value added)	100.0	125.0	101.7	87.0	80.0	75.0	71.5	69.2	67.8	0.2	-2.4	-1.1	-0.5
Transport (Energy on GDP)	100.0	94.6	90.0	83.7	77.3	70.3	66.1	61.3	56.3	-1.0	-1.5	-1.6	-1.6
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.67	0.52	0.45	0.38	0.30	0.28	0.30	0.29	0.30	-3.8	-4.0	0.0	-0.2
Final energy demand (t of CO_2/toe)	2.38	2.33	2.25	2.12	2.06	2.01	1.96	1.92	1.90	-0.6	-0.9	-0.5	-0.3
Industry	2.34	2.35	2.13	1.79	1.65	1.60	1.52	1.48	1.46	-1.0	-2.5	-0.8	-0.4
Residential	2.11	1.96	1.90	1.85	1.81	1.77	1.73	1.69	1.67	-1.0	-0.5	-0.5	-0.3
Tertiary	1.57	1.71	1.49	1.38	1.30	1.19	1.12	1.05	1.03	-0.5	-1.4	-1.4	-0.9
Transport	2.91	2.91	2.92	2.85	2.84	2.84	2.80	2.78	2.78	0.0	-0.2	-0.2	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**73.99**	**79.33**	**87.48**	**104.50**	**118.97**	**130.34**	**144.93**	**159.65**		**2.8**	**2.2**	**2.0**
Nuclear		14.21	14.21	13.79	10.35	9.85	9.58	10.88	11.29		-3.1	-0.8	1.7
Hydro (pumping excluded)		1.34	1.37	1.39	1.39	1.39	1.39	1.39	1.39		0.1	0.0	0.0
Wind and solar		0.20	0.40	3.52	14.30	16.25	16.82	18.39	21.13		42.8	1.6	2.3
Thermal		58.23	63.34	68.78	78.45	91.49	102.55	114.28	125.83		2.2	2.7	2.1
of which cogeneration units		*1.45*	*3.25*	*6.90*	*11.03*	*17.37*	*22.37*	*29.62*	*29.12*		*13.0*	*7.3*	*2.7*
Open cycle(incl. biomass-waste)		46.29	41.81	39.85	25.00	14.87	15.84	11.88	12.20		-5.0	-4.5	-2.6
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	3.32	4.03	5.09				4.4
Gas Turbines Combined Cycle		8.35	18.58	26.15	50.88	70.97	77.12	91.45	100.39		10.6	4.2	2.7
Small Gas Turbines		3.59	2.95	2.78	2.57	5.64	6.26	6.92	8.14		-1.4	9.3	2.7
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		39.5	42.3	44.1	50.0	53.0	53.0	54.4	54.8				
Load factor for gross electric capacities (%)		51.3	53.6	51.7	47.9	46.4	45.8	44.8	43.7				
CHP indicator (% of electricity from CHP)		3.6	7.0	8.8	10.2	10.6	13.5	14.8	14.3				
Non fossil fuels in electricity generation (%)		29.3	26.0	27.2	27.2	24.6	22.7	22.3	21.9				
nuclear		26.8	22.9	22.0	16.9	15.0	13.4	13.0	12.5				
renewable energy forms		2.5	3.1	5.2	10.2	9.6	9.4	9.3	9.5				
of which waste		*0.2*	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	*0.3*	*0.4*				
Transport sector													
Passenger transport activity (Gpkm)	**724.6**	**736.1**	**777.5**	**841.2**	**918.1**	**998.2**	**1079.7**	**1156.4**	**1229.6**	**0.7**	**1.7**	**1.6**	**1.3**
public road transport	46.2	44.3	45.0	51.0	53.5	57.3	61.2	64.4	67.4	-0.3	1.8	1.3	1.0
private cars and motorcycles	606.1	613.3	630.0	676.3	736.0	793.1	848.7	898.8	946.1	0.4	1.6	1.4	1.1
rail	39.7	37.0	47.7	50.1	51.2	55.5	59.4	64.2	66.5	1.9	0.7	1.5	1.1
aviation	28.4	36.6	50.3	58.8	71.6	86.0	103.4	121.2	141.1	5.9	3.6	3.7	3.2
inland navigation	4.2	4.8	4.5	5.0	5.7	6.3	7.1	7.8	8.6	0.7	2.4	2.2	2.0
travel per person (km per capita)	**12588**	**12560**	**13011**	**13886**	**14999**	**16147**	**17274**	**18317**	**19361**	**0.3**	**1.4**	**1.4**	**1.1**
Freight transport activity (Gtkm)	**215.3**	**222.8**	**244.1**	**273.6**	**313.5**	**354.9**	**399.5**	**448.2**	**500.1**	**1.3**	**2.5**	**2.5**	**2.3**
trucks	143.2	157.1	165.8	184.0	215.9	247.8	283.2	322.4	365.4	1.5	2.7	2.8	2.6
rail	16.3	12.5	18.3	20.8	22.0	23.4	24.6	26.1	27.3	1.2	1.8	1.1	1.0
inland navigation	55.8	53.1	60.0	68.8	75.7	83.8	91.8	99.7	107.4	0.7	2.3	1.9	1.6
freight activity per unit of GDP (tkm/000 Euro'00)	**174**	**165**	**157**	**155**	**157**	**157**	**157**	**156**	**155**	**-1.0**	**0.0**	**0.0**	**-0.1**
Energy demand in transport (Mtoe)	**45.45**	**46.89**	**51.49**	**54.08**	**56.65**	**58.22**	**61.86**	**64.56**	**66.74**	**1.3**	**1.0**	**0.9**	**0.8**
public road transport	2.63	2.27	2.16	2.41	2.44	2.44	2.41	2.36	2.34	-1.9	1.2	-0.1	-0.3
private cars and motorcycles	23.30	22.69	24.25	25.94	25.75	24.74	25.33	25.02	24.23	0.4	0.6	-0.2	-0.4
trucks	10.38	11.73	11.89	13.19	15.43	17.44	19.12	20.80	22.04	1.4	2.6	2.2	1.4
rail	1.08	1.25	1.20	1.23	1.13	0.94	0.89	0.89	0.88	1.1	-0.6	-2.3	-0.1
aviation	6.79	7.84	11.01	10.22	10.69	11.35	12.70	14.02	15.68	4.9	-0.3	1.7	2.1
inland navigation	1.27	1.12	0.96	1.10	1.20	1.32	1.40	1.48	1.57	-2.7	2.3	1.6	1.1
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	46.5	46.2	49.6	47.2	43.5	39.5	38.2	36.5	35.0	0.7	-1.3	-1.3	-0.9
freight transport (toe/Mtkm)	54.7	58.0	52.9	52.5	53.3	53.0	51.5	49.8	47.3	-0.3	0.1	-0.3	-0.9

Source: PRIMES Model

EU CANDIDATE COUNTRIES +NORWAY+SWITZERLAND: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)

Mtoe	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Primary Production	**376.2**	**421.7**	**438.8**	**441.4**	**448.5**	**436.6**	**417.7**	**388.1**	**371.1**	**1.6**	**0.2**	**-0.7**	**-1.2**
Solids	167.7	152.4	127.5	115.5	110.5	100.8	90.9	79.9	74.8	-2.7	-1.4	-1.9	-1.9
Oil	98.4	155.6	177.8	176.2	172.6	155.3	133.6	107.3	92.3	6.1	-0.3	-2.5	-3.6
Natural gas	54.0	50.3	63.4	75.9	93.2	104.4	113.1	122.9	128.3	1.6	3.9	2.0	1.3
Nuclear	25.6	25.2	28.0	29.6	26.4	27.7	27.7	20.8	11.8	0.9	-0.6	0.5	-8.2
Renewable energy sources	30.5	38.1	42.1	44.3	45.9	48.4	52.4	57.2	63.9	3.3	0.9	1.3	2.0
Hydro	17.2	19.4	20.9	21.7	22.5	24.0	25.3	25.9	26.4	1.9	0.8	1.2	0.4
Biomass	11.7	16.2	18.5	19.7	19.4	18.9	19.0	20.7	23.7	4.7	0.4	-0.2	2.2
Waste	1.4	2.2	2.0	1.9	2.3	2.7	3.2	4.0	4.7	3.5	1.3	3.3	3.9
Wind	0.0	0.0	0.0	0.4	1.0	2.0	3.5	4.7	6.1		65.8	13.0	5.8
Solar and others	0.0	0.1	0.3	0.4	0.6	0.9	1.4	2.0	3.0	31.4	6.2	9.2	7.9
Geothermal	0.1	0.2	0.4	0.2	0.0	0.0	0.0	0.0	0.0	9.4			
Net Imports	**55.3**	**-29.6**	**-56.9**	**-48.4**	**-26.3**	**22.3**	**84.1**	**150.9**	**210.4**				**9.6**
Solids	-1.2	-10.4	-2.0	4.6	9.1	15.6	24.2	33.1	39.9			10.2	5.1
Oil	32.4	-37.0	-60.5	-55.0	-39.9	-7.9	32.6	77.9	113.8				13.3
Crude oil and Feedstocks	23.2	-44.9	-71.8	-67.1	-53.3	-23.4	12.5	51.5	78.9				20.3
Oil products	9.2	7.9	11.3	12.1	13.4	15.6	20.1	26.4	34.9	2.0	1.8	4.1	5.7
Natural gas	24.7	19.1	9.5	5.9	7.9	17.9	30.9	42.9	59.6	-9.1	-1.9	14.7	6.8
Electricity	-0.6	-1.4	-3.9	-3.8	-3.4	-3.4	-3.7	-3.0	-2.9				
Gross Inland Consumption	**428.1**	**391.4**	**382.4**	**390.9**	**419.7**	**455.9**	**498.4**	**535.1**	**577.1**	**-1.1**	**0.9**	**1.7**	**1.5**
Solids	168.4	145.4	129.4	120.0	119.6	116.4	115.1	113.0	114.7	-2.6	-0.8	-0.4	0.0
Oil	127.1	114.6	114.1	119.0	130.2	144.5	162.8	181.3	201.7	-1.1	1.3	2.3	2.2
Natural gas	77.9	69.6	72.8	81.8	101.1	122.3	144.1	165.8	187.9	-0.7	3.3	3.6	2.7
Nuclear	25.6	25.2	28.0	29.6	26.4	27.7	27.7	20.8	11.8	0.9	-0.6	0.5	-8.2
Electricity	-1.3	-1.4	-3.9	-3.8	-3.4	-3.4	-3.7	-3.0	-2.9				
Renewable energy forms	30.5	38.0	41.9	44.3	45.9	48.4	52.4	57.2	63.9	3.2	0.9	1.3	2.0
as % in Gross Inland Consumption													
Solids	39.3	37.1	33.8	30.7	28.5	25.5	23.1	21.1	19.9				
Oil	29.7	29.3	29.8	30.4	31.0	31.7	32.7	33.9	34.9				
Natural gas	18.2	17.8	19.0	20.9	24.1	26.8	28.9	31.0	32.6				
Nuclear	6.0	6.4	7.3	7.6	6.3	6.1	5.5	3.9	2.0				
Renewable energy forms	7.1	9.7	11.0	11.3	10.9	10.6	10.5	10.7	11.1				
Electricity Generation in TWhe	**664.7**	**671.3**	**750.0**	**808.8**	**927.5**	**1066.0**	**1236.3**	**1375.5**	**1542.7**	**1.2**	**2.1**	**2.9**	**2.2**
Nuclear	99.3	97.7	108.5	114.7	102.2	107.3	107.1	80.4	45.7	0.9	-0.6	0.5	-8.2
Hydro & wind	200.2	225.6	242.6	255.2	274.0	302.1	335.4	355.5	379.4	1.9	1.2	2.0	1.2
Thermal (incl. biomass)	365.2	348.0	398.9	439.0	551.3	656.6	793.9	939.6	1117.6	0.9	3.3	3.7	3.5
Fuel Inputs for Thermal Power Generation	**118.6**	**104.4**	**106.2**	**106.3**	**123.0**	**136.5**	**156.2**	**177.7**	**204.0**	**-1.1**	**1.5**	**2.4**	**2.7**
Solids	83.6	77.5	77.8	76.1	81.3	82.8	85.8	88.0	93.4	-0.7	0.4	0.5	0.8
Oil	13.9	10.0	8.1	6.6	7.5	9.0	12.2	17.0	21.8	-5.2	-0.8	4.9	6.0
Gas	20.3	15.6	18.7	21.6	31.2	40.5	52.2	63.7	76.8	-0.8	5.3	5.3	3.9
Biomass - Waste	0.8	1.3	1.6	2.1	3.0	4.2	6.1	9.0	12.0	6.7	6.2	7.5	7.0
Geothermal heat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Hydrogen - Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Fuel Input in other transformation proc.	**180.3**	**157.2**	**143.0**	**142.6**	**150.3**	**160.1**	**172.5**	**184.6**	**197.8**	**-2.3**	**0.5**	**1.4**	**1.4**
Refineries	119.0	108.8	106.3	109.2	119.5	132.1	146.7	160.1	173.7	-1.1	1.2	2.1	1.7
District heating	22.5	17.2	12.0	11.1	10.2	8.9	7.5	6.2	5.0	-6.1	-1.6	-3.0	-4.0
Biofuels and hydrogen production	0.0	0.0	0.0	0.1	0.4	0.7	1.4	2.6	4.6			13.6	12.5
Others	38.8	31.2	24.7	22.3	20.2	18.4	16.9	15.7	14.6	-4.4	-2.0	-1.8	-1.5
Energy Branch Consumption	**21.8**	**26.8**	**25.0**	**24.5**	**26.3**	**28.2**	**30.5**	**32.5**	**34.4**	**1.4**	**0.5**	**1.5**	**1.2**
Non-Energy Uses	**19.7**	**18.8**	**20.5**	**21.6**	**22.8**	**23.9**	**25.0**	**26.0**	**27.0**	**0.4**	**1.1**	**0.9**	**0.8**
Final Energy Demand	**289.2**	**253.5**	**246.5**	**253.6**	**274.9**	**302.8**	**334.9**	**366.4**	**401.2**	**-1.6**	**1.1**	**2.0**	**1.8**
by sector													
Industry	122.7	95.6	86.4	81.7	82.9	86.9	91.0	94.6	98.2	-3.5	-0.4	0.9	0.8
Residential	75.2	75.9	71.0	74.0	80.2	87.5	95.3	102.8	110.5	-0.6	1.2	1.7	1.5
Tertiary	44.4	33.7	35.7	37.9	41.1	45.1	50.1	56.0	62.9	-2.1	1.4	2.0	2.3
Transport	46.9	48.3	53.4	60.1	70.7	83.3	98.5	112.9	129.6	1.3	2.8	3.4	2.8
by fuel													
Solids	57.9	45.3	34.6	30.2	26.2	23.0	20.2	17.2	14.6	-5.0	-2.8	-2.5	-3.2
Oil	85.8	79.7	85.2	89.5	98.8	110.5	124.6	137.3	152.0	-0.1	1.5	2.3	2.0
Gas	51.2	41.8	41.3	45.9	54.2	65.1	74.4	84.0	92.7	-2.1	2.8	3.2	2.2
Electricity	44.5	42.8	46.8	51.0	59.2	68.5	79.8	89.8	101.4	0.5	2.4	3.0	2.4
Heat (from CHP and District Heating)	36.3	25.3	18.4	17.4	17.7	18.0	19.5	22.4	24.9	-6.6	-0.4	1.0	2.5
Other	13.4	18.6	20.3	19.5	18.7	17.6	16.5	15.7	15.5	4.2	-0.8	-1.3	-0.6
CO_2 Emissions (Mt of CO_2)	**1165.2**	**1012.7**	**963.3**	**958.0**	**1031.9**	**1108.1**	**1204.7**	**1297.7**	**1411.2**	**-1.9**	**0.7**	**1.6**	**1.6**
Electricity and Steam production	509.1	441.1	424.1	416.4	459.1	486.3	529.7	574.9	637.0	-1.8	0.8	1.4	1.9
Energy Branch	32.8	44.9	42.8	41.2	43.2	45.6	48.2	50.3	51.9	2.7	0.1	1.1	0.7
Industry	267.3	211.9	195.3	179.9	172.7	170.9	166.2	161.9	153.6	-3.1	-1.2	-0.4	-0.8
Residential	128.6	116.5	90.4	91.3	96.7	106.1	114.2	120.5	128.2	-3.5	0.7	1.7	1.2
Tertiary	93.4	59.9	57.3	56.3	56.3	59.4	63.4	67.2	72.6	-4.8	-0.2	1.2	1.4
Transport	134.0	138.4	153.3	173.0	203.8	239.9	283.1	323.0	367.8	1.4	2.9	3.3	2.7
CO_2 Emissions Index (1990=100)	**100.0**	**86.9**	**82.7**	**82.2**	**88.6**	**95.1**	**103.4**	**111.4**	**121.1**				

See explanations on page 219

Source: ACE Model

EU CANDIDATE COUNTRIES +NORWAY+SWITZERLAND: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (B)

	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	174.2	179.3	184.5	187.8	190.4	193.0	195.1	197.3	198.4	0.6	0.3	0.2	0.2
GDP (in 000 MEuro'00)	904	934	1086	1232	1475	1771	2107	2477	2879	1.8	3.1	3.6	3.2
Gross Inl. Cons./GDP (toe/MEuro'00)	473.4	419.1	352.1	317.3	284.5	257.5	236.5	216.0	200.4	-2.9	-2.1	-1.8	-1.6
Gross Inl. Cons./Capita (toe/inhabitant)	2458	2183	2073	2081	2204	2363	2554	2713	2909	-1.7	0.6	1.5	1.3
Electricity Generated/Capita (kWh/inhabitant)	3816	3744	4066	4306	4872	5525	6336	6973	7777	0.6	1.8	2.7	2.1
Carbon intensity (t of CO_2/toe of GIC)	2.7	2.6	2.5	2.5	2.5	2.4	2.4	2.4	2.4	-0.8	-0.2	-0.2	0.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	6.7	5.6	5.2	5.1	5.4	5.7	6.2	6.6	7.1	-2.4	0.4	1.3	1.4
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	1288.5	1084.3	886.9	777.8	699.5	625.9	571.7	523.9	490.1	-3.7	-2.3	-2.0	-1.5
Import Dependency %	12.9	-7.5	-14.8	-12.3	-6.2	4.9	16.8	28.0	36.2				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	72.1	55.2	45.6	38.7	33.7	29.7	26.6	24.3	-5.8	-3.5	-2.6	-2.0
Residential (Energy on Private Income)	100.0	97.8	78.9	72.9	66.0	59.6	54.2	49.4	45.4	-2.3	-1.8	-2.0	-1.7
Tertiary (Energy on Value added)	100.0	74.2	67.4	62.5	55.9	50.4	46.5	43.6	41.6	-3.9	-1.9	-1.8	-1.1
Transport (Energy on GDP)	100.0	99.7	95.0	94.1	92.5	90.8	90.2	88.0	86.9	-0.5	-0.3	-0.2	-0.4
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.45	0.43	0.42	0.39	0.39	0.37	0.35	0.34	0.34	-0.7	-0.7	-1.0	-0.4
Final energy demand (t of CO_2/toe)	2.16	2.08	2.01	1.97	1.93	1.90	1.87	1.84	1.80	-0.7	-0.4	-0.3	-0.4
Industry	2.18	2.22	2.26	2.20	2.08	1.97	1.83	1.71	1.56	0.4	-0.8	-1.3	-1.5
Residential	1.71	1.53	1.27	1.23	1.21	1.21	1.20	1.17	1.16	-2.9	-0.5	-0.1	-0.3
Tertiary	2.10	1.78	1.60	1.48	1.37	1.32	1.26	1.20	1.15	-2.7	-1.5	-0.8	-0.9
Transport	2.86	2.87	2.87	2.88	2.88	2.88	2.87	2.86	2.84	0.0	0.0	0.0	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**171.1**	**185.5**	**211.2**	**248.1**	**292.7**	**346.3**	**384.2**	**430.6**		**2.9**	**3.4**	**2.2**
Nuclear		15.5	17.0	16.9	13.9	14.6	14.6	11.0	6.3		-2.0	0.5	-8.0
Hydro (pumping excluded)		62.1	66.9	72.7	77.4	84.3	91.2	93.2	95.2		1.5	1.7	0.4
Wind and solar		0.0	0.1	2.2	6.0	11.7	20.7	28.2	37.6		58.5	13.3	6.1
Thermal		93.5	101.5	119.5	150.8	182.1	219.9	251.8	291.4		4.0	3.8	2.9
of which cogeneration units		*28.9*	*23.9*	*18.9*	*20.2*	*22.7*	*27.4*	*35.0*	*43.4*		*-1.7*	*3.1*	*4.7*
Open cycle (incl. biomass-waste)		89.0	92.3	93.5	102.9	109.3	116.7	123.0	132.3		1.1	1.3	1.3
Supercritical Polyvalent/Clean Coal and Lignite		0.0	0.0	0.1	0.6	2.8	6.8	13.9	23.5			26.8	13.2
Gas Turbines Combined Cycle		3.1	7.0	21.6	40.2	59.1	80.7	95.3	111.9		19.1	7.2	3.3
Small Gas Turbines		1.3	2.2	4.3	7.1	11.0	15.6	19.6	23.7		12.5	8.2	4.3
Fuel Cells		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Geothermal heat		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Indicators													
Efficiency for thermal electricity production (%)		30.4	33.5	36.4	39.3	42.1	44.4	46.3	48.0				
Load factor for gross electric capacities (%)		44.8	46.2	43.8	42.7	41.6	40.7	40.9	40.9				
CHP indicator (% of electricity from CHP)		22.5	16.2	12.9	12.0	11.7	12.2	14.1	15.3				
Non fossil fuels in electricity generation (%)		48.5	47.3	46.6	41.6	39.9	37.7	34.4	31.0				
nuclear		14.5	14.5	14.2	11.0	10.1	8.7	5.8	3.0				
renewable energy forms		34.0	32.8	32.4	30.6	29.8	29.1	28.6	28.0				
of which waste		*0.2*	*0.2*	*0.4*	*0.5*	*0.7*	*0.8*	*1.0*	*1.2*				
Transport sector													
Passenger transport activity (Gpkm)	**872.3**	**841.2**	**908.2**	**1003.8**	**1161.7**	**1380.8**	**1669.8**	**2021.5**	**2469.0**	**0.4**	**2.5**	**3.7**	**4.0**
public road transport	230.8	201.6	193.1	194.9	198.1	198.9	199.8	200.6	205.1	-1.8	0.3	0.1	0.3
private cars and motorcycles	459.6	507.5	590.9	676.8	814.8	1006.3	1256.3	1559.2	1942.9	2.5	3.3	4.4	4.5
rail	149.9	94.2	83.1	83.2	86.8	93.9	105.8	121.8	140.9	-5.7	0.4	2.0	2.9
aviation	26.3	32.0	34.4	42.1	54.7	73.8	99.1	130.3	170.1	2.7	4.8	6.1	5.6
inland navigation	5.7	5.8	6.7	6.9	7.3	7.8	8.8	9.6	10.0	1.5	0.8	2.0	1.2
travel per person (km per capita)	**5008**	**4692**	**4924**	**5344**	**6101**	**7156**	**8558**	**10247**	**12447**	**-0.2**	**2.2**	**3.4**	**3.8**
Freight transport activity (Gtkm)	**638.8**	**540.8**	**586.6**	**642.2**	**750.3**	**883.9**	**1030.2**	**1177.8**	**1322.2**	**-0.8**	**2.5**	**3.2**	**2.5**
trucks	302.6	305.9	371.9	429.7	532.3	657.8	795.1	933.4	1068.8	2.1	3.7	4.1	3.0
rail	287.5	190.6	159.9	154.4	156.1	160.9	167.8	175.1	182.4	-5.7	-0.2	0.7	0.8
inland navigation	48.8	44.4	54.8	58.2	61.9	65.2	67.4	69.4	71.1	1.2	1.2	0.9	0.5
freight activity per unit of GDP (tkm/000 Euro'00)	**706**	**579**	**540**	**521**	**509**	**499**	**489**	**476**	**459**	**-2.6**	**-0.6**	**-0.4**	**-0.6**
Energy demand in transport (Mtoe)	**46.9**	**48.3**	**53.4**	**60.1**	**70.7**	**83.3**	**98.5**	**112.9**	**129.6**	**1.3**	**2.8**	**3.4**	**2.8**
public road transport	2.9	2.6	2.8	2.8	2.9	2.8	2.8	2.7	2.6	-0.1	0.1	-0.4	-0.4
private cars and motorcycles	15.4	17.1	22.4	26.2	33.0	39.6	49.0	56.9	67.4	3.8	4.0	4.0	3.2
trucks	19.0	19.7	19.2	21.6	24.9	29.5	33.8	38.6	42.7	0.1	2.6	3.1	2.4
rail	3.4	2.8	2.6	2.4	2.4	2.4	2.4	2.5	2.5	-2.9	-0.7	0.1	0.5
aviation	4.3	5.0	5.3	5.9	6.5	7.9	9.4	11.1	13.1	2.3	2.0	3.7	3.4
inland navigation	1.8	1.2	1.1	1.1	1.1	1.2	1.2	1.2	1.2	-5.2	0.5	0.5	0.2
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	28.5	31.4	35.5	36.4	37.8	37.6	37.7	35.9	34.5	2.2	0.6	0.0	-0.9
freight transport (toe/Mtkm)	34.5	40.4	36.1	36.6	35.7	35.5	34.6	34.3	33.6	0.5	-0.1	-0.3	-0.3

Source: ACE Model

ACCEDING EU COUNTRIES: BASELINE SCENARIO — **SUMMARY ENERGY BALANCE AND INDICATORS (A)**

Mtoe	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Primary Production	**170.4**	**159.3**	**137.6**	**124.4**	**116.0**	**108.1**	**103.4**	**93.5**	**87.1**	**-2.1**	**-1.7**	**-1.1**	**-1.7**
Solids	141.0	126.3	103.7	88.4	82.0	73.6	68.0	61.3	58.5	-3.0	-2.3	-1.8	-1.5
Oil	2.7	3.1	3.7	2.2	2.3	2.3	2.3	2.3	2.3	3.0	-4.7	0.4	-0.3
Natural gas	6.8	7.4	6.1	6.0	5.9	5.7	5.5	5.2	5.0	-1.0	-0.3	-0.8	-1.0
Nuclear	15.6	14.2	14.9	17.6	15.0	15.0	15.0	10.5	5.3	-0.5	0.1	0.0	-10.0
Renewable energy sources	4.2	8.2	9.1	10.3	10.8	11.4	12.6	14.2	16.1	8.0	1.6	1.6	2.5
Hydro	1.1	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.6	2.1	0.9	0.8	0.3
Biomass	2.4	6.0	7.0	7.7	7.5	7.4	7.6	8.3	9.4	11.4	0.7	0.1	2.1
Waste	0.8	0.9	0.7	0.8	0.9	1.1	1.3	1.5	1.7	-0.4	2.4	3.0	3.1
Wind	0.0	0.0	0.0	0.3	0.6	1.1	1.7	2.1	2.5		92.8	10.6	4.1
Solar and others	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9		19.2	8.7	6.1
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Net Imports	**68.3**	**49.7**	**59.5**	**78.4**	**97.5**	**117.2**	**135.6**	**151.9**	**163.3**	**-1.4**	**5.1**	**3.4**	**1.9**
Solids	-14.8	-21.2	-16.2	-10.2	-6.1	-1.4	4.8	11.5	15.0				12.2
Oil	52.0	44.3	45.4	51.5	56.8	62.5	69.4	74.9	79.8	-1.3	2.3	2.0	1.4
Crude oil and Feedstocks	43.5	36.9	41.1	45.4	50.2	55.3	60.5	64.1	66.2	-0.6	2.0	1.9	0.9
Oil products	8.4	7.4	4.3	6.1	6.6	7.2	8.9	10.8	13.6	-6.4	4.2	3.1	4.3
Natural gas	31.2	26.6	31.7	38.5	47.9	57.1	62.9	66.3	69.3	0.2	4.2	2.8	1.0
Electricity	-0.2	-0.1	-1.5	-1.4	-1.1	-1.0	-1.4	-0.7	-0.7				
Gross Inland Consumption	**237.8**	**210.5**	**197.6**	**202.0**	**212.5**	**224.2**	**237.9**	**244.1**	**249.0**	**-1.8**	**0.7**	**1.1**	**0.5**
Solids	128.0	108.1	90.3	78.1	75.9	72.2	72.8	72.7	73.5	-3.4	-1.7	-0.4	0.1
Oil	53.5	46.0	47.4	52.9	58.1	63.8	70.6	75.9	80.7	-1.2	2.0	2.0	1.3
Natural gas	37.2	34.3	37.5	44.5	53.8	62.8	68.3	71.5	74.2	0.1	3.7	2.4	0.8
Nuclear	15.6	14.2	14.9	17.6	15.0	15.0	15.0	10.5	5.3	-0.5	0.1	0.0	-10.0
Electricity	-0.8	-0.1	-1.5	-1.4	-1.1	-1.0	-1.4	-0.7	-0.7				
Renewable energy forms	4.2	8.1	9.0	10.3	10.8	11.4	12.6	14.2	16.1	7.9	1.9	1.6	2.5
as % in Gross Inland Consumption													
Solids	53.9	51.3	45.7	38.7	35.7	32.2	30.6	29.8	29.5				
Oil	22.5	21.8	24.0	26.2	27.3	28.4	29.7	31.1	32.4				
Natural gas	15.6	16.3	19.0	22.0	25.3	28.0	28.7	29.3	29.8				
Nuclear	6.6	6.8	7.6	8.7	7.1	6.7	6.3	4.3	2.1				
Renewable energy forms	1.8	3.8	4.5	5.1	5.1	5.1	5.3	5.8	6.5				
Electricity Generation in TWhe	**324.5**	**300.7**	**324.2**	**351.1**	**403.5**	**465.5**	**537.2**	**582.7**	**630.8**	**0.0**	**2.2**	**2.9**	**1.6**
Nuclear	60.6	55.0	57.9	68.0	58.2	58.1	58.1	40.8	20.4	-0.5	0.1	0.0	-10.0
Hydro & wind	12.8	15.6	15.8	19.7	24.3	30.5	38.1	43.4	48.4	2.1	4.4	4.6	2.4
Thermal (incl. biomass)	251.1	230.1	250.6	263.4	321.0	376.9	440.9	498.5	562.0	0.0	2.5	3.2	2.5
Fuel Inputs for Thermal Power Generation	**75.5**	**65.5**	**66.4**	**64.4**	**72.4**	**78.6**	**88.2**	**96.7**	**106.4**	**-1.3**	**0.9**	**2.0**	**1.9**
Solids	63.4	56.8	56.6	50.1	52.7	53.2	57.2	59.6	62.5	-1.1	-0.7	0.8	0.9
Oil	5.4	4.4	3.4	3.9	4.4	5.5	7.7	10.7	14.0	-4.4	2.5	5.9	6.2
Gas	6.3	4.1	5.8	9.5	14.0	18.0	20.7	23.1	25.7	-0.9	9.2	4.0	2.2
Biomass - Waste	0.4	0.2	0.6	1.0	1.4	2.0	2.6	3.4	4.2	4.7	9.1	6.3	5.0
Geothermal heat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Hydrogen - Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Fuel Input in other transformation proc.	**94.1**	**75.9**	**72.8**	**72.3**	**75.0**	**77.9**	**81.4**	**83.9**	**85.7**	**-2.5**	**0.3**	**0.8**	**0.5**
Refineries	46.9	40.5	45.9	47.6	52.5	57.7	63.1	67.0	69.7	-0.2	1.4	1.9	1.0
District heating	19.7	13.8	9.9	9.0	8.2	7.1	5.9	4.7	3.7	-6.7	-1.8	-3.3	-4.4
Biofuels and hydrogen production	0.0	0.0	0.0	0.0	0.1	0.2	0.6	1.1	2.1			26.2	14.1
Others	27.5	21.6	17.1	15.7	14.3	13.0	11.8	10.9	10.2	-4.6	-1.8	-1.8	-1.5
Energy Branch Consumption	**11.9**	**12.7**	**12.4**	**12.1**	**12.7**	**13.4**	**14.2**	**14.9**	**15.4**	**0.4**	**0.3**	**1.1**	**0.8**
Non-Energy Uses	**12.1**	**9.9**	**10.9**	**11.8**	**12.6**	**13.2**	**13.8**	**14.4**	**14.8**	**-1.0**	**1.4**	**1.0**	**0.7**
Final Energy Demand	**154.7**	**132.9**	**121.5**	**124.3**	**132.5**	**142.0**	**151.3**	**157.8**	**162.8**	**-2.4**	**0.9**	**1.3**	**0.7**
by sector													
Industry	66.1	50.9	41.5	39.0	38.7	39.2	39.6	40.2	40.9	-4.5	-0.7	0.2	0.3
Residential	39.3	41.7	34.4	35.1	37.8	41.3	44.5	46.5	47.6	-1.3	0.9	1.7	0.7
Tertiary	29.5	20.1	21.6	23.0	24.5	26.3	28.1	29.7	31.2	-3.1	1.3	1.4	1.0
Transport	19.7	20.2	24.0	27.2	31.4	35.2	39.1	41.4	43.1	2.0	2.7	2.2	1.0
by fuel													
Solids	43.9	34.4	20.7	17.1	13.3	10.5	8.4	7.0	5.9	-7.2	-4.3	-4.5	-3.4
Oil	36.0	30.1	34.4	37.3	41.5	45.5	49.7	51.8	53.0	-0.4	1.9	1.8	0.6
Gas	25.4	25.0	25.8	28.1	32.6	37.2	39.6	40.4	40.4	0.2	2.3	2.0	0.2
Electricity	20.6	18.5	19.6	21.6	25.3	29.4	33.9	37.5	40.8	-0.5	2.6	3.0	1.9
Heat (from CHP and District Heating)	25.3	17.4	13.5	12.8	12.7	12.8	13.6	15.0	16.9	-6.1	-0.6	0.6	2.2
Other	3.5	7.5	7.4	7.4	7.0	6.6	6.2	6.0	5.8	7.8	-0.5	-1.2	-0.7
CO_2 Emissions (Mt of CO_2)	**722.5**	**611.2**	**553.5**	**532.0**	**558.2**	**579.1**	**613.0**	**634.3**	**655.6**	**-2.6**	**0.1**	**0.9**	**0.7**
Electricity and Steam production	357.2	301.0	285.6	266.7	285.9	296.0	321.0	340.9	365.3	-2.2	0.0	1.2	1.3
Energy Branch	13.3	18.8	17.6	16.6	16.6	16.7	16.7	16.5	16.0	2.8	-0.6	0.1	-0.5
Industry	148.3	124.1	96.8	87.1	79.7	74.3	69.0	65.3	61.1	-4.2	-1.9	-1.4	-1.2
Residential	82.2	71.7	48.2	46.7	48.7	53.2	56.6	56.8	55.4	-5.2	0.1	1.5	-0.2
Tertiary	65.9	38.5	37.0	36.8	36.9	37.6	37.8	37.4	36.9	-5.6	0.0	0.3	-0.2
Transport	55.6	57.2	68.4	78.1	90.3	101.2	111.8	117.5	120.9	2.1	2.8	2.2	0.8
CO_2 Emissions Index (1990=100)	**100.0**	**84.6**	**76.6**	**73.6**	**77.3**	**80.2**	**84.8**	**87.8**	**90.7**				

See explanations on page 219

Source: ACE Model

ACCEDING EU COUNTRIES: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	75.1	75.2	74.7	74.1	73.4	72.7	71.7	70.6	69.1	-0.1	-0.2	-0.2	-0.4
GDP (in 000 MEuro'00)	333	323	394	468	574	693	821	957	1100	1.7	3.8	3.6	3.0
Gross Inl. Cons./GDP (toe/MEuro'00)	713.8	652.4	501.2	431.4	370.3	323.6	289.7	255.0	226.3	-3.5	-3.0	-2.4	-2.4
Gross Inl. Cons./Capita (toe/inhabitant)	3165	2800	2645	2725	2896	3085	3319	3456	3601	-1.8	0.9	1.4	0.8
Electricity Generated/Capita (kWh/inhabitant)	4319	4000	4338	4737	5497	6404	7496	8249	9124	0.0	2.4	3.1	2.0
Carbon intensity (t of CO_2/toe of GIC)	3.04	2.90	2.80	2.63	2.63	2.58	2.58	2.60	2.63	-0.8	-0.6	-0.2	0.2
CO_2 Emissions/Capita (t of CO_2/inhabitant)	9.6	8.1	7.4	7.2	7.6	8.0	8.6	9.0	9.5	-2.6	0.3	1.2	1.0
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	2169.1	1894.3	1403.7	1136.4	972.6	835.8	746.7	662.6	595.7	-4.3	-3.6	-2.6	-2.2
Import Dependency %	28.7	23.5	30.0	38.6	45.7	52.0	56.7	61.9	65.2				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	87.7	55.6	42.7	34.8	29.3	25.3	22.6	20.9	-5.7	-4.6	-3.2	-1.9
Residential (Energy on Private Income)	100.0	109.8	75.5	65.5	57.0	50.9	45.9	41.0	36.6	-2.8	-2.8	-2.1	-2.3
Tertiary (Energy on Value added)	100.0	64.5	57.0	50.4	43.3	37.8	33.5	29.8	26.7	-5.5	-2.7	-2.5	-2.2
Transport (Energy on GDP)	100.0	105.8	102.6	98.0	92.4	85.8	80.4	72.9	66.1	0.3	-1.0	-1.4	-1.9
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.54	0.56	0.55	0.50	0.49	0.46	0.44	0.43	0.42	0.2	-1.2	-1.0	-0.4
Final energy demand (t of CO_2/toe)	2.28	2.19	2.06	2.00	1.93	1.88	1.82	1.76	1.68	-1.0	-0.7	-0.6	-0.8
Industry	2.24	2.44	2.33	2.24	2.06	1.90	1.74	1.63	1.49	0.4	-1.2	-1.6	-1.5
Residential	2.09	1.72	1.40	1.33	1.29	1.29	1.27	1.22	1.16	-3.9	-0.8	-0.1	-0.9
Tertiary	2.23	1.92	1.71	1.60	1.50	1.43	1.34	1.26	1.18	-2.6	-1.3	-1.1	-1.3
Transport	2.82	2.82	2.85	2.87	2.87	2.87	2.86	2.84	2.80	0.1	0.1	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**72.8**	**76.8**	**86.0**	**103.8**	**124.5**	**148.2**	**164.0**	**180.6**		**3.1**	**3.6**	**2.0**
Nuclear		8.4	9.3	10.0	7.9	7.9	7.9	5.5	2.8		-1.6	0.0	-9.7
Hydro (pumping excluded)		5.9	6.2	6.6	6.9	7.2	7.5	7.6	7.7		1.1	0.8	0.4
Wind and solar		0.0	0.0	1.6	3.6	6.4	10.0	12.6	15.2		73.0	10.7	4.3
Thermal		58.5	61.3	67.8	85.4	102.9	122.9	138.3	154.8		3.4	3.7	2.3
of which cogeneration units		*21.4*	*16.1*	*13.6*	*15.3*	*17.7*	*21.0*	*26.1*	*33.1*		*-0.5*	*3.2*	*4.7*
Open cycle (incl. biomass-waste)		57.6	58.3	56.9	64.2	68.1	74.3	78.3	83.5		1.0	1.5	1.2
Supercritical Polyvalent/Clean Coal and Lignite		0.0	0.0	0.0	0.4	1.9	4.5	8.4	12.8			27.3	11.1
Gas Turbines Combined Cycle		0.0	1.3	7.8	16.1	25.7	34.5	39.8	44.4		28.4	8.0	2.5
Small Gas Turbines		0.9	1.7	3.0	4.7	7.2	9.6	11.8	14.1		10.8	7.3	3.9
Fuel Cells		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Geothermal heat		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Indicators													
Efficiency for thermal electricity production (%)		32.0	33.9	36.3	39.1	42.2	44.0	45.4	46.6				
Load factor for gross electric capacities (%)		47.1	48.2	46.6	44.4	42.7	41.4	40.6	39.9				
CHP indicator (% of electricity from CHP)		36.4	29.4	23.2	21.3	20.7	21.5	24.9	28.4				
Non fossil fuels in electricity generation (%)		23.7	23.2	25.9	21.8	20.8	19.9	17.0	14.0				
nuclear		18.3	17.8	19.4	14.4	12.5	10.8	7.0	3.2				
renewable energy forms		5.4	5.3	6.6	7.4	8.3	9.1	10.0	10.7				
of which waste		*0.1*	*0.1*	*0.4*	*0.6*	*0.7*	*0.8*	*0.9*	*1.1*				
Transport sector													
Passenger transport activity (Gpkm)	**488.8**	**468.3**	**498.0**	**542.8**	**615.7**	**707.9**	**811.0**	**911.1**	**1005.8**	**0.2**	**2.1**	**2.8**	**2.2**
public road transport	115.7	87.0	81.2	80.4	81.0	82.5	84.7	87.5	90.9	-3.5	0.0	0.4	0.7
private cars and motorcycles	268.0	315.8	352.9	394.4	458.6	536.8	621.0	699.0	770.8	2.8	2.7	3.1	2.2
rail	91.9	50.8	46.3	46.4	48.3	52.2	58.2	66.4	75.2	-6.6	0.4	1.9	2.6
aviation	12.8	14.2	17.0	20.9	27.1	35.7	46.3	57.4	68.1	2.9	4.8	5.5	3.9
inland navigation	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	4.0	0.9	0.9	0.4
travel per person (km per capita)	**6507**	**6230**	**6664**	**7324**	**8388**	**9739**	**11316**	**12897**	**14547**	**0.2**	**2.3**	**3.0**	**2.5**
Freight transport activity (Gtkm)	**327.0**	**258.1**	**275.9**	**303.1**	**340.4**	**389.4**	**443.5**	**496.5**	**544.5**	**-1.7**	**2.1**	**2.7**	**2.1**
trucks	118.4	119.0	155.5	187.2	223.4	269.6	319.5	368.7	413.3	2.8	3.7	3.6	2.6
rail	205.2	137.8	118.7	114.2	115.2	118.0	122.1	125.9	129.2	-5.3	-0.3	0.6	0.6
inland navigation	3.4	1.3	1.7	1.7	1.8	1.8	1.9	1.9	2.0	-6.4	0.0	0.6	1.0
freight activity per unit of GDP (tkm/000 Euro'00)	**982**	**800**	**700**	**647**	**593**	**562**	**540**	**519**	**495**	**-3.3**	**-1.6**	**-0.9**	**-0.9**
Energy demand in transport (Mtoe)	**19.7**	**20.2**	**24.0**	**27.2**	**31.4**	**35.2**	**39.1**	**41.4**	**43.1**	**2.0**	**2.7**	**2.2**	**1.0**
public road transport	1.3	1.0	1.2	1.2	1.2	1.1	1.1	1.1	1.1	-0.9	-0.3	-0.2	-0.1
private cars and motorcycles	7.6	9.6	12.1	13.8	16.7	18.5	20.5	20.9	21.3	4.8	3.2	2.1	0.4
trucks	6.6	6.7	7.9	9.3	10.5	12.1	13.6	15.1	16.3	1.8	2.9	2.6	1.9
rail	2.4	1.5	1.3	1.3	1.2	1.2	1.2	1.2	1.2	-5.6	-0.7	-0.3	-0.5
aviation	1.5	1.3	1.4	1.6	1.8	2.2	2.7	3.0	3.2	-0.8	2.7	3.9	1.9
inland navigation	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-20.6	-0.8	0.2	0.2
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	24.2	27.0	30.9	31.8	33.0	31.8	30.8	28.2	26.2	2.5	0.7	-0.7	-1.6
freight transport (toe/Mtkm)	24.3	29.5	31.3	32.9	32.7	32.7	31.9	31.6	30.9	2.6	0.5	-0.3	-0.3

Source: ACE Model

BULGARIA: BASELINE SCENARIO										SUMMARY ENERGY BALANCE AND INDICATORS (A)			
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**9.61**	**10.42**	**10.02**	**9.18**	**8.07**	**7.43**	**6.86**	**6.45**	**4.93**	**0.4**	**-2.1**	**-1.6**	**-3.2**
Solids	5.38	5.51	4.41	4.42	3.92	3.18	2.47	1.96	1.89	-2.0	-1.2	-4.5	-2.7
Oil	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	-3.9	-0.2	0.0	-0.1
Natural gas	0.01	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.3			
Nuclear	3.82	4.50	4.75	3.90	3.17	3.18	3.18	3.18	1.59	2.2	-4.0	0.0	-6.7
Renewable energy sources	0.34	0.33	0.81	0.81	0.94	1.03	1.17	1.27	1.41	9.1	1.6	2.2	1.9
Hydro	0.16	0.11	0.23	0.23	0.23	0.24	0.24	0.25	0.26	3.6	0.2	0.5	0.5
Biomass	0.17	0.22	0.56	0.54	0.56	0.55	0.55	0.54	0.56	12.5	0.0	-0.2	0.2
Waste	0.00	0.00	0.01	0.02	0.10	0.17	0.25	0.30	0.37		24.4	9.2	4.2
Wind	0.00	0.00	0.00	0.01	0.03	0.05	0.08	0.10	0.12			9.4	4.5
Solar and others	0.00	0.00	0.00	0.01	0.01	0.02	0.05	0.08	0.10			16.2	6.6
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**18.19**	**13.55**	**8.73**	**9.04**	**10.29**	**11.45**	**12.57**	**13.42**	**14.90**	**-7.1**	**1.7**	**2.0**	**1.7**
Solids	3.81	2.45	2.31	2.29	2.07	2.35	2.51	2.84	3.52	-4.9	-1.1	1.9	3.4
Oil	8.63	6.56	4.08	4.41	5.11	5.37	5.82	5.92	6.14	-7.2	2.3	1.3	0.5
Crude oil and Feedstocks	8.35	8.08	5.38	5.56	6.28	6.71	7.09	7.12	7.09	-4.3	1.6	1.2	0.0
Oil products	0.28	-1.53	-1.30	-1.15	-1.18	-1.35	-1.27	-1.20	-0.94				
Natural gas	5.43	4.56	2.74	2.77	3.56	4.19	4.68	5.12	5.73	-6.6	2.6	2.8	2.1
Electricity	0.33	-0.01	-0.40	-0.43	-0.44	-0.46	-0.43	-0.46	-0.49				
Gross Inland Consumption	**28.82**	**23.97**	**19.15**	**18.14**	**18.28**	**18.78**	**19.33**	**19.75**	**19.71**	**-4.0**	**-0.5**	**0.6**	**0.2**
Solids	9.24	8.29	6.91	6.71	5.99	5.53	4.98	4.80	5.40	-2.9	-1.4	-1.8	0.8
Oil	9.70	6.29	4.16	4.37	5.06	5.31	5.75	5.85	6.06	-8.1	2.0	1.3	0.5
Natural gas	5.39	4.58	2.93	2.77	3.56	4.19	4.68	5.12	5.73	-5.9	2.0	2.8	2.1
Nuclear	3.82	4.50	4.75	3.90	3.17	3.18	3.18	3.18	1.59	2.2	-4.0	0.0	-6.7
Electricity	0.33	-0.01	-0.40	-0.43	-0.44	-0.46	-0.43	-0.46	-0.49				
Renewable energy forms	0.33	0.32	0.80	0.81	0.94	1.03	1.17	1.27	1.41	9.1	1.6	2.2	1.9
as % in Gross Inland Consumption													
Solids	32.1	34.6	36.1	37.0	32.8	29.4	25.8	24.3	27.4				
Oil	33.7	26.2	21.7	24.1	27.7	28.3	29.8	29.6	30.8				
Natural gas	18.7	19.1	15.3	15.3	19.5	22.3	24.2	25.9	29.1				
Nuclear	13.3	18.8	24.8	21.5	17.3	16.9	16.5	16.1	8.1				
Renewable energy forms	1.2	1.3	4.2	4.4	5.1	5.5	6.1	6.4	7.2				
Electricity Generation in TWhe	**42.14**	**40.72**	**40.65**	**40.85**	**43.43**	**47.38**	**50.20**	**53.88**	**57.41**	**-0.4**	**0.7**	**1.5**	**1.4**
Nuclear	14.80	17.44	18.38	15.10	12.26	12.30	12.31	12.31	6.16	2.2	-4.0	0.0	-6.7
Hydro & wind	1.88	1.24	2.67	2.72	3.08	3.38	3.74	4.04	4.41	3.6	1.4	2.0	1.6
Thermal (incl. biomass)	25.46	22.03	19.59	23.03	28.09	31.69	34.14	37.52	46.85	-2.6	3.7	2.0	3.2
Fuel Inputs for Thermal Power Generation	**10.25**	**8.39**	**6.16**	**6.53**	**6.85**	**7.11**	**7.19**	**7.60**	**9.15**	**-5.0**	**1.1**	**0.5**	**2.4**
Solids	6.95	5.85	5.13	5.47	4.93	4.63	4.18	4.10	4.80	-3.0	-0.4	-1.6	1.4
Oil	0.95	0.73	0.17	0.12	0.17	0.20	0.32	0.48	0.68	-15.8	0.0	6.4	7.9
Gas	2.35	1.81	0.86	0.92	1.64	2.11	2.43	2.69	3.26	-9.5	6.6	4.0	3.0
Biomass - Waste	0.00	0.00	0.00	0.02	0.10	0.18	0.26	0.33	0.42		40.7	10.2	4.8
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**13.53**	**11.59**	**7.46**	**7.46**	**8.03**	**8.34**	**8.63**	**8.62**	**8.55**	**-5.8**	**0.7**	**0.7**	**-0.1**
Refineries	8.44	8.10	5.43	5.60	6.32	6.76	7.14	7.19	7.19	-4.3	1.5	1.2	0.1
District heating	2.79	1.41	0.32	0.30	0.29	0.28	0.26	0.26	0.23	-19.4	-1.3	-1.0	-1.1
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.07	0.12			32.0	11.7
Others	2.29	2.07	1.70	1.55	1.42	1.29	1.19	1.09	1.01	-2.9	-1.8	-1.8	-1.6
Energy Branch Consumption	**1.35**	**1.34**	**1.13**	**0.85**	**0.87**	**0.91**	**0.96**	**1.00**	**1.04**	**-1.8**	**-2.6**	**0.9**	**0.9**
Non-Energy Uses	**1.44**	**1.24**	**1.25**	**1.30**	**1.38**	**1.46**	**1.54**	**1.61**	**1.67**	**-1.4**	**1.0**	**1.1**	**0.8**
Final Energy Demand	**16.40**	**11.39**	**8.54**	**8.53**	**9.12**	**9.53**	**10.17**	**10.51**	**10.82**	**-6.3**	**0.7**	**1.1**	**0.6**
by sector													
Industry	9.07	6.07	3.71	3.31	3.06	2.91	2.87	2.86	2.89	-8.5	-1.9	-0.6	0.1
Residential	2.36	2.37	1.98	2.01	2.07	2.17	2.30	2.46	2.61	-1.7	0.5	1.0	1.3
Tertiary	2.40	1.09	0.99	1.03	1.16	1.31	1.48	1.64	1.78	-8.5	1.5	2.5	1.9
Transport	2.57	1.86	1.86	2.19	2.83	3.15	3.53	3.54	3.53	-3.2	4.3	2.2	0.0
by fuel													
Solids	1.52	1.20	0.72	0.64	0.53	0.47	0.42	0.38	0.33	-7.1	-3.1	-2.3	-2.4
Oil	5.06	2.96	3.05	3.29	3.86	4.04	4.33	4.25	4.26	-4.9	2.4	1.1	-0.2
Gas	2.07	1.79	1.23	1.16	1.15	1.20	1.29	1.37	1.38	-5.0	-0.7	1.2	0.7
Electricity	3.03	2.47	2.08	2.10	2.26	2.49	2.70	2.92	3.13	-3.7	0.9	1.8	1.5
Heat (from CHP and District Heating)	4.54	2.80	0.88	0.79	0.74	0.76	0.85	1.03	1.18	-15.2	-1.7	1.4	3.3
Other	0.17	0.18	0.59	0.55	0.58	0.57	0.58	0.56	0.53	13.0	-0.1	0.0	-0.8
CO_2 Emissions (Mt of CO_2)	**73.6**	**54.5**	**41.4**	**42.2**	**42.9**	**43.0**	**43.0**	**43.3**	**47.6**	**-5.6**	**0.4**	**0.0**	**1.0**
Electricity and Steam production	45.5	34.8	24.5	25.8	25.4	25.1	24.3	25.0	29.6	-6.0	0.4	-0.4	2.0
Energy Branch	1.6	1.3	1.3	0.7	0.7	0.8	0.8	0.8	0.7	-2.1	-5.5	0.8	-0.5
Industry	11.6	9.5	8.6	7.6	6.8	6.1	5.6	5.1	4.6	-3.0	-2.3	-1.9	-2.0
Residential	2.9	2.4	0.5	0.5	0.5	0.6	0.8	1.1	1.2	-16.7	1.1	4.9	3.4
Tertiary	4.8	1.2	1.2	1.3	1.3	1.2	1.2	1.2	1.5	-12.6	0.1	-0.2	1.9
Transport	7.2	5.2	5.3	6.3	8.2	9.1	10.2	10.2	10.0	-3.0	4.4	2.2	-0.1
CO_2 Emissions Index (1990=100)	**100.0**	**74.0**	**56.2**	**57.3**	**58.3**	**58.4**	**58.4**	**58.8**	**64.7**				

See explanations on page 219

Source: ACE Model

BULGARIA: BASELINE SCENARIO										SUMMARY ENERGY BALANCE AND INDICATORS (B)			
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	8.72	8.41	8.17	7.78	7.39	7.01	6.65	6.30	5.95	-0.6	-1.0	-1.1	-1.1
GDP (in 000 MEuro'00)	17.4	15.2	14.6	18.4	22.6	26.5	30.4	34.3	38.1	-1.7	4.4	3.0	2.3
Gross Inl. Cons./GDP (toe/MEuro'00)	1656.7	1572.5	1309.9	985.2	810.1	709.5	635.2	575.8	517.4	-2.3	-4.7	-2.4	-2.0
Gross Inl. Cons./Capita (toe/inhabitant)	3.31	2.85	2.34	2.33	2.47	2.68	2.91	3.14	3.31	-3.4	0.5	1.6	1.3
Electricity Generated/Capita (kWh/inhabitant)	4834	4844	4975	5250	5875	6763	7548	8559	9653	0.3	1.7	2.5	2.5
Carbon intensity (t of CO_2/toe of GIC)	2.56	2.27	2.16	2.32	2.35	2.29	2.22	2.19	2.42	-1.7	0.8	-0.5	0.8
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.45	6.48	5.07	5.42	5.81	6.14	6.46	6.88	8.01	-5.0	1.4	1.1	2.2
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	4.2	3.6	2.8	2.3	1.9	1.6	1.4	1.3	1.3	-3.9	-3.9	-2.9	-1.2
Import Dependency %	63.0	55.9	45.4	49.6	56.1	60.6	64.7	67.6	75.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	97.0	70.1	49.6	37.7	30.7	26.5	23.5	21.6	-3.5	-6.0	-3.5	-2.0
Residential (Energy on Private Income)	100.0	125.1	112.2	93.4	77.9	69.1	63.5	60.3	57.4	1.2	-3.6	-2.0	-1.0
Tertiary (Energy on Value added)	100.0	60.1	58.0	47.4	43.2	41.5	40.7	40.0	39.1	-5.3	-2.9	-0.6	-0.4
Transport (Energy on GDP)	100.0	82.6	86.1	80.5	84.8	80.4	78.4	69.9	62.8	-1.5	-0.1	-0.8	-2.2
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.45	0.45	0.45	0.48	0.46	0.42	0.38	0.36	0.39	-0.1	0.3	-1.8	0.2
Final energy demand (t of CO_2/toe)	1.62	1.62	1.83	1.84	1.85	1.80	1.76	1.67	1.60	1.3	0.1	-0.5	-1.0
Industry	1.28	1.57	2.32	2.29	2.23	2.11	1.97	1.78	1.60	6.1	-0.4	-1.3	-2.1
Residential	1.21	1.03	0.23	0.27	0.25	0.28	0.36	0.43	0.44	-15.2	0.6	3.8	2.1
Tertiary	2.01	1.14	1.26	1.23	1.09	0.94	0.83	0.75	0.83	-4.6	-1.4	-2.7	0.0
Transport	2.81	2.81	2.87	2.89	2.91	2.90	2.89	2.87	2.84	0.2	0.1	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**12.08**	**11.83**	**12.05**	**12.73**	**13.71**	**14.85**	**15.87**	**16.55**		**0.7**	**1.6**	**1.1**
Nuclear		3.76	3.76	2.88	2.00	2.00	2.00	2.00	1.00		-6.1	0.0	-6.7
Hydro (pumping excluded)		1.87	1.87	1.91	1.95	1.99	2.03	2.09	2.15		0.4	0.4	0.5
Wind and solar		0.00	0.00	0.04	0.19	0.32	0.48	0.60	0.75			9.5	4.6
Thermal		6.45	6.20	7.22	8.58	9.41	10.34	11.19	12.66		3.3	1.9	2.0
of which cogeneration units		*1.04*	*0.99*	*0.84*	*0.84*	*0.85*	*1.01*	*1.35*	*1.61*		*-1.6*	*1.9*	*4.8*
Open cycle (incl. biomass-waste)		6.45	6.20	6.71	6.50	6.31	6.16	6.11	6.44		0.5	-0.5	0.4
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.04	0.12	0.27	0.56	1.03			20.4	14.1
Gas Turbines Combined Cycle		0.00	0.00	0.44	1.75	2.52	3.28	3.75	4.24			6.5	2.6
Small Gas Turbines		0.00	0.00	0.07	0.29	0.45	0.63	0.78	0.95			7.9	4.2
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		23.8	28.4	31.1	35.9	38.9	41.5	43.2	44.7				
Load factor for gross electric capacities (%)		38.5	39.2	38.7	39.0	39.4	38.6	38.7	39.6				
CHP indicator (% of electricity from CHP)		19.0	13.7	11.8	10.5	9.9	11.4	13.4	15.3				
Non fossil fuels in electricity generation (%)		45.9	51.8	43.8	36.3	34.7	34.2	32.9	21.5				
nuclear		42.8	45.2	37.0	28.2	26.0	24.5	22.9	10.7				
renewable energy forms		3.1	6.6	6.8	8.1	8.7	9.7	10.0	10.8				
of which waste		*0.0*	*0.0*	*0.2*	*0.9*	*1.5*	*2.0*	*2.2*	*2.7*				
Transport sector													
Passenger transport activity (Gpkm)	**46.0**	**30.3**	**31.0**	**34.6**	**40.5**	**48.0**	**57.2**	**65.3**	**72.1**	**-3.9**	**2.7**	**3.5**	**2.3**
public road transport	16.3	7.1	2.1	2.1	2.3	2.6	3.0	3.4	3.8	-18.5	1.0	2.7	2.2
private cars and motorcycles	19.2	15.3	23.6	26.9	32.0	38.1	45.5	52.1	57.4	2.1	3.1	3.6	2.3
rail	7.8	4.7	3.5	3.5	3.8	4.1	4.6	5.2	5.6	-7.8	0.8	2.1	2.0
aviation	2.6	3.1	1.8	2.0	2.5	3.2	4.0	4.7	5.3	-3.3	3.1	4.8	2.9
inland navigation	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
travel per person (km per capita)	**5278**	**3601**	**3792**	**4446**	**5483**	**6850**	**8597**	**10379**	**12123**	**-3.3**	**3.8**	**4.6**	**3.5**
Freight transport activity (Gtkm)	**67.7**	**39.7**	**24.6**	**27.0**	**30.4**	**33.2**	**35.6**	**37.6**	**39.2**	**-9.6**	**2.2**	**1.6**	**1.0**
trucks	52.0	31.0	19.4	21.7	25.1	27.7	30.0	31.8	33.2	-9.4	2.6	1.8	1.0
rail	14.1	8.6	5.2	5.2	5.4	5.5	5.7	5.8	6.0	-9.5	0.3	0.6	0.5
inland navigation	1.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
freight activity per unit of GDP (tkm/000 Euro'00)	**3894**	**2607**	**1681**	**1464**	**1349**	**1256**	**1171**	**1097**	**1030**	**-8.1**	**-2.2**	**-1.4**	**-1.3**
Energy demand in transport (Mtoe)	**2.57**	**1.86**	**1.86**	**2.19**	**2.83**	**3.15**	**3.53**	**3.54**	**3.53**	**-3.2**	**4.3**	**2.2**	**0.0**
public road transport	0.10	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.04	-11.9	3.1	1.3	0.2
private cars and motorcycles	0.30	0.26	0.77	0.95	1.31	1.43	1.60	1.64	1.65	9.9	5.4	2.0	0.3
trucks	1.64	1.06	0.88	1.03	1.29	1.47	1.65	1.62	1.59	-6.1	4.0	2.5	-0.4
rail	0.22	0.14	0.08	0.08	0.07	0.07	0.07	0.08	0.08	-9.8	-0.9	0.2	0.5
aviation	0.29	0.35	0.11	0.11	0.12	0.14	0.16	0.17	0.18	-9.6	1.0	3.1	1.0
inland navigation	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	18.2	24.6	31.0	33.0	37.4	34.6	32.4	29.2	26.7	5.5	1.9	-1.4	-1.9
freight transport (toe/Mtkm)	25.6	28.0	36.6	38.9	43.2	44.8	47.0	43.5	41.0	3.6	1.7	0.8	-1.3

Source: ACE Model

CYPRUS: BASELINE SCENARIO										SUMMARY ENERGY BALANCE AND INDICATORS (A)			
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**0.01**	**0.04**	**0.04**	**0.07**	**0.09**	**0.12**	**0.18**	**0.23**	**0.30**	**22.0**	**7.4**	**7.3**	**4.9**
Solids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			-9.7	-10.0
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	0.01	0.04	0.04	0.07	0.09	0.12	0.18	0.23	0.30	22.0	7.3	7.4	5.0
Hydro	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biomass	0.01	0.01	0.01	0.02	0.04	0.06	0.08	0.09	0.11	4.4	14.3	7.8	3.6
Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Wind	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.03			10.9	5.0
Solar and others	0.00	0.03	0.04	0.04	0.05	0.06	0.09	0.12	0.16		2.9	6.3	6.0
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**1.65**	**2.05**	**2.58**	**2.71**	**2.95**	**3.16**	**3.31**	**3.42**	**3.50**	**4.6**	**1.4**	**1.1**	**0.6**
Solids	0.06	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	-5.8	-1.6	-3.2	-0.7
Oil	1.59	2.04	2.54	2.68	2.92	3.13	3.29	3.40	3.48	4.8	1.4	1.2	0.6
Crude oil and Feedstocks	0.63	0.81	1.17	1.24	1.34	1.42	1.46	1.46	1.45	6.4	1.4	0.8	-0.1
Oil products	0.96	1.23	1.37	1.44	1.58	1.71	1.83	1.94	2.03	3.7	1.4	1.5	1.1
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Gross Inland Consumption	**1.54**	**2.01**	**2.43**	**2.57**	**2.80**	**3.01**	**3.19**	**3.32**	**3.43**	**4.7**	**1.4**	**1.3**	**0.7**
Solids	0.06	0.01	0.03	0.03	0.03	0.03	0.02	0.02	0.02	-6.0	-1.1	-3.4	-0.8
Oil	1.47	1.95	2.35	2.47	2.68	2.86	2.98	3.07	3.12	4.8	1.3	1.1	0.4
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy forms	0.01	0.04	0.05	0.07	0.09	0.12	0.18	0.23	0.30	22.6	6.7	7.4	5.0
as % in Gross Inland Consumption													
Solids	3.9	0.6	1.3	1.3	1.0	0.8	0.6	0.6	0.6				
Oil	95.7	97.2	96.7	96.0	95.7	95.0	93.6	92.3	90.7				
Natural gas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	0.4	2.2	1.9	2.7	3.2	4.1	5.8	7.1	8.7				
Electricity Generation in TWhe	**1.97**	**2.47**	**3.37**	**3.88**	**4.46**	**5.07**	**5.72**	**6.31**	**6.97**	**5.5**	**2.8**	**2.5**	**2.0**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	0.00	0.00	0.00	0.05	0.09	0.15	0.24	0.31	0.42			11.0	5.6
Thermal (incl. biomass)	1.97	2.47	3.37	3.84	4.37	4.92	5.48	6.00	6.55	5.5	2.6	2.3	1.8
Fuel Inputs for Thermal Power Generation	**0.52**	**0.64**	**0.89**	**0.87**	**0.96**	**1.06**	**1.16**	**1.25**	**1.33**	**5.5**	**0.8**	**1.9**	**1.4**
Solids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	0.52	0.64	0.89	0.85	0.93	1.01	1.10	1.18	1.26	5.5	0.5	1.7	1.4
Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biomass - Waste	0.00	0.00	0.00	0.02	0.03	0.05	0.06	0.07	0.07			8.1	1.4
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**0.65**	**0.84**	**1.19**	**1.24**	**1.34**	**1.42**	**1.46**	**1.47**	**1.47**	**6.3**	**1.2**	**0.9**	**0.1**
Refineries	0.65	0.84	1.19	1.24	1.34	1.42	1.46	1.47	1.46	6.3	1.2	0.8	0.0
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02				14.5
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Energy Branch Consumption	**0.04**	**0.04**	**0.05**	**0.06**	**0.06**	**0.06**	**0.07**	**0.07**	**0.07**	**3.6**	**1.2**	**1.0**	**0.4**
Non-Energy Uses	**0.07**	**0.06**	**0.09**	**0.09**	**0.09**	**0.10**	**0.10**	**0.10**	**0.11**	**2.1**	**0.8**	**0.7**	**0.5**
Final Energy Demand	**1.06**	**1.43**	**1.66**	**1.86**	**2.03**	**2.18**	**2.30**	**2.38**	**2.44**	**4.6**	**2.1**	**1.2**	**0.6**
by sector													
Industry	0.23	0.39	0.44	0.47	0.49	0.50	0.50	0.51	0.50	7.0	1.1	0.3	0.0
Residential	0.11	0.18	0.21	0.25	0.28	0.31	0.34	0.37	0.40	7.2	2.7	2.0	1.6
Tertiary	0.09	0.09	0.13	0.17	0.20	0.24	0.28	0.31	0.34	4.2	4.5	3.2	2.0
Transport	0.64	0.77	0.87	0.98	1.06	1.12	1.17	1.19	1.20	3.1	2.0	1.0	0.2
by fuel													
Solids	0.06	0.01	0.03	0.03	0.03	0.02	0.02	0.02	0.02	-6.0	-1.1	-3.4	-0.8
Oil	0.85	1.19	1.33	1.48	1.61	1.70	1.74	1.74	1.71	4.6	1.9	0.8	-0.2
Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.15	0.19	0.26	0.30	0.34	0.39	0.44	0.49	0.54	5.5	3.0	2.6	2.0
Heat (from CHP and District Heating)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Other	0.00	0.04	0.04	0.05	0.05	0.06	0.10	0.13	0.18	25.9	2.6	5.9	6.1
CO_2 Emissions (Mt of CO_2)	**4.5**	**5.9**	**7.2**	**7.5**	**8.1**	**8.6**	**8.9**	**9.2**	**9.3**	**4.8**	**1.2**	**1.0**	**0.4**
Electricity and Steam production	1.7	2.1	2.8	2.7	3.0	3.2	3.5	3.8	4.0	5.5	0.5	1.6	1.4
Energy Branch	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.9	0.7	0.4	-0.5
Industry	0.7	1.2	1.4	1.5	1.5	1.4	1.3	1.2	1.1	7.7	0.5	-0.9	-2.1
Residential	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	2.4	3.0	1.1	0.9
Tertiary	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2			8.3	1.3
Transport	1.9	2.3	2.6	2.9	3.2	3.3	3.5	3.5	3.5	3.1	1.9	1.0	0.2
CO_2 Emissions Index (1990=100)	**100.0**	**129.9**	**159.1**	**166.1**	**179.3**	**190.4**	**197.8**	**203.1**	**206.0**				

See explanations on page 219

Source: ACE Model

CYPRUS: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	0.68	0.73	0.75	0.78	0.81	0.83	0.85	0.87	0.87	1.1	0.7	0.5	0.3
GDP (in 000 MEuro'00)	6.5	8.1	9.8	11.7	14.0	16.5	19.2	22.1	25.1	4.2	3.6	3.2	2.7
Gross Inl. Cons./GDP (toe/MEuro'00)	235.6	246.8	247.9	218.8	199.7	182.0	166.0	150.6	136.9	0.5	-2.1	-1.8	-1.9
Gross Inl. Cons./Capita (toe/inhabitant)	2.28	2.75	3.22	3.27	3.46	3.62	3.76	3.84	3.93	3.5	0.7	0.8	0.5
Electricity Generated/Capita (kWh/inhabitant)	2924	3389	4465	4949	5515	6095	6744	7290	7979	4.3	2.1	2.0	1.7
Carbon intensity (t of CO_2/toe of GIC)	2.93	2.92	2.95	2.92	2.89	2.86	2.80	2.76	2.70	0.1	-0.2	-0.3	-0.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	6.68	8.02	9.50	9.55	10.00	10.32	10.51	10.58	10.64	3.6	0.5	0.5	0.1
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.6	-2.4	-2.1	-2.2
Import Dependency %	103.4	98.9	98.5	97.4	97.0	96.2	94.7	93.5	92.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	93.8	102.9	91.6	78.5	67.4	57.9	50.4	44.4	0.3	-2.7	-3.0	-2.6
Residential (Energy on Private Income)	100.0	133.8	126.3	120.6	114.6	108.4	103.0	97.2	92.5	2.4	-1.0	-1.1	-1.1
Tertiary (Energy on Value added)	100.0	88.1	101.3	106.0	109.6	110.4	109.4	106.2	102.0	0.1	0.8	0.0	-0.7
Transport (Energy on GDP)	100.0	95.7	90.2	84.2	76.7	69.0	61.9	54.8	48.4	-1.0	-1.6	-2.1	-2.4
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.84	0.83	0.84	0.70	0.67	0.64	0.61	0.60	0.58	0.0	-2.3	-0.9	-0.6
Final energy demand (t of CO_2/toe)	2.60	2.59	2.54	2.50	2.45	2.39	2.30	2.21	2.11	-0.2	-0.4	-0.6	-0.9
Industry	2.93	3.09	3.12	3.07	2.97	2.80	2.63	2.41	2.13	0.6	-0.5	-1.2	-2.1
Residential	1.71	1.14	1.08	1.13	1.11	1.07	1.01	1.00	0.95	-4.5	0.3	-1.0	-0.6
Tertiary	0.00	0.00	0.00	0.09	0.30	0.56	0.48	0.46	0.45			4.9	-0.7
Transport	2.97	2.98	2.99	2.98	2.98	2.98	2.97	2.96	2.95	0.0	0.0	0.0	0.0
Electricity and steam generation													
Generation Capacity in GWe		0.94	1.02	1.36	1.75	1.95	2.18	2.38	2.61		5.6	2.2	1.8
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Wind and solar		0.00	0.00	0.02	0.03	0.06	0.09	0.11	0.15			11.1	5.5
Thermal		0.94	1.02	1.34	1.72	1.90	2.09	2.26	2.45		5.4	2.0	1.6
of which cogeneration units		*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*			*0.0*	*0.0*
Open cycle (incl. biomass-waste)		0.89	0.89	1.21	1.57	1.73	1.90	2.05	2.24		5.8	1.9	1.7
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Gas Turbines Combined Cycle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Small Gas Turbines		0.05	0.13	0.14	0.15	0.17	0.19	0.21	0.22		1.6	2.4	1.4
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		33.0	32.6	37.9	39.2	39.8	40.7	41.4	42.4				
Load factor for gross electric capacities (%)		30.2	37.8	32.6	29.1	29.6	30.0	30.3	30.5				
CHP indicator (% of electricity from CHP)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Non fossil fuels in electricity generation (%)		0.0	0.0	3.1	4.8	7.1	9.2	9.8	10.8				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		0.0	0.0	3.1	4.8	7.1	9.2	9.8	10.8				
of which waste		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*				
Transport sector													
Passenger transport activity (Gpkm)	**5.8**	**6.7**	**8.1**	**9.2**	**10.4**	**11.5**	**12.6**	**13.7**	**14.8**	**3.5**	**2.5**	**2.0**	**1.6**
public road transport	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.7	0.7	3.3	1.5	0.5	0.3
private cars and motorcycles	3.6	4.2	5.1	5.7	6.2	6.8	7.3	7.9	8.5	3.6	1.9	1.6	1.5
rail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
aviation	1.8	2.1	2.4	3.0	3.5	4.1	4.6	5.1	5.6	3.3	3.8	2.7	1.9
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
travel per person (km per capita)	**8519**	**9214**	**10764**	**11782**	**12859**	**13848**	**14875**	**15855**	**16949**	**2.4**	**1.8**	**1.5**	**1.3**
Freight transport activity (Gtkm)	**3.7**	**4.6**	**5.2**	**5.9**	**6.6**	**7.3**	**7.9**	**8.5**	**9.0**	**3.6**	**2.4**	**1.8**	**1.3**
trucks	3.7	4.6	5.2	5.9	6.6	7.3	7.9	8.5	9.0	3.6	2.4	1.8	1.3
rail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
freight activity per unit of GDP (tkm/000 Euro'00)	**562**	**563**	**534**	**502**	**471**	**441**	**412**	**386**	**358**	**-0.5**	**-1.2**	**-1.3**	**-1.4**
Energy demand in transport (Mtoe)	**0.64**	**0.77**	**0.87**	**0.98**	**1.06**	**1.12**	**1.17**	**1.19**	**1.20**	**3.1**	**2.0**	**1.0**	**0.2**
public road transport	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	6.4	1.3	0.2	-0.2
private cars and motorcycles	0.13	0.15	0.24	0.28	0.34	0.34	0.34	0.33	0.33	6.8	3.3	0.2	-0.3
trucks	0.26	0.33	0.33	0.36	0.37	0.39	0.41	0.43	0.44	2.4	1.2	1.0	0.8
rail	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
aviation	0.25	0.28	0.29	0.32	0.34	0.38	0.41	0.41	0.41	1.4	1.7	1.8	0.0
inland navigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	66.6	64.6	66.8	67.0	66.3	63.4	60.5	55.5	51.0	0.0	-0.1	-0.9	-1.7
freight transport (toe/Mtkm)	70.9	72.8	62.9	60.3	56.1	54.2	51.7	50.7	49.2	-1.2	-1.1	-0.8	-0.5

Source: ACE Model

CZECH REPUBLIC: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**38.51**	**31.82**	**29.87**	**27.34**	**25.66**	**23.10**	**22.10**	**21.44**	**18.30**	**-2.5**	**-1.5**	**-1.5**	**-1.9**
Solids	34.70	27.56	25.00	18.66	16.86	14.13	12.96	12.08	11.97	-3.2	-3.9	-2.6	-0.8
Oil	0.21	0.26	0.38	0.18	0.20	0.21	0.21	0.21	0.21	6.3	-6.1	0.4	0.1
Natural gas	0.20	0.20	0.17	0.14	0.12	0.10	0.10	0.10	0.10	-1.7	-3.7	-1.5	-0.4
Nuclear	3.28	3.19	3.54	7.43	7.41	7.39	7.36	7.34	3.85	0.8	7.7	-0.1	-6.3
Renewable energy sources	0.12	0.62	0.78	0.92	1.08	1.26	1.47	1.71	2.17	20.1	3.3	3.1	4.0
Hydro	0.12	0.17	0.15	0.16	0.17	0.18	0.19	0.20	0.20	2.0	1.2	1.1	0.5
Biomass	0.00	0.42	0.40	0.47	0.54	0.60	0.70	0.83	1.06		3.1	2.6	4.3
Waste	0.00	0.03	0.23	0.23	0.27	0.30	0.32	0.34	0.39		1.7	1.8	1.8
Wind	0.00	0.00	0.00	0.04	0.07	0.14	0.19	0.24	0.33			10.6	5.7
Solar and others	0.00	0.00	0.00	0.02	0.03	0.04	0.07	0.11	0.19			8.9	11.1
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**7.63**	**8.54**	**9.41**	**13.60**	**16.32**	**19.31**	**21.28**	**22.58**	**25.25**	**2.1**	**5.7**	**2.7**	**1.7**
Solids	-5.69	-5.82	-4.74	-2.96	-2.63	-2.08	-1.61	-1.06	0.41				
Oil	8.60	7.89	7.54	9.02	10.17	10.83	11.58	12.05	12.60	-1.3	3.0	1.3	0.8
Crude oil and Feedstocks	7.37	6.93	5.57	6.18	6.78	7.18	7.46	7.54	7.55	-2.8	2.0	1.0	0.1
Oil products	1.22	0.97	1.97	2.84	3.39	3.65	4.13	4.51	5.04	4.8	5.6	2.0	2.0
Natural gas	4.78	6.42	7.48	8.43	9.65	11.43	12.17	12.46	13.06	4.6	2.6	2.3	0.7
Electricity	-0.06	0.04	-0.86	-0.89	-0.88	-0.86	-0.86	-0.87	-0.81				
Gross Inland Consumption	**47.40**	**41.72**	**40.54**	**40.94**	**41.99**	**42.41**	**43.38**	**44.02**	**43.55**	**-1.6**	**0.4**	**0.3**	**0.0**
Solids	29.84	23.32	21.68	15.70	14.23	12.05	11.34	11.02	12.38	-3.1	-4.1	-2.2	0.9
Oil	8.96	8.01	7.90	9.21	10.37	11.03	11.79	12.26	12.81	-1.3	2.8	1.3	0.8
Natural gas	5.26	6.55	7.50	8.57	9.77	11.53	12.26	12.56	13.15	3.6	2.7	2.3	0.7
Nuclear	3.28	3.19	3.54	7.43	7.41	7.39	7.36	7.34	3.85	0.8	7.7	-0.1	-6.3
Electricity	-0.06	0.04	-0.86	-0.89	-0.88	-0.86	-0.86	-0.87	-0.81				
Renewable energy forms	0.12	0.62	0.78	0.92	1.08	1.26	1.47	1.71	2.17	20.1	3.3	3.1	4.0
as % in Gross Inland Consumption													
Solids	63.0	55.9	53.5	38.4	33.9	28.4	26.1	25.0	28.4				
Oil	18.9	19.2	19.5	22.5	24.7	26.0	27.2	27.9	29.4				
Natural gas	11.1	15.7	18.5	20.9	23.3	27.2	28.3	28.5	30.2				
Nuclear	6.9	7.6	8.7	18.1	17.6	17.4	17.0	16.7	8.8				
Renewable energy forms	0.3	1.5	1.9	2.3	2.6	3.0	3.4	3.9	5.0				
Electricity Generation in TWhe	**62.56**	**60.58**	**72.91**	**76.73**	**83.42**	**91.15**	**98.80**	**105.94**	**112.93**	**1.5**	**1.4**	**1.7**	**1.3**
Nuclear	12.70	12.34	13.71	28.76	28.67	28.63	28.51	28.41	14.91	0.8	7.7	-0.1	-6.3
Hydro & wind	1.45	2.00	1.76	2.28	2.80	3.68	4.45	5.05	6.24	2.0	4.8	4.8	3.4
Thermal (incl. biomass)	48.41	46.23	57.44	45.69	51.95	58.83	65.84	72.48	91.78	1.7	-1.0	2.4	3.4
Fuel Inputs for Thermal Power Generation	**10.99**	**14.33**	**15.76**	**12.16**	**12.93**	**13.17**	**14.13**	**15.11**	**18.48**	**3.7**	**-2.0**	**0.9**	**2.7**
Solids	9.95	13.28	13.91	9.73	9.26	8.08	8.08	8.23	9.99	3.4	-4.0	-1.4	2.2
Oil	0.74	0.31	0.20	0.41	0.70	0.90	1.27	1.65	2.13	-12.2	13.1	6.2	5.4
Gas	0.30	0.61	1.26	1.52	2.38	3.50	4.03	4.40	5.39	15.4	6.6	5.4	2.9
Biomass - Waste	0.00	0.12	0.39	0.49	0.59	0.68	0.75	0.82	0.96		4.1	2.5	2.5
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**18.52**	**14.36**	**11.32**	**10.99**	**11.12**	**11.16**	**11.21**	**11.16**	**11.19**	**-4.8**	**-0.2**	**0.1**	**0.0**
Refineries	7.92	7.22	6.11	6.37	6.99	7.40	7.72	7.86	7.97	-2.6	1.4	1.0	0.3
District heating	2.14	1.25	0.93	0.92	0.86	0.79	0.69	0.58	0.47	-8.0	-0.8	-2.2	-3.7
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.01	0.04	0.11	0.21	0.38			23.5	12.6
Others	8.46	5.88	4.28	3.70	3.26	2.94	2.69	2.52	2.38	-6.6	-2.7	-1.9	-1.2
Energy Branch Consumption	**1.70**	**1.88**	**1.92**	**1.89**	**1.97**	**2.03**	**2.10**	**2.15**	**2.21**	**1.2**	**0.3**	**0.7**	**0.5**
Non-Energy Uses	**1.75**	**2.41**	**2.03**	**2.46**	**2.64**	**2.77**	**2.87**	**2.94**	**3.01**	**1.5**	**2.7**	**0.8**	**0.5**
Final Energy Demand	**34.80**	**27.19**	**24.02**	**24.50**	**25.36**	**26.10**	**26.84**	**27.22**	**27.50**	**-3.6**	**0.5**	**0.6**	**0.2**
by sector													
Industry	18.12	14.72	10.38	9.77	9.53	9.45	9.38	9.39	9.43	-5.4	-0.9	-0.2	0.1
Residential	8.31	6.14	5.00	5.07	5.21	5.46	5.79	6.08	6.29	-5.0	0.4	1.1	0.8
Tertiary	5.50	3.45	3.79	4.17	4.41	4.60	4.73	4.80	4.85	-3.7	1.5	0.7	0.2
Transport	2.86	2.89	4.86	5.48	6.21	6.60	6.94	6.95	6.93	5.4	2.5	1.1	0.0
by fuel													
Solids	17.72	8.29	4.94	4.48	3.68	2.83	2.26	1.88	1.56	-12.0	-2.9	-4.8	-3.6
Oil	6.34	5.11	5.53	6.13	6.84	7.18	7.49	7.51	7.52	-1.4	2.1	0.9	0.0
Gas	5.14	5.90	6.44	6.71	6.99	7.58	7.80	7.77	7.43	2.3	0.8	1.1	-0.5
Electricity	4.14	4.13	4.24	4.50	4.99	5.55	6.10	6.61	7.16	0.2	1.6	2.0	1.6
Heat (from CHP and District Heating)	1.45	3.46	2.62	2.46	2.63	2.71	2.93	3.16	3.46	6.1	0.0	1.1	1.7
Other	0.00	0.30	0.24	0.22	0.23	0.25	0.26	0.30	0.36		-0.1	1.2	3.2
CO_2 Emissions (Mt of CO_2)	**158.8**	**127.1**	**119.0**	**103.2**	**103.1**	**99.8**	**100.5**	**100.9**	**108.9**	**-2.8**	**-1.4**	**-0.2**	**0.8**
Electricity and Steam production	51.0	61.5	64.0	47.9	48.5	46.5	48.3	50.5	61.0	2.3	-2.7	0.0	2.3
Energy Branch	2.3	1.6	2.2	2.2	2.2	2.2	2.1	2.1	2.0	-0.4	-0.3	-0.2	-0.8
Industry	58.8	38.4	26.7	25.3	23.1	20.7	18.7	17.1	15.6	-7.6	-1.4	-2.1	-1.8
Residential	24.9	11.6	6.9	6.6	6.1	6.2	6.3	6.4	6.2	-12.1	-1.3	0.4	-0.1
Tertiary	14.2	6.1	5.5	5.5	5.4	5.4	5.3	5.1	4.8	-9.1	-0.1	-0.2	-1.0
Transport	7.7	7.9	13.8	15.7	17.8	18.9	19.8	19.7	19.4	6.0	2.6	1.0	-0.2
CO_2 Emissions Index (1990=100)	**100.0**	**80.0**	**74.9**	**65.0**	**64.9**	**62.8**	**63.3**	**63.5**	**68.5**				

See explanations on page 219

Source: ACE Model

CZECH REPUBLIC: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	10.36	10.33	10.27	10.22	10.12	10.03	9.88	9.73	9.51	-0.1	-0.1	-0.2	-0.4
GDP (in 000 MEuro'00)	60.6	57.7	61.3	73.7	87.7	101.9	115.9	129.2	142.1	0.1	3.6	2.8	2.1
Gross Inl. Cons./GDP (toe/MEuro'00)	782.3	722.6	660.8	555.3	479.0	416.4	374.2	340.8	306.5	-1.7	-3.2	-2.4	-2.0
Gross Inl. Cons./Capita (toe/inhabitant)	4.57	4.04	3.95	4.01	4.15	4.23	4.39	4.53	4.58	-1.5	0.5	0.6	0.4
Electricity Generated/Capita (kWh/inhabitant)	6037	5866	7098	7510	8241	9089	10003	10892	11876	1.6	1.5	2.0	1.7
Carbon intensity (t of CO_2/toe of GIC)	3.35	3.05	2.94	2.52	2.45	2.35	2.32	2.29	2.50	-1.3	-1.8	-0.6	0.8
CO_2 Emissions/Capita (t of CO_2/inhabitant)	15.33	12.30	11.59	10.10	10.18	9.95	10.18	10.37	11.45	-2.8	-1.3	0.0	1.2
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	2.6	2.2	1.9	1.4	1.2	1.0	0.9	0.8	0.8	-3.0	-4.9	-3.0	-1.2
Import Dependency %	16.1	20.5	23.2	33.2	38.9	45.5	49.1	51.3	58.0				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	91.7	55.3	42.9	35.3	30.4	27.0	24.6	22.7	-5.8	-4.4	-2.6	-1.7
Residential (Energy on Private Income)	100.0	79.7	59.8	50.1	43.1	38.6	35.9	33.9	32.0	-5.0	-3.2	-1.8	-1.1
Tertiary (Energy on Value added)	100.0	51.1	50.6	45.3	39.7	35.1	31.3	28.2	25.6	-6.6	-2.4	-2.4	-2.0
Transport (Energy on GDP)	100.0	105.9	167.8	157.5	150.0	137.2	126.8	113.9	103.3	5.3	-1.1	-1.7	-2.0
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.61	0.56	0.57	0.42	0.40	0.36	0.34	0.33	0.38	-0.6	-3.6	-1.5	0.9
Final energy demand (t of CO_2/toe)	3.03	2.35	2.20	2.17	2.07	1.96	1.87	1.77	1.67	-3.2	-0.6	-1.0	-1.1
Industry	3.24	2.61	2.58	2.59	2.42	2.19	1.99	1.83	1.65	-2.3	-0.6	-1.9	-1.9
Residential	3.00	1.88	1.38	1.30	1.16	1.13	1.09	1.05	0.99	-7.5	-1.7	-0.7	-0.9
Tertiary	2.57	1.78	1.44	1.32	1.23	1.17	1.12	1.06	0.98	-5.6	-1.6	-0.9	-1.3
Transport	2.68	2.73	2.83	2.87	2.88	2.87	2.85	2.83	2.80	0.5	0.2	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**14.02**	**13.32**	**16.60**	**19.60**	**22.23**	**24.56**	**26.63**	**28.47**		**3.9**	**2.3**	**1.5**
Nuclear		1.76	1.76	3.72	3.72	3.72	3.72	3.72	1.96		7.8	0.0	-6.2
Hydro (pumping excluded)		1.04	1.04	1.12	1.19	1.27	1.34	1.38	1.42		1.4	1.2	0.5
Wind and solar		0.00	0.01	0.23	0.43	0.84	1.20	1.50	2.13		43.2	10.7	5.9
Thermal		11.22	10.51	11.54	14.25	16.40	18.30	20.03	22.97		3.1	2.5	2.3
of which cogeneration units		*5.76*	*3.97*	*3.02*	*3.25*	*3.42*	*3.84*	*4.57*	*5.12*		*-2.0*	*1.7*	*2.9*
Open cycle (incl. biomass-waste)		10.84	9.55	9.57	10.92	11.01	11.72	12.21	13.09		1.4	0.7	1.1
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.05	0.28	0.52	0.95	1.90			25.7	13.8
Gas Turbines Combined Cycle		0.00	0.19	1.04	2.12	3.66	4.63	5.26	6.07		27.3	8.1	2.7
Small Gas Turbines		0.37	0.77	0.92	1.15	1.45	1.42	1.60	1.91		4.2	2.1	3.0
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		28.8	32.6	33.6	35.8	39.6	41.3	42.5	43.9				
Load factor for gross electric capacities (%)		49.3	62.5	52.8	48.6	46.8	45.9	45.4	45.3				
CHP indicator (% of electricity from CHP)		21.2	27.0	21.0	21.2	20.8	22.1	23.2	24.9				
Non fossil fuels in electricity generation (%)		24.4	22.2	42.6	40.1	38.2	36.2	34.5	22.1				
nuclear		20.4	18.8	37.5	34.4	31.4	28.9	26.8	13.2				
renewable energy forms		4.0	3.4	5.1	5.8	6.7	7.3	7.7	8.9				
of which waste		*0.0*	*0.1*	*0.9*	*1.1*	*1.2*	*1.2*	*1.2*	*1.3*				
Transport sector													
Passenger transport activity (Gpkm)	**91.9**	**84.2**	**88.0**	**96.2**	**106.1**	**117.2**	**128.1**	**139.0**	**148.5**	**-0.4**	**1.9**	**1.9**	**1.5**
public road transport	11.9	11.0	8.6	8.3	8.5	8.7	9.1	9.6	10.1	-3.1	-0.2	0.7	1.0
private cars and motorcycles	62.6	62.2	68.4	76.2	84.3	93.3	101.6	110.0	117.4	0.9	2.1	1.9	1.5
rail	14.0	8.0	7.3	7.1	7.2	7.5	7.9	8.4	8.9	-6.3	0.0	0.9	1.3
aviation	3.4	3.1	3.7	4.6	6.0	7.7	9.4	10.9	12.0	0.9	5.0	4.7	2.5
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
travel per person (km per capita)	**8868**	**8157**	**8565**	**9415**	**10477**	**11692**	**12965**	**14285**	**15615**	**-0.3**	**2.0**	**2.2**	**1.9**
Freight transport activity (Gtkm)	**70.2**	**53.9**	**54.7**	**58.3**	**63.1**	**69.0**	**75.1**	**81.1**	**86.8**	**-2.5**	**1.4**	**1.8**	**1.5**
trucks	30.2	31.3	37.1	42.5	47.5	53.3	59.0	64.5	69.7	2.1	2.5	2.2	1.7
rail	40.0	22.6	16.6	14.9	14.7	14.8	15.1	15.5	16.0	-8.4	-1.3	0.3	0.6
inland navigation	0.0	0.0	0.9	0.9	0.9	1.0	1.0	1.1	1.1		0.2	0.7	1.2
freight activity per unit of GDP (tkm/000 Euro'00)	**1159**	**934**	**892**	**791**	**720**	**678**	**648**	**628**	**611**	**-2.6**	**-2.1**	**-1.0**	**-0.6**
Energy demand in transport (Mtoe)	**2.86**	**2.89**	**4.86**	**5.48**	**6.21**	**6.60**	**6.94**	**6.95**	**6.93**	**5.4**	**2.5**	**1.1**	**0.0**
public road transport	0.08	0.08	0.12	0.12	0.12	0.12	0.12	0.13	0.13	4.3	-0.4	0.3	0.5
private cars and motorcycles	1.16	1.20	2.34	2.65	3.04	3.24	3.43	3.45	3.46	7.3	2.7	1.2	0.1
trucks	1.12	1.21	1.89	2.19	2.51	2.66	2.77	2.76	2.72	5.3	2.9	1.0	-0.2
rail	0.27	0.20	0.30	0.27	0.26	0.25	0.23	0.21	0.18	0.9	-1.3	-1.2	-2.4
aviation	0.23	0.20	0.21	0.24	0.27	0.33	0.37	0.41	0.43	-0.8	2.6	3.2	1.4
inland navigation	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00		-9.5	-3.3	-3.3
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	17.3	18.6	32.0	32.8	33.6	32.6	31.7	29.5	27.7	6.4	0.5	-0.6	-1.3
freight transport (toe/Mtkm)	18.1	24.5	37.3	39.9	41.8	40.2	38.4	35.2	32.4	7.5	1.2	-0.9	-1.7

Source: ACE Model

ESTONIA: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)

Mtoe	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Primary Production	**5.41**	**2.96**	**2.92**	**2.98**	**2.22**	**0.72**	**0.67**	**0.62**	**0.59**	**-6.0**	**-2.7**	**-11.3**	**-1.2**
Solids	5.41	2.60	2.42	2.52	1.76	0.24	0.23	0.23	0.23	-7.8	-3.1	-18.3	-0.3
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	0.00	0.35	0.50	0.46	0.46	0.48	0.44	0.40	0.37		-0.9	-0.4	-1.7
Hydro	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		5.4	2.9	-0.1
Biomass	0.00	0.35	0.50	0.46	0.45	0.46	0.42	0.38	0.35		-1.0	-0.7	-1.9
Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Wind	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01		46.8	14.1	-0.1
Solar and others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			4.1	2.1
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**4.51**	**1.88**	**1.70**	**2.11**	**2.70**	**3.76**	**3.88**	**3.96**	**4.00**	**-9.3**	**4.8**	**3.7**	**0.3**
Solids	0.72	0.30	0.28	0.11	0.37	1.03	1.06	1.07	1.05	-8.8	2.7	11.1	-0.1
Oil	3.14	1.06	0.83	1.23	1.34	1.44	1.54	1.62	1.69	-12.4	4.9	1.4	0.9
Crude oil and Feedstocks	0.00	-0.14	-0.11	0.00	0.00	0.00	0.00	0.00	0.00				
Oil products	3.14	1.20	0.95	1.23	1.34	1.44	1.54	1.62	1.69	-11.3	3.5	1.4	0.9
Natural gas	1.26	0.58	0.66	0.84	1.07	1.36	1.35	1.35	1.33	-6.2	4.9	2.3	-0.2
Electricity	-0.60	-0.07	-0.08	-0.08	-0.08	-0.07	-0.07	-0.07	-0.07				
Gross Inland Consumption	**10.16**	**4.87**	**4.56**	**4.97**	**4.78**	**4.32**	**4.39**	**4.42**	**4.41**	**-7.7**	**0.5**	**-0.9**	**0.1**
Solids	6.37	3.10	2.76	2.63	2.13	1.27	1.29	1.29	1.28	-8.0	-2.6	-4.9	-0.1
Oil	3.14	0.92	0.72	1.11	1.20	1.29	1.38	1.45	1.51	-13.7	5.3	1.4	0.9
Natural gas	1.26	0.58	0.66	0.84	1.07	1.36	1.35	1.35	1.33	-6.2	4.9	2.3	-0.2
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	-0.60	-0.07	-0.08	-0.08	-0.08	-0.07	-0.07	-0.07	-0.07				
Renewable energy forms	0.00	0.34	0.50	0.46	0.46	0.48	0.44	0.40	0.37		-0.9	-0.4	-1.7
as % in Gross Inland Consumption													
Solids	62.7	63.7	60.6	53.0	44.5	29.5	29.5	29.2	29.0				
Oil	30.9	18.8	15.7	22.3	25.1	29.9	31.5	32.8	34.2				
Natural gas	12.4	12.0	14.5	17.0	22.4	31.4	30.7	30.6	30.0				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	0.0	6.9	11.0	9.3	9.6	11.0	10.0	9.0	8.3				
Electricity Generation in TWhe	**17.18**	**8.69**	**8.51**	**9.17**	**9.68**	**10.28**	**10.65**	**11.02**	**11.35**	**-6.8**	**1.3**	**1.0**	**0.6**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	0.00	0.00	0.01	0.02	0.06	0.19	0.19	0.19	0.19		24.9	12.9	-0.1
Thermal (incl. biomass)	17.18	8.69	8.51	9.15	9.62	10.10	10.46	10.83	11.17	-6.8	1.2	0.8	0.7
Fuel Inputs for Thermal Power Generation	**5.53**	**2.48**	**2.40**	**2.79**	**2.60**	**2.10**	**2.21**	**2.29**	**2.37**	**-8.0**	**0.8**	**-1.6**	**0.7**
Solids	4.74	2.30	2.17	2.51	2.02	1.19	1.23	1.24	1.24	-7.5	-0.7	-4.9	0.1
Oil	0.50	0.08	0.01	0.01	0.07	0.11	0.19	0.26	0.34	-31.4	19.8	10.5	5.9
Gas	0.29	0.10	0.23	0.26	0.46	0.71	0.68	0.68	0.67	-2.4	7.4	4.0	-0.3
Biomass - Waste	0.00	0.00	0.00	0.01	0.04	0.09	0.10	0.11	0.12		34.4	9.9	1.7
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**1.11**	**0.76**	**0.63**	**0.55**	**0.48**	**0.40**	**0.33**	**0.27**	**0.22**	**-5.4**	**-2.8**	**-3.5**	**-4.0**
Refineries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
District heating	1.00	0.50	0.45	0.41	0.37	0.32	0.26	0.21	0.16	-7.6	-2.0	-3.5	-4.5
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			24.5	3.7
Others	0.11	0.25	0.18	0.14	0.11	0.09	0.07	0.06	0.06	5.3	-5.1	-3.9	-2.6
Energy Branch Consumption	**0.38**	**0.14**	**0.17**	**0.14**	**0.15**	**0.15**	**0.16**	**0.16**	**0.16**	**-8.0**	**-1.1**	**0.6**	**0.3**
Non-Energy Uses	**0.33**	**0.23**	**0.22**	**0.23**	**0.24**	**0.25**	**0.26**	**0.26**	**0.27**	**-4.0**	**0.8**	**0.8**	**0.6**
Final Energy Demand	**5.99**	**2.51**	**2.37**	**2.52**	**2.60**	**2.71**	**2.78**	**2.83**	**2.85**	**-8.9**	**0.9**	**0.7**	**0.2**
by sector													
Industry	1.76	0.79	0.52	0.53	0.54	0.56	0.58	0.58	0.59	-11.4	0.3	0.7	0.2
Residential	0.80	0.96	0.93	0.88	0.87	0.87	0.88	0.89	0.90	1.5	-0.6	0.1	0.3
Tertiary	2.81	0.26	0.33	0.37	0.39	0.40	0.41	0.41	0.41	-19.3	1.7	0.5	0.1
Transport	0.62	0.50	0.59	0.75	0.81	0.88	0.92	0.94	0.95	-0.4	3.1	1.3	0.3
by fuel													
Solids	0.62	0.17	0.10	0.09	0.06	0.04	0.03	0.02	0.01	-16.3	-5.2	-6.7	-7.1
Oil	2.56	0.87	0.77	0.92	0.97	1.03	1.05	1.06	1.05	-11.3	2.3	0.8	0.0
Gas	0.23	0.20	0.13	0.19	0.24	0.30	0.34	0.37	0.38	-5.0	5.8	3.7	1.0
Electricity	0.59	0.39	0.43	0.47	0.51	0.55	0.57	0.60	0.63	-3.1	1.7	1.2	0.9
Heat (from CHP and District Heating)	2.00	0.59	0.51	0.47	0.48	0.48	0.51	0.53	0.58	-12.8	-0.7	0.6	1.3
Other	0.00	0.28	0.42	0.38	0.35	0.32	0.28	0.24	0.20		-1.8	-2.4	-3.0
CO_2 Emissions (Mt of CO_2)	**36.6**	**15.2**	**13.7**	**15.6**	**14.2**	**11.5**	**11.8**	**12.0**	**12.1**	**-9.3**	**0.4**	**-1.9**	**0.2**
Electricity and Steam production	25.2	11.3	10.6	12.0	10.5	7.5	7.7	7.8	7.9	-8.3	-0.1	-3.1	0.3
Energy Branch	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	-12.5	-14.6	1.1	0.1
Industry	1.8	1.7	0.8	0.7	0.7	0.6	0.6	0.6	0.5	-8.1	-1.3	-1.1	-1.7
Residential	0.8	0.4	0.3	0.3	0.4	0.5	0.5	0.6	0.6	-9.7	3.7	3.4	1.1
Tertiary	6.7	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	-27.4	0.0	-1.1	-1.4
Transport	1.7	1.5	1.7	2.2	2.4	2.6	2.7	2.8	2.8	0.0	3.2	1.3	0.3
CO_2 Emissions Index (1990=100)	**100.0**	**41.5**	**37.5**	**42.6**	**38.9**	**31.3**	**32.2**	**32.7**	**33.0**				

See explanations on page 219

Source: ACE Model

ESTONIA: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	1.57	1.45	1.37	1.30	1.23	1.17	1.11	1.05	0.98	-1.3	-1.1	-1.1	-1.2
GDP (in 000 MEuro'00)	6.8	4.6	5.9	7.5	8.9	10.4	11.6	12.7	13.8	-1.5	4.3	2.6	1.7
Gross Inl. Cons./GDP (toe/MEuro'00)	1492.7	1052.7	776.1	662.7	535.7	417.4	378.6	347.7	320.6	-6.3	-3.6	-3.4	-1.6
Gross Inl. Cons./Capita (toe/inhabitant)	6.47	3.36	3.32	3.83	3.88	3.69	3.96	4.22	4.50	-6.4	1.5	0.2	1.3
Electricity Generated/Capita (kWh/inhabitant)	10936	6003	6205	7073	7840	8771	9599	10536	11582	-5.5	2.4	2.0	1.9
Carbon intensity (t of CO_2/toe of GIC)	3.60	3.12	3.01	3.13	2.97	2.65	2.69	2.71	2.73	-1.8	-0.1	-1.0	0.2
CO_2 Emissions/Capita (t of CO_2/inhabitant)	23.28	10.48	10.00	12.01	11.53	9.78	10.63	11.45	12.30	-8.1	1.4	-0.8	1.5
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	5.4	3.3	2.3	2.1	1.6	1.1	1.0	0.9	0.9	-8.0	-3.8	-4.4	-1.5
Import Dependency %	44.4	37.9	36.4	41.4	55.0	84.0	85.2	86.4	87.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	88.5	42.0	30.9	26.2	23.6	21.9	20.3	18.9	-8.3	-4.6	-1.8	-1.4
Residential (Energy on Private Income)	100.0	165.2	130.9	100.1	82.4	70.6	63.6	58.9	55.4	2.7	-4.5	-2.6	-1.4
Tertiary (Energy on Value added)	100.0	12.1	12.2	10.7	9.5	8.3	7.5	6.8	6.3	-19.0	-2.4	-2.4	-1.8
Transport (Energy on GDP)	100.0	119.0	110.8	109.3	99.2	93.0	87.3	81.7	75.9	1.0	-1.1	-1.3	-1.4
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.59	0.66	0.67	0.75	0.63	0.44	0.43	0.42	0.41	1.2	-0.5	-3.8	-0.6
Final energy demand (t of CO_2/toe)	1.83	1.52	1.29	1.41	1.43	1.46	1.47	1.47	1.44	-3.5	1.0	0.3	-0.2
Industry	1.02	2.10	1.47	1.38	1.26	1.15	1.05	0.96	0.87	3.7	-1.5	-1.8	-1.9
Residential	0.94	0.45	0.29	0.36	0.45	0.55	0.62	0.68	0.67	-11.0	4.3	3.3	0.8
Tertiary	2.38	1.09	0.82	0.81	0.69	0.66	0.59	0.56	0.51	-10.1	-1.7	-1.6	-1.5
Transport	2.81	2.90	2.93	2.94	2.94	2.93	2.92	2.92	2.92	0.4	0.0	-0.1	0.0
Electricity and steam generation													
Generation Capacity in GWe		**3.34**	**2.75**	**2.71**	**2.66**	**2.65**	**2.78**	**2.87**	**2.98**		**-0.3**	**0.4**	**0.7**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		5.6	2.9	0.0
Wind and solar		0.00	0.00	0.00	0.02	0.08	0.08	0.08	0.08		47.1	14.4	0.0
Thermal		3.34	2.75	2.70	2.64	2.56	2.69	2.78	2.89		-0.4	0.2	0.7
of which cogeneration units		*0.51*	*0.42*	*0.29*	*0.29*	*0.28*	*0.41*	*0.50*	*0.61*		*-3.7*	*3.5*	*4.0*
Open cycle (incl. biomass-waste)		3.34	2.75	2.54	2.09	1.34	1.42	1.47	1.53		-2.7	-3.8	0.7
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.01	0.10	0.11	0.11	0.11			23.1	0.3
Gas Turbines Combined Cycle		0.00	0.00	0.14	0.45	0.94	0.96	0.98	1.01			8.0	0.4
Small Gas Turbines		0.00	0.00	0.02	0.08	0.18	0.20	0.22	0.25			9.1	2.1
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		31.8	30.9	28.6	32.4	41.9	41.5	41.7	41.7				
Load factor for gross electric capacities (%)		29.7	35.3	38.6	41.5	44.3	43.7	43.9	43.5				
CHP indicator (% of electricity from CHP)		43.6	13.8	10.9	13.3	15.5	20.7	24.7	30.0				
Non fossil fuels in electricity generation (%)		0.1	0.2	0.4	2.0	5.1	5.3	5.3	5.5				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		0.1	0.2	0.4	2.0	5.1	5.3	5.3	5.5				
of which waste		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Transport sector													
Passenger transport activity (Gpkm)	**11.7**	**8.6**	**9.4**	**10.3**	**11.3**	**12.5**	**13.6**	**14.2**	**14.6**	**-2.2**	**1.8**	**1.9**	**0.7**
public road transport	4.9	2.5	2.6	2.7	2.8	2.8	2.8	2.9	2.9	-6.0	0.7	0.1	0.0
private cars and motorcycles	5.1	5.5	6.0	6.6	7.4	8.4	9.2	9.7	10.0	1.5	2.1	2.3	0.8
rail	1.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	-16.0	0.6	1.5	0.8
aviation	0.2	0.1	0.2	0.3	0.5	0.7	0.8	1.0	1.0	1.2	7.7	5.8	1.8
inland navigation	0.0	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	44.1	1.1	0.7	0.3
travel per person (km per capita)	**7450**	**5957**	**6853**	**7936**	**9146**	**10707**	**12287**	**13609**	**14890**	**-0.8**	**2.9**	**3.0**	**1.9**
Freight transport activity (Gtkm)	**11.5**	**5.4**	**11.1**	**12.4**	**13.1**	**13.8**	**14.3**	**14.7**	**15.0**	**-0.4**	**1.7**	**0.8**	**0.5**
trucks	4.5	1.5	4.0	6.5	7.4	8.0	8.4	8.8	9.1	-1.1	6.2	1.3	0.7
rail	7.0	3.8	7.0	5.8	5.8	5.8	5.8	5.9	6.0	0.1	-2.0	0.1	0.2
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.4	0.6	0.5
freight activity per unit of GDP (tkm/000 Euro'00)	**1688**	**1167**	**1884**	**1648**	**1471**	**1330**	**1230**	**1153**	**1090**	**1.1**	**-2.4**	**-1.8**	**-1.2**
Energy demand in transport (Mtoe)	**0.62**	**0.50**	**0.59**	**0.75**	**0.81**	**0.88**	**0.92**	**0.94**	**0.95**	**-0.4**	**3.1**	**1.3**	**0.3**
public road transport	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	-3.9	0.3	-0.2	-0.1
private cars and motorcycles	0.18	0.25	0.23	0.25	0.27	0.30	0.32	0.33	0.34	2.6	1.4	1.7	0.6
trucks	0.32	0.14	0.23	0.37	0.41	0.44	0.45	0.46	0.47	-3.2	5.8	1.0	0.3
rail	0.02	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.03	11.0	-2.6	-0.4	-1.3
aviation	0.04	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.06	-3.8	4.2	4.7	0.1
inland navigation	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	43.2	0.8	0.5	0.3
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	24.7	37.6	33.3	33.0	32.1	32.3	31.9	31.7	31.1	3.0	-0.4	-0.1	-0.2
freight transport (toe/Mtkm)	28.8	32.7	25.2	32.9	33.8	34.3	34.1	33.7	33.1	-1.3	3.0	0.1	-0.3

Source: ACE Model

HUNGARY: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**14.22**	**13.27**	**11.09**	**10.15**	**9.42**	**8.70**	**8.71**	**7.06**	**5.31**	**-2.5**	**-1.6**	**-0.8**	**-4.8**
Solids	4.14	3.05	2.89	2.83	2.12	1.35	1.27	1.27	1.14	-3.5	-3.0	-5.0	-1.1
Oil	2.27	2.29	1.68	0.95	0.86	0.82	0.81	0.80	0.79	-3.0	-6.5	-0.7	-0.2
Natural gas	3.81	3.79	2.48	2.40	2.37	2.35	2.34	2.34	2.33	-4.2	-0.4	-0.1	0.0
Nuclear	3.58	3.66	3.64	3.58	3.58	3.59	3.59	1.79	0.00	0.2	-0.2	0.0	
Renewable energy sources	0.41	0.49	0.40	0.39	0.49	0.59	0.71	0.87	1.04	-0.4	2.1	3.9	3.9
Hydro	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.0	0.7	0.8	1.2
Biomass	0.40	0.47	0.36	0.32	0.31	0.33	0.37	0.45	0.57	-1.1	-1.4	1.8	4.5
Waste	0.00	0.00	0.02	0.03	0.08	0.11	0.12	0.16	0.17		15.1	3.8	3.6
Wind	0.00	0.00	0.00	0.02	0.06	0.12	0.18	0.21	0.24			11.0	3.0
Solar and others	0.00	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.04			5.2	4.0
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**14.19**	**12.08**	**13.58**	**16.24**	**18.84**	**20.77**	**21.79**	**23.22**	**24.39**	**-0.4**	**3.3**	**1.5**	**1.1**
Solids	1.63	1.03	0.76	1.23	2.35	3.49	4.33	5.09	5.82	-7.3	11.9	6.3	3.0
Oil	6.43	5.32	5.27	6.14	6.63	6.92	7.23	7.42	7.45	-2.0	2.3	0.9	0.3
Crude oil and Feedstocks	6.29	5.75	5.80	6.94	7.95	8.60	8.94	9.03	8.95	-0.8	3.2	1.2	0.0
Oil products	0.15	-0.43	-0.53	-0.80	-1.32	-1.68	-1.71	-1.61	-1.49				
Natural gas	5.17	5.53	7.25	8.58	9.51	10.08	10.05	10.44	10.82	3.4	2.8	0.6	0.7
Electricity	0.96	0.21	0.30	0.29	0.35	0.28	0.17	0.26	0.30	-11.1	1.6	-6.6	5.5
Gross Inland Consumption	**28.44**	**25.31**	**24.51**	**26.39**	**28.26**	**29.47**	**30.51**	**30.28**	**29.70**	**-1.5**	**1.4**	**0.8**	**-0.3**
Solids	6.12	4.32	3.68	4.06	4.48	4.84	5.60	6.36	6.96	-5.0	2.0	2.3	2.2
Oil	8.51	7.47	6.87	7.09	7.49	7.74	8.04	8.22	8.25	-2.1	0.9	0.7	0.3
Natural gas	8.91	9.17	9.62	10.98	11.87	12.43	12.39	12.78	13.15	0.8	2.1	0.4	0.6
Nuclear	3.58	3.66	3.64	3.58	3.58	3.59	3.59	1.79	0.00	0.2	-0.2	0.0	
Electricity	0.96	0.21	0.30	0.29	0.35	0.28	0.17	0.26	0.30	-11.1	1.6	-6.6	5.5
Renewable energy forms	0.37	0.49	0.40	0.39	0.49	0.59	0.71	0.87	1.04	0.7	2.1	3.9	3.9
as % in Gross Inland Consumption													
Solids	21.5	17.1	15.0	15.4	15.8	16.4	18.4	21.0	23.4				
Oil	29.9	29.5	28.0	26.9	26.5	26.3	26.3	27.1	27.8				
Natural gas	31.3	36.2	39.3	41.6	42.0	42.2	40.6	42.2	44.3				
Nuclear	12.6	14.4	14.9	13.6	12.7	12.2	11.8	5.9	0.0				
Renewable energy forms	1.3	1.9	1.6	1.5	1.7	2.0	2.3	2.9	3.5				
Electricity Generation in TWhe	**28.44**	**34.02**	**34.99**	**40.18**	**49.87**	**56.46**	**62.45**	**63.52**	**64.03**	**2.1**	**3.6**	**2.3**	**0.3**
Nuclear	13.86	14.15	14.11	13.85	13.88	13.89	13.90	6.94	0.00	0.2	-0.2	0.0	
Hydro & wind	0.18	0.16	0.18	0.37	0.94	1.63	2.34	2.67	3.10	0.0	18.2	9.5	2.8
Thermal (incl. biomass)	14.40	19.70	20.71	25.96	35.05	40.94	46.21	53.91	60.93	3.7	5.4	2.8	2.8
Fuel Inputs for Thermal Power Generation	**5.44**	**5.86**	**5.77**	**6.94**	**7.95**	**8.40**	**9.20**	**10.56**	**11.61**	**0.6**	**3.3**	**1.5**	**2.3**
Solids	3.36	2.77	2.86	3.26	3.81	4.26	5.08	5.89	6.54	-1.6	2.9	2.9	2.6
Oil	0.44	1.45	1.06	0.74	0.38	0.25	0.33	0.50	0.59	9.1	-9.6	-1.5	6.0
Gas	1.64	1.63	1.83	2.92	3.66	3.76	3.66	4.00	4.28	1.1	7.2	0.0	1.6
Biomass - Waste	0.00	0.00	0.02	0.03	0.09	0.12	0.13	0.18	0.20		15.7	4.3	4.1
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**11.29**	**10.40**	**9.27**	**9.43**	**10.21**	**10.69**	**10.97**	**11.05**	**11.07**	**-1.9**	**1.0**	**0.7**	**0.1**
Refineries	8.60	8.27	7.54	7.89	8.82	9.44	9.79	9.91	9.90	-1.3	1.6	1.0	0.1
District heating	1.18	0.78	0.60	0.51	0.44	0.37	0.31	0.25	0.19	-6.5	-3.2	-3.5	-4.4
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.01	0.03	0.09	0.17	0.29			24.3	12.9
Others	1.51	1.35	1.13	1.03	0.94	0.86	0.79	0.73	0.68	-2.8	-1.8	-1.8	-1.4
Energy Branch Consumption	**1.41**	**1.30**	**1.14**	**1.08**	**1.13**	**1.15**	**1.18**	**1.18**	**1.15**	**-2.1**	**-0.1**	**0.4**	**-0.3**
Non-Energy Uses	**1.76**	**1.63**	**1.60**	**1.73**	**1.82**	**1.89**	**1.95**	**1.99**	**2.03**	**-0.9**	**1.3**	**0.7**	**0.4**
Final Energy Demand	**19.32**	**15.83**	**15.85**	**16.61**	**18.09**	**19.21**	**19.87**	**20.23**	**20.36**	**-2.0**	**1.3**	**0.9**	**0.2**
by sector													
Industry	6.44	3.79	3.46	3.31	3.60	3.86	3.98	4.07	4.11	-6.0	0.4	1.0	0.3
Residential	6.45	5.95	5.16	5.17	5.39	5.71	5.94	6.10	6.17	-2.2	0.4	1.0	0.4
Tertiary	3.28	3.38	3.90	4.13	4.29	4.41	4.45	4.48	4.50	1.8	1.0	0.4	0.1
Transport	3.15	2.71	3.32	3.99	4.80	5.24	5.49	5.57	5.58	0.5	3.7	1.4	0.2
by fuel													
Solids	2.53	1.08	0.65	0.44	0.35	0.32	0.30	0.28	0.26	-12.7	-6.1	-1.6	-1.5
Oil	6.20	4.23	4.27	4.77	5.46	5.79	5.97	5.98	5.91	-3.7	2.5	0.9	-0.1
Gas	5.94	6.37	6.63	6.90	7.12	7.57	7.67	7.75	7.87	1.1	0.7	0.7	0.3
Electricity	2.72	2.39	2.53	2.89	3.59	3.99	4.33	4.49	4.57	-0.7	3.5	1.9	0.5
Heat (from CHP and District Heating)	1.59	1.29	1.41	1.29	1.27	1.21	1.27	1.40	1.42	-1.2	-1.0	0.0	1.1
Other	0.34	0.47	0.36	0.33	0.31	0.33	0.32	0.34	0.33	0.5	-1.4	0.4	0.1
CO_2 Emissions (Mt of CO_2)	**68.5**	**56.8**	**53.7**	**57.7**	**62.2**	**65.3**	**68.9**	**73.2**	**76.3**	**-2.4**	**1.5**	**1.0**	**1.0**
Electricity and Steam production	22.8	22.2	21.2	24.0	26.4	27.6	30.6	35.0	38.3	-0.7	2.2	1.5	2.3
Energy Branch	2.5	2.2	1.5	1.4	1.4	1.4	1.4	1.4	1.3	-5.2	-0.5	0.1	-0.8
Industry	14.3	8.6	6.5	5.6	5.1	5.2	5.0	5.1	5.0	-7.6	-2.5	-0.1	0.0
Residential	14.1	10.4	8.3	8.2	8.5	9.0	9.3	9.4	9.6	-5.2	0.3	0.9	0.3
Tertiary	5.8	5.6	6.7	6.9	7.0	7.0	6.9	6.6	6.5	1.5	0.4	-0.2	-0.6
Transport	9.0	7.7	9.6	11.6	13.9	15.1	15.7	15.8	15.6	0.7	3.7	1.2	-0.1
CO_2 Emissions Index (1990=100)	**100.0**	**82.9**	**78.4**	**84.2**	**90.7**	**95.3**	**100.6**	**106.9**	**111.3**				

See explanations on page 219

Source: ACE Model

HUNGARY: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	10.37	10.23	10.02	9.78	9.54	9.31	9.07	8.83	8.58	-0.3	-0.5	-0.5	-0.6
GDP (in 000 MEuro'00)	51.6	45.7	55.7	68.2	81.2	94.8	106.9	118.3	130.0	0.8	3.8	2.8	2.0
Gross Inl. Cons./GDP (toe/MEuro'00)	551.7	553.3	440.0	387.2	347.9	310.7	285.4	255.9	228.4	-2.2	-2.3	-2.0	-2.2
Gross Inl. Cons./Capita (toe/inhabitant)	2.74	2.47	2.45	2.70	2.96	3.17	3.36	3.43	3.46	-1.1	1.9	1.3	0.3
Electricity Generated/Capita (kWh/inhabitant)	2743	3326	3491	4110	5227	6067	6886	7192	7463	2.4	4.1	2.8	0.8
Carbon intensity (t of CO_2/toe of GIC)	2.41	2.24	2.19	2.18	2.20	2.22	2.26	2.42	2.57	-0.9	0.0	0.3	1.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	6.61	5.55	5.36	5.90	6.51	7.02	7.60	8.29	8.89	-2.1	2.0	1.6	1.6
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	1.3	1.2	1.0	0.8	0.8	0.7	0.6	0.6	0.6	-3.2	-2.3	-1.7	-0.9
Import Dependency %	49.9	47.7	55.4	61.6	66.7	70.5	71.4	76.7	82.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	76.5	44.7	32.7	30.0	27.6	25.7	24.0	22.4	-7.7	-3.9	-1.5	-1.3
Residential (Energy on Private Income)	100.0	104.1	81.3	68.6	59.5	53.5	49.3	45.8	42.4	-2.0	-3.1	-1.9	-1.5
Tertiary (Energy on Value added)	100.0	109.1	110.6	97.2	84.0	72.7	64.2	57.8	52.3	1.0	-2.7	-2.7	-2.0
Transport (Energy on GDP)	100.0	96.9	97.5	95.7	96.6	90.3	84.0	77.0	70.1	-0.2	-0.1	-1.4	-1.8
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.47	0.44	0.39	0.42	0.39	0.38	0.39	0.43	0.46	-1.7	0.0	-0.2	1.8
Final energy demand (t of CO_2/toe)	2.24	2.05	1.96	1.94	1.90	1.89	1.86	1.82	1.80	-1.3	-0.3	-0.2	-0.3
Industry	2.22	2.27	1.87	1.69	1.40	1.35	1.26	1.25	1.22	-1.7	-2.8	-1.1	-0.3
Residential	2.19	1.75	1.60	1.58	1.57	1.58	1.57	1.55	1.56	-3.1	-0.2	0.0	0.0
Tertiary	1.77	1.67	1.72	1.67	1.63	1.59	1.54	1.47	1.43	-0.3	-0.6	-0.5	-0.7
Transport	2.84	2.85	2.90	2.90	2.89	2.88	2.86	2.83	2.79	0.2	0.0	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**7.45**	**8.16**	**9.35**	**11.87**	**13.78**	**15.65**	**15.98**	**16.23**		**3.8**	**2.8**	**0.4**
Nuclear		1.76	1.76	1.76	1.76	1.76	1.76	0.88	0.00		0.0	0.0	
Hydro (pumping excluded)		0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06		0.9	0.8	1.2
Wind and solar		0.00	0.00	0.09	0.38	0.73	1.09	1.26	1.47			11.0	3.0
Thermal		5.64	6.35	7.45	9.67	11.23	12.74	13.78	14.69		4.3	2.8	1.4
of which cogeneration units		*1.05*	*0.93*	*0.80*	*0.85*	*0.91*	*1.02*	*1.19*	*1.27*		*-0.9*	*1.8*	*2.2*
Open cycle (incl. biomass-waste)		5.40	5.26	5.48	6.28	6.23	6.42	6.81	7.03		1.8	0.2	0.9
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.06	0.25	0.51	0.78	1.14			23.4	8.3
Gas Turbines Combined Cycle		0.00	0.55	1.38	2.75	3.99	4.89	5.19	5.45		17.5	5.9	1.1
Small Gas Turbines		0.24	0.54	0.59	0.58	0.76	0.92	1.00	1.08		0.6	4.8	1.6
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		29.3	31.7	32.8	38.4	42.4	43.6	44.3	45.6				
Load factor for gross electric capacities (%)		52.1	49.0	49.1	48.0	46.8	45.5	45.4	45.0				
CHP indicator (% of electricity from CHP)		6.1	13.6	11.1	9.7	8.7	8.9	10.4	11.3				
Non fossil fuels in electricity generation (%)		42.1	41.1	35.6	30.4	28.3	26.8	16.1	5.9				
nuclear		41.6	40.3	34.5	27.8	24.6	22.3	10.9	0.0				
renewable energy forms		0.5	0.8	1.2	2.6	3.7	4.5	5.2	5.9				
of which waste		*0.0*	*0.0*	*0.2*	*0.6*	*0.7*	*0.7*	*0.8*	*0.9*				
Transport sector													
Passenger transport activity (Gpkm)	**72.2**	**61.4**	**70.0**	**80.4**	**93.4**	**105.5**	**114.6**	**122.4**	**127.9**	**-0.3**	**2.9**	**2.1**	**1.1**
public road transport	10.5	9.6	11.3	12.1	12.5	12.7	12.8	12.8	12.8	0.7	1.1	0.2	0.0
private cars and motorcycles	48.1	41.0	45.9	53.8	64.0	73.3	79.8	85.4	89.6	-0.5	3.4	2.2	1.2
rail	11.4	8.4	9.7	10.3	11.0	11.9	12.8	13.6	14.2	-1.6	1.2	1.6	1.0
aviation	2.1	2.4	3.1	4.2	5.9	7.6	9.2	10.6	11.3	3.9	6.6	4.6	2.1
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
travel per person (km per capita)	**6962**	**6005**	**6986**	**8221**	**9787**	**11337**	**12641**	**13855**	**14912**	**0.0**	**3.4**	**2.6**	**1.7**
Freight transport activity (Gtkm)	**34.0**	**22.2**	**27.0**	**32.4**	**37.9**	**43.6**	**48.4**	**52.8**	**56.9**	**-2.3**	**3.5**	**2.5**	**1.6**
trucks	15.2	13.8	18.4	23.4	28.6	33.8	38.3	42.4	46.4	1.9	4.5	3.0	1.9
rail	16.8	8.4	8.6	8.9	9.4	9.8	10.1	10.3	10.5	-6.4	0.8	0.8	0.4
inland navigation	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
freight activity per unit of GDP (tkm/000 Euro'00)	**660**	**486**	**485**	**475**	**467**	**460**	**453**	**446**	**438**	**-3.0**	**-0.4**	**-0.3**	**-0.3**
Energy demand in transport (Mtoe)	**3.15**	**2.71**	**3.32**	**3.99**	**4.80**	**5.24**	**5.49**	**5.57**	**5.58**	**0.5**	**3.7**	**1.4**	**0.2**
public road transport	0.12	0.11	0.18	0.20	0.21	0.20	0.19	0.18	0.17	3.9	1.2	-0.7	-1.3
private cars and motorcycles	1.53	1.32	1.68	2.05	2.61	2.79	2.89	2.82	2.74	0.9	4.5	1.0	-0.5
trucks	0.97	0.89	1.05	1.27	1.42	1.63	1.76	1.92	2.05	0.8	3.1	2.2	1.5
rail	0.28	0.19	0.17	0.17	0.17	0.17	0.17	0.17	0.16	-4.5	-0.2	-0.2	-0.2
aviation	0.17	0.19	0.23	0.30	0.39	0.44	0.48	0.48	0.45	3.2	5.1	2.2	-0.6
inland navigation	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	28.1	28.9	31.9	33.4	35.8	33.9	32.3	29.6	27.3	1.3	1.1	-1.0	-1.6
freight transport (toe/Mtkm)	33.1	42.1	40.2	40.2	38.4	38.1	37.0	37.0	36.5	2.0	-0.5	-0.4	-0.1

Source: ACE Model

LATVIA: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**0.39**	**0.73**	**1.25**	**1.11**	**1.21**	**1.27**	**1.31**	**1.31**	**1.29**	**12.4**	**-0.3**	**0.8**	**-0.1**
Solids	0.00	0.08	0.02	0.04	0.04	0.05	0.07	0.08	0.10		10.1	4.6	4.6
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	0.39	0.65	1.23	1.06	1.17	1.22	1.24	1.22	1.19	12.3	-0.5	0.6	-0.4
Hydro	0.39	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.24	-4.6	-0.2	0.1	0.0
Biomass	0.00	0.40	0.99	0.80	0.88	0.90	0.89	0.85	0.82		-1.2	0.2	-0.9
Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Wind	0.00	0.00	0.00	0.02	0.05	0.08	0.10	0.12	0.12		65.1	7.0	1.6
Solar and others	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01			5.2	3.7
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**6.23**	**3.37**	**2.48**	**2.93**	**3.18**	**3.47**	**3.67**	**3.79**	**3.83**	**-8.8**	**2.5**	**1.4**	**0.4**
Solids	0.43	0.11	0.04	0.18	0.29	0.39	0.47	0.52	0.52	-20.4	20.5	5.1	1.1
Oil	3.18	2.07	1.17	1.33	1.44	1.59	1.70	1.78	1.84	-9.5	2.0	1.7	0.8
Crude oil and Feedstocks	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00				
Oil products	3.18	2.07	1.12	1.33	1.44	1.59	1.70	1.78	1.84	-10.0	2.6	1.7	0.8
Natural gas	2.31	1.00	1.11	1.23	1.25	1.26	1.27	1.28	1.28	-7.0	1.1	0.2	0.0
Electricity	0.31	0.19	0.15	0.19	0.21	0.23	0.23	0.21	0.19	-6.7	3.4	0.5	-1.7
Gross Inland Consumption	**6.07**	**4.00**	**3.66**	**4.04**	**4.39**	**4.74**	**4.98**	**5.10**	**5.12**	**-4.9**	**1.8**	**1.3**	**0.3**
Solids	0.43	0.23	0.11	0.22	0.33	0.44	0.54	0.60	0.63	-12.5	11.1	5.1	1.6
Oil	3.18	2.03	1.24	1.33	1.44	1.59	1.70	1.78	1.84	-9.0	1.5	1.7	0.8
Natural gas	2.14	1.01	1.09	1.23	1.25	1.26	1.27	1.28	1.28	-6.5	1.3	0.2	0.0
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	-0.08	0.19	0.15	0.19	0.21	0.23	0.23	0.21	0.19		3.4	0.5	-1.7
Renewable energy forms	0.39	0.53	1.06	1.06	1.17	1.22	1.24	1.22	1.19	10.6	1.0	0.6	-0.4
as % in Gross Inland Consumption													
Solids	7.2	5.9	3.1	5.4	7.5	9.3	10.8	11.9	12.3				
Oil	52.4	50.8	33.8	33.0	32.7	33.6	34.2	34.8	35.9				
Natural gas	35.3	25.3	29.9	30.4	28.4	26.6	25.5	25.1	24.9				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	6.4	13.2	29.0	26.4	26.6	25.7	24.9	24.0	23.2				
Electricity Generation in TWhe	**11.15**	**3.98**	**4.14**	**5.59**	**6.91**	**8.25**	**9.56**	**10.75**	**11.59**	**-9.4**	**5.3**	**3.3**	**1.9**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	4.50	2.94	2.82	3.01	3.35	3.64	3.96	4.18	4.17	-4.6	1.7	1.7	0.5
Thermal (incl. biomass)	6.65	1.04	1.31	2.59	3.56	4.62	5.60	6.57	7.42	-15.0	10.5	4.6	2.8
Fuel Inputs for Thermal Power Generation	**0.92**	**0.61**	**0.51**	**0.73**	**0.87**	**1.04**	**1.20**	**1.36**	**1.49**	**-5.7**	**5.3**	**3.3**	**2.2**
Solids	0.00	0.06	0.05	0.15	0.27	0.38	0.48	0.56	0.58		19.0	6.0	1.9
Oil	0.31	0.25	0.08	0.09	0.09	0.13	0.17	0.23	0.31	-12.7	1.4	6.4	6.0
Gas	0.61	0.29	0.39	0.48	0.48	0.49	0.49	0.50	0.51	-4.4	2.2	0.2	0.2
Biomass - Waste	0.00	0.00	0.00	0.01	0.02	0.04	0.05	0.07	0.09			9.6	5.7
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**1.69**	**0.93**	**0.64**	**0.55**	**0.48**	**0.40**	**0.33**	**0.27**	**0.22**	**-9.3**	**-2.9**	**-3.6**	**-4.2**
Refineries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
District heating	1.69	0.92	0.64	0.55	0.48	0.40	0.33	0.26	0.21	-9.3	-2.9	-3.7	-4.3
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01			25.8	3.3
Others	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-8.8	-1.0	-1.0
Energy Branch Consumption	**0.02**	**0.16**	**0.15**	**0.08**	**0.09**	**0.09**	**0.10**	**0.11**	**0.11**	**19.7**	**-5.1**	**1.4**	**0.7**
Non-Energy Uses	**0.00**	**0.00**	**0.07**	**0.07**	**0.07**	**0.08**	**0.08**	**0.08**	**0.08**	**37.4**	**0.1**	**0.5**	**0.3**
Final Energy Demand	**4.76**	**3.06**	**2.94**	**3.24**	**3.54**	**3.82**	**4.02**	**4.11**	**4.15**	**-4.7**	**1.9**	**1.3**	**0.3**
by sector													
Industry	0.85	0.55	0.68	0.75	0.82	0.86	0.90	0.92	0.92	-2.1	1.8	1.0	0.2
Residential	0.96	1.06	0.97	0.99	1.04	1.08	1.11	1.13	1.14	0.1	0.8	0.6	0.2
Tertiary	1.82	0.57	0.58	0.64	0.68	0.71	0.73	0.74	0.75	-10.8	1.6	0.7	0.3
Transport	1.13	0.88	0.71	0.85	0.99	1.16	1.27	1.32	1.33	-4.6	3.4	2.5	0.5
by fuel													
Solids	0.59	0.11	0.05	0.05	0.04	0.04	0.04	0.03	0.03	-21.4	-2.6	-0.7	-1.9
Oil	2.06	1.20	0.97	1.09	1.21	1.34	1.42	1.44	1.43	-7.3	2.2	1.6	0.1
Gas	0.59	0.29	0.33	0.38	0.44	0.49	0.54	0.58	0.61	-5.6	2.9	2.1	1.1
Electricity	0.75	0.38	0.38	0.51	0.61	0.71	0.80	0.88	0.92	-6.6	4.8	2.7	1.3
Heat (from CHP and District Heating)	0.78	0.88	0.59	0.53	0.47	0.45	0.43	0.44	0.46	-2.7	-2.2	-0.9	0.6
Other	0.00	0.19	0.62	0.69	0.77	0.79	0.79	0.74	0.70		2.2	0.2	-1.2
CO_2 Emissions (Mt of CO_2)	**16.9**	**9.2**	**6.6**	**7.5**	**8.3**	**9.2**	**9.9**	**10.5**	**10.7**	**-8.9**	**2.2**	**1.9**	**0.8**
Electricity and Steam production	7.0	4.2	2.5	3.2	3.5	3.9	4.3	4.6	4.9	-9.9	3.4	2.1	1.3
Energy Branch	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0		-42.5	25.8	3.3
Industry	1.5	0.9	1.0	1.1	1.1	1.2	1.1	1.1	1.0	-3.5	0.9	-0.1	-1.1
Residential	0.2	0.6	0.3	0.3	0.3	0.3	0.4	0.4	0.5	4.1	0.7	2.3	2.5
Tertiary	4.9	0.7	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-20.1	-0.7	0.6	0.5
Transport	3.3	2.6	2.1	2.5	2.9	3.3	3.6	3.8	3.8	-4.5	3.4	2.4	0.4
CO_2 Emissions Index (1990=100)	**100.0**	**54.4**	**39.2**	**44.4**	**48.9**	**54.4**	**58.8**	**61.7**	**63.4**				

See explanations on page 219

Source: ACE Model

LATVIA:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	2.67	2.49	2.37	2.31	2.24	2.18	2.11	2.05	1.98	-1.2	-0.6	-0.6	-0.7
GDP (in 000 MEuro'00)	12.4	6.1	7.9	10.5	13.0	15.4	17.8	19.9	21.8	-4.4	5.1	3.2	2.1
Gross Inl. Cons./GDP (toe/MEuro'00)	489.3	655.2	463.6	382.8	338.7	307.4	280.5	256.9	234.7	-0.5	-3.1	-1.9	-1.8
Gross Inl. Cons./Capita (toe/inhabitant)	2.27	1.61	1.54	1.75	1.96	2.17	2.36	2.49	2.59	-3.8	2.4	1.9	1.0
Electricity Generated/Capita (kWh/inhabitant)	4173	1601	1743	2426	3080	3785	4521	5246	5869	-8.4	5.9	3.9	2.6
Carbon intensity (t of CO_2/toe of GIC)	2.79	2.30	1.81	1.86	1.89	1.94	2.00	2.05	2.09	-4.2	0.4	0.6	0.5
CO_2 Emissions/Capita (t of CO_2/inhabitant)	6.34	3.70	2.79	3.26	3.69	4.23	4.70	5.10	5.43	-7.9	2.8	2.5	1.5
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	1.4	1.5	0.8	0.7	0.6	0.6	0.6	0.5	0.5	-4.7	-2.7	-1.3	-1.3
Import Dependency %	102.7	84.4	67.9	72.6	72.4	73.2	73.7	74.4	74.8				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	142.7	139.4	116.5	103.6	91.9	82.9	75.0	68.6	3.4	-2.9	-2.2	-1.9
Residential (Energy on Private Income)	100.0	201.6	149.0	121.3	102.3	88.5	78.4	70.8	64.9	4.1	-3.7	-2.6	-1.9
Tertiary (Energy on Value added)	100.0	55.0	42.2	33.9	28.9	25.0	22.1	20.0	18.3	-8.3	-3.7	-2.7	-1.8
Transport (Energy on GDP)	100.0	157.5	98.4	88.3	83.9	82.4	78.2	72.7	66.8	-0.2	-1.6	-0.7	-1.6
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.35	0.26	0.19	0.24	0.25	0.26	0.27	0.27	0.27	-5.9	2.7	0.7	-0.1
Final energy demand (t of CO_2/toe)	2.08	1.55	1.33	1.34	1.36	1.39	1.41	1.41	1.41	-4.3	0.2	0.4	0.0
Industry	1.76	1.59	1.52	1.46	1.40	1.35	1.25	1.16	1.09	-1.5	-0.8	-1.1	-1.4
Residential	0.19	0.58	0.28	0.28	0.28	0.29	0.33	0.38	0.41	4.1	-0.1	1.6	2.2
Tertiary	2.71	1.16	0.91	0.78	0.72	0.70	0.71	0.72	0.73	-10.4	-2.3	-0.1	0.2
Transport	2.89	2.94	2.92	2.91	2.90	2.88	2.87	2.86	2.85	0.1	-0.1	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**2.07**	**1.94**	**2.55**	**3.08**	**3.49**	**3.93**	**4.31**	**4.49**		**4.7**	**2.5**	**1.3**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		1.49	1.49	1.49	1.49	1.50	1.51	1.52	1.53		0.0	0.1	0.1
Wind and solar		0.00	0.00	0.12	0.27	0.40	0.54	0.64	0.64		72.0	7.2	1.7
Thermal		0.58	0.45	0.94	1.32	1.59	1.88	2.15	2.32		11.4	3.6	2.1
of which cogeneration units		*0.58*	*0.45*	*0.40*	*0.33*	*0.35*	*0.44*	*0.59*	*0.76*		*-3.0*	*2.7*	*5.7*
Open cycle (incl. biomass-waste)		0.58	0.45	0.65	0.80	0.91	1.05	1.19	1.28		5.9	2.7	2.0
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.01	0.03	0.05	0.08	0.09			18.3	5.7
Gas Turbines Combined Cycle		0.00	0.00	0.25	0.44	0.56	0.65	0.71	0.75			3.9	1.4
Small Gas Turbines		0.00	0.00	0.04	0.07	0.10	0.13	0.17	0.21			6.5	4.6
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		18.8	25.9	32.5	37.0	39.8	41.7	43.5	45.0				
Load factor for gross electric capacities (%)		21.9	24.3	25.0	25.6	27.0	27.8	28.4	29.4				
CHP indicator (% of electricity from CHP)		26.2	31.7	26.5	22.9	23.8	25.8	29.5	35.8				
Non fossil fuels in electricity generation (%)		73.8	68.3	54.5	49.7	45.8	43.6	41.7	39.6				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		73.8	68.3	54.5	49.7	45.8	43.6	41.7	39.6				
of which waste		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*				
Transport sector													
Passenger transport activity (Gpkm)	**19.8**	**16.6**	**17.4**	**18.5**	**20.7**	**24.1**	**26.9**	**28.9**	**30.3**	**-1.3**	**1.8**	**2.6**	**1.2**
public road transport	5.9	1.8	2.4	2.5	2.6	2.6	2.6	2.6	2.6	-8.7	0.8	0.2	0.0
private cars and motorcycles	7.6	13.0	13.8	14.8	16.8	19.8	22.2	23.9	24.9	6.1	2.0	2.8	1.2
rail	5.4	1.4	0.7	0.7	0.7	0.8	0.9	0.9	1.0	-18.2	0.0	1.7	1.3
aviation	0.8	0.4	0.4	0.4	0.6	0.8	1.1	1.4	1.7	-8.2	4.6	7.0	4.2
inland navigation	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	1.0	1.0	0.6
travel per person (km per capita)	**7418**	**6689**	**7312**	**8030**	**9236**	**11064**	**12706**	**14125**	**15333**	**-0.1**	**2.4**	**3.2**	**1.9**
Freight transport activity (Gtkm)	**24.7**	**12.0**	**16.1**	**20.3**	**23.2**	**25.7**	**27.4**	**28.6**	**29.5**	**-4.2**	**3.7**	**1.7**	**0.7**
trucks	5.9	1.8	3.6	6.3	9.0	11.4	13.2	14.6	15.6	-4.8	9.6	3.9	1.7
rail	18.5	9.8	12.2	13.7	13.9	13.9	13.8	13.7	13.5	-4.1	1.3	0.0	-0.3
inland navigation	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	2.2	-0.1	0.3	0.3
freight activity per unit of GDP (tkm/000 Euro'00)	**1990**	**1965**	**2042**	**1927**	**1789**	**1666**	**1543**	**1443**	**1350**	**0.3**	**-1.3**	**-1.5**	**-1.3**
Energy demand in transport (Mtoe)	**1.13**	**0.88**	**0.71**	**0.85**	**0.99**	**1.16**	**1.27**	**1.32**	**1.33**	**-4.6**	**3.4**	**2.5**	**0.5**
public road transport	0.05	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-4.6	0.6	-0.1	-0.4
private cars and motorcycles	0.17	0.46	0.40	0.42	0.48	0.55	0.60	0.59	0.58	8.6	1.9	2.2	-0.3
trucks	0.27	0.13	0.17	0.27	0.35	0.43	0.48	0.53	0.55	-4.6	7.7	3.3	1.4
rail	0.42	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-15.6	0.6	-0.1	-0.4
aviation	0.10	0.03	0.03	0.03	0.04	0.06	0.07	0.08	0.08	-11.3	3.8	4.4	1.6
inland navigation	0.12	0.15	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-23.5	-0.1	0.2	0.3
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	30.0	34.5	27.4	27.5	27.6	27.2	26.7	24.9	23.5	-0.9	0.1	-0.4	-1.3
freight transport (toe/Mtkm)	21.9	25.4	14.5	16.9	18.2	19.7	20.2	20.9	21.0	-4.0	2.3	1.0	0.4

Source: ACE Model

LITHUANIA: BASELINE SCENARIO										SUMMARY ENERGY BALANCE AND INDICATORS (A)			
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**4.84**	**3.56**	**3.21**	**2.10**	**1.14**	**1.22**	**1.30**	**1.38**	**1.43**	**-4.0**	**-9.8**	**1.3**	**0.9**
Solids	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-6.0	-15.2	-9.4	-7.4
Oil	0.00	0.13	0.32	0.34	0.40	0.45	0.51	0.55	0.57		2.1	2.5	1.1
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	4.44	3.14	2.22	1.08	0.00	0.00	0.00	0.00	0.00	-6.7			
Renewable energy sources	0.38	0.27	0.66	0.68	0.74	0.76	0.80	0.83	0.87	5.7	1.3	0.7	0.9
Hydro	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	-2.0	0.8	0.8	0.8
Biomass	0.34	0.24	0.63	0.62	0.65	0.62	0.60	0.57	0.59	6.3	0.3	-0.8	-0.2
Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Wind	0.00	0.00	0.00	0.02	0.06	0.10	0.15	0.21	0.22			9.5	3.8
Solar and others	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02			12.8	6.5
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**11.89**	**5.63**	**4.22**	**5.20**	**6.40**	**7.13**	**7.86**	**8.41**	**8.84**	**-9.8**	**4.3**	**2.1**	**1.2**
Solids	0.70	0.18	0.09	0.29	0.81	1.19	1.43	1.63	1.75	-18.8	24.9	5.8	2.0
Oil	7.54	3.65	2.18	2.51	2.60	2.78	3.16	3.45	3.69	-11.7	1.8	2.0	1.6
Crude oil and Feedstocks	9.56	3.60	4.77	4.99	5.77	6.53	7.26	7.75	7.99	-6.7	1.9	2.3	1.0
Oil products	-2.02	0.04	-2.58	-2.48	-3.17	-3.76	-4.10	-4.30	-4.31				
Natural gas	4.67	2.03	2.06	2.45	2.98	3.15	3.25	3.31	3.39	-7.8	3.7	0.9	0.4
Electricity	-1.03	-0.23	-0.11	-0.05	0.01	0.01	0.01	0.01	0.01			1.2	-0.4
Gross Inland Consumption	**17.19**	**8.53**	**7.12**	**7.19**	**7.42**	**8.21**	**9.01**	**9.62**	**10.10**	**-8.4**	**0.4**	**2.0**	**1.1**
Solids	0.81	0.28	0.10	0.29	0.81	1.19	1.43	1.63	1.75	-18.7	23.0	5.8	2.0
Oil	7.96	3.04	2.20	2.74	2.88	3.09	3.52	3.83	4.07	-12.1	2.7	2.0	1.5
Natural gas	4.67	2.03	2.06	2.45	2.98	3.15	3.25	3.31	3.39	-7.8	3.7	0.9	0.4
Nuclear	4.44	3.14	2.22	1.08	0.00	0.00	0.00	0.00	0.00	-6.7			
Electricity	-1.07	-0.23	-0.11	-0.05	0.01	0.01	0.01	0.01	0.01			1.2	-0.4
Renewable energy forms	0.38	0.27	0.65	0.68	0.74	0.76	0.80	0.83	0.87	5.6	1.4	0.7	0.9
as % in Gross Inland Consumption													
Solids	4.7	3.3	1.4	4.1	11.0	14.5	15.9	16.9	17.3				
Oil	46.3	35.6	30.9	38.1	38.7	37.7	39.0	39.9	40.3				
Natural gas	27.2	23.8	29.0	34.1	40.1	38.3	36.1	34.4	33.6				
Nuclear	25.8	36.8	31.1	15.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	2.2	3.1	9.1	9.4	10.0	9.3	8.8	8.6	8.6				
Electricity Generation in TWhe	**28.82**	**13.56**	**11.12**	**11.15**	**12.02**	**14.50**	**16.72**	**18.96**	**21.13**	**-9.1**	**0.8**	**3.4**	**2.4**
Nuclear	17.19	12.17	8.58	4.19	0.00	0.00	0.00	0.00	0.00	-6.7			
Hydro & wind	0.41	0.37	0.34	0.60	1.08	1.60	2.17	2.81	3.02	-2.0	12.3	7.2	3.3
Thermal (incl. biomass)	11.22	1.02	2.20	6.37	10.94	12.91	14.55	16.15	18.12	-15.0	17.4	2.9	2.2
Fuel Inputs for Thermal Power Generation	**2.99**	**1.01**	**0.88**	**1.73**	**2.41**	**2.68**	**3.02**	**3.35**	**3.74**	**-11.5**	**10.6**	**2.3**	**2.2**
Solids	0.00	0.00	0.00	0.20	0.73	1.13	1.38	1.59	1.72			6.5	2.2
Oil	0.89	0.53	0.16	0.50	0.31	0.22	0.36	0.51	0.69	-15.5	6.4	1.5	6.9
Gas	2.11	0.49	0.72	1.02	1.33	1.26	1.16	1.09	1.12	-10.2	6.4	-1.3	-0.3
Biomass - Waste	0.00	0.00	0.00	0.02	0.04	0.07	0.12	0.16	0.21			10.8	5.9
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**12.52**	**4.75**	**5.67**	**5.92**	**6.70**	**7.45**	**8.18**	**8.69**	**8.95**	**-7.6**	**1.7**	**2.0**	**0.9**
Refineries	9.57	3.37	5.02	5.33	6.17	6.99	7.78	8.33	8.61	-6.2	2.1	2.3	1.0
District heating	2.95	1.37	0.64	0.59	0.52	0.45	0.37	0.30	0.24	-14.1	-2.0	-3.4	-4.2
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.05	0.10			30.1	13.1
Others	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-1.6	-1.0	-1.0
Energy Branch Consumption	**0.62**	**0.53**	**0.61**	**0.63**	**0.71**	**0.80**	**0.89**	**0.95**	**0.99**	**-0.1**	**1.5**	**2.2**	**1.2**
Non-Energy Uses	**1.65**	**0.56**	**0.69**	**0.70**	**0.73**	**0.77**	**0.80**	**0.84**	**0.86**	**-8.4**	**0.6**	**1.0**	**0.7**
Final Energy Demand	**9.51**	**4.43**	**3.69**	**3.98**	**4.54**	**5.15**	**5.75**	**6.17**	**6.46**	**-9.0**	**2.1**	**2.4**	**1.2**
by sector													
Industry	2.91	1.09	0.68	0.66	0.71	0.79	0.84	0.91	0.96	-13.6	0.5	1.8	1.3
Residential	1.61	1.40	1.35	1.42	1.60	1.77	1.92	2.02	2.07	-1.7	1.7	1.9	0.8
Tertiary	3.49	0.88	0.59	0.61	0.66	0.74	0.83	0.93	1.01	-16.3	1.2	2.3	2.0
Transport	1.50	1.06	1.07	1.29	1.57	1.86	2.15	2.32	2.41	-3.3	3.9	3.2	1.2
by fuel													
Solids	0.70	0.23	0.09	0.09	0.07	0.06	0.04	0.03	0.03	-18.6	-2.3	-5.1	-4.5
Oil	3.67	1.52	1.39	1.61	1.91	2.20	2.47	2.64	2.71	-9.2	3.2	2.6	0.9
Gas	0.67	0.36	0.36	0.46	0.69	0.93	1.14	1.29	1.35	-5.9	6.6	5.2	1.6
Electricity	1.03	0.55	0.53	0.58	0.67	0.82	0.95	1.09	1.22	-6.4	2.4	3.5	2.5
Heat (from CHP and District Heating)	3.10	1.55	0.72	0.66	0.61	0.61	0.68	0.75	0.85	-13.5	-1.7	1.0	2.3
Other	0.34	0.21	0.59	0.58	0.58	0.53	0.46	0.38	0.31	5.6	-0.1	-2.4	-3.8
CO_2 Emissions (Mt of CO_2)	**32.2**	**13.6**	**10.3**	**13.7**	**17.2**	**19.7**	**22.0**	**23.8**	**25.1**	**-10.7**	**5.3**	**2.5**	**1.3**
Electricity and Steam production	16.1	6.5	3.8	6.2	8.3	9.2	10.2	11.2	12.2	-13.4	8.1	2.1	1.8
Energy Branch	0.6	0.8	1.2	1.2	1.4	1.5	1.7	1.8	1.8	6.2	1.6	2.0	0.6
Industry	2.7	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.2	-8.9	0.4	0.8	0.2
Residential	2.4	0.8	0.5	0.7	1.2	1.5	1.8	2.0	2.0	-13.9	8.1	4.7	1.0
Tertiary	5.9	1.4	0.6	0.6	0.7	0.8	0.9	1.0	1.1	-20.8	1.5	2.8	1.8
Transport	4.3	3.1	3.2	3.8	4.6	5.4	6.2	6.7	6.8	-3.1	3.9	3.0	1.0
CO_2 Emissions Index (1990=100)	**100.0**	**42.4**	**32.1**	**42.5**	**53.6**	**61.2**	**68.5**	**74.1**	**78.1**				

See explanations on page 219

Source: ACE Model

LITHUANIA:BASELINE SCENARIO										SUMMARY ENERGY BALANCE AND INDICATORS (B)			
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	3.70	3.63	3.51	3.47	3.41	3.36	3.30	3.24	3.17	-0.5	-0.3	-0.3	-0.4
GDP (in 000 MEuro'00)	18.5	10.7	12.6	16.0	20.0	24.3	29.1	33.7	38.1	-3.7	4.7	3.8	2.7
Gross Inl. Cons./GDP (toe/MEuro'00)	929.1	795.1	563.5	449.5	371.3	337.2	309.8	285.2	265.2	-4.9	-4.1	-1.8	-1.5
Gross Inl. Cons./Capita (toe/inhabitant)	4.65	2.35	2.03	2.08	2.18	2.45	2.73	2.97	3.19	-7.9	0.7	2.3	1.6
Electricity Generated/Capita (kWh/inhabitant)	7793	3735	3172	3218	3525	4322	5069	5847	6668	-8.6	1.1	3.7	2.8
Carbon intensity (t of CO_2/toe of GIC)	1.87	1.60	1.45	1.90	2.32	2.40	2.45	2.48	2.49	-2.5	4.8	0.5	0.2
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.69	3.76	2.95	3.94	5.05	5.86	6.68	7.35	7.92	-10.3	5.5	2.8	1.7
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	1.7	1.3	0.8	0.9	0.9	0.8	0.8	0.7	0.7	-7.3	0.5	-1.3	-1.4
Import Dependency %	69.2	64.9	58.5	71.2	84.8	85.4	85.8	85.9	86.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	54.2	28.7	21.7	18.5	16.7	14.9	13.7	12.8	-11.7	-4.3	-2.2	-1.5
Residential (Energy on Private Income)	100.0	150.4	114.3	94.0	85.0	78.0	71.6	65.3	59.8	1.3	-2.9	-1.7	-1.8
Tertiary (Energy on Value added)	100.0	44.3	24.3	19.6	16.9	15.3	14.5	13.8	13.4	-13.2	-3.6	-1.5	-0.8
Transport (Energy on GDP)	100.0	121.5	105.0	99.6	97.1	94.1	91.1	84.9	78.1	0.5	-0.8	-0.6	-1.5
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.24	0.18	0.17	0.29	0.38	0.38	0.37	0.36	0.35	-3.3	8.6	-0.2	-0.5
Final energy demand (t of CO_2/toe)	1.62	1.42	1.44	1.56	1.66	1.73	1.76	1.77	1.73	-1.1	1.4	0.6	-0.2
Industry	0.94	0.92	1.59	1.61	1.58	1.52	1.43	1.37	1.28	5.4	0.0	-1.0	-1.1
Residential	1.49	0.57	0.39	0.52	0.73	0.86	0.95	1.00	0.97	-12.4	6.3	2.8	0.2
Tertiary	1.70	1.60	0.97	1.01	1.01	1.06	1.06	1.06	1.05	-5.4	0.4	0.5	-0.1
Transport	2.87	2.92	2.93	2.93	2.93	2.92	2.89	2.87	2.84	0.2	0.0	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**5.24**	**5.24**	**4.51**	**4.23**	**5.23**	**6.09**	**6.93**	**7.52**		**-2.1**	**3.7**	**2.1**
Nuclear		2.50	2.50	1.25	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13		0.9	0.8	0.8
Wind and solar		0.00	0.00	0.12	0.33	0.56	0.82	1.12	1.21			9.7	3.9
Thermal		2.63	2.63	3.03	3.80	4.56	5.14	5.69	6.18		3.7	3.1	1.8
of which cogeneration units		*0.79*	*0.79*	*0.50*	*0.40*	*0.42*	*0.71*	*0.94*	*1.20*		*-6.7*	*5.9*	*5.5*
Open cycle (incl. biomass-waste)		2.63	2.63	2.66	2.80	2.93	2.88	2.71	2.89		0.6	0.3	0.0
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.03	0.09	0.20	0.47	0.57			23.0	11.0
Gas Turbines Combined Cycle		0.00	0.00	0.32	0.84	1.30	1.70	2.04	2.16			7.4	2.4
Small Gas Turbines		0.00	0.00	0.05	0.14	0.24	0.36	0.47	0.55			10.0	4.4
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		12.7	25.5	32.6	39.6	42.0	42.4	42.7	43.1				
Load factor for gross electric capacities (%)		29.6	24.2	28.3	32.4	31.6	31.4	31.2	32.1				
CHP indicator (% of electricity from CHP)		7.5	19.7	15.9	15.0	16.7	22.7	27.1	31.7				
Non fossil fuels in electricity generation (%)		92.5	80.2	43.4	10.3	12.7	15.4	17.8	18.0				
nuclear		89.7	77.2	37.6	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		2.7	3.0	5.9	10.3	12.7	15.4	17.8	18.0				
of which waste		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*				
Transport sector													
Passenger transport activity (Gpkm)	**23.6**	**16.6**	**15.9**	**17.6**	**21.7**	**26.4**	**32.3**	**37.2**	**41.1**	**-3.9**	**3.2**	**4.1**	**2.5**
public road transport	6.7	3.3	2.1	1.9	2.0	2.1	2.2	2.4	2.6	-10.9	-0.7	1.3	1.7
private cars and motorcycles	12.3	11.7	12.7	14.6	18.4	22.7	27.7	31.8	34.8	0.3	3.8	4.2	2.3
rail	3.6	1.1	0.6	0.6	0.6	0.7	0.8	1.0	1.1	-16.3	0.3	2.6	3.1
aviation	1.0	0.4	0.4	0.4	0.6	0.9	1.4	2.0	2.5	-9.1	5.2	8.5	5.9
inland navigation	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1		1.9	1.3	0.5
travel per person (km per capita)	**6393**	**4560**	**4521**	**5075**	**6358**	**7870**	**9778**	**11473**	**12970**	**-3.4**	**3.5**	**4.4**	**2.9**
Freight transport activity (Gtkm)	**26.6**	**11.9**	**13.7**	**16.7**	**19.7**	**22.6**	**25.2**	**27.4**	**28.8**	**-6.4**	**3.7**	**2.5**	**1.3**
trucks	7.3	4.7	5.8	8.4	11.1	13.8	16.3	18.3	19.6	-2.4	6.8	3.9	1.9
rail	19.3	7.2	7.8	8.2	8.5	8.8	8.9	9.0	9.1	-8.6	0.8	0.4	0.2
inland navigation	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1		3.0	0.9	0.2
freight activity per unit of GDP (tkm/000 Euro'00)	**1438**	**1111**	**1082**	**1044**	**985**	**929**	**868**	**812**	**755**	**-2.8**	**-0.9**	**-1.3**	**-1.4**
Energy demand in transport (Mtoe)	**1.50**	**1.06**	**1.07**	**1.29**	**1.57**	**1.86**	**2.15**	**2.32**	**2.41**	**-3.3**	**3.9**	**3.2**	**1.2**
public road transport	0.09	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	-7.7	-0.8	0.9	1.2
private cars and motorcycles	0.43	0.48	0.55	0.63	0.80	0.94	1.11	1.17	1.20	2.5	3.9	3.3	0.7
trucks	0.51	0.39	0.38	0.52	0.62	0.75	0.85	0.95	0.99	-3.0	5.1	3.1	1.5
rail	0.07	0.10	0.08	0.07	0.07	0.07	0.07	0.07	0.07	1.2	-0.8	-0.5	0.0
aviation	0.40	0.04	0.03	0.03	0.04	0.05	0.08	0.09	0.11	-22.7	2.2	7.1	3.4
inland navigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		2.5	0.8	0.2
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	39.9	36.5	39.9	40.4	41.0	39.6	38.5	35.5	33.2	0.0	0.3	-0.6	-1.5
freight transport (toe/Mtkm)	20.9	37.9	32.4	34.7	34.7	35.9	35.9	36.6	36.3	4.5	0.7	0.3	0.1

Source: ACE Model

MALTA: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.02**	**0.03**			**9.5**	**10.6**
Solids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03			9.5	10.6
Hydro	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biomass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Wind	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02			7.3	10.1
Solar and others	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02			13.6	11.3
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**0.80**	**0.85**	**0.86**	**0.97**	**1.11**	**1.26**	**1.43**	**1.52**	**1.59**	**0.7**	**2.6**	**2.5**	**1.1**
Solids	0.18	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	0.62	0.83	0.86	0.97	1.11	1.26	1.43	1.52	1.59	3.3	2.6	2.5	1.1
Crude oil and Feedstocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil products	0.62	0.83	0.86	0.97	1.11	1.26	1.43	1.52	1.59	3.3	2.6	2.5	1.1
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Gross Inland Consumption	**0.79**	**0.78**	**0.82**	**0.92**	**1.06**	**1.21**	**1.37**	**1.46**	**1.54**	**0.3**	**2.7**	**2.6**	**1.2**
Solids	0.18	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	0.59	0.75	0.82	0.92	1.06	1.20	1.36	1.44	1.50	3.3	2.6	2.5	1.0
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy forms	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03			9.5	10.6
as % in Gross Inland Consumption													
Solids	23.3	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Oil	74.3	95.9	100.0	99.9	99.5	99.2	99.1	98.4	97.8				
Natural gas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	0.0	0.0	0.0	0.1	0.5	0.8	0.9	1.6	2.2				
Electricity Generation in TWhe	**1.10**	**1.63**	**1.92**	**2.31**	**2.97**	**3.59**	**4.19**	**4.61**	**4.95**	**5.7**	**4.5**	**3.5**	**1.7**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	0.00	0.00	0.00	0.00	0.04	0.09	0.09	0.17	0.24			7.4	10.4
Thermal (incl. biomass)	1.10	1.63	1.92	2.31	2.93	3.50	4.10	4.44	4.72	5.7	4.3	3.4	1.4
Fuel Inputs for Thermal Power Generation	**0.51**	**0.48**	**0.52**	**0.54**	**0.65**	**0.77**	**0.90**	**0.94**	**0.98**	**0.3**	**2.3**	**3.2**	**0.8**
Solids	0.18	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	0.32	0.45	0.52	0.54	0.65	0.77	0.90	0.94	0.98	4.9	2.3	3.2	0.8
Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biomass - Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				
Refineries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Energy Branch Consumption	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**2.5**	**4.1**	**3.1**	**1.3**
Non-Energy Uses	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				
Final Energy Demand	**0.36**	**0.45**	**0.48**	**0.54**	**0.62**	**0.69**	**0.76**	**0.84**	**0.90**	**2.9**	**2.6**	**2.1**	**1.6**
by sector													
Industry	0.02	0.04	0.05	0.05	0.06	0.08	0.09	0.10	0.12	9.3	3.3	3.4	2.8
Residential	0.06	0.07	0.08	0.08	0.10	0.11	0.12	0.13	0.14	3.1	2.5	2.4	1.3
Tertiary	0.06	0.03	0.06	0.07	0.08	0.10	0.12	0.13	0.14	0.4	3.8	3.4	1.8
Transport	0.23	0.30	0.29	0.34	0.37	0.40	0.43	0.47	0.50	2.6	2.3	1.5	1.5
by fuel													
Solids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	0.26	0.34	0.34	0.38	0.41	0.44	0.46	0.50	0.53	2.7	1.7	1.2	1.4
Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	0.10	0.11	0.13	0.16	0.21	0.26	0.30	0.33	0.36	3.3	4.6	3.6	1.8
Heat (from CHP and District Heating)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01			13.9	10.9
CO_2 Emissions (Mt of CO_2)	**2.5**	**2.6**	**2.7**	**2.9**	**3.3**	**3.7**	**4.2**	**4.5**	**4.7**	**0.6**	**2.0**	**2.5**	**1.0**
Electricity and Steam production	1.8	1.6	1.7	1.7	2.1	2.5	2.9	3.0	3.1	-0.6	2.3	3.2	0.8
Energy Branch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Industry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.2	0.2	-1.1
Residential	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-1.8	-5.0	-3.4	1.2
Tertiary	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0		-5.3	-2.7	1.0
Transport	0.7	0.9	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.7	2.3	1.5	1.5
CO_2 Emissions Index (1990=100)	**100.0**	**101.5**	**106.4**	**113.0**	**129.9**	**147.8**	**167.1**	**177.3**	**185.1**				

See explanations on page 219

Source: ACE Model

MALTA:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	0.36	0.38	0.39	0.40	0.40	0.41	0.41	0.42	0.42	0.8	0.4	0.2	0.1
GDP (in 000 MEuro'00)	2.5	3.3	4.1	4.7	5.6	6.8	8.4	10.0	11.4	4.9	3.3	4.1	3.2
Gross Inl. Cons./GDP (toe/MEuro'00)	314.3	236.3	201.6	197.9	190.4	177.5	163.7	146.9	134.8	-4.3	-0.6	-1.5	-1.9
Gross Inl. Cons./Capita (toe/inhabitant)	2.20	2.06	2.10	2.32	2.63	2.95	3.31	3.50	3.69	-0.5	2.3	2.3	1.1
Electricity Generated/Capita (kWh/inhabitant)	3056	4317	4915	5808	7348	8730	10097	11029	11873	4.9	4.1	3.2	1.6
Carbon intensity (t of CO_2/toe of GIC)	3.19	3.29	3.29	3.09	3.09	3.08	3.08	3.06	3.04	0.3	-0.6	0.0	-0.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	7.03	6.79	6.90	7.18	8.12	9.10	10.20	10.73	11.23	-0.2	1.6	2.3	1.0
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	1.0	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	-4.0	-1.2	-1.5	-2.1
Import Dependency %	97.7	103.6	100.1	99.9	99.5	99.2	99.1	98.5	97.9				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	197.2	170.6	169.1	167.1	164.7	161.9	159.0	156.4	5.5	-0.2	-0.3	-0.3
Residential (Energy on Private Income)	100.0	100.2	85.3	81.4	78.1	72.6	65.2	58.8	53.8	-1.6	-0.9	-1.8	-1.9
Tertiary (Energy on Value added)	100.0	41.1	60.8	63.6	63.1	60.4	56.5	52.5	49.0	-4.9	0.4	-1.1	-1.4
Transport (Energy on GDP)	100.0	100.5	80.9	79.9	73.9	65.9	57.4	52.7	48.7	-2.1	-0.9	-2.5	-1.6
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	1.60	0.96	0.87	0.75	0.70	0.68	0.69	0.65	0.63	-5.9	-2.1	-0.3	-0.8
Final energy demand (t of CO_2/toe)	2.15	2.24	2.16	2.06	1.94	1.86	1.78	1.77	1.74	0.1	-1.1	-0.8	-0.2
Industry	0.00	0.00	0.26	0.22	0.19	0.17	0.14	0.12	0.10		-3.0	-3.0	-3.8
Residential	1.67	1.48	1.02	0.79	0.48	0.35	0.27	0.29	0.27	-4.8	-7.3	-5.6	-0.1
Tertiary	0.00	0.00	1.01	0.63	0.40	0.32	0.22	0.22	0.20		-8.7	-5.8	-0.8
Transport	2.97	2.98	2.98	2.97	2.97	2.97	2.97	2.97	2.97	0.0	0.0	0.0	0.0
Electricity and steam generation													
Generation Capacity in GWe		**0.42**	**0.51**	**0.67**	**0.87**	**1.07**	**1.26**	**1.43**	**1.56**		**5.5**	**3.7**	**2.2**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Wind and solar		0.00	0.00	0.00	0.02	0.04	0.07	0.13	0.17			13.3	9.7
Thermal		0.42	0.51	0.67	0.85	1.03	1.19	1.30	1.39		5.2	3.4	1.5
of which cogeneration units		*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*			*0.0*	*0.0*
Open cycle (incl. biomass-waste)		0.37	0.47	0.60	0.74	0.88	1.01	1.11	1.18		4.7	3.2	1.5
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Gas Turbines Combined Cycle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Small Gas Turbines		0.05	0.05	0.07	0.12	0.15	0.18	0.19	0.21		9.4	4.4	1.6
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		29.0	31.6	36.6	38.5	39.2	39.1	40.6	41.5				
Load factor for gross electric capacities (%)		44.6	42.7	39.5	38.8	38.3	37.9	36.9	36.2				
CHP indicator (% of electricity from CHP)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Non fossil fuels in electricity generation (%)		0.0	0.0	0.0	1.4	2.5	2.1	3.6	4.8				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		0.0	0.0	0.0	1.4	2.5	2.1	3.6	4.8				
of which waste		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*				
Transport sector													
Passenger transport activity (Gpkm)	**2.3**	**2.8**	**3.2**	**3.6**	**4.1**	**4.6**	**5.2**	**5.7**	**6.3**	**3.1**	**2.6**	**2.3**	**2.0**
public road transport	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-0.8	-0.3	0.6	1.1
private cars and motorcycles	2.0	2.2	2.5	2.8	3.1	3.4	3.6	3.8	4.0	2.7	2.0	1.5	1.1
rail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
aviation	0.2	0.4	0.5	0.7	0.9	1.1	1.4	1.8	2.1	7.7	5.5	5.0	4.0
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
travel per person (km per capita)	**6478**	**7292**	**8141**	**9103**	**10113**	**11205**	**12426**	**13718**	**15027**	**2.3**	**2.2**	**2.1**	**1.9**
Freight transport activity (Gtkm)	**2.5**	**3.2**	**3.5**	**3.9**	**4.3**	**4.7**	**5.1**	**5.5**	**5.7**	**3.7**	**2.0**	**1.7**	**1.1**
trucks	2.5	3.2	3.5	3.9	4.3	4.7	5.1	5.5	5.7	3.7	2.0	1.7	1.1
rail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
freight activity per unit of GDP (tkm/000 Euro'00)	**979**	**965**	**873**	**837**	**773**	**693**	**613**	**547**	**501**	**-1.1**	**-1.2**	**-2.3**	**-2.0**
Energy demand in transport (Mtoe)	**0.23**	**0.30**	**0.29**	**0.34**	**0.37**	**0.40**	**0.43**	**0.47**	**0.50**	**2.6**	**2.3**	**1.5**	**1.5**
public road transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.7	-0.3	0.3	0.5
private cars and motorcycles	0.04	0.05	0.06	0.07	0.08	0.08	0.08	0.08	0.08	3.6	3.2	0.2	-0.6
trucks	0.11	0.14	0.10	0.11	0.11	0.12	0.12	0.13	0.13	-0.5	0.9	0.9	0.6
rail	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
aviation	0.07	0.11	0.13	0.15	0.17	0.20	0.22	0.26	0.29	5.7	3.0	2.5	2.6
inland navigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	50.8	58.3	60.5	62.6	63.4	62.2	60.2	60.1	59.1	1.8	0.5	-0.5	-0.2
freight transport (toe/Mtkm)	43.9	43.1	29.0	27.9	25.9	25.0	23.8	23.3	22.6	-4.1	-1.1	-0.9	-0.5

Source: ACE Model

NORWAY: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**120.06**	**182.20**	**224.99**	**237.19**	**250.29**	**244.79**	**232.84**	**217.40**	**208.91**	**6.5**	**1.1**	**-0.7**	**-1.1**
Solids	0.20	0.20	0.42	0.47	0.47	0.46	0.43	0.39	0.33	7.6	1.0	-0.8	-2.6
Oil	84.27	142.18	165.25	165.47	161.57	143.69	121.96	95.50	80.29	7.0	-0.2	-2.8	-4.1
Natural gas	24.14	28.25	45.80	57.60	74.35	86.24	95.37	105.92	112.10	6.6	5.0	2.5	1.6
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	11.45	11.57	13.52	13.65	13.89	14.39	15.08	15.59	16.19	1.7	0.3	0.8	0.7
Hydro	10.42	10.44	12.18	12.15	12.11	12.22	12.28	12.36	12.44	1.6	-0.1	0.1	0.1
Biomass	0.92	1.02	1.20	1.27	1.30	1.35	1.42	1.48	1.59	2.6	0.8	0.8	1.2
Waste	0.11	0.12	0.14	0.18	0.23	0.28	0.33	0.37	0.39	2.4	5.4	3.6	1.8
Wind	0.00	0.00	0.00	0.05	0.25	0.54	1.05	1.37	1.76		57.7	15.6	5.3
Solar and others	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01			12.2	9.0
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**-96.30**	**-157.54**	**-198.20**	**-209.81**	**-221.23**	**-214.10**	**-200.64**	**-183.91**	**-174.43**				
Solids	0.67	0.86	0.60	0.59	0.50	0.44	0.37	0.30	0.24	-1.1	-1.7	-3.1	-4.3
Oil	-73.43	-133.04	-154.98	-155.74	-151.65	-133.51	-111.57	-85.06	-69.82				
Crude oil and Feedstocks	-68.38	-127.63	-149.09	-149.87	-145.82	-127.74	-105.82	-79.40	-64.37				
Oil products	-5.05	-5.41	-5.89	-5.87	-5.83	-5.77	-5.75	-5.65	-5.45				
Natural gas	-22.17	-24.79	-42.17	-53.03	-68.46	-79.40	-87.81	-97.52	-103.21				
Electricity	-1.37	-0.57	-1.64	-1.63	-1.63	-1.63	-1.63	-1.63	-1.64				
Gross Inland Consumption	**21.45**	**23.46**	**25.62**	**26.49**	**28.11**	**29.67**	**31.11**	**32.34**	**33.26**	**1.8**	**0.9**	**1.0**	**0.7**
Solids	0.86	1.02	1.08	1.06	0.97	0.90	0.80	0.69	0.57	2.2	-1.0	-1.9	-3.3
Oil	8.53	7.97	9.03	8.85	8.98	9.17	9.30	9.29	9.24	0.6	-0.1	0.3	-0.1
Natural gas	1.98	3.46	3.63	4.57	5.89	6.84	7.56	8.40	8.89	6.3	5.0	2.5	1.6
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	-1.37	-0.57	-1.64	-1.63	-1.63	-1.63	-1.63	-1.63	-1.64				
Renewable energy forms	11.45	11.58	13.52	13.65	13.89	14.39	15.08	15.59	16.19	1.7	0.3	0.8	0.7
as % in Gross Inland Consumption													
Solids	4.0	4.4	4.2	4.0	3.5	3.0	2.6	2.1	1.7				
Oil	39.8	34.0	35.2	33.4	31.9	30.9	29.9	28.7	27.8				
Natural gas	9.2	14.8	14.2	17.2	21.0	23.0	24.3	26.0	26.7				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	53.4	49.3	52.8	51.5	49.4	48.5	48.5	48.2	48.7				
Electricity Generation in TWhe	**121.61**	**122.06**	**142.36**	**146.71**	**153.82**	**162.15**	**170.73**	**178.72**	**186.13**	**1.6**	**0.8**	**1.0**	**0.9**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	121.15	121.35	141.63	141.88	143.72	148.35	154.99	159.78	165.18	1.6	0.1	0.8	0.6
Thermal (incl. biomass)	0.47	0.70	0.73	4.84	10.10	13.80	15.74	18.94	20.96	4.6	30.0	4.5	2.9
Fuel Inputs for Thermal Power Generation	**0.11**	**0.15**	**0.14**	**0.97**	**1.82**	**2.40**	**2.71**	**3.22**	**3.56**	**2.9**	**28.9**	**4.0**	**2.8**
Solids	0.01	0.02	0.02	0.04	0.04	0.03	0.03	0.02	0.02	0.9	9.0	-3.3	-3.2
Oil	0.00	0.00	0.00	0.02	0.08	0.11	0.14	0.18	0.23			5.1	5.0
Gas	0.02	0.04	0.04	0.69	1.40	1.86	2.05	2.44	2.67	6.8	42.2	3.9	2.7
Biomass - Waste	0.07	0.09	0.09	0.21	0.30	0.40	0.49	0.58	0.64	2.2	13.2	5.1	2.7
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**13.67**	**13.35**	**15.59**	**15.68**	**15.87**	**16.13**	**16.43**	**16.51**	**16.50**	**1.3**	**0.2**	**0.3**	**0.0**
Refineries	13.57	13.23	15.46	15.60	15.77	16.00	16.23	16.23	16.12	1.3	0.2	0.3	-0.1
District heating	0.07	0.07	0.10	0.05	0.04	0.04	0.03	0.02	0.02	4.1	-8.1	-3.8	-4.4
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.03	0.08	0.16	0.24	0.36			18.7	8.3
Others	0.03	0.04	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.7	-4.4	-6.8	-6.9
Energy Branch Consumption	**3.02**	**4.41**	**4.24**	**4.44**	**5.01**	**5.44**	**5.90**	**6.27**	**6.44**	**3.4**	**1.7**	**1.7**	**0.9**
Non-Energy Uses	**1.84**	**2.01**	**2.08**	**2.18**	**2.25**	**2.32**	**2.39**	**2.46**	**2.51**	**1.2**	**0.8**	**0.6**	**0.5**
Final Energy Demand	**16.23**	**17.11**	**18.26**	**18.84**	**19.42**	**20.15**	**20.82**	**21.30**	**21.73**	**1.2**	**0.6**	**0.7**	**0.4**
by sector													
Industry	6.10	6.19	6.98	7.19	7.46	7.74	8.02	8.22	8.46	1.4	0.7	0.7	0.5
Residential	3.61	3.87	3.74	3.71	3.75	3.83	3.93	4.06	4.14	0.4	0.0	0.5	0.5
Tertiary	2.31	2.63	2.93	3.00	3.06	3.09	3.13	3.18	3.24	2.4	0.4	0.2	0.4
Transport	4.22	4.42	4.61	4.94	5.16	5.49	5.74	5.85	5.89	0.9	1.1	1.1	0.3
by fuel													
Solids	0.81	0.97	1.01	0.99	0.91	0.85	0.76	0.65	0.54	2.1	-1.0	-1.8	-3.3
Oil	6.11	6.12	6.32	6.47	6.51	6.64	6.72	6.66	6.56	0.3	0.3	0.3	-0.2
Gas	0.01	0.02	0.19	0.23	0.25	0.27	0.30	0.32	0.36	33.8	2.7	1.7	1.8
Electricity	8.33	8.92	9.43	9.83	10.40	11.07	11.76	12.40	12.99	1.3	1.0	1.2	1.0
Heat (from CHP and District Heating)	0.07	0.11	0.13	0.13	0.17	0.18	0.20	0.22	0.26	5.6	2.8	1.4	2.8
Other	0.90	0.99	1.18	1.20	1.17	1.14	1.10	1.05	1.02	2.8	-0.1	-0.7	-0.8
CO_2 Emissions (Mt of CO_2)	**29.1**	**33.0**	**33.7**	**36.2**	**39.1**	**41.3**	**42.7**	**43.8**	**44.0**	**1.5**	**1.5**	**0.9**	**0.3**
Electricity and Steam production	0.2	0.2	0.2	1.9	3.7	4.8	5.4	6.4	7.0	3.8	31.2	3.7	2.8
Energy Branch	7.1	10.3	9.9	10.4	11.7	12.6	13.7	14.6	14.9	3.3	1.6	1.6	0.8
Industry	6.3	6.0	7.0	6.7	6.2	5.7	5.1	4.5	4.0	1.0	-1.2	-1.9	-2.5
Residential	1.4	0.9	0.8	0.7	0.7	0.6	0.6	0.6	0.5	-5.9	-1.3	-1.2	-1.0
Tertiary	1.7	2.7	2.5	2.3	2.1	1.9	1.7	1.4	1.2	3.9	-1.9	-2.3	-2.8
Transport	12.3	12.7	13.3	14.2	14.8	15.6	16.2	16.4	16.3	0.7	1.1	0.9	0.0
CO_2 Emissions Index (1990=100)	**100.0**	**113.3**	**115.8**	**124.4**	**134.3**	**141.9**	**146.6**	**150.7**	**151.3**				

See explanations on page 219

Source: ACE Model

NORWAY:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	4,24	4.36	4.49	4.57	4.63	4.69	4.76	4.82	4.88	0.6	0.3	0.3	0.3
GDP (in 000 MEuro'00)	128.7	155.7	185.0	205.8	231.4	260.5	291.5	322.1	353.4	3.7	2.3	2.3	1.9
Gross Inl. Cons./GDP (toe/MEuro'00)	166.7	150.7	138.4	128.7	121.5	113.9	106.7	100.4	94.1	-1.8	-1.3	-1.3	-1.2
Gross Inl. Cons./Capita (toe/inhabitant)	5.06	5.38	5.70	5.79	6.07	6.32	6.54	6.70	6.81	1.2	0.6	0.7	0.4
Electricity Generated/Capita (kWh/inhabitant)	28675	28007	31699	32073	33196	34552	35880	37050	38135	1.0	0.5	0.8	0.6
Carbon intensity (t of CO_2/toe of GIC)	1.36	1.41	1.31	1.37	1.39	1.39	1.37	1.36	1.32	-0.3	0.6	-0.1	-0.4
CO_2 Emissions/Capita (t of CO_2/inhabitant)	6.86	7.56	7.50	7.91	8.43	8.80	8.96	9.09	9.02	0.9	1.2	0.6	0.1
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	-2.1	-0.7	-1.4	-1.6
Import Dependency %	-439.7	-651.9	-749.5	-766.5	-761.2	-697.8	-623.2	-549.1	-505.9				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	75.9	77.3	72.9	68.2	62.8	58.0	53.8	50.7	-2.5	-1.3	-1.6	-1.3
Residential (Energy on Private Income)	100.0	92.4	75.3	66.7	59.6	53.8	49.1	45.7	42.3	-2.8	-2.3	-1.9	-1.5
Tertiary (Energy on Value added)	100.0	101.0	91.7	82.8	74.1	65.5	58.8	53.7	49.7	-0.9	-2.1	-2.3	-1.7
Transport (Energy on GDP)	100.0	86.7	76.0	73.3	68.0	64.3	60.1	55.4	50.8	-2.7	-1.1	-1.2	-1.7
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.00	0.00	0.00	0.01	0.02	0.03	0.03	0.03	0.04	2.2	30.1	2.6	1.8
Final energy demand (t of CO_2/toe)	1.34	1.31	1.29	1.27	1.22	1.18	1.13	1.08	1.01	-0.4	-0.5	-0.7	-1.1
Industry	1.04	0.98	1.00	0.93	0.83	0.73	0.64	0.55	0.47	-0.4	-1.9	-2.6	-3.0
Residential	0.39	0.24	0.20	0.20	0.18	0.16	0.15	0.14	0.13	-6.3	-1.3	-1.7	-1.5
Tertiary	0.75	1.01	0.87	0.77	0.69	0.61	0.53	0.45	0.38	1.5	-2.3	-2.6	-3.2
Transport	2.92	2.88	2.88	2.87	2.86	2.85	2.83	2.80	2.77	-0.1	0.0	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**27.34**	**27.89**	**29.65**	**33.74**	**37.43**	**42.21**	**44.85**	**47.65**		**1.9**	**2.3**	**1.2**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		26.96	27.50	27.65	27.81	27.96	28.12	28.26	28.40		0.1	0.1	0.1
Wind and solar		0.00	0.01	0.29	1.33	2.91	5.66	7.43	9.53		58.0	15.6	5.3
Thermal		0.38	0.38	1.70	4.60	6.56	8.43	9.16	9.72		28.5	6.2	1.4
of which cogeneration units		0.38	0.38	0.17	0.16	0.14	0.13	0.12	0.13		-7.9	-2.4	0.0
Open cycle (incl. biomass-waste)		0.38	0.38	0.20	0.31	0.45	0.65	0.76	0.90		-2.0	7.8	3.3
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.05			25.1	17.4
Gas Turbines Combined Cycle		0.00	0.00	1.33	3.78	5.35	6.76	7.26	7.59			6.0	1.2
Small Gas Turbines		0.00	0.00	0.17	0.52	0.76	1.00	1.10	1.18			6.9	1.6
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		40.5	44.5	43.3	47.8	49.6	50.1	50.7	50.8				
Load factor for gross electric capacities (%)		51.0	58.3	56.5	52.0	49.4	46.2	45.5	44.6				
CHP indicator (% of electricity from CHP)		0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.4				
Non fossil fuels in electricity generation (%)		99.7	99.7	97.0	93.9	92.3	91.8	90.6	90.1				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		99.7	99.7	97.0	93.9	92.3	91.8	90.6	90.1				
of which waste		*0.2*	*0.2*	*0.2*	*0.3*	*0.5*	*0.6*	*0.7*	*0.8*				
Transport sector													
Passenger transport activity (Gpkm)	**50.2**	**54.4**	**59.8**	**66.0**	**72.6**	**79.4**	**85.9**	**89.9**	**93.8**	**1.8**	**2.0**	**1.7**	**0.9**
public road transport	3.9	3.8	4.2	4.4	4.5	4.6	4.7	4.7	4.7	0.8	0.8	0.3	0.1
private cars and motorcycles	40.6	44.1	47.7	52.0	56.4	60.9	64.9	67.3	69.7	1.6	1.7	1.4	0.7
rail	2.1	2.4	2.6	2.8	3.0	3.2	3.4	3.5	3.7	2.3	1.4	1.2	0.8
aviation	3.1	3.6	4.5	5.9	7.7	9.7	11.8	13.2	14.5	3.8	5.5	4.4	2.1
inland navigation	0.5	0.6	0.8	0.9	1.0	1.0	1.1	1.1	1.2	4.9	1.8	1.3	0.6
travel per person (km per capita)	**11844**	**12484**	**13319**	**14422**	**15677**	**16928**	**18050**	**18638**	**19223**	**1.2**	**1.6**	**1.4**	**0.6**
Freight transport activity (Gtkm)	**47.8**	**47.4**	**59.5**	**64.1**	**68.4**	**72.2**	**75.5**	**78.2**	**80.7**	**2.2**	**1.4**	**1.0**	**0.7**
trucks	8.2	9.7	11.9	13.3	15.3	17.3	20.1	22.4	24.9	3.8	2.5	2.8	2.2
rail	2.6	2.7	2.5	2.5	2.5	2.6	2.6	2.7	2.8	-0.4	0.0	0.5	0.6
inland navigation	37.0	35.0	45.0	48.3	50.6	52.3	52.8	53.0	53.1	2.0	1.2	0.4	0.1
freight activity per unit of GDP (tkm/000 Euro'00)	**371**	**304**	**321**	**311**	**296**	**277**	**259**	**243**	**228**	**-1.4**	**-0.8**	**-1.3**	**-1.2**
Energy demand in transport (Mtoe)	**4.22**	**4.42**	**4.61**	**4.94**	**5.16**	**5.49**	**5.74**	**5.85**	**5.89**	**0.9**	**1.1**	**1.1**	**0.3**
public road transport	0.07	0.06	0.08	0.09	0.09	0.09	0.09	0.09	0.09	2.5	0.6	0.0	-0.4
private cars and motorcycles	1.83	2.04	2.10	2.19	2.23	2.24	2.22	2.18	2.13	1.3	0.6	0.0	-0.4
trucks	0.74	0.90	0.84	0.90	0.96	1.04	1.15	1.26	1.36	1.2	1.3	1.8	1.7
rail	0.10	0.18	0.18	0.18	0.17	0.17	0.17	0.18	0.18	5.4	-0.2	0.0	0.2
aviation	0.52	0.58	0.69	0.82	0.93	1.14	1.32	1.35	1.35	2.7	3.1	3.6	0.3
inland navigation	0.95	0.66	0.73	0.77	0.78	0.80	0.79	0.79	0.79	-2.6	0.7	0.1	-0.1
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	49.9	51.9	50.3	49.3	46.7	45.6	44.0	42.0	39.7	0.1	-0.7	-0.6	-1.0
freight transport (toe/Mtkm)	35.8	33.7	26.9	26.4	25.8	25.8	26.0	26.5	26.8	-2.8	-0.4	0.1	0.3

Source: ACE Model

POLAND: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**99.36**	**99.34**	**80.07**	**71.36**	**68.25**	**65.40**	**61.57**	**56.33**	**54.70**	**-2.1**	**-1.6**	**-1.0**	**-1.2**
Solids	94.46	91.07	71.31	62.02	58.92	56.00	51.91	46.02	43.66	-2.8	-1.9	-1.3	-1.7
Oil	0.17	0.33	1.20	0.69	0.75	0.82	0.77	0.72	0.65	21.6	-4.6	0.3	-1.7
Natural gas	2.38	3.17	3.31	3.33	3.34	3.18	2.95	2.70	2.45	3.4	0.1	-1.2	-1.8
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	2.35	4.76	4.25	5.33	5.24	5.40	5.94	6.89	7.93	6.1	2.1	1.3	2.9
Hydro	0.12	0.16	0.18	0.19	0.21	0.23	0.25	0.25	0.26	4.0	1.6	1.6	0.5
Biomass	1.46	3.76	3.62	4.46	4.13	3.89	3.87	4.32	4.92	9.5	1.3	-0.7	2.4
Waste	0.77	0.84	0.45	0.49	0.53	0.63	0.74	0.91	1.08	-5.3	1.7	3.4	3.8
Wind	0.00	0.00	0.00	0.14	0.28	0.51	0.84	1.09	1.31		91.0	11.7	4.6
Solar and others	0.00	0.00	0.00	0.05	0.09	0.14	0.24	0.32	0.37			10.5	4.2
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**2.10**	**-0.11**	**9.63**	**18.30**	**28.06**	**38.98**	**51.80**	**62.86**	**69.23**	**16.5**	**11.3**	**6.3**	**2.9**
Solids	-18.91	-21.21	-16.31	-11.86	-10.21	-8.61	-4.72	0.16	1.23				
Oil	14.32	15.53	19.88	21.16	23.60	26.94	31.24	34.81	38.00	3.3	1.7	2.8	2.0
Crude oil and Feedstocks	12.94	13.98	18.39	19.66	21.22	23.56	26.40	28.38	29.46	3.6	1.4	2.2	1.1
Oil products	1.38	1.55	1.49	1.50	2.38	3.38	4.85	6.44	8.54	0.8	4.8	7.4	5.8
Natural gas	6.78	5.81	6.61	9.55	15.19	21.15	25.75	28.36	30.49	-0.3	8.7	5.4	1.7
Electricity	-0.09	-0.24	-0.55	-0.55	-0.52	-0.49	-0.47	-0.47	-0.49				
Gross Inland Consumption	**99.85**	**99.91**	**89.99**	**89.35**	**95.94**	**103.94**	**112.88**	**118.63**	**123.29**	**-1.0**	**0.6**	**1.6**	**0.9**
Solids	75.41	70.38	56.33	50.16	48.71	47.38	47.19	46.18	44.89	-2.9	-1.4	-0.3	-0.5
Oil	13.23	16.02	20.01	21.54	23.98	27.33	31.52	34.96	38.02	4.2	1.8	2.8	1.9
Natural gas	8.94	8.99	9.95	12.88	18.53	24.33	28.70	31.06	32.94	1.1	6.4	4.5	1.4
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	-0.09	-0.24	-0.55	-0.55	-0.52	-0.49	-0.47	-0.47	-0.49				
Renewable energy forms	2.35	4.76	4.25	5.33	5.24	5.40	5.94	6.89	7.93	6.1	2.1	1.3	2.9
as % in Gross Inland Consumption													
Solids	75.5	70.4	62.6	56.1	50.8	45.6	41.8	38.9	36.4				
Oil	13.3	16.0	22.2	24.1	25.0	26.3	27.9	29.5	30.8				
Natural gas	9.0	9.0	11.1	14.4	19.3	23.4	25.4	26.2	26.7				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	2.4	4.8	4.7	6.0	5.5	5.2	5.3	5.8	6.4				
Electricity Generation in TWhe	**134.42**	**137.04**	**143.17**	**154.19**	**182.90**	**218.71**	**261.02**	**295.40**	**327.18**	**0.6**	**2.5**	**3.6**	**2.3**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	1.42	1.89	2.11	3.82	5.70	8.64	12.73	15.71	18.53	4.1	10.4	8.4	3.8
Thermal (incl. biomass)	133.00	135.15	141.06	150.37	177.20	210.07	248.29	279.69	308.65	0.6	2.3	3.4	2.2
Fuel Inputs for Thermal Power Generation	**44.42**	**36.90**	**36.43**	**34.59**	**38.70**	**43.08**	**48.43**	**52.64**	**56.44**	**-2.0**	**0.6**	**2.3**	**1.5**
Solids	42.14	35.89	35.05	31.73	33.65	34.97	37.16	37.86	37.98	-1.8	-0.4	1.0	0.2
Oil	1.24	0.41	0.43	0.46	0.78	1.49	2.55	4.34	6.36	-10.0	6.0	12.6	9.6
Gas	0.67	0.49	0.78	2.10	3.81	5.91	7.69	8.93	10.09	1.5	17.1	7.3	2.7
Biomass - Waste	0.37	0.11	0.16	0.31	0.45	0.71	1.03	1.51	2.01	-8.3	11.2	8.6	6.9
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**38.45**	**32.90**	**33.82**	**33.38**	**34.02**	**35.26**	**37.12**	**38.39**	**39.30**	**-1.3**	**0.1**	**0.9**	**0.6**
Refineries	13.02	14.90	20.05	20.35	21.98	24.40	27.30	29.39	30.72	4.4	0.9	2.2	1.2
District heating	10.63	6.00	4.18	4.17	3.81	3.27	2.67	2.10	1.64	-8.9	-0.9	-3.5	-4.7
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.02	0.07	0.26	0.56	1.08			28.0	15.3
Others	14.80	12.01	9.59	8.87	8.20	7.53	6.89	6.34	5.86	-4.2	-1.5	-1.7	-1.6
Energy Branch Consumption	**6.74**	**7.66**	**7.30**	**7.20**	**7.52**	**7.97**	**8.55**	**9.03**	**9.46**	**0.8**	**0.3**	**1.3**	**1.0**
Non-Energy Uses	**4.24**	**3.73**	**4.35**	**4.57**	**4.88**	**5.20**	**5.50**	**5.76**	**6.02**	**0.3**	**1.2**	**1.2**	**0.9**
Final Energy Demand	**61.00**	**64.26**	**56.27**	**55.81**	**59.72**	**65.42**	**71.57**	**75.98**	**79.67**	**-0.8**	**0.6**	**1.8**	**1.1**
by sector													
Industry	26.33	24.36	19.61	17.47	16.95	16.99	17.20	17.64	18.28	-2.9	-1.5	0.1	0.6
Residential	18.01	22.65	17.21	17.45	19.25	21.76	24.05	25.29	25.88	-0.5	1.1	2.2	0.7
Tertiary	9.07	8.82	10.01	10.61	11.50	12.72	14.00	15.21	16.33	1.0	1.4	2.0	1.6
Transport	7.58	8.43	9.44	10.27	12.03	13.95	16.33	17.84	19.18	2.2	2.4	3.1	1.6
by fuel													
Solids	17.25	22.54	13.35	10.60	7.96	6.27	4.87	4.03	3.33	-2.5	-5.0	-4.8	-3.7
Oil	9.30	11.82	15.79	16.41	18.30	20.65	23.48	24.92	25.85	5.4	1.5	2.5	1.0
Gas	7.98	7.60	7.31	8.50	11.89	15.04	17.13	17.93	18.37	-0.9	5.0	3.7	0.7
Electricity	8.26	7.70	8.32	9.05	10.89	13.19	15.93	18.18	20.27	0.1	2.7	3.9	2.4
Heat (from CHP and District Heating)	15.56	8.82	6.88	6.57	6.40	6.36	6.54	7.36	8.49	-7.8	-0.7	0.2	2.6
Other	2.65	5.77	4.61	4.67	4.27	3.90	3.62	3.56	3.36	5.7	-0.8	-1.7	-0.7
CO_2 Emissions (Mt of CO_2)	**340.1**	**328.3**	**290.2**	**272.5**	**286.2**	**303.8**	**325.1**	**335.9**	**343.1**	**-1.6**	**-0.1**	**1.3**	**0.5**
Electricity and Steam production	216.0	170.2	159.9	149.7	160.8	171.0	184.9	193.5	200.9	-3.0	0.1	1.4	0.8
Energy Branch	5.7	12.5	10.9	10.4	10.3	10.3	10.3	10.1	9.8	6.6	-0.5	0.0	-0.5
Industry	44.2	60.3	46.4	38.9	34.6	32.7	30.4	29.2	27.6	0.5	-2.9	-1.3	-1.0
Residential	32.7	41.9	26.7	24.9	26.7	29.9	32.4	32.1	30.7	-2.0	0.0	2.0	-0.5
Tertiary	20.0	19.8	19.7	19.5	19.6	20.3	20.7	20.7	20.6	-0.1	-0.1	0.5	0.0
Transport	21.4	23.6	26.5	29.1	34.2	39.8	46.4	50.4	53.4	2.2	2.6	3.1	1.4
CO_2 Emissions Index (1990=100)	**100.0**	**96.5**	**85.3**	**80.1**	**84.2**	**89.4**	**95.6**	**98.8**	**100.9**				

See explanations on page 219

Source: ACE Model

POLAND:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	38.12	38.59	38.65	38.47	38.26	38.06	37.67	37.29	36.62	0.1	-0.1	-0.2	-0.3
GDP (in 000 MEuro'00)	135.8	151.4	194.6	224.8	282.4	351.1	429.6	518.2	613.9	3.7	3.8	4.3	3.6
Gross Inl. Cons./GDP (toe/MEuro'00)	735.1	659.8	462.5	397.5	339.7	296.1	262.7	228.9	200.8	-4.5	-3.0	-2.5	-2.7
Gross Inl. Cons./Capita (toe/inhabitant)	2.62	2.59	2.33	2.32	2.51	2.73	3.00	3.18	3.37	-1.2	0.7	1.8	1.2
Electricity Generated/Capita (kWh/inhabitant)	3526	3551	3705	4008	4780	5747	6928	7921	8935	0.5	2.6	3.8	2.6
Carbon intensity (t of CO_2/toe of GIC)	3.41	3.29	3.22	3.05	2.98	2.92	2.88	2.83	2.78	-0.5	-0.8	-0.4	-0.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.92	8.51	7.51	7.08	7.48	7.98	8.63	9.01	9.37	-1.7	0.0	1.4	0.8
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	2.5	2.2	1.5	1.2	1.0	0.9	0.8	0.6	0.6	-5.0	-3.8	-2.9	-3.0
Import Dependency %	2.1	-0.1	10.7	20.4	29.1	37.3	45.7	52.7	55.9				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	94.2	58.6	43.9	34.0	27.4	22.9	20.3	18.9	-5.2	-5.3	-3.9	-1.9
Residential (Energy on Private Income)	100.0	112.8	67.6	59.7	51.9	46.1	41.2	35.8	31.0	-3.8	-2.6	-2.3	-2.8
Tertiary (Energy on Value added)	100.0	82.0	72.6	65.8	55.8	48.3	42.4	37.2	32.7	-3.1	-2.6	-2.7	-2.6
Transport (Energy on GDP)	100.0	99.7	86.9	81.9	76.3	71.2	68.1	61.7	56.0	-1.4	-1.3	-1.1	-1.9
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.64	0.67	0.67	0.61	0.59	0.56	0.53	0.49	0.46	0.6	-1.2	-1.2	-1.5
Final energy demand (t of CO_2/toe)	1.94	2.27	2.12	2.01	1.93	1.87	1.82	1.74	1.66	0.9	-1.0	-0.6	-0.9
Industry	1.68	2.47	2.37	2.23	2.04	1.92	1.77	1.66	1.51	3.5	-1.5	-1.4	-1.6
Residential	1.81	1.85	1.55	1.43	1.38	1.37	1.35	1.27	1.19	-1.6	-1.1	-0.3	-1.3
Tertiary	2.21	2.25	1.97	1.83	1.71	1.59	1.48	1.36	1.26	-1.1	-1.4	-1.4	-1.6
Transport	2.82	2.80	2.81	2.83	2.85	2.85	2.84	2.82	2.79	0.0	0.1	0.0	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**29.95**	**33.12**	**36.04**	**46.65**	**59.41**	**74.85**	**86.71**	**99.09**		**3.5**	**4.8**	**2.8**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		0.62	0.87	0.96	1.06	1.15	1.25	1.28	1.31		2.0	1.7	0.5
Wind and solar		0.00	0.00	0.82	1.68	3.11	5.15	6.70	8.17			11.9	4.7
Thermal		29.33	32.25	34.26	43.91	55.16	68.45	78.73	89.60		3.1	4.5	2.7
of which cogeneration units		11.54	8.60	8.18	9.43	11.16	12.94	16.35	21.75		0.9	3.2	5.3
Open cycle (incl. biomass-waste)		29.33	32.13	30.11	34.70	38.39	42.82	45.27	48.39		0.8	2.1	1.2
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.20	1.07	2.77	5.47	8.36			29.9	11.7
Gas Turbines Combined Cycle		0.00	0.12	3.31	7.13	12.26	17.63	21.19	24.37		50.5	9.5	3.3
Small Gas Turbines		0.00	0.00	0.84	1.88	3.44	5.23	6.80	8.49			10.8	5.0
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		33.9	35.0	38.7	40.5	43.0	45.2	46.9	48.5				
Load factor for gross electric capacities (%)		52.2	49.3	48.8	44.8	42.0	39.8	38.9	37.7				
CHP indicator (% of electricity from CHP)		63.1	45.0	35.4	30.2	28.2	27.7	31.4	35.7				
Non fossil fuels in electricity generation (%)		1.6	1.9	3.3	4.2	5.5	6.8	7.9	8.9				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		1.6	1.9	3.3	4.2	5.5	6.8	7.9	8.9				
of which waste		*0.2*	*0.2*	*0.4*	*0.5*	*0.7*	*0.9*	*1.1*	*1.4*				
Transport sector													
Passenger transport activity (Gpkm)	**213.4**	**215.9**	**226.7**	**241.2**	**274.3**	**323.2**	**386.0**	**449.2**	**513.2**	**0.6**	**1.9**	**3.5**	**2.9**
public road transport	56.3	44.0	43.3	43.1	43.4	44.1	45.5	47.3	49.6	-2.6	0.0	0.5	0.9
private cars and motorcycles	104.1	140.5	153.7	168.0	198.7	242.0	295.1	345.4	394.5	4.0	2.6	4.0	2.9
rail	50.4	26.6	24.1	23.8	24.6	26.7	30.7	36.9	43.9	-7.1	0.2	2.3	3.6
aviation	2.3	4.6	5.4	6.1	7.5	10.3	14.5	19.5	25.1	8.9	3.2	6.9	5.6
inland navigation	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	-5.1	0.1	1.0	0.5
travel per person (km per capita)	**5598**	**5595**	**5865**	**6270**	**7169**	**8493**	**10246**	**12046**	**14017**	**0.5**	**2.0**	**3.6**	**3.2**
Freight transport activity (Gtkm)	**122.9**	**121.2**	**125.3**	**131.8**	**147.8**	**174.0**	**206.5**	**239.9**	**270.2**	**0.2**	**1.7**	**3.4**	**2.7**
trucks	40.3	51.2	70.9	79.5	94.8	119.3	148.8	179.4	207.4	5.8	2.9	4.6	3.4
rail	81.6	69.1	54.0	52.0	52.6	54.3	57.3	60.1	62.4	-4.0	-0.3	0.9	0.8
inland navigation	1.0	0.9	0.4	0.4	0.4	0.4	0.4	0.4	0.4	-8.9	-0.7	0.3	1.0
freight activity per unit of GDP (tkm/000 Euro'00)	**905**	**800**	**644**	**586**	**523**	**496**	**481**	**463**	**440**	**-3.3**	**-2.1**	**-0.8**	**-0.9**
Energy demand in transport (Mtoe)	**7.58**	**8.43**	**9.44**	**10.27**	**12.03**	**13.95**	**16.33**	**17.84**	**19.18**	**2.2**	**2.4**	**3.1**	**1.6**
public road transport	0.62	0.46	0.57	0.56	0.55	0.54	0.54	0.54	0.55	-0.8	-0.4	-0.1	0.2
private cars and motorcycles	3.07	3.97	4.64	5.24	6.65	7.66	9.01	9.34	9.72	4.2	3.7	3.1	0.8
trucks	2.38	2.91	3.30	3.54	3.88	4.67	5.51	6.54	7.35	3.3	1.6	3.6	2.9
rail	1.20	0.68	0.54	0.52	0.51	0.50	0.51	0.51	0.52	-7.6	-0.6	0.0	0.2
aviation	0.21	0.39	0.39	0.41	0.44	0.58	0.76	0.90	1.03	6.2	1.2	5.6	3.1
inland navigation	0.11	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-24.7	-0.8	0.3	0.8
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	21.6	23.8	25.9	26.8	28.8	28.0	27.4	24.7	22.7	1.8	1.1	-0.5	-1.9
freight transport (toe/Mtkm)	24.2	27.1	28.5	28.8	28.0	28.3	27.8	28.2	27.9	1.7	-0.2	-0.1	0.0

Source: ACE Model

ROMANIA: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**40.83**	**32.74**	**28.29**	**27.04**	**27.27**	**27.16**	**25.60**	**24.95**	**24.48**	**-3.6**	**-0.4**	**-0.6**	**-0.4**
Solids	8.65	8.31	5.59	3.98	3.67	3.10	2.15	2.07	1.94	-4.3	-4.1	-5.2	-1.0
Oil	7.70	6.83	6.16	5.77	5.73	5.70	5.69	5.69	5.68	-2.2	-0.7	-0.1	0.0
Natural gas	22.90	14.44	10.96	11.82	12.19	11.38	10.66	10.02	9.45	-7.1	1.1	-1.3	-1.2
Nuclear	0.00	0.00	1.43	1.36	1.36	2.70	2.68	2.64	2.65		-0.5	7.0	-0.1
Renewable energy sources	1.58	3.16	4.14	4.11	4.33	4.27	4.41	4.53	4.76	10.1	0.4	0.2	0.8
Hydro	0.98	1.44	1.27	1.30	1.40	1.49	1.58	1.64	1.74	2.6	1.0	1.2	1.0
Biomass	0.60	1.36	2.76	2.69	2.63	2.30	2.04	1.88	1.81	16.5	-0.5	-2.5	-1.2
Waste	0.00	0.36	0.09	0.07	0.16	0.23	0.34	0.51	0.56		5.8	7.8	5.1
Wind	0.00	0.00	0.00	0.02	0.10	0.21	0.39	0.42	0.56			14.6	3.7
Solar and others	0.00	0.00	0.00	0.02	0.03	0.05	0.07	0.07	0.09			6.8	2.8
Geothermal	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**21.84**	**14.14**	**7.81**	**9.13**	**11.93**	**15.39**	**19.25**	**22.11**	**24.58**	**-9.8**	**4.3**	**4.9**	**2.5**
Solids	4.51	2.86	1.85	1.35	1.57	1.81	2.34	2.57	2.86	-8.5	-1.6	4.1	2.0
Oil	10.59	6.46	3.31	4.92	6.86	8.34	10.12	12.09	13.23	-11.0	7.5	4.0	2.7
Crude oil and Feedstocks	15.59	8.40	4.66	5.92	8.30	10.50	12.38	13.80	14.87	-11.4	5.9	4.1	1.8
Oil products	-5.00	-1.94	-1.35	-1.00	-1.45	-2.16	-2.26	-1.72	-1.64				
Natural gas	5.93	4.79	2.71	2.92	3.57	5.29	6.85	7.52	8.56	-7.5	2.8	6.7	2.3
Electricity	0.81	0.03	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.07				
Gross Inland Consumption	**62.40**	**46.84**	**36.30**	**36.17**	**39.20**	**42.55**	**44.86**	**47.06**	**49.07**	**-5.3**	**0.8**	**1.4**	**0.9**
Solids	12.93	11.21	7.40	5.33	5.23	4.92	4.50	4.63	4.80	-5.4	-3.4	-1.5	0.7
Oil	18.25	13.21	9.70	10.69	12.58	14.04	15.81	17.77	18.91	-6.1	2.6	2.3	1.8
Natural gas	28.83	19.23	13.68	14.74	15.76	16.68	17.51	17.54	18.01	-7.2	1.4	1.1	0.3
Nuclear	0.00	0.00	1.43	1.36	1.36	2.70	2.68	2.64	2.65		-0.5	7.0	-0.1
Electricity	0.81	0.03	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.07				
Renewable energy forms	1.58	3.16	4.15	4.11	4.33	4.27	4.41	4.53	4.76	10.1	0.4	0.2	0.8
as % in Gross Inland Consumption													
Solids	20.7	23.9	20.4	14.7	13.3	11.6	10.0	9.8	9.8				
Oil	29.2	28.2	26.7	29.6	32.1	33.0	35.2	37.8	38.5				
Natural gas	46.2	41.1	37.7	40.8	40.2	39.2	39.0	37.3	36.7				
Nuclear	0.0	0.0	3.9	3.8	3.5	6.3	6.0	5.6	5.4				
Renewable energy forms	2.5	6.7	11.4	11.4	11.0	10.0	9.8	9.6	9.7				
Electricity Generation in TWhe	**64.31**	**59.27**	**51.94**	**54.54**	**64.23**	**75.25**	**84.32**	**92.13**	**100.87**	**-2.1**	**2.1**	**2.8**	**1.8**
Nuclear	0.00	0.00	5.53	5.28	5.26	10.44	10.37	10.21	10.25		-0.5	7.0	-0.1
Hydro & wind	11.41	16.69	14.78	15.33	17.49	19.74	22.93	23.97	26.92	2.6	1.7	2.7	1.6
Thermal (incl. biomass)	52.90	42.57	31.63	33.94	41.48	45.07	51.02	57.95	63.69	-5.0	2.7	2.1	2.2
Fuel Inputs for Thermal Power Generation	**23.11**	**16.67**	**10.63**	**9.88**	**10.85**	**11.16**	**11.99**	**13.73**	**14.51**	**-7.5**	**0.2**	**1.0**	**1.9**
Solids	7.88	7.45	5.42	3.92	4.09	3.95	3.65	3.89	4.16	-3.7	-2.8	-1.2	1.3
Oil	6.23	3.01	1.70	2.03	2.11	2.18	2.61	3.67	4.05	-12.2	2.2	2.2	4.5
Gas	8.98	6.17	3.51	3.87	4.46	4.73	5.22	5.35	5.37	-9.0	2.4	1.6	0.3
Biomass - Waste	0.01	0.04	0.00	0.06	0.19	0.30	0.51	0.82	0.93	-10.4	45.6	10.6	6.2
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**27.28**	**20.48**	**14.57**	**14.98**	**17.05**	**18.97**	**20.63**	**21.91**	**22.99**	**-6.1**	**1.6**	**1.9**	**1.1**
Refineries	22.97	15.04	10.94	11.69	14.03	16.21	18.11	19.57	20.73	-7.2	2.5	2.6	1.4
District heating	0.00	1.86	1.75	1.72	1.65	1.50	1.31	1.12	0.95		-0.6	-2.3	-3.2
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.00	0.03	0.09	0.18	0.34			37.4	14.9
Others	4.31	3.59	1.88	1.57	1.37	1.23	1.12	1.04	0.96	-8.0	-3.1	-1.9	-1.5
Energy Branch Consumption	**3.21**	**5.44**	**4.11**	**3.86**	**4.14**	**4.39**	**4.60**	**4.84**	**4.99**	**2.5**	**0.1**	**1.1**	**0.8**
Non-Energy Uses	**0.91**	**1.33**	**2.06**	**2.09**	**2.17**	**2.26**	**2.39**	**2.52**	**2.64**	**8.5**	**0.5**	**1.0**	**1.0**
Final Energy Demand	**43.94**	**27.12**	**22.65**	**23.58**	**26.05**	**28.29**	**30.48**	**32.32**	**34.02**	**-6.4**	**1.4**	**1.6**	**1.1**
by sector													
Industry	25.69	15.23	9.13	6.81	5.88	5.82	5.92	6.08	6.37	-9.8	-4.3	0.1	0.7
Residential	10.40	6.39	8.46	10.18	11.39	11.98	12.39	12.75	13.06	-2.0	3.0	0.8	0.5
Tertiary	3.39	2.36	1.60	1.90	2.33	2.78	3.26	3.69	4.05	-7.2	3.8	3.4	2.2
Transport	4.45	3.12	3.46	4.69	6.45	7.72	8.91	9.80	10.54	-2.5	6.4	3.3	1.7
by fuel													
Solids	3.21	1.52	0.99	0.76	0.64	0.55	0.50	0.44	0.38	-11.1	-4.4	-2.5	-2.7
Oil	8.18	5.63	5.39	6.31	7.95	9.17	10.36	11.16	11.84	-4.1	4.0	2.7	1.3
Gas	21.12	10.34	6.88	7.34	7.76	8.50	9.00	9.01	9.54	-10.6	1.2	1.5	0.6
Electricity	4.66	3.12	2.92	3.09	3.67	4.34	4.90	5.39	5.95	-4.6	2.3	2.9	1.9
Heat (from CHP and District Heating)	6.16	4.68	3.58	3.36	3.41	3.47	3.83	4.79	5.06	-5.3	-0.5	1.2	2.8
Other	0.59	1.82	2.88	2.72	2.62	2.26	1.89	1.53	1.25	17.2	-0.9	-3.2	-4.1
CO_2 Emissions (Mt of CO_2)	**168.6**	**116.6**	**85.2**	**82.7**	**90.3**	**95.4**	**100.6**	**106.9**	**111.7**	**-6.6**	**0.6**	**1.1**	**1.0**
Electricity and Steam production	73.3	59.8	40.5	36.0	38.1	37.9	38.5	42.6	44.5	-5.8	-0.6	0.1	1.4
Energy Branch	5.7	8.1	7.5	7.1	7.6	8.0	8.2	8.4	8.5	2.8	0.1	0.8	0.4
Industry	60.5	31.3	18.7	13.8	11.4	10.8	10.7	10.5	10.3	-11.1	-4.8	-0.7	-0.4
Residential	8.6	5.4	6.7	10.3	12.3	13.5	14.1	13.4	14.0	-2.5	6.3	1.4	-0.1
Tertiary	8.0	3.2	1.9	2.0	2.6	3.2	3.8	4.3	4.7	-13.4	3.0	4.1	2.2
Transport	12.5	8.8	9.9	13.5	18.5	22.0	25.4	27.8	29.6	-2.4	6.5	3.2	1.6
CO_2 Emissions Index (1990=100)	**100.0**	**69.1**	**50.5**	**49.1**	**53.6**	**56.6**	**59.7**	**63.4**	**66.2**				

See explanations on page 219

Source: ACE Model

ROMANIA:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	23.21	22.68	22.44	22.15	21.79	21.43	21.01	20.58	20.13	-0.3	-0.3	-0.4	-0.4
GDP (in 000 MEuro'00)	50.3	45.1	42.2	53.6	68.5	85.7	104.4	123.2	141.1	-1.7	5.0	4.3	3.1
Gross Inl. Cons./GDP (toe/MEuro'00)	1241.2	1038.8	860.8	675.3	572.2	496.4	429.7	381.9	347.7	-3.6	-4.0	-2.8	-2.1
Gross Inl. Cons./Capita (toe/inhabitant)	2.69	2.07	1.62	1.63	1.80	1.99	2.14	2.29	2.44	-5.0	1.1	1.7	1.3
Electricity Generated/Capita (kWh/inhabitant)	2771	2613	2315	2463	2948	3511	4014	4476	5011	-1.8	2.4	3.1	2.2
Carbon intensity (t of CO_2/toe of GIC)	2.70	2.49	2.35	2.29	2.30	2.24	2.24	2.27	2.28	-1.4	-0.2	-0.3	0.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	7.27	5.14	3.80	3.74	4.14	4.45	4.79	5.20	5.55	-6.3	0.9	1.5	1.5
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	3.4	2.6	2.0	1.5	1.3	1.1	1.0	0.9	0.8	-4.9	-4.2	-3.1	-2.0
Import Dependency %	35.0	30.2	21.5	25.2	30.4	36.2	42.9	47.0	50.1				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	80.7	43.6	26.2	17.8	14.2	12.1	10.6	9.7	-8.0	-8.6	-3.8	-2.2
Residential (Energy on Private Income)	100.0	64.6	84.9	79.4	68.2	56.7	47.9	41.6	37.1	-1.6	-2.2	-3.5	-2.5
Tertiary (Energy on Value added)	100.0	76.0	56.6	50.9	48.0	45.2	42.9	40.7	38.9	-5.5	-1.6	-1.1	-1.0
Transport (Energy on GDP)	100.0	78.2	92.5	98.8	106.3	101.6	96.4	89.8	84.3	-0.8	1.4	-1.0	-1.3
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.54	0.43	0.39	0.35	0.33	0.30	0.27	0.26	0.26	-3.3	-1.5	-1.9	-0.7
Final energy demand (t of CO_2/toe)	2.04	1.79	1.64	1.68	1.72	1.75	1.77	1.73	1.72	-2.2	0.4	0.3	-0.3
Industry	2.35	2.05	2.05	2.03	1.94	1.86	1.80	1.72	1.61	-1.4	-0.6	-0.7	-1.1
Residential	0.83	0.85	0.79	1.02	1.08	1.13	1.14	1.05	1.07	-0.5	3.1	0.6	-0.6
Tertiary	2.37	1.33	1.20	1.05	1.10	1.15	1.17	1.16	1.17	-6.6	-0.8	0.6	0.0
Transport	2.81	2.81	2.85	2.87	2.86	2.86	2.84	2.83	2.81	0.1	0.0	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**21.39**	**22.93**	**23.29**	**26.69**	**32.17**	**37.38**	**39.88**	**44.68**		**1.5**	**3.4**	**1.8**
Nuclear		0.00	0.70	0.70	0.70	1.40	1.40	1.40	1.40		0.0	7.2	0.0
Hydro (pumping excluded)		5.88	6.62	7.17	7.75	8.33	8.92	9.48	10.03		1.6	1.4	1.2
Wind and solar		0.00	0.00	0.13	0.59	1.24	2.39	2.63	3.53		89.4	14.9	4.0
Thermal		15.51	15.61	15.29	17.64	21.20	24.68	26.37	29.71		1.2	3.4	1.9
of which cogeneration units		*5.72*	*6.00*	*3.96*	*3.31*	*3.27*	*4.36*	*6.22*	*7.00*		*-5.8*	*2.8*	*4.9*
Open cycle (incl. biomass-waste)		15.51	15.50	14.18	13.83	14.68	14.21	14.38	14.79		-1.1	0.3	0.4
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.07	0.28	0.81	1.09	2.30			28.0	11.0
Gas Turbines Combined Cycle		0.00	0.00	0.85	3.08	5.17	7.94	8.73	9.99			9.9	2.3
Small Gas Turbines		0.00	0.11	0.26	0.66	1.06	1.72	2.18	2.63		19.1	10.1	4.3
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		24.8	27.9	31.3	34.4	36.3	38.3	38.5	40.1				
Load factor for gross electric capacities (%)		31.6	25.9	26.7	27.5	26.7	25.7	26.4	25.8				
CHP indicator (% of electricity from CHP)		53.8	37.1	29.6	26.8	24.7	27.8	36.9	38.7				
Non fossil fuels in electricity generation (%)		28.2	39.1	38.1	36.4	41.5	41.6	40.3	40.4				
nuclear		0.0	10.6	9.7	8.2	13.9	12.3	11.1	10.2				
renewable energy forms		28.2	28.5	28.4	28.2	27.7	29.3	29.3	30.2				
of which waste		*0.0*	*0.0*	*0.2*	*0.6*	*0.9*	*1.3*	*1.9*	*2.1*				
Transport sector													
Passenger transport activity (Gpkm)	**91.5**	**63.1**	**72.0**	**92.5**	**121.8**	**150.8**	**180.1**	**208.8**	**236.6**	**-2.4**	**5.4**	**4.0**	**2.8**
public road transport	24.9	12.3	8.3	7.8	7.9	8.5	9.3	10.4	11.8	-10.4	-0.5	1.6	2.4
private cars and motorcycles	32.3	28.4	50.1	71.6	99.5	125.4	150.0	172.7	194.0	4.5	7.1	4.2	2.6
rail	30.6	18.9	11.6	10.7	11.2	12.4	14.1	16.0	17.9	-9.2	-0.4	2.3	2.4
aviation	3.7	3.4	1.9	2.3	3.1	4.5	6.7	9.7	12.9	-6.6	5.2	8.0	6.8
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-4.5	0.1	1.1	0.5
travel per person (km per capita)	**3942**	**2781**	**3207**	**4175**	**5589**	**7037**	**8575**	**10144**	**11755**	**-2.0**	**5.7**	**4.4**	**3.2**
Freight transport activity (Gtkm)	**79.9**	**47.0**	**31.0**	**36.2**	**43.7**	**55.3**	**67.1**	**78.5**	**89.3**	**-9.0**	**3.5**	**4.4**	**2.9**
trucks	29.0	19.7	13.5	20.5	27.9	38.9	49.7	60.1	69.8	-7.4	7.6	5.9	3.4
rail	48.8	24.2	14.7	13.1	13.3	13.9	14.8	15.7	16.7	-11.3	-1.0	1.1	1.2
inland navigation	2.1	3.1	2.8	2.6	2.5	2.5	2.5	2.7	2.8	2.9	-1.2	0.3	1.1
freight activity per unit of GDP (tkm/000 Euro'00)	**1589**	**1043**	**734**	**675**	**638**	**645**	**642**	**637**	**633**	**-7.4**	**-1.4**	**0.1**	**-0.2**
Energy demand in transport (Mtoe)	**4.45**	**3.12**	**3.46**	**4.69**	**6.45**	**7.72**	**8.91**	**9.80**	**10.54**	**-2.5**	**6.4**	**3.3**	**1.7**
public road transport	0.34	0.15	0.14	0.13	0.14	0.14	0.15	0.16	0.17	-8.7	0.0	0.9	1.2
private cars and motorcycles	1.18	0.92	1.82	2.77	4.22	4.95	5.63	5.99	6.29	4.4	8.8	2.9	1.1
trucks	2.14	1.28	0.79	1.12	1.38	1.87	2.28	2.74	3.11	-9.5	5.8	5.1	3.1
rail	0.23	0.48	0.46	0.40	0.39	0.38	0.38	0.37	0.36	7.0	-1.6	-0.3	-0.5
aviation	0.24	0.19	0.14	0.17	0.22	0.29	0.38	0.46	0.53	-5.3	4.8	5.4	3.4
inland navigation	0.31	0.10	0.11	0.10	0.10	0.10	0.09	0.09	0.09	-9.7	-1.4	-0.8	-0.6
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	21.1	25.6	33.9	36.5	40.0	37.6	35.8	33.0	30.8	4.8	1.7	-1.1	-1.5
freight transport (toe/Mtkm)	31.6	32.0	32.8	36.5	36.1	37.1	36.7	37.0	36.6	0.4	1.0	0.2	0.0

Source: ACE Model

SLOVAKIA: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**5.28**	**4.92**	**5.99**	**6.30**	**5.25**	**5.20**	**5.15**	**3.93**	**3.95**	**1.3**	**-1.3**	**-0.2**	**-2.6**
Solids	1.40	1.10	1.02	1.37	1.67	1.51	1.30	1.30	1.14	-3.1	5.1	-2.5	-1.3
Oil	0.08	0.08	0.06	0.05	0.05	0.05	0.05	0.05	0.05	-2.5	-1.8	-0.4	-0.1
Natural gas	0.34	0.26	0.13	0.09	0.08	0.07	0.07	0.07	0.07	-9.1	-5.0	-1.3	-0.5
Nuclear	3.14	2.98	4.30	4.26	2.83	2.83	2.83	1.41	1.41	3.2	-4.1	0.0	-6.7
Renewable energy sources	0.33	0.50	0.49	0.52	0.62	0.73	0.90	1.11	1.29	4.0	2.4	3.8	3.7
Hydro	0.16	0.43	0.41	0.42	0.43	0.44	0.46	0.47	0.48	9.7	0.6	0.6	0.5
Biomass	0.17	0.08	0.08	0.07	0.11	0.19	0.31	0.47	0.61	-7.1	3.7	10.3	7.2
Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Wind	0.00	0.00	0.00	0.03	0.07	0.09	0.12	0.14	0.15			6.1	2.3
Solar and others	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.04			6.5	9.2
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**16.78**	**12.44**	**11.55**	**12.41**	**13.68**	**14.70**	**15.65**	**16.79**	**17.29**	**-3.7**	**1.7**	**1.4**	**1.0**
Solids	6.00	4.15	3.43	2.65	2.77	2.96	3.41	3.68	3.80	-5.5	-2.1	2.1	1.1
Oil	4.72	3.65	2.65	3.76	4.17	4.71	5.29	5.84	6.45	-5.6	4.6	2.4	2.0
Crude oil and Feedstocks	6.16	5.38	5.27	6.13	6.92	7.79	8.76	9.77	10.61	-1.5	2.8	2.4	1.9
Oil products	-1.43	-1.73	-2.62	-2.37	-2.75	-3.09	-3.47	-3.93	-4.16				
Natural gas	5.60	4.53	5.71	6.21	6.84	7.10	7.01	7.16	6.98	0.2	1.8	0.2	0.0
Electricity	0.45	0.12	-0.23	-0.21	-0.09	-0.06	-0.06	0.11	0.06				
Gross Inland Consumption	**21.68**	**17.75**	**17.47**	**18.70**	**18.93**	**19.89**	**20.80**	**20.72**	**21.25**	**-2.1**	**0.8**	**0.9**	**0.2**
Solids	7.72	5.50	4.27	4.02	4.44	4.47	4.71	4.97	4.94	-5.7	0.4	0.6	0.5
Oil	4.71	3.43	2.87	3.81	4.21	4.76	5.33	5.89	6.49	-4.8	3.9	2.4	2.0
Natural gas	5.34	5.22	5.77	6.31	6.92	7.17	7.08	7.23	7.05	0.8	1.8	0.2	0.0
Nuclear	3.14	2.98	4.30	4.26	2.83	2.83	2.83	1.41	1.41	3.2	-4.1	0.0	-6.7
Electricity	0.45	0.12	-0.23	-0.21	-0.09	-0.06	-0.06	0.11	0.06				
Renewable energy forms	0.33	0.50	0.49	0.52	0.62	0.73	0.90	1.11	1.29	4.0	2.4	3.8	3.7
as % in Gross Inland Consumption													
Solids	35.6	31.0	24.5	21.5	23.4	22.5	22.7	24.0	23.3				
Oil	21.7	19.4	16.4	20.4	22.3	23.9	25.6	28.4	30.6				
Natural gas	24.6	29.4	33.1	33.7	36.6	36.1	34.0	34.9	33.2				
Nuclear	14.5	16.8	24.6	22.8	15.0	14.2	13.6	6.8	6.6				
Renewable energy forms	1.5	2.8	2.8	2.8	3.3	3.7	4.3	5.3	6.1				
Electricity Generation in TWhe	**23.43**	**26.04**	**30.44**	**33.73**	**36.60**	**42.14**	**47.66**	**50.46**	**54.17**	**2.6**	**1.9**	**2.7**	**1.3**
Nuclear	12.15	11.54	16.64	16.50	10.98	10.98	10.97	5.47	5.47	3.2	-4.1	0.0	-6.7
Hydro & wind	1.88	4.96	4.73	5.15	5.76	6.16	6.71	7.14	7.35	9.7	2.0	1.5	0.9
Thermal (incl. biomass)	9.41	9.54	9.07	12.09	19.86	25.00	29.99	37.85	41.36	-0.4	8.2	4.2	3.3
Fuel Inputs for Thermal Power Generation	**3.09**	**2.19**	**1.93**	**2.81**	**4.14**	**5.14**	**6.08**	**7.30**	**7.95**	**-4.6**	**7.9**	**3.9**	**2.7**
Solids	2.19	1.68	1.35	1.57	2.25	2.69	3.16	3.64	3.79	-4.7	5.3	3.5	1.8
Oil	0.25	0.12	0.04	0.23	0.30	0.43	0.59	0.71	0.97	-16.8	22.5	7.0	5.2
Gas	0.65	0.39	0.55	0.96	1.50	1.86	2.10	2.61	2.80	-1.7	10.7	3.4	2.9
Biomass - Waste	0.00	0.00	0.00	0.06	0.09	0.15	0.23	0.34	0.40			9.5	5.7
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**9.29**	**10.25**	**10.03**	**9.90**	**10.38**	**10.84**	**11.47**	**12.22**	**12.91**	**0.8**	**0.3**	**1.0**	**1.2**
Refineries	6.59	5.25	5.76	6.18	6.97	7.85	8.83	9.86	10.76	-1.3	1.9	2.4	2.0
District heating	0.03	2.95	2.33	1.75	1.66	1.43	1.20	0.98	0.78	52.3	-3.3	-3.2	-4.2
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.09	0.18			26.9	14.9
Others	2.66	2.05	1.94	1.97	1.74	1.55	1.40	1.29	1.19	-3.1	-1.1	-2.2	-1.6
Energy Branch Consumption	**0.90**	**0.88**	**0.92**	**0.94**	**0.95**	**1.00**	**1.06**	**1.10**	**1.14**	**0.3**	**0.3**	**1.0**	**0.7**
Non-Energy Uses	**2.28**	**1.13**	**1.61**	**1.72**	**1.81**	**1.90**	**1.99**	**2.06**	**2.13**	**-3.4**	**1.2**	**0.9**	**0.7**
Final Energy Demand	**14.64**	**9.82**	**9.63**	**10.28**	**10.84**	**11.47**	**12.14**	**12.71**	**13.14**	**-4.1**	**1.2**	**1.1**	**0.8**
by sector													
Industry	8.11	4.02	4.27	4.35	4.36	4.32	4.32	4.30	4.24	-6.2	0.2	-0.1	-0.2
Residential	2.40	2.09	2.32	2.61	2.82	2.97	3.09	3.19	3.26	-0.3	2.0	0.9	0.5
Tertiary	3.06	2.33	1.60	1.59	1.64	1.75	1.89	2.03	2.16	-6.3	0.2	1.4	1.4
Transport	1.08	1.37	1.45	1.73	2.03	2.42	2.83	3.19	3.48	3.0	3.4	3.4	2.1
by fuel													
Solids	4.27	1.87	1.41	1.25	1.07	0.85	0.77	0.69	0.63	-10.5	-2.7	-3.2	-2.0
Oil	3.22	1.65	1.74	2.06	2.34	2.70	3.08	3.48	3.80	-6.0	3.0	2.8	2.1
Gas	4.32	3.78	4.03	4.24	4.35	4.33	4.11	3.86	3.61	-0.7	0.8	-0.6	-1.3
Electricity	2.01	1.87	1.89	2.14	2.44	2.86	3.26	3.60	3.84	-0.6	2.6	2.9	1.6
Heat (from CHP and District Heating)	0.65	0.65	0.55	0.58	0.61	0.70	0.84	0.98	1.17	-1.6	1.0	3.3	3.3
Other	0.17	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10	-24.7	11.0	8.6	4.5
CO_2 Emissions (Mt of CO_2)	**51.4**	**40.7**	**36.0**	**37.3**	**41.6**	**43.8**	**46.2**	**49.1**	**50.1**	**-3.5**	**1.5**	**1.0**	**0.8**
Electricity and Steam production	11.3	17.6	13.8	14.6	18.7	21.0	23.1	25.9	27.1	2.0	3.1	2.1	1.6
Energy Branch	1.5	1.1	1.3	1.2	1.1	1.1	1.0	0.9	0.9	-1.4	-1.3	-1.2	-1.2
Industry	22.1	10.2	10.6	10.4	9.8	8.6	7.9	7.1	6.6	-7.1	-0.8	-2.2	-1.7
Residential	5.8	3.5	3.6	3.9	4.0	4.0	4.0	3.9	3.7	-4.8	1.1	-0.1	-0.8
Tertiary	7.8	4.5	2.6	2.3	2.3	2.2	2.2	2.2	2.2	-10.2	-1.5	-0.4	-0.2
Transport	2.9	3.7	4.1	4.9	5.8	6.9	8.0	9.0	9.7	3.4	3.6	3.4	1.9
CO_2 Emissions Index (1990=100)	**100.0**	**79.1**	**70.0**	**72.6**	**80.9**	**85.2**	**89.8**	**95.4**	**97.5**				

See explanations on page 219

Source: ACE Model

SLOVAKIA: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	5.30	5.36	5.40	5.42	5.42	5.42	5.37	5.32	5.23	0.2	0.0	-0.1	-0.3
GDP (in 000 MEuro'00)	21.4	18.4	22.1	26.7	32.5	39.2	46.7	54.1	61.6	0.3	3.9	3.7	2.8
Gross Inl. Cons./GDP (toe/MEuro'00)	1014.0	965.9	789.8	700.4	582.2	508.0	445.9	382.7	344.9	-2.5	-3.0	-2.6	-2.5
Gross Inl. Cons./Capita (toe/inhabitant)	4.09	3.31	3.23	3.45	3.49	3.67	3.87	3.90	4.07	-2.3	0.8	1.0	0.5
Electricity Generated/Capita (kWh/inhabitant)	4422	4855	5635	6223	6750	7772	8875	9487	10365	2.5	1.8	2.8	1.6
Carbon intensity (t of CO_2/toe of GIC)	2.37	2.29	2.06	2.00	2.20	2.20	2.22	2.37	2.36	-1.4	0.6	0.1	0.6
CO_2 Emissions/Capita (t of CO_2/inhabitant)	9.71	7.58	6.66	6.89	7.68	8.08	8.59	9.23	9.59	-3.7	1.4	1.1	1.1
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	2.4	2.2	1.6	1.4	1.3	1.1	1.0	0.9	0.8	-3.8	-2.4	-2.5	-1.9
Import Dependency %	77.4	70.1	66.1	66.3	72.3	73.9	75.3	81.0	81.4				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	58.4	54.5	46.7	38.9	32.1	26.8	22.7	19.6	-5.9	-3.3	-3.7	-3.1
Residential (Energy on Private Income)	100.0	112.6	111.9	108.1	96.6	83.8	72.5	64.4	57.7	1.1	-1.5	-2.8	-2.3
Tertiary (Energy on Value added)	100.0	83.3	46.9	37.0	31.0	27.2	24.5	22.6	21.1	-7.3	-4.1	-2.3	-1.5
Transport (Energy on GDP)	100.0	147.8	129.4	128.1	123.3	122.2	120.1	116.6	111.8	2.6	-0.5	-0.3	-0.7
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.34	0.49	0.36	0.34	0.41	0.40	0.38	0.40	0.38	0.5	1.4	-0.6	-0.1
Final energy demand (t of CO_2/toe)	2.64	2.23	2.17	2.09	2.01	1.90	1.82	1.75	1.68	-1.9	-0.8	-1.0	-0.7
Industry	2.72	2.54	2.49	2.39	2.24	1.99	1.82	1.66	1.56	-0.9	-1.0	-2.1	-1.5
Residential	2.43	1.69	1.55	1.49	1.42	1.36	1.29	1.22	1.12	-4.4	-0.8	-1.0	-1.4
Tertiary	2.55	1.92	1.65	1.48	1.38	1.28	1.15	1.07	0.99	-4.2	-1.8	-1.8	-1.5
Transport	2.70	2.72	2.81	2.84	2.84	2.85	2.84	2.82	2.79	0.4	0.1	0.0	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**6.56**	**7.84**	**8.98**	**9.70**	**10.99**	**12.23**	**12.58**	**13.24**		**2.2**	**2.3**	**0.8**
Nuclear		1.76	2.64	2.64	1.76	1.76	1.76	0.88	0.88		-4.0	0.0	-6.7
Hydro (pumping excluded)		1.67	1.73	1.79	1.85	1.91	1.97	2.03	2.08		0.7	0.6	0.5
Wind and solar		0.00	0.00	0.16	0.40	0.53	0.73	0.88	0.92			6.1	2.4
Thermal		3.13	3.47	4.39	5.69	6.79	7.77	8.79	9.35		5.1	3.2	1.9
of which cogeneration units		*0.85*	*0.66*	*0.15*	*0.27*	*0.58*	*0.88*	*1.05*	*1.40*		*-8.4*	*12.4*	*4.8*
Open cycle (incl. biomass-waste)		2.91	3.04	3.08	3.33	3.88	4.11	4.52	4.78		0.9	2.1	1.5
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.03	0.08	0.22	0.45	0.54			20.7	9.4
Gas Turbines Combined Cycle		0.00	0.22	0.96	1.82	2.21	2.69	2.98	3.10		23.8	4.0	1.4
Small Gas Turbines		0.22	0.22	0.35	0.51	0.62	0.76	0.85	0.94		8.9	4.1	2.2
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		37.4	40.4	37.0	41.3	42.1	42.9	45.1	45.4				
Load factor for gross electric capacities (%)		45.3	44.3	42.9	43.1	43.8	44.5	45.8	46.7				
CHP indicator (% of electricity from CHP)		0.0	0.0	0.8	1.8	4.2	7.2	10.3	14.2				
Non fossil fuels in electricity generation (%)		63.4	70.2	64.4	46.3	41.7	38.6	27.4	26.5				
nuclear		44.3	54.7	48.9	30.0	26.0	23.0	10.8	10.1				
renewable energy forms		19.1	15.5	15.5	16.4	15.7	15.6	16.6	16.4				
of which waste		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*				
Transport sector													
Passenger transport activity (Gpkm)	**29.8**	**32.8**	**34.2**	**37.8**	**43.7**	**51.3**	**59.4**	**67.5**	**75.3**	**1.4**	**2.5**	**3.1**	**2.4**
public road transport	12.0	11.2	7.8	6.9	6.4	6.5	6.7	7.0	7.3	-4.2	-2.0	0.5	0.9
private cars and motorcycles	13.5	17.2	23.3	27.9	33.9	40.7	47.4	53.7	59.6	5.6	3.8	3.4	2.3
rail	4.2	4.2	2.9	2.8	3.0	3.4	3.9	4.3	4.8	-3.7	0.5	2.4	2.2
aviation	0.0	0.2	0.2	0.2	0.3	0.7	1.4	2.4	3.6		6.6	15.6	10.1
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
travel per person (km per capita)	**5619**	**6106**	**6324**	**6976**	**8062**	**9470**	**11052**	**12697**	**14403**	**1.2**	**2.5**	**3.2**	**2.7**
Freight transport activity (Gtkm)	**23.2**	**19.0**	**14.8**	**16.2**	**18.7**	**22.0**	**26.1**	**30.1**	**34.0**	**-4.4**	**2.4**	**3.4**	**2.7**
trucks	5.4	5.2	5.0	7.7	10.3	13.5	17.3	21.0	24.5	-0.8	7.6	5.3	3.5
rail	17.9	13.8	9.8	8.5	8.4	8.5	8.8	9.1	9.5	-5.8	-1.5	0.5	0.8
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
freight activity per unit of GDP (tkm/000 Euro'00)	**1085**	**1032**	**668**	**608**	**576**	**563**	**560**	**556**	**552**	**-4.7**	**-1.5**	**-0.3**	**-0.1**
Energy demand in transport (Mtoe)	**1.08**	**1.37**	**1.45**	**1.73**	**2.03**	**2.42**	**2.83**	**3.19**	**3.48**	**3.0**	**3.4**	**3.4**	**2.1**
public road transport	0.15	0.16	0.14	0.12	0.11	0.11	0.11	0.11	0.10	-0.9	-2.1	-0.3	-0.8
private cars and motorcycles	0.46	0.66	0.88	1.04	1.24	1.45	1.63	1.73	1.81	6.7	3.5	2.7	1.1
trucks	0.37	0.40	0.31	0.45	0.55	0.70	0.86	1.03	1.18	-1.6	5.9	4.5	3.2
rail	0.10	0.12	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-1.9	-0.8	0.5	-0.1
aviation	0.00	0.04	0.03	0.03	0.04	0.08	0.16	0.24	0.32		3.3	14.0	7.3
inland navigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	22.1	28.0	32.0	32.8	32.9	32.8	32.7	31.5	30.3	3.8	0.3	-0.1	-0.8
freight transport (toe/Mtkm)	18.2	24.0	24.0	30.0	31.3	33.3	34.0	35.2	35.3	2.8	2.7	0.8	0.4

Source: ACE Model

SLOVENIA: BASELINE SCENARIO — SUMMARY ENERGY BALANCE AND INDICATORS (A)													
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**2.37**	**2.61**	**3.11**	**2.99**	**2.70**	**2.37**	**2.43**	**1.17**	**1.16**	**2.7**	**-1.4**	**-1.1**	**-7.1**
Solids	0.89	0.83	1.06	0.90	0.63	0.32	0.31	0.30	0.29	1.7	-5.1	-6.9	-0.7
Oil	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	18.0			
Natural gas	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-10.8	-7.1	-1.8	-0.5
Nuclear	1.20	1.25	1.24	1.22	1.20	1.20	1.23	0.00	0.00	0.3	-0.3	0.2	
Renewable energy sources	0.25	0.51	0.79	0.87	0.86	0.85	0.89	0.87	0.88	12.0	0.9	0.3	-0.2
Hydro	0.25	0.28	0.33	0.38	0.39	0.40	0.41	0.41	0.41	2.7	1.6	0.7	-0.2
Biomass	0.00	0.23	0.41	0.44	0.41	0.36	0.35	0.33	0.34		-0.1	-1.6	-0.3
Waste	0.00	0.00	0.05	0.05	0.06	0.07	0.09	0.09	0.09		3.0	3.0	0.0
Wind	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.04	0.04			23.1	0.6
Solar and others	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01			6.0	3.4
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Net Imports	**2.50**	**2.95**	**3.46**	**3.88**	**4.26**	**4.63**	**4.93**	**5.38**	**5.42**	**3.3**	**2.1**	**1.5**	**0.9**
Solids	0.11	0.06	0.25	0.11	0.15	0.20	0.37	0.36	0.39	8.4	-5.0	9.5	0.6
Oil	1.82	2.29	2.47	2.65	2.79	2.88	2.93	3.01	3.05	3.1	1.2	0.5	0.4
Crude oil and Feedstocks	0.60	0.61	0.16	0.20	0.20	0.20	0.21	0.20	0.20	-12.5	2.6	0.0	-0.1
Oil products	1.23	1.68	2.31	2.45	2.59	2.67	2.73	2.81	2.84	6.5	1.1	0.5	0.4
Natural gas	0.65	0.75	0.86	1.21	1.38	1.59	2.03	1.94	1.92	2.9	4.8	3.9	-0.5
Electricity	-0.08	-0.14	-0.11	-0.09	-0.06	-0.03	-0.40	0.07	0.06				
Gross Inland Consumption	**4.63**	**5.61**	**6.54**	**6.87**	**6.96**	**7.00**	**7.36**	**6.55**	**6.58**	**3.5**	**0.6**	**0.6**	**-1.1**
Solids	1.09	0.88	1.31	1.01	0.78	0.51	0.67	0.66	0.67	1.8	-5.1	-1.4	0.0
Oil	1.77	2.34	2.45	2.65	2.79	2.88	2.93	3.01	3.05	3.3	1.3	0.5	0.4
Natural gas	0.64	0.75	0.87	1.21	1.38	1.59	2.03	1.94	1.92	3.0	4.8	3.9	-0.5
Nuclear	1.20	1.25	1.24	1.22	1.20	1.20	1.23	0.00	0.00	0.3	-0.3	0.2	
Electricity	-0.34	-0.14	-0.11	-0.09	-0.06	-0.03	-0.40	0.07	0.06				
Renewable energy forms	0.25	0.54	0.79	0.87	0.86	0.85	0.89	0.87	0.88	12.0	0.9	0.3	-0.2
as % in Gross Inland Consumption													
Solids	23.5	15.7	20.0	14.7	11.2	7.3	9.2	10.1	10.2				
Oil	38.3	41.7	37.5	38.5	40.1	41.1	39.9	46.0	46.3				
Natural gas	13.9	13.3	13.3	17.7	19.9	22.8	27.6	29.6	29.2				
Nuclear	26.0	22.2	19.0	17.7	17.3	17.1	16.7	0.0	0.0				
Renewable energy forms	5.5	9.7	12.0	12.6	12.4	12.1	12.1	13.2	13.3				
Electricity Generation in TWhe	**15.39**	**12.65**	**13.62**	**14.14**	**14.67**	**15.36**	**20.43**	**15.73**	**16.54**	**-1.2**	**0.7**	**3.4**	**-2.1**
Nuclear	4.66	4.82	4.80	4.72	4.66	4.63	4.76	0.00	0.00	0.3	-0.3	0.2	
Hydro & wind	2.95	3.24	3.83	4.41	4.54	4.76	5.25	5.16	5.19	2.7	1.7	1.5	-0.1
Thermal (incl. biomass)	7.78	4.59	4.99	5.01	5.47	5.98	10.42	10.58	11.35	-4.3	0.9	6.7	0.9
Fuel Inputs for Thermal Power Generation	**1.08**	**0.95**	**1.31**	**1.21**	**1.22**	**1.18**	**1.88**	**1.92**	**2.01**	**1.9**	**-0.7**	**4.4**	**0.7**
Solids	0.84	0.74	1.21	0.92	0.71	0.45	0.62	0.62	0.64	3.7	-5.3	-1.2	0.2
Oil	0.16	0.12	0.01	0.03	0.14	0.19	0.25	0.33	0.38	-22.8	28.1	6.1	4.2
Gas	0.08	0.09	0.07	0.25	0.33	0.47	0.90	0.84	0.87	-2.3	17.4	10.7	-0.4
Biomass - Waste	0.00	0.00	0.02	0.01	0.05	0.07	0.11	0.12	0.13		12.0	8.2	2.0
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**0.63**	**0.70**	**0.28**	**0.28**	**0.29**	**0.29**	**0.31**	**0.33**	**0.38**	**-7.8**	**0.2**	**0.7**	**2.1**
Refineries	0.59	0.62	0.19	0.20	0.21	0.21	0.22	0.23	0.25	-10.6	0.7	0.6	1.4
District heating	0.04	0.08	0.09	0.08	0.08	0.07	0.06	0.05	0.04	7.2	-1.3	-2.0	-3.9
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.05	0.09			23.2	12.5
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Energy Branch Consumption	**0.11**	**0.12**	**0.11**	**0.12**	**0.12**	**0.13**	**0.13**	**0.13**	**0.14**	**-0.1**	**0.7**	**0.7**	**0.4**
Non-Energy Uses	**0.01**	**0.12**	**0.25**	**0.26**	**0.28**	**0.29**	**0.31**	**0.32**	**0.33**	**45.1**	**0.8**	**1.0**	**0.8**
Final Energy Demand	**3.25**	**3.98**	**4.59**	**4.94**	**5.13**	**5.27**	**5.32**	**5.33**	**5.31**	**3.5**	**1.1**	**0.4**	**0.0**
by sector													
Industry	1.36	1.19	1.44	1.60	1.70	1.74	1.75	1.76	1.76	0.6	1.6	0.3	0.0
Residential	0.61	1.18	1.17	1.18	1.20	1.25	1.28	1.30	1.31	6.7	0.3	0.6	0.3
Tertiary	0.33	0.26	0.60	0.64	0.66	0.68	0.69	0.69	0.70	6.1	0.9	0.4	0.1
Transport	0.95	1.35	1.38	1.53	1.57	1.61	1.61	1.59	1.55	3.8	1.3	0.3	-0.4
by fuel													
Solids	0.20	0.11	0.10	0.09	0.07	0.06	0.05	0.04	0.03	-6.8	-3.0	-3.7	-3.4
Oil	1.54	2.14	2.29	2.46	2.49	2.51	2.51	2.50	2.49	4.0	0.8	0.1	-0.1
Gas	0.50	0.47	0.60	0.76	0.85	0.91	0.91	0.88	0.84	1.8	3.5	0.7	-0.8
Electricity	0.84	0.81	0.90	0.97	1.03	1.11	1.18	1.24	1.29	0.8	1.3	1.3	0.9
Heat (from CHP and District Heating)	0.18	0.19	0.20	0.20	0.27	0.31	0.37	0.41	0.44	1.0	3.5	2.9	1.7
Other	0.00	0.26	0.51	0.47	0.42	0.36	0.31	0.26	0.22		-2.0	-3.0	-3.2
CO_2 Emissions (Mt of CO_2)	**10.9**	**11.9**	**14.1**	**14.2**	**14.0**	**13.6**	**15.4**	**15.3**	**15.4**	**2.6**	**0.0**	**0.9**	**0.0**
Electricity and Steam production	4.3	3.9	5.4	4.7	4.3	3.7	5.6	5.6	5.9	2.3	-2.3	2.6	0.6
Energy Branch	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	4.9	-0.2	1.0	0.1
Industry	2.3	1.9	2.3	2.6	2.8	2.8	2.7	2.6	2.5	0.0	1.9	-0.2	-0.7
Residential	1.1	2.1	1.4	1.4	1.3	1.4	1.5	1.5	1.6	2.4	0.0	1.0	0.7
Tertiary	0.5	0.0	1.0	1.0	1.1	1.0	1.0	1.0	0.9	6.5	0.5	-0.6	-0.4
Transport	2.7	3.9	4.0	4.4	4.5	4.6	4.6	4.5	4.3	3.9	1.3	0.2	-0.6
CO_2 Emissions Index (1990=100)	**100.0**	**108.6**	**128.7**	**129.8**	**128.2**	**124.6**	**140.7**	**140.0**	**140.3**				

See explanations on page 219

Source: ACE Model

SLOVENIA:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	2.00	1.99	1.99	1.98	1.95	1.93	1.89	1.85	1.80	0.0	-0.2	-0.3	-0.5
GDP (in 000 MEuro'00)	16.9	16.5	20.3	24.3	28.6	32.4	35.9	39.3	42.6	1.8	3.5	2.3	1.7
Gross Inl. Cons./GDP (toe/MEuro'00)	273.1	341.1	321.6	282.7	243.2	216.0	205.2	167.0	154.5	1.6	-2.8	-1.7	-2.8
Gross Inl. Cons./Capita (toe/inhabitant)	2.32	2.82	3.29	3.47	3.56	3.63	3.90	3.54	3.66	3.6	0.8	0.9	-0.6
Electricity Generated/Capita (kWh/inhabitant)	7704	6365	6846	7148	7512	7968	10817	8510	9211	-1.2	0.9	3.7	-1.6
Carbon intensity (t of CO_2/toe of GIC)	2.37	2.12	2.15	2.07	2.02	1.95	2.09	2.34	2.33	-0.9	-0.6	0.4	1.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	5.48	5.98	7.08	7.18	7.19	7.07	8.15	8.29	8.55	2.6	0.2	1.3	0.5
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	0.6	0.7	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.7	-3.4	-1.3	-1.7
Import Dependency %	54.0	52.6	52.9	56.4	61.2	66.2	67.0	82.2	82.3				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	106.7	102.5	93.4	84.5	76.1	69.1	63.5	59.1	0.2	-1.9	-2.0	-1.5
Residential (Energy on Private Income)	100.0	176.0	147.6	126.4	109.0	99.1	91.3	84.6	78.4	4.0	-3.0	-1.8	-1.5
Tertiary (Energy on Value added)	100.0	73.9	143.0	125.3	109.1	96.5	87.4	79.7	73.2	3.6	-2.7	-2.2	-1.8
Transport (Energy on GDP)	100.0	147.1	121.3	112.6	98.0	88.9	80.3	72.4	65.2	1.9	-2.1	-2.0	-2.1
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.24	0.26	0.33	0.28	0.23	0.19	0.22	0.27	0.26	3.2	-3.4	-0.6	1.9
Final energy demand (t of CO_2/toe)	2.03	2.00	1.88	1.92	1.89	1.87	1.84	1.80	1.77	-0.8	0.1	-0.3	-0.4
Industry	1.67	1.57	1.58	1.63	1.63	1.59	1.54	1.49	1.43	-0.6	0.3	-0.5	-0.7
Residential	1.75	1.81	1.16	1.21	1.12	1.16	1.17	1.18	1.23	-4.0	-0.4	0.4	0.5
Tertiary	1.58	0.13	1.65	1.60	1.59	1.51	1.44	1.39	1.36	0.4	-0.4	-1.0	-0.6
Transport	2.88	2.91	2.89	2.89	2.88	2.87	2.85	2.83	2.79	0.1	0.0	-0.1	-0.2
Electricity and steam generation													
Generation Capacity in GWe		**2.85**	**2.94**	**3.21**	**3.39**	**3.66**	**4.70**	**4.17**	**4.39**		**1.4**	**3.3**	**-0.7**
Nuclear		0.66	0.66	0.66	0.66	0.66	0.66	0.00	0.00		0.0	0.0	
Hydro (pumping excluded)		0.91	0.94	1.11	1.16	1.21	1.21	1.21	1.21		2.0	0.4	0.0
Wind and solar		0.00	0.00	0.01	0.03	0.06	0.20	0.20	0.22			23.0	0.9
Thermal		1.28	1.33	1.43	1.54	1.73	2.63	2.76	2.97		1.5	5.5	1.2
of which cogeneration units		*0.30*	*0.25*	*0.27*	*0.50*	*0.62*	*0.74*	*0.87*	*1.01*		*7.2*	*4.0*	*3.2*
Open cycle (incl. biomass-waste)		1.28	1.09	1.04	0.96	0.76	0.95	1.01	1.10		-1.3	-0.1	1.5
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.00	0.02	0.10	0.11	0.13			49.4	2.5
Gas Turbines Combined Cycle		0.00	0.24	0.37	0.51	0.82	1.36	1.40	1.45		7.9	10.2	0.6
Small Gas Turbines		0.00	0.00	0.02	0.07	0.13	0.22	0.25	0.29			12.2	2.8
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		43.2	34.2	36.9	40.5	45.5	49.1	49.2	50.3				
Load factor for gross electric capacities (%)		50.6	52.9	50.2	49.4	47.9	49.7	43.1	43.0				
CHP indicator (% of electricity from CHP)		18.0	13.8	12.1	19.2	21.4	19.8	30.7	32.4				
Non fossil fuels in electricity generation (%)		63.7	63.9	64.9	64.1	63.1	51.4	36.4	35.2				
nuclear		38.1	35.3	33.4	31.8	30.1	23.3	0.0	0.0				
renewable energy forms		25.6	28.7	31.5	32.3	33.0	28.1	36.4	35.2				
of which waste		*0.0*	*0.0*	*0.2*	*0.8*	*1.1*	*1.3*	*1.9*	*1.9*				
Transport sector													
Passenger transport activity (Gpkm)	**18.4**	**22.7**	**25.3**	**28.0**	**30.1**	**31.4**	**32.4**	**33.2**	**33.8**	**3.2**	**1.8**	**0.7**	**0.4**
public road transport	7.1	3.0	2.4	2.1	2.1	2.1	2.1	2.1	2.2	-10.1	-1.4	0.1	0.1
private cars and motorcycles	8.9	18.4	21.4	24.1	25.8	26.5	27.0	27.3	27.6	9.2	1.9	0.5	0.2
rail	1.4	0.6	0.7	0.8	0.8	0.9	0.9	0.9	0.9	-6.9	1.8	0.6	0.4
aviation	1.0	0.6	0.7	1.0	1.4	1.9	2.4	2.8	3.2	-2.8	6.5	5.6	3.1
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
travel per person (km per capita)	**9188**	**11396**	**12692**	**14131**	**15407**	**16293**	**17164**	**17935**	**18835**	**3.3**	**2.0**	**1.1**	**0.9**
Freight transport activity (Gtkm)	**7.7**	**4.8**	**4.5**	**5.1**	**5.9**	**6.6**	**7.3**	**7.9**	**8.6**	**-5.3**	**2.8**	**2.2**	**1.6**
trucks	3.5	1.7	1.9	3.0	3.8	4.5	5.2	5.8	6.3	-6.0	7.2	3.1	2.1
rail	4.2	3.1	2.6	2.1	2.1	2.1	2.1	2.2	2.2	-4.8	-2.1	0.3	0.5
inland navigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
freight activity per unit of GDP (tkm/000 Euro'00)	**455**	**292**	**219**	**209**	**205**	**204**	**203**	**202**	**201**	**-7.1**	**-0.7**	**-0.1**	**-0.1**
Energy demand in transport (Mtoe)	**0.95**	**1.35**	**1.38**	**1.53**	**1.57**	**1.61**	**1.61**	**1.59**	**1.55**	**3.8**	**1.3**	**0.3**	**-0.4**
public road transport	0.13	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	-7.2	-1.7	-0.6	-1.1
private cars and motorcycles	0.43	1.04	1.09	1.17	1.16	1.15	1.11	1.06	1.00	9.9	0.6	-0.4	-1.1
trucks	0.34	0.19	0.16	0.24	0.28	0.32	0.35	0.39	0.42	-7.0	5.5	2.4	1.7
rail	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	1.7	-0.9	-0.8	-1.3
aviation	0.03	0.02	0.03	0.04	0.05	0.06	0.07	0.07	0.07	0.3	5.5	3.8	-0.2
inland navigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	32.4	50.3	47.4	45.6	42.4	40.6	38.4	35.8	33.3	3.9	-1.1	-1.0	-1.4
freight transport (toe/Mtkm)	45.7	44.3	41.0	49.8	49.8	50.7	49.9	50.3	49.7	-1.1	2.0	0.0	0.0

Source: ACE Model

SWITZERLAND: BASELINE SCENARIO								SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**9.78**	**11.04**	**11.79**	**12.09**	**12.34**	**12.33**	**12.30**	**10.44**	**8.92**	**1.9**	**0.5**	**0.0**	**-3.2**
Solids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Nuclear	6.18	6.51	6.91	6.79	6.84	6.82	6.78	4.40	2.29	1.1	-0.1	-0.1	-10.3
Renewable energy sources	3.60	4.53	4.88	5.31	5.50	5.51	5.52	6.04	6.62	3.1	1.2	0.0	1.8
Hydro	2.56	3.02	3.17	3.08	3.08	3.10	3.08	3.26	3.41	2.1	-0.3	0.0	1.0
Biomass	0.42	0.59	0.56	1.38	1.53	1.52	1.51	1.57	1.67	2.9	10.5	-0.1	1.0
Waste	0.55	0.83	1.03	0.80	0.82	0.79	0.78	0.89	0.97	6.4	-2.2	-0.5	2.2
Wind	0.00	0.00	0.00	0.01	0.02	0.04	0.05	0.18	0.36		55.4	9.4	21.4
Solar and others	0.00	0.02	0.02	0.04	0.05	0.06	0.09	0.14	0.21		6.8	7.1	8.6
Geothermal	0.06	0.08	0.09	0.00	0.00	0.00	0.00	0.00	0.00	4.1			
Net Imports	**15.16**	**13.90**	**14.28**	**16.44**	**17.12**	**17.90**	**18.67**	**20.43**	**21.51**	**-0.6**	**1.8**	**0.9**	**1.4**
Solids	0.34	0.16	0.19	0.27	0.26	0.25	0.24	0.25	0.27	-5.6	3.3	-0.9	1.4
Oil	13.38	12.17	12.26	13.33	13.05	12.86	12.52	12.62	12.57	-0.9	0.6	-0.4	0.0
Crude oil and Feedstocks	3.23	4.81	4.80	4.78	4.67	4.56	4.41	4.33	4.21	4.0	-0.3	-0.6	-0.5
Oil products	10.15	7.37	7.46	8.55	8.38	8.30	8.12	8.29	8.36	-3.0	1.2	-0.3	0.3
Natural gas	1.63	2.19	2.43	3.45	4.39	5.38	6.45	8.06	9.10	4.1	6.1	3.9	3.5
Electricity	-0.18	-0.63	-0.61	-0.60	-0.58	-0.58	-0.54	-0.50	-0.42				
Gross Inland Consumption	**25.06**	**25.27**	**26.60**	**28.52**	**29.44**	**30.22**	**30.95**	**30.85**	**30.42**	**0.6**	**1.0**	**0.5**	**-0.2**
Solids	0.36	0.19	0.25	0.27	0.26	0.25	0.24	0.25	0.27	-3.5	0.3	-0.9	1.4
Oil	13.46	12.45	12.73	13.31	13.03	12.84	12.51	12.60	12.55	-0.6	0.2	-0.4	0.0
Natural gas	1.63	2.19	2.43	3.45	4.39	5.38	6.45	8.06	9.10	4.1	6.1	3.9	3.5
Nuclear	6.18	6.51	6.91	6.79	6.84	6.82	6.78	4.40	2.29	1.1	-0.1	-0.1	-10.3
Electricity	-0.18	-0.63	-0.61	-0.60	-0.58	-0.58	-0.54	-0.50	-0.42				
Renewable energy forms	3.61	4.54	4.88	5.31	5.50	5.51	5.52	6.04	6.62	3.0	1.2	0.0	1.8
as % in Gross Inland Consumption													
Solids	1.4	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.9				
Oil	53.7	49.3	47.9	46.7	44.3	42.5	40.4	40.8	41.3				
Natural gas	6.5	8.7	9.1	12.1	14.9	17.8	20.8	26.1	29.9				
Nuclear	24.7	25.8	26.0	23.8	23.2	22.6	21.9	14.3	7.5				
Renewable energy forms	14.4	18.0	18.3	18.6	18.7	18.2	17.8	19.6	21.8				
Electricity Generation in TWhe	**54.62**	**62.30**	**65.96**	**67.74**	**69.97**	**71.98**	**74.90**	**78.01**	**82.32**	**1.9**	**0.6**	**0.7**	**0.9**
Nuclear	23.93	25.20	26.77	26.28	26.47	26.39	26.25	17.04	8.88	1.1	-0.1	-0.1	-10.3
Hydro & wind	29.80	35.18	36.85	35.99	36.11	36.52	36.42	40.05	43.83	2.1	-0.2	0.1	1.9
Thermal (incl. biomass)	0.89	1.92	2.34	5.47	7.39	9.06	12.23	20.92	29.61	10.1	12.2	5.2	9.2
Fuel Inputs for Thermal Power Generation	**0.61**	**0.89**	**1.04**	**1.28**	**1.68**	**2.00**	**2.68**	**4.25**	**5.46**	**5.5**	**4.9**	**4.8**	**7.4**
Solids	0.01	0.00	0.00	0.00	0.01	0.02	0.04	0.09	0.16			19.0	13.3
Oil	0.10	0.06	0.01	0.07	0.19	0.25	0.45	0.68	1.03	-18.8	31.1	9.3	8.6
Gas	0.10	0.13	0.18	0.63	0.85	1.08	1.48	2.60	3.28	5.8	16.8	5.8	8.2
Biomass - Waste	0.39	0.71	0.85	0.59	0.64	0.64	0.70	0.88	1.00	7.9	-2.8	0.9	3.7
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**3.18**	**4.83**	**4.81**	**4.99**	**5.13**	**5.08**	**5.05**	**5.10**	**5.06**	**4.2**	**0.7**	**-0.2**	**0.0**
Refineries	3.17	4.83	4.80	4.85	4.84	4.75	4.64	4.60	4.52	4.3	0.1	-0.4	-0.3
District heating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Biofuels and hydrogen production	0.00	0.00	0.00	0.13	0.29	0.33	0.41	0.49	0.54			3.5	2.8
Others	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-11.8	-10.0	-6.6	-6.5
Energy Branch Consumption	**0.33**	**0.47**	**0.46**	**0.46**	**0.45**	**0.44**	**0.44**	**0.44**	**0.44**	**3.4**	**-0.2**	**-0.2**	**0.1**
Non-Energy Uses	**0.56**	**0.52**	**0.57**	**0.58**	**0.59**	**0.60**	**0.61**	**0.62**	**0.63**	**0.2**	**0.3**	**0.3**	**0.3**
Final Energy Demand	**19.42**	**20.10**	**21.27**	**22.00**	**22.58**	**23.22**	**23.63**	**24.35**	**24.81**	**0.9**	**0.6**	**0.5**	**0.5**
by sector													
Industry	3.69	4.02	4.84	5.22	5.62	6.03	6.33	6.51	6.68	2.7	1.5	1.2	0.5
Residential	5.29	5.93	5.60	5.62	5.69	5.78	5.91	6.06	6.24	0.6	0.1	0.4	0.5
Tertiary	4.15	3.71	3.77	3.85	3.99	4.06	4.10	4.13	4.13	-0.9	0.5	0.3	0.1
Transport	6.29	6.44	7.06	7.30	7.29	7.35	7.29	7.65	7.75	1.2	0.3	0.0	0.6
by fuel													
Solids	0.34	0.19	0.25	0.26	0.25	0.23	0.19	0.15	0.12	-3.0	0.0	-2.7	-4.9
Oil	12.29	12.20	12.56	12.47	12.07	11.81	11.27	11.14	10.73	0.2	-0.4	-0.7	-0.5
Gas	1.51	2.05	2.23	2.80	3.50	4.24	4.89	5.39	5.73	4.0	4.6	3.4	1.6
Electricity	4.04	4.19	4.50	4.65	4.86	5.02	5.30	5.58	6.00	1.1	0.8	0.9	1.3
Heat (from CHP and District Heating)	0.25	0.29	0.32	0.32	0.42	0.50	0.66	0.82	0.85	2.5	2.9	4.6	2.6
Other	0.98	1.17	1.41	1.50	1.48	1.42	1.32	1.27	1.37	3.7	0.5	-1.1	0.4
CO_2 Emissions (Mt of CO_2)	**42.8**	**43.3**	**44.9**	**46.9**	**47.9**	**49.5**	**50.8**	**54.8**	**57.0**	**0.5**	**0.7**	**0.6**	**1.2**
Electricity and Steam production	0.6	0.5	0.5	1.7	2.6	3.4	5.1	8.6	11.5	-2.9	19.0	6.9	8.5
Energy Branch	0.4	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	5.5	-0.6	-0.2	-0.4
Industry	5.1	5.2	6.3	7.2	8.1	9.1	9.6	9.9	9.7	2.2	2.5	1.8	0.0
Residential	11.9	12.2	11.2	11.0	10.7	10.5	10.1	9.5	9.0	-0.6	-0.4	-0.6	-1.1
Tertiary	7.1	6.5	6.3	5.9	5.6	5.5	5.3	5.2	5.0	-1.2	-1.1	-0.5	-0.7
Transport	17.7	18.2	20.0	20.5	20.2	20.4	20.1	21.1	21.3	1.2	0.1	-0.1	0.6
CO_2 Emissions Index (1990=100)	**100.0**	**101.2**	**104.9**	**109.7**	**112.1**	**115.8**	**118.8**	**128.1**	**133.4**				

See explanations on page 219

Source: ACE Model

SWITZERLAND:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	6.71	7.04	7.17	7.17	7.18	7.19	7.24	7.29	7.28	0.7	0.0	0.1	0.1
GDP (in 000 MEuro'00)	249.8	248.9	272.3	295.6	332.0	371.4	415.1	460.1	508.0	0.9	2.0	2.3	2.0
Gross Inl. Cons./GDP (toe/MEuro'00)	100.3	101.5	97.7	96.5	88.7	81.4	74.6	67.1	59.9	-0.3	-1.0	-1.7	-2.2
Gross Inl. Cons./Capita (toe/inhabitant)	3.73	3.59	3.71	3.98	4.10	4.20	4.28	4.23	4.18	-0.1	1.0	0.4	-0.2
Electricity Generated/Capita (kWh/inhabitant)	8140	8849	9196	9444	9745	10013	10348	10704	11305	1.2	0.6	0.6	0.9
Carbon intensity (t of CO_2/toe of GIC)	1.71	1.71	1.69	1.64	1.63	1.64	1.64	1.78	1.88	-0.1	-0.4	0.1	1.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	6.37	6.15	6.25	6.54	6.67	6.89	7.02	7.51	7.83	-0.2	0.7	0.5	1.1
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	-0.4	-1.3	-1.6	-0.9
Import Dependency %	60.5	55.0	53.6	57.6	58.1	59.2	60.3	66.2	70.7				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	79.4	86.2	84.4	80.5	75.9	70.9	65.9	61.8	-1.5	-0.7	-1.3	-1.4
Residential (Energy on Private Income)	100.0	108.6	94.8	88.3	79.9	72.5	65.9	60.7	56.3	-0.5	-1.7	-1.9	-1.6
Tertiary (Energy on Value added)	100.0	99.4	93.0	86.9	79.8	71.8	64.4	58.0	52.2	-0.7	-1.5	-2.1	-2.1
Transport (Energy on GDP)	100.0	102.8	103.0	98.1	87.2	78.6	69.7	66.0	60.6	0.3	-1.7	-2.2	-1.4
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.01	0.01	0.01	0.02	0.03	0.04	0.06	0.10	0.12	-4.7	18.1	5.8	7.3
Final energy demand (t of CO_2/toe)	2.15	2.10	2.06	2.03	1.98	1.96	1.91	1.87	1.81	-0.5	-0.4	-0.4	-0.5
Industry	1.38	1.29	1.30	1.38	1.44	1.51	1.52	1.52	1.45	-0.6	1.0	0.6	-0.5
Residential	2.25	2.06	1.99	1.96	1.89	1.82	1.70	1.56	1.44	-1.2	-0.5	-1.0	-1.7
Tertiary	1.70	1.75	1.66	1.52	1.41	1.36	1.30	1.25	1.20	-0.3	-1.6	-0.8	-0.8
Transport	2.82	2.83	2.83	2.81	2.77	2.77	2.75	2.75	2.75	0.0	-0.2	-0.1	0.0
Electricity and steam generation													
Generation Capacity in GWe		**14.99**	**16.03**	**18.94**	**19.52**	**20.13**	**20.84**	**22.15**	**23.93**		**2.0**	**0.7**	**1.4**
Nuclear		3.25	3.25	3.25	3.25	3.25	3.25	2.11	1.10		0.0	0.0	-10.3
Hydro (pumping excluded)		10.79	12.17	12.42	12.68	12.94	13.19	13.40	13.60		0.4	0.4	0.3
Wind and solar		0.01	0.01	0.11	0.15	0.26	0.36	1.16	2.27		30.9	9.4	20.3
Thermal		0.95	0.61	3.16	3.45	3.68	4.04	5.49	6.96		19.0	1.6	5.6
of which cogeneration units		*0.22*	*0.19*	*0.21*	*0.32*	*0.40*	*0.52*	*0.64*	*0.73*		*5.2*	*4.9*	*3.5*
Open cycle (incl. biomass-waste)		0.76	0.42	0.55	0.63	0.52	0.59	0.77	1.01		4.1	-0.8	5.6
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.08	0.09	0.11	0.13	0.23	0.35			3.5	10.7
Gas Turbines Combined Cycle		0.03	0.03	2.04	2.21	2.53	2.76	3.93	5.08		52.3	2.3	6.3
Small Gas Turbines		0.15	0.15	0.48	0.52	0.52	0.57	0.56	0.52		13.1	0.9	-0.9
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		21.8	21.7	37.7	38.7	39.9	40.1	43.0	47.1				
Load factor for gross electric capacities (%)		47.4	47.0	40.8	40.9	40.8	41.0	40.2	39.3				
CHP indicator (% of electricity from CHP)		2.6	2.2	2.1	2.6	3.0	3.8	4.7	4.8				
Non fossil fuels in electricity generation (%)		98.4	98.6	93.9	91.6	89.7	86.2	76.6	68.3				
nuclear		40.4	40.6	38.8	37.8	36.7	35.0	21.8	10.8				
renewable energy forms		57.9	58.0	55.1	53.8	53.0	51.1	54.8	57.5				
of which waste		*1.3*	*1.9*	*1.7*	*1.8*	*1.9*	*2.0*	*2.7*	*3.3*				
Transport sector													
Passenger transport activity (Gpkm)	**101.1**	**106.2**	**110.2**	**113.1**	**116.6**	**121.3**	**127.1**	**133.7**	**138.8**	**0.9**	**0.6**	**0.9**	**0.9**
public road transport	5.7	5.8	6.0	6.0	6.1	6.2	6.3	6.4	6.5	0.5	0.1	0.3	0.4
private cars and motorcycles	82.2	86.4	87.9	89.6	91.4	94.0	97.3	101.2	103.9	0.7	0.4	0.6	0.7
rail	11.1	11.7	13.3	13.7	14.1	14.5	15.0	15.8	16.3	1.8	0.6	0.7	0.8
aviation	1.9	2.2	2.8	3.6	4.9	6.5	8.2	10.2	11.8	3.8	5.8	5.3	3.6
inland navigation	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	5.9	0.1	0.3	0.2
travel per person (km per capita)	**15065**	**15083**	**15362**	**15772**	**16241**	**16869**	**17555**	**18345**	**19060**	**0.2**	**0.6**	**0.8**	**0.8**
Freight transport activity (Gtkm)	**19.7**	**22.9**	**29.4**	**33.3**	**37.3**	**41.3**	**45.6**	**49.9**	**54.6**	**4.1**	**2.4**	**2.0**	**1.8**
trucks	10.6	14.0	18.7	21.9	25.7	29.5	33.6	37.7	42.0	5.8	3.2	2.7	2.2
rail	8.9	8.7	10.7	11.3	11.5	11.6	11.8	12.1	12.5	1.8	0.8	0.2	0.5
inland navigation	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-4.9	-1.0	0.3	0.7
freight activity per unit of GDP (tkm/000 Euro'00)	**79**	**92**	**108**	**113**	**112**	**111**	**110**	**109**	**107**	**3.2**	**0.4**	**-0.2**	**-0.2**
Energy demand in transport (Mtoe)	**6.29**	**6.44**	**7.06**	**7.30**	**7.29**	**7.35**	**7.29**	**7.65**	**7.75**	**1.2**	**0.3**	**0.0**	**0.6**
public road transport	0.10	0.09	0.12	0.12	0.12	0.12	0.12	0.12	0.11	1.7	0.0	-0.1	-0.1
private cars and motorcycles	3.78	3.59	3.73	3.69	3.57	3.35	3.16	3.13	3.03	-0.1	-0.4	-1.2	-0.4
trucks	0.98	1.17	1.28	1.43	1.54	1.71	1.85	2.04	2.21	2.7	1.9	1.8	1.8
rail	0.23	0.22	0.24	0.24	0.24	0.23	0.23	0.22	0.21	0.3	0.0	-0.5	-1.0
aviation	1.19	1.36	1.69	1.82	1.81	1.93	1.92	2.14	2.18	3.5	0.7	0.6	1.3
inland navigation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	2.3	-0.4	0.1	0.3
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	52.0	49.2	52.0	51.4	48.8	46.1	42.4	41.7	39.7	0.0	-0.6	-1.4	-0.7
freight transport (toe/Mtkm)	52.3	53.2	45.2	44.5	42.8	42.6	41.6	41.7	41.1	-1.5	-0.6	-0.3	-0.1

Source: ACE Model

TURKEY: BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (A)				
Mtoe	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**'90-'00**	**'00-'10**	**'10-'20**	**'20-'30**
										Annual % Change			
Primary Production	**25.50**	**26.02**	**26.19**	**31.55**	**34.58**	**36.76**	**36.68**	**35.38**	**36.79**	**0.3**	**2.8**	**0.6**	**0.0**
Solids	12.41	12.08	13.29	18.24	20.44	20.41	17.80	14.21	12.10	0.7	4.4	-1.4	-3.8
Oil	3.61	3.47	2.73	2.72	2.97	3.50	3.56	3.77	4.04	-2.8	0.8	1.8	1.3
Natural gas	0.17	0.15	0.53	0.49	0.74	1.10	1.65	1.78	1.81	11.7	3.4	8.4	1.0
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Renewable energy sources	9.30	10.31	9.64	10.10	10.43	11.75	13.67	15.63	18.85	0.4	0.8	2.7	3.3
Hydro	1.99	3.06	2.66	3.53	4.22	5.39	6.55	6.74	6.93	2.9	4.8	4.5	0.6
Biomass	7.21	7.07	6.46	6.17	5.86	5.74	5.93	6.92	8.70	-1.1	-1.0	0.1	3.9
Waste	0.00	0.00	0.02	0.04	0.05	0.10	0.22	0.42	0.66		12.4	16.0	11.6
Wind	0.00	0.00	0.00	0.00	0.01	0.08	0.25	0.49	0.80		17.4	33.1	12.5
Solar and others	0.02	0.05	0.26	0.20	0.29	0.44	0.72	1.06	1.75	28.7	0.9	9.7	9.2
Geothermal	0.08	0.14	0.24	0.16	0.00	0.00	0.00	0.00	0.00	11.2			
Net Imports	**28.10**	**36.62**	**51.00**	**48.46**	**58.10**	**74.49**	**98.61**	**126.93**	**160.53**	**6.1**	**1.3**	**5.4**	**5.0**
Solids	4.21	4.47	9.24	10.28	10.82	12.19	13.98	15.65	17.99	8.2	1.6	2.6	2.6
Oil	21.28	26.54	29.41	26.59	30.01	36.59	46.34	57.43	71.90	3.3	0.2	4.4	4.5
Crude oil and Feedstocks	20.85	24.52	21.43	21.13	23.07	27.23	33.95	41.51	50.93	0.3	0.7	3.9	4.1
Oil products	0.43	2.03	7.98	5.46	6.93	9.35	12.39	15.91	20.97	34.0	-1.4	6.0	5.4
Natural gas	2.68	5.66	12.05	11.30	16.94	25.35	37.89	53.41	70.18	16.2	3.5	8.4	6.4
Electricity	-0.06	-0.06	0.29	0.29	0.33	0.36	0.41	0.43	0.47		1.4	2.2	1.3
Gross Inland Consumption	**52.65**	**61.39**	**77.10**	**79.58**	**92.11**	**110.50**	**134.28**	**160.99**	**195.65**	**3.9**	**1.8**	**3.8**	**3.8**
Solids	16.94	16.62	23.46	28.52	31.25	32.61	31.78	29.87	30.09	3.3	2.9	0.2	-0.5
Oil	23.61	28.74	31.08	28.88	32.42	39.33	48.89	59.88	74.26	2.8	0.4	4.2	4.3
Natural gas	2.85	5.79	12.64	11.79	17.68	26.45	39.53	55.18	71.99	16.0	3.4	8.4	6.2
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Electricity	-0.06	-0.06	0.29	0.29	0.33	0.36	0.41	0.43	0.47		1.4	2.2	1.3
Renewable energy forms	9.30	10.31	9.64	10.10	10.43	11.75	13.67	15.63	18.85	0.4	0.8	2.7	3.3
as % in Gross Inland Consumption													
Solids	32.2	27.1	30.4	35.8	33.9	29.5	23.7	18.6	15.4				
Oil	44.8	46.8	40.3	36.3	35.2	35.6	36.4	37.2	38.0				
Natural gas	5.4	9.4	16.4	14.8	19.2	23.9	29.4	34.3	36.8				
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Renewable energy forms	17.7	16.8	12.5	12.7	11.3	10.6	10.2	9.7	9.6				
Electricity Generation in TWhe	**57.54**	**86.25**	**124.92**	**147.92**	**192.59**	**243.75**	**318.96**	**390.07**	**485.08**	**8.1**	**4.4**	**5.2**	**4.3**
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro & wind	23.15	35.54	30.91	39.61	49.29	63.61	79.14	84.31	90.61	2.9	4.8	4.9	1.4
Thermal (incl. biomass)	34.40	50.71	94.01	108.31	143.30	180.14	239.81	305.76	394.48	10.6	4.3	5.3	5.1
Fuel Inputs for Thermal Power Generation	**9.02**	**12.84**	**21.80**	**23.30**	**29.33**	**35.24**	**43.46**	**52.23**	**64.92**	**9.2**	**3.0**	**4.0**	**4.1**
Solids	5.34	7.42	10.63	16.59	19.48	21.03	20.74	20.32	21.79	7.1	6.2	0.6	0.5
Oil	1.19	1.80	2.80	0.49	0.60	0.74	0.94	1.37	1.80	8.9	-14.2	4.5	6.7
Gas	2.49	3.34	8.27	5.98	8.92	12.77	20.25	27.54	36.50	12.8	0.8	8.5	6.1
Biomass - Waste	0.00	0.28	0.10	0.25	0.33	0.70	1.53	3.00	4.82		13.0	16.6	12.2
Geothermal heat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydrogen - Methanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Fuel Input in other transformation proc.	**28.55**	**31.07**	**27.68**	**27.26**	**29.18**	**33.69**	**40.39**	**48.59**	**59.00**	**-0.3**	**0.5**	**3.3**	**3.9**
Refineries	23.93	27.10	23.76	23.85	26.04	30.73	37.51	45.47	55.44	-0.1	0.9	3.7	4.0
District heating	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.05			2.1	14.3
Biofuels and hydrogen production	0.00	0.00	0.00	0.00	0.01	0.07	0.13	0.50	1.06			30.1	23.4
Others	4.63	3.97	3.92	3.40	3.12	2.88	2.74	2.59	2.46	-1.6	-2.3	-1.3	-1.1
Energy Branch Consumption	**1.96**	**2.44**	**2.68**	**2.78**	**3.10**	**3.59**	**4.33**	**5.06**	**6.00**	**3.2**	**1.4**	**3.4**	**3.3**
Non-Energy Uses	**2.85**	**3.87**	**3.58**	**3.67**	**3.83**	**4.01**	**4.20**	**4.43**	**4.70**	**2.3**	**0.7**	**0.9**	**1.1**
Final Energy Demand	**38.49**	**44.84**	**54.33**	**56.41**	**65.25**	**79.61**	**98.49**	**120.08**	**147.00**	**3.5**	**1.8**	**4.2**	**4.1**
by sector													
Industry	12.01	13.18	20.16	20.23	22.19	25.27	28.27	30.72	32.91	5.3	1.0	2.5	1.5
Residential	14.27	15.68	16.84	17.32	19.48	22.44	26.28	31.01	36.87	1.7	1.5	3.0	3.4
Tertiary	2.64	3.81	4.87	5.12	6.01	7.57	10.01	13.64	18.46	6.3	2.1	5.2	6.3
Transport	9.58	12.17	12.46	13.74	17.57	24.33	33.93	44.71	58.76	2.7	3.5	6.8	5.6
by fuel													
Solids	8.09	6.95	10.92	10.48	10.50	10.45	9.97	8.55	7.35	3.0	-0.4	-0.5	-3.0
Oil	18.12	22.74	23.44	23.69	26.89	33.32	42.24	52.30	65.64	2.6	1.4	4.6	4.5
Gas	1.17	2.64	4.90	6.21	9.02	13.76	19.27	27.50	35.22	15.4	6.3	7.9	6.2
Electricity	3.87	5.60	8.25	9.78	12.76	16.19	21.24	26.05	32.50	7.9	4.5	5.2	4.3
Heat (from CHP and District Heating)	0.00	0.00	0.00	0.10	0.21	0.26	0.34	0.49	0.67			5.0	7.2
Other	7.24	6.90	6.82	6.15	5.87	5.63	5.43	5.20	5.61	-0.6	-1.5	-0.8	0.3
CO_2 Emissions (Mt of CO_2)	**128.6**	**154.2**	**204.6**	**218.1**	**253.5**	**299.9**	**354.6**	**414.5**	**495.3**	**4.8**	**2.2**	**3.4**	**3.4**
Electricity and Steam production	32.3	44.8	72.8	84.3	103.4	119.0	135.5	151.5	179.1	8.5	3.6	2.7	2.8
Energy Branch	4.7	5.7	5.9	5.8	6.1	6.9	8.1	9.4	11.1	2.2	0.3	2.9	3.2
Industry	35.4	35.8	57.9	57.5	60.6	64.8	66.1	66.6	63.9	5.0	0.4	0.9	-0.3
Residential	21.6	23.8	23.2	22.0	23.8	27.6	32.0	39.2	48.2	0.7	0.2	3.0	4.2
Tertiary	5.9	7.9	8.3	8.1	7.9	10.0	13.5	17.7	23.2	3.4	-0.5	5.5	5.6
Transport	28.6	36.2	36.5	40.4	51.8	71.5	99.4	130.1	169.7	2.5	3.6	6.7	5.5
CO_2 Emissions Index (1990=100)	**100.0**	**119.9**	**159.2**	**169.6**	**197.2**	**233.2**	**275.8**	**322.4**	**385.2**				

See explanations on page 219

Source: ACE Model

TURKEY:BASELINE SCENARIO									SUMMARY ENERGY BALANCE AND INDICATORS (B)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	'90-'00	'00-'10	'10-'20	'20-'30
										Annual % Change			
Main Energy System Indicators													
Population (Million)	56.20	61.64	67.46	72.06	76.00	79.94	83.79	87.64	90.99	1.8	1.2	1.0	0.8
GDP (in 000 MEuro'00)	125.0	146.4	177.7	190.3	247.0	333.6	444.8	579.9	738.4	3.6	3.3	6.1	5.2
Gross Inl. Cons./GDP (toe/MEuro'00)	421.2	419.3	434.0	418.2	373.0	331.2	301.9	277.6	265.0	0.3	-1.5	-2.1	-1.3
Gross Inl. Cons./Capita (toe/inhabitant)	0.94	1.00	1.14	1.10	1.21	1.38	1.60	1.84	2.15	2.0	0.6	2.8	3.0
Electricity Generated/Capita (kWh/inhabitant)	1024	1399	1852	2053	2534	3049	3807	4451	5331	6.1	3.2	4.2	3.4
Carbon intensity (t of CO_2/toe of GIC)	2.44	2.51	2.65	2.74	2.75	2.71	2.64	2.57	2.53	0.8	0.4	-0.4	-0.4
CO_2 Emissions/Capita (t of CO_2/inhabitant)	2.29	2.50	3.03	3.03	3.34	3.75	4.23	4.73	5.44	2.9	1.0	2.4	2.5
CO_2 Emissions to GDP (t of CO_2/MEuro'00)	1.0	1.1	1.2	1.1	1.0	0.9	0.8	0.7	0.7	1.1	-1.1	-2.5	-1.7
Import Dependency %	53.3	59.5	65.8	60.6	62.7	67.0	72.9	78.2	81.4				
Energy intensity indicators (1990=100)													
Industry (Energy on Value added)	100.0	88.2	111.2	105.5	89.1	74.5	62.2	52.2	44.4	1.1	-2.2	-3.5	-3.3
Residential (Energy on Private Income)	100.0	95.9	83.0	81.1	73.1	63.3	55.5	49.8	45.9	-1.8	-1.3	-2.7	-1.9
Tertiary (Energy on Value added)	100.0	126.0	131.2	128.8	115.7	109.3	109.3	114.4	121.4	2.8	-1.2	-0.6	1.0
Transport (Energy on GDP)	100.0	108.5	91.6	94.3	92.9	95.2	99.6	100.7	103.9	-0.9	0.1	0.7	0.4
Carbon Intensity indicators													
Electricity and Steam production (t of CO_2/MWh)	0.56	0.52	0.58	0.57	0.53	0.48	0.42	0.38	0.36	0.4	-0.9	-2.3	-1.4
Final energy demand (t of CO_2/toe)	2.38	2.31	2.32	2.27	2.21	2.18	2.14	2.11	2.08	-0.3	-0.5	-0.3	-0.3
Industry	2.95	2.71	2.87	2.85	2.73	2.56	2.34	2.17	1.94	-0.3	-0.5	-1.5	-1.8
Residential	1.52	1.52	1.38	1.27	1.22	1.23	1.22	1.27	1.31	-0.9	-1.2	0.0	0.7
Tertiary	2.25	2.06	1.71	1.58	1.32	1.32	1.35	1.29	1.26	-2.7	-2.6	0.3	-0.7
Transport	2.99	2.98	2.93	2.94	2.95	2.94	2.93	2.91	2.89	-0.2	0.1	-0.1	-0.1
Electricity and steam generation													
Generation Capacity in GWe		**22.43**	**29.98**	**41.32**	**51.59**	**64.80**	**82.85**	**97.49**	**117.19**		**5.6**	**4.9**	**3.5**
Nuclear		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Hydro (pumping excluded)		10.77	12.49	16.97	20.33	25.91	31.50	32.38	33.25		5.0	4.5	0.5
Wind and solar		0.00	0.02	0.02	0.10	0.61	1.86	3.76	6.38		17.9	33.4	13.1
Thermal		11.66	17.47	24.33	31.16	38.28	49.49	61.36	77.56		6.0	4.7	4.6
of which cogeneration units		*0.17*	*0.29*	*0.13*	*0.26*	*0.33*	*0.44*	*0.61*	*0.81*		*-0.9*	*5.4*	*6.2*
Open cycle (incl. biomass-waste)		8.33	11.54	14.97	17.42	19.23	20.84	22.68	25.67		4.2	1.8	2.1
Supercritical Polyvalent/Clean Coal and Lignite		0.00	0.00	0.00	0.03	0.33	1.12	3.55	6.97			43.3	20.0
Gas Turbines Combined Cycle		3.08	5.68	9.11	13.34	17.74	25.46	31.85	40.59		8.9	6.7	4.8
Small Gas Turbines		0.23	0.23	0.25	0.37	0.98	2.07	3.27	4.33		4.8	18.9	7.7
Fuel Cells		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Geothermal heat		0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00				
Indicators													
Efficiency for thermal electricity production (%)		33.8	37.0	40.0	42.1	44.0	47.5	50.4	52.3				
Load factor for gross electric capacities (%)		43.9	47.6	41.3	42.6	42.9	43.9	45.7	47.3				
CHP indicator (% of electricity from CHP)		0.0	0.0	0.5	0.7	0.8	0.7	0.9	0.9				
Non fossil fuels in electricity generation (%)		41.6	25.0	28.0	26.1	27.2	26.9	25.1	23.3				
nuclear		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
renewable energy forms		41.6	25.0	28.0	26.1	27.2	26.9	25.1	23.3				
of which waste		0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.6				
Transport sector													
Passenger transport activity (Gpkm)	**94.7**	**119.0**	**137.3**	**154.9**	**194.4**	**273.4**	**408.5**	**612.7**	**921.9**	**3.8**	**3.5**	**7.7**	**8.5**
public road transport	64.3	85.7	91.3	94.1	96.2	94.6	91.8	88.1	87.4	3.6	0.5	-0.5	-0.5
private cars and motorcycles	17.3	17.5	28.8	42.4	76.9	151.2	277.5	466.9	747.0	5.2	10.3	13.7	10.4
rail	6.4	5.8	5.8	6.0	6.5	7.5	10.4	15.0	22.3	-0.9	1.0	4.9	7.9
aviation	2.2	5.5	6.4	7.3	9.4	14.2	22.1	35.2	57.4	11.2	4.0	8.9	10.0
inland navigation	4.5	4.5	5.0	5.2	5.4	5.9	6.8	7.5	7.8	1.1	0.7	2.3	1.4
travel per person (km per capita)	**1685**	**1931**	**2035**	**2150**	**2558**	**3420**	**4875**	**6991**	**10132**	**1.9**	**2.3**	**6.7**	**7.6**
Freight transport activity (Gtkm)	**96.7**	**125.7**	**166.2**	**178.7**	**230.0**	**292.6**	**363.1**	**437.2**	**514.0**	**5.6**	**3.3**	**4.7**	**3.5**
trucks	84.4	112.5	152.9	165.1	214.9	274.8	342.1	412.7	485.7	6.1	3.5	4.8	3.6
rail	7.8	8.5	8.2	8.2	8.2	9.3	10.8	12.9	15.3	0.5	0.0	2.7	3.5
inland navigation	4.5	4.7	5.1	5.4	6.9	8.5	10.1	11.6	13.0	1.2	3.1	3.8	2.6
freight activity per unit of GDP (tkm/000 Euro'00)	**774**	**858**	**936**	**939**	**931**	**877**	**816**	**754**	**696**	**1.9**	**0.0**	**-1.3**	**-1.6**
Energy demand in transport (Mtoe)	**9.58**	**12.17**	**12.46**	**13.74**	**17.57**	**24.33**	**33.93**	**44.71**	**58.76**	**2.7**	**3.5**	**6.8**	**5.6**
public road transport	0.97	1.21	1.27	1.30	1.32	1.27	1.22	1.14	1.11	2.8	0.3	-0.8	-0.9
private cars and motorcycles	0.70	0.67	1.87	2.76	5.01	9.13	15.91	23.04	33.08	10.3	10.4	12.2	7.6
trucks	6.89	8.59	7.54	7.81	9.17	11.26	13.28	15.80	18.10	0.9	2.0	3.8	3.1
rail	0.26	0.28	0.27	0.27	0.28	0.31	0.37	0.45	0.57	0.4	0.4	2.7	4.5
aviation	0.50	1.19	1.31	1.40	1.57	2.12	2.89	3.99	5.60	10.2	1.8	6.3	6.8
inland navigation	0.26	0.22	0.20	0.20	0.21	0.24	0.27	0.29	0.29	-2.7	0.7	2.4	1.0
Efficiency indicator (activity related)													
passenger transport (toe/Mpkm)	26.3	28.4	34.5	37.1	42.2	47.0	50.0	46.8	43.8	2.8	2.0	1.7	-1.3
freight transport (toe/Mtkm)	73.3	69.9	46.4	44.7	40.7	39.2	37.2	36.7	35.7	-4.5	-1.3	-0.9	-0.4

Source: ACE Model

APPENDIX 2

SUMMARY ENERGY BALANCES AND INDICATORS

(1) EUROSTAT Energy Balances do not take into account non-marketed steam, i.e. steam generated - either in boilers or in CHP plants - and used on site by industrial consumers. Using statistical information provided by EUROSTAT on CHP, the non-marketed steam generated in CHP units as well as the corresponding fuel input have been estimated for this study. In the PRIMES model, steam has been attributed to the demand side and the fuel input to the supply side. This approach ensures a better comparability of historical figures with the projections. However, slight differences exist for certain figures related to steam generation - both in terms of final energy demand and transformation input - in this report compared to EUROSTAT energy balances.

Disclaimer: Energy and transport statistics reported in this publication and used for the modelling are taken mainly from EUROSTAT and from the publication "EU Energy and Transport in Figures" of the Directorate General for Energy and Transport. Energy and transport statistical concepts have developed differently in the past according to their individual purposes. Energy demand in transport reflects usually sales of fuels at the point of refuelling, which can differ from the region of consumption. This is particularly relevant for airplanes and trucks. Transport statistics deal with the transport activity within a country but may not always fully include transit shipments. These differences should be borne in mind when comparing energy and transport figures. This applies in particular to transport activity ratios, such as energy efficiency in freight transport, which is measured in tonnes of oil equivalent per million tonne-km.

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