EUROPEAN ENERGY AND TRANSPORT

Scenarios on high oil and gas prices

Directorate-General for Energy and Transport

EUROPEAN COMMISSION

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European Commission

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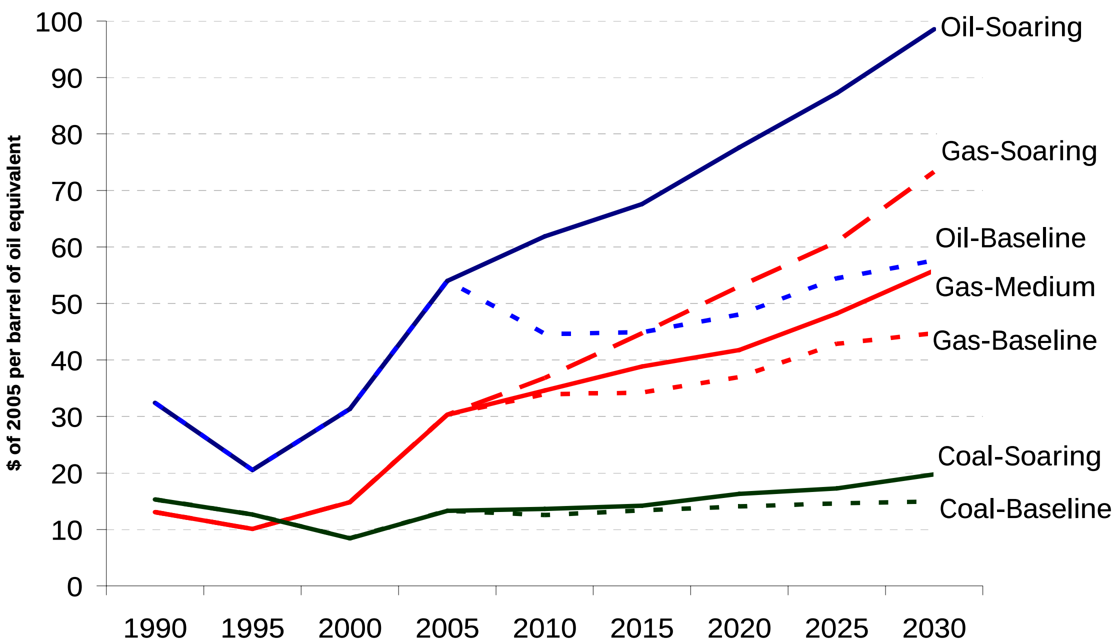
Executive Summary

For the last few years, the EU has experienced rising import prices for oil and gas, which have reached in summer 2006 unprecedented levels in nominal terms. Oil and gas prices may continue rising and it is no longer only a remote possibility that the oil price could reach a level of 100 $ per barrel in money of 2005 in say 2030. In any case, it is worthwhile to examine the energy consequences of such possible developments given that energy import prices are one key driver for the development of EU-25 energy demand and supply. In the past gas prices have followed oil prices rather closely. While this cannot be excluded as a possible future development even under very high oil prices, an alternative development might materialise, in which gas prices would decouple somewhat more form oil prices. Therefore two alternative scenarios have been examined, addressing different pathways for the evolution of the world energy system and their impact on energy import prices for the EU-25:

- The "Medium gas and soaring oil prices" case has oil prices close to 100$ per barrel in real terms on the assumption of higher economic growth in parts of Asia (China, India and other Asian developing countries) in combination to relatively less abundant resources than in the Baseline1 scenario. Furthermore, this case is characterised by the assumption that gas prices are no longer linked with the oil price.

- In the "Soaring oil and gas prices" case with the same oil price path, the assumptions as regards economic growth and availability of fossil fuel resources are identical to those of the "Medium gas and soaring oil prices" case; but gas prices remain linked to the evolution of the oil price.

International energy prices for Europe under alternative scenarios



Source: POLES.

[1] See European Energy and Transport Trends to 2030 – update 2005 available from: http://ec.europa.eu/dgs/energy_transport/figures/trends_2030_update_2005/index_en.htm

The projections for the energy import prices in the two alternative scenarios derive from the output of the POLES model, as was the case for the Baseline scenario. The two alternative price scenarios focus on the impacts that faster world economic growth in combination with relatively less abundant resources could have on the evolution of international fuel prices, which in turn affects the world energy outlook. World GDP grows at a rate of 3.3% pa in 2001-2030 (0.2 percentage points above “World Baseline” levels per annum). The difference between the two alternative cases is about the relation of gas to the oil prices. In both alternative cases oil and coal prices are the same, but gas prices follows different trajectories with lower gas price growth in the medium gas price case than in the soaring oil and gas price scenario (see figure above).

The oil price in 2010 reaches 62 $05 per barrel of oil equivalent (boe), up 15 % from 2005 levels. In 2030 the oil price is further rising to 99 $05 per boe (compared to 58 $05 per boe in the baseline scenario), which is an increase of more than 70% compared with the baseline. The coal import prices also grow on top of Baseline levels, however at a much slower pace compared to oil. The price for imported coal for the European market reaches 14 $05 per boe in 2010 and 20 $05 per boe in 2030 exceeding the Baseline level by 32% in 2030.

In the “medium gas and soaring oil prices" case, the price of natural gas in the European market reaches 35 $05 per boe in 2010 and 56 $05 per boe in 2030 (2% and 25% higher than in the Baseline scenario, respectively). In the “soaring oil and gas prices” case, natural gas prices exhibit an even higher growth over the projection period reaching 37 $05 per boe in 2010 (+9% from Baseline levels) and 73 $05 per boe in 2030 (+64% from Baseline levels.

In the two sub-cases, except from different import price trajectories, all assumptions (notably energy policies as well as GDP and sectoral production structure) remain unchanged from the Baseline.

Effects of higher fossil fuel prices

The higher prices in the “Medium gas and soaring oil prices” and the “Soaring oil and gas prices” cases lead to significant changes in the evolution of world primary energy supply in comparison to the “World Baseline” scenario. In particular, energy demand is lower than under Baseline developments due to higher energy prices despite higher world economic growth. Consequently, energy intensity improves relative to Baseline - the more so, the higher the gas prices are (soaring oil and gas prices case).

The different import price developments affect above all the fuel structure favouring in particular renewables and nuclear in the long run, but also solid fuels. Coal and lignite are encouraged with strongly growing oil and gas prices. However, in the medium and long term, the competitive advantage that renewables and nuclear gain with high fossil fuel prices (including for coal) becomes more important. Given these changes in the fuel structure, CO2 emissions would exceed baseline levels in the short term (2010) as high oil and gas prices encourage more coal use. Only in the medium and long term the effects of higher fossil fuel prices on the competitiveness of renewables and nuclear prevail, which leads to world CO2 emissions that are somewhat below baseline levels. These effects are somewhat more pronounced in case of soaring oil and gas prices. More details including on the world baseline are shown in part 2.2 of this report.

The main purpose of this study is the analysis of the effects of high oil and gas prices on the EU energy system. The EU energy system reacts to higher import prices and the entailed higher energy costs through changes in the fuel mix as well as in terms of improving energy intensity. Primary energy consumption grows less with higher import prices in the two sub-case and the fuel structure changes in favour of renewables, nuclear and solid fuels – however at different degrees according to the scenario.

EU-25: Medium gas and soaring oil price scenario results

In the "medium gas and soaring oil price" case, primary energy demand is about 1% lower than Baseline in 2010 with a slightly higher reduction in 2030 (almost -2%). Energy intensity improves accordingly as GDP of the EU remains unchanged from Baseline in this partial equilibrium modelling.

The most important changes occur in the fuel mix. Oil exhibits the strongest decline from Baseline levels (-4.8% in 2010, -7.9% in 2030). In the long term, demand for both solid fuels and natural gas decline from Baseline levels (-2.5% and -1.5% respectively in 2030). In 2010 and 2020 consumption of natural gas and coal is somewhat higher than in the Baseline as a result of several price induced substitution processes including the replacement of oil with natural gas in household and services as well a more solid fuel use in power generation to the detriment of oil and gas. Higher fossil fuel prices lead to a strong increase in the use of renewable energy forms (+6.0% from Baseline levels in 2020, +9.4% in 2030). Nuclear energy is also projected to become a more competitive option in the long run exceeding Baseline levels by +5.9% in 2030.

The renewables share in gross energy consumption increases somewhat compared with Baseline (+0.2 and +1.4 percentage points in 2010 and 2030 respectively). However, higher fossil fuel prices alone deliver only a limited contribution towards achieving renewables targets, such as the 12% share in gross energy consumption in 2010.

Shares of primary energy sources (in %)) in the Medium gas and soaring oil price scenario and changes from Baseline (percentage points)

	2000	2010	2020	2030	Change from Baseline		
					2010	2020	2030
Solid fuels	18.5	16.1	14.4	15.3	+0.2	+0.6	-0.1
Oil	38.4	35.4	33.3	31.7	-1.5	-2.3	-2.1
Gas	22.8	26.4	28.7	27.4	+0.9	+0.6	0.0
Nuclear	14.4	13.8	12.4	12.0	+0.1	+0.2	+0.9
Renewables	5.8	8.2	11.1	13.5	+0.2	+0.8	+1.4

As a result of these changes in the fuel mix and of slightly lower energy intensity, CO2 emissions grow at a slower pace than in the Baseline scenario in the short to medium term (+1.2% from 1990 levels in 2010, +1.3% in 2020). In the long term, CO2 emissions decrease to minus 0.4% from 1990 levels in 2030.

The higher deployment of renewables and nuclear in the long term, in combination with the increasing cost effectiveness of exploiting indigenous fossil fuel resources, leads to a somewhat lower import dependency reaching 61.2% in 2030, which is 3.7 percentage points below Baseline levels.

EU-25: Soaring oil and gas price scenario

The “Soaring oil and gas prices” case has high gas prices in addition to high oil prices close to 100$ per barrel in 2030. This leads to a small reduction of energy requirements in the EU-25 energy system in comparison to the Baseline scenario (-1.8% in 2030) and a more favourable development for CO2 emissions (reaching +0.8% from 1990 levels in 2030 compared to +4.7% in the Baseline scenario). The import dependency of the EU-25 is also lower than in the Baseline reaching 59.7% in 2030 compared to 64.8% in the Baseline scenario. Similarly, the “Soaring oil and gas prices” case produces somewhat higher renewables shares.

However, in comparison with the “Medium gas and soaring oil price” case, the linking of gas to oil prices exhibits some disadvantages. In addition to the competitiveness disadvantages of higher gas prices for the EU economy, such higher gas prices would also lead to higher CO_2 emission in the long term, as higher gas prices encourage more solid fuel use. Whereas CO_2 emissions fall slightly below the 1990 level in 2030 in the “Medium gas and soaring oil price” case, they stay above the 1990 level in the entire projection period with soaring gas prices, i.e. when gas and oil prices are coupled. It is far from clear whether the slightly higher renewables share in the “Soaring oil and gas price case” in 2030 (14.0% in gross energy consumption instead of 13.5% with medium gas prices) as well as the somewhat lower import dependency (59.7% in 2030 instead of 61.2%) can outweigh these disadvantages.

Scenarios on high oil and gas prices

1.1. Introduction

Energy import prices are one key driver for the development of EU-25 energy demand and supply. In the Baseline scenario[2] of 2005 the evolution of international fuel prices reflects a conventional wisdom view of the development of the world energy system with relatively abundant oil and gas resources. However, large uncertainties prevail as regards the evolution of international fuel prices, related both on the possible different economic growth patterns for the different world regions as well as on the availability of fossil fuel resources. The price volatility seen in the last few years adds to this uncertainty. Oil and gas prices have continued to increase to levels that hardly anybody would have expected a few years ago.

In that context two alternative scenarios have been examined, addressing different pathways for the evolution of the world energy system and their impact on energy import prices for the EU-25 energy system:

- The "Medium gas and soaring oil prices" case, assumes a higher economic growth in parts of Asia (China, India and other Asian developing countries) in combination to relatively less abundant resources than in the Baseline scenario. Furthermore, this case is characterised by the assumption that gas prices are no longer linked with the oil price.
- In the "Soaring oil and gas prices" case, the assumptions as regards economic growth and availability of fossil fuel resources are identical to those of the "Medium gas and soaring oil prices" case with gas prices remaining linked to the evolution of the oil price.

The projections for the energy import prices assumed in the two alternative scenarios derive from the output of the POLES model,[3] as was the case for the Baseline scenario.

The next chapter provides a short description of the three consistent international energy scenarios with contrasted oil and gas price profiles, and an analysis of their consequences on the key variables of the world energy system, on the basis of the POLES model projections. In chapter 3, the impacts of the "Medium gas and soaring oil prices" case on the future evolution of the EU-25 energy system are discussed in detail. A brief discussion of the impacts of the "Soaring oil and gas prices" case is also provided.

1.2. The World energy outlook under alternative economic development and resources availability assumptions

The work with the POLES model, undertaken by LEPII/EPE-CNRS focused on the examination of world market trends and resulting international fuel price trajectories

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[2] European energy and transport: Trends to 2030 –update 2005 (2006).

[3] 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 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 into 26 regions. For the model design see the model reference manual: *POLES 2.2. European Commission, DG XII, December 1996.*

under different assumptions as regards the availability of fuel resources, as well as issues related to economic growth for the different world regions. The presentation of the international framework puts the analysis for the EU in the global context.

1.2.1. The "World Baseline" scenario

The "World Baseline" scenario corresponds to an energy world developing on the basis of economic fundamentals, without noticeable impacts of climate policies or of geopolitical constraints on world oil development. As illustrated in Table 1.2-1,[4] world population is assumed to expand at a rate of 0.9% pa in 2001-2030 (from +1.4% pa in 1990-2001) whereas world GDP (expressed in power purchasing standards) grows at a rate of 3.1% pa in 2001-2030. Thus, the average per capita GDP increases from 8324 $05 in 2001 up to 15814 $05 in 2030 (+2.2% pa in 2001-2030).

Table 1.2-1: Key assumptions for the "World Baseline" scenario

	1990	2001	2010	2020	2030
Demographic and macroeconomic assumptions					
Population (million)	5248	6112	6800	7510	8100
GDP (000 M$05-pps)	37105	50880	71713	98593	128095
Per capita GDP ($05/cap)	7070	8325	10546	13128	15814
Oil and gas reserves (in 000 Mtoe)					
Oil reserves	139.2	160.1	213.8	193.6	176.8
Gas reserves	121.0	146.0	203.8	223.4	228.7
			annual growth rate		
	90/01	**01/10**	**10/20**	**20/30**	**01/30**
Demographic and macroeconomic assumptions					
Population (million)	1.39	1.19	1.00	0.76	0.94
GDP (billion $05)	2.91	3.89	3.23	2.65	3.13
Per capita GDP ($05/cap)	1.50	2.66	2.21	1.88	2.16
Oil and gas reserves					
Oil reserves	1.28	3.27	-0.99	-0.90	0.33
Gas reserves	1.72	3.78	0.92	0.24	1.51

Source: POLES.

A key feature of the POLES model is its detailed simulation module for the oil and gas discovery and development process, which is in particular essential to the endogenous process of international oil and gas prices determination.[5] In broad terms, the logic used in order to model oil and gas supply and price is based on the following sequence:

- The Ultimate Recoverable Resources (URR) is derived from the US Geological Survey (USGS) estimates, but is modified over the projection period in order to account for the impact of increasing recovery rates (which are assumed to be dependent on the oil and gas prices).
- Discoveries depend on the drilling effort (also oil and gas price dependent) and the reserves are equal to the total discoveries minus the past cumulative production.
- For all regions except the Gulf, the production depends on a price dependent "reserve on production" or R/P ratio.

[4] The POLES model uses 2001 as the base year for the analysis. Thus, in the tables referring to world projections figures for 2001 (instead for 2000; as is the case for the EU-25) are provided.

[5] World energy prices in the DG Research WETO-H2 project follow a similar approach

- The international prices depends, in the case of oil on the world R/P ratio (including non conventional oil), and for gas on regional R/P ratios as well as of an indexation term to the oil price that can be modified according to the scenario examined.

In this process, the most important exogenous hypothesis is related to the URR estimate at the beginning of the simulation. The uncertainty concerning this set of hypotheses is quite high as testifies the long-lasting controversy between 'optimists' and 'pessimists' concerning oil and gas resources. In order to produce the "World Baseline" scenario, a relatively optimistic view on oil and gas resource availability has been adopted. In this Baseline scenario world oil reserves will expand significantly between 2001 and 2010 (+33.5%). Beyond 2010, as the world production level exceeds the rate of additional discoveries, world reserves will decline slowly, exceeding nevertheless in 2030 the 2001 level by 10.4%. World gas reserves also exhibit a significant growth between 2001 and 2010 (+39.6%) but slow down thereafter. However, even in the long run that annual production levels remain below additional discoveries and consequently gas reserves exhibit a further increase reaching +56.7% from 2001 levels in 2030.

Table 1.2-2: World Primary Energy Supply in the "World Baseline" scenario

	Mtoe				
	1990	**2001**	**2010**	**2020**	**2030**
Coal, lignite	2168	2352	3176	3592	4387
Oil	3104	3644	4370	5787	6730
Natural gas	1747	2082	2889	3950	4728
Nuclear energy	509	671	736	833	1132
Renewable energy forms	1104	1341	1537	1642	1765
Hydro & Geothermal	193	232	275	313	346
Biomass & Waste	909	1101	1242	1278	1297
Wind and other renewables	1	7	20	51	122
Total	**8631**	**10090**	**12708**	**15804**	**18742**
	annual growth rate				
	90/01	**01/10**	**10/20**	**20/30**	**01/30**
Coal, lignite	0.7	3.4	1.2	2.0	2.1
Oil	1.5	2.0	2.8	1.5	2.1
Natural gas	1.6	3.7	3.2	1.8	2.8
Nuclear energy	2.5	1.0	1.2	3.1	1.8
Renewable energy forms	1.8	1.5	0.7	0.7	0.9
Hydro & Geothermal	1.7	1.9	1.3	1.0	1.3
Biomass & Waste	1.8	1.3	0.3	0.1	0.5
Wind and other renewables	17.6	11.8	9.8	9.1	9.8
Total	**1.4**	**2.6**	**2.2**	**1.7**	**2.1**

Source: POLES.

World primary energy supply is projected to grow at a rate of 2.1% pa in 2001-2030 driven by increasing population and economic growth (see Table 1.2-2). In the "World Baseline" scenario the global energy system will become even more dominated by fossil fuels over the next 30 years as dependence on fossil fuels is projected to reach 84.5% in 2030 from 80.1% in 2001. Oil is projected to grow at rates similar to overall primary energy supply and remains the most important source of energy at world level over the projection period (accounting in 2030 for 35.9% of total primary supply from 36.1% in 2001). The most pronounced growth among fossil fuels is projected for natural gas (+2.8% pa in 2001-2030) whereas primary supply of solid fuels grows at rates slightly above average (+2.1% pa). In 2030 natural gas accounts for 25.2% of world primary energy supply (+4.6 percentage points from 2001 levels) becoming the second most important energy form in the world energy system. The share of solid fuels is projected to reach 23.4% in 2030 (from 23.3% in 2001). The nuclear contribution to global primary energy requirements will continue to increase but at a slower pace compared to the recent past (+1.8% pa in 2001-2030 compared to +2.5% pa in 1990-2001) accounting in 2030 for 6.0% of primary energy supply (-0.7 percentage points from 2001 levels). Biomass use in developing countries that is to a large extent unsustainable is expected to decline with increasing living standards. Globally, biomass-waste utilisation increases only moderately (+0.5% pa in 2001-2030) and in combination with limitations on further hydro expansion the growth of renewable energy forms is limited to just 0.9% pa in 2001-2030. In 2030, renewables account for 9.4% of primary energy supply compared to 13.3% in 2001. Biomass and waste account for 82.2% of renewables supply in 2001 and for 73.5% in 2030. On the contrary a substantial growth is projected for wind and solar energy (+9.8% pa in 2001-2030) leading to an increase of their share in renewables supply by 6.4 percentage points (from 0.5% in 2001 up to 6.9% in 2030).

Energy intensity improvements in the "World Baseline" scenario are projected to reach 1.0% pa in 2001-2030 (see Table 1.2-3), with consumption per capita increasing from 1.65 toe in 2001 to 2.31 toe in 2030 (+1.1% pa in 2001-2030).

Table 1.2-3: Key indicators for the world energy system in the "World Baseline" scenario

	1990	2001	2010	2020	2030
Gross Inland Consumption (Mtoe)	8631	10090	12708	15804	18742
Gross Inl Cons / GDP (toe/M$05)	233	198	177	160	146
Gross Inland Cons./Capita (kgoe/cap)	1645	1651	1869	2104	2314
CO_2 Emissions (Mtn CO_2)	20822	23566	30521	38318	45722
CO_2 Emissions / Capita (t of CO_2/capita)	4.0	3.9	4.5	5.1	5.6
Carbon intensity (t of CO_2/toe of GIC)	2.4	2.3	2.4	2.4	2.4
			annual growth rate		
	90/01	**01/10**	**10/20**	**20/30**	**01/30**
Gross Inland Consumption (Mtoe)	1.43	2.60	2.20	1.72	2.09
Gross Inl Cons / GDP (toe/M$05)	-1.44	-1.24	-1.00	-0.91	-1.01
Gross Inland Cons./Capita (kgoe/cap)	0.03	1.39	1.19	0.95	1.13
CO_2 Emissions (Mtn CO_2)	1.13	2.92	2.30	1.78	2.23
CO_2 Emissions / Capita (t of CO_2/capita)	-0.26	1.70	1.29	1.02	1.28
Carbon intensity (t of CO_2/toe of GIC)	-0.29	0.31	0.09	0.06	0.15

Source: POLES.

Given the above Baseline energy developments, global CO_2 emissions will increase by 2.2% pa on average between 2001 and 2030. In 2030, world CO_2 emissions will be more than twice as high as in 1990 (an increase of 120% over the 1990 level). The projected CO_2 emissions growth is even slightly faster than primary energy consumption. The carbon intensity of the world energy system is projected to worsen by 0.15% pa in 2001-2030, as changes in the fuel mix towards the use of fossil fuels are partly counterbalanced by the projected shift towards the use of natural gas and away from coal.

The evolution of primary energy prices in the "World Baseline" scenario, illustrated in Table 1.2-4, reflects a situation in which no strong supply constraints are supposed to be felt at least in the period to 2020. The projected decline of the oil price, from the high levels of 2005 (55 $05 per boe), in the period to 2010 reflects a modelled development of relatively abundant supply due to competition among key producers. It should be recalled that the modelling considers economic fundamentals but cannot address more short term fluctuations reflecting e.g. enhanced geopolitical instabilities. After that date, when the production of the Gulf and OPEC regions has to expand more rapidly to keep pace with world demand, the oil price increases regularly and attains 58 $05 per boe in 2030, a level that is higher than the one reached in 2005 under particularly tense supply conditions.

Table 1.2-4: Primary energy prices in the "World Baseline" scenario

	$05/boe				
	1990	**2001**	**2010**	**2020**	**2030**
Oil	32.4	35.9	44.6	48.1	57.6
Natural Gas					
American market	18.3	25.2	23.4	36.0	45.4
European and African market	13.1	17.9	33.9	37.0	44.7
Asian market	24.8	26.9	34.2	39.1	42.0
Coal					
American market	15.3	8.3	9.9	12.2	15.3
European and African market	15.4	9.4	12.5	14.1	14.9
Asian market	11.1	8.9	12.1	14.1	16.4
	annual growth rate				
	90/01	**01/10**	**10/20**	**20/30**	**01/30**
Oil	0.9	2.5	0.7	1.8	1.6
Natural Gas					
American market	2.9	-0.8	4.4	2.3	2.0
European and African market	2.9	7.3	0.9	1.9	3.1
Asian market	0.7	2.7	1.4	0.7	1.5
Coal					
American market	-5.4	1.9	2.1	2.3	2.0
European and African market	-4.4	3.2	1.2	0.6	1.6
Asian market	-2.0	3.4	1.6	1.5	2.0

Source: POLES.

These changes reflect the built-in dynamic processes in the model: in the short run, oil prices depend on changes in global oil demand and on the productive capacities of the 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 relative dynamics of oil demand and of available reserves, which is measured by the variations in the R/P ratio. In the "World Baseline" scenario the R/P ratio is projected to increase from close to 46 years in 2001 up to 49 years in 2010 declining thereafter to reach 26 years in 2030.

While the oil market is fairly integrated at a global level ("one great pool"), this is not the case for gas and coal, the markets of which still show a strong regional basis. The main reason for these regional differentiations is the high transportation cost of gas and coal, relative to their production cost. Although the development of LNG transport facilities will introduce some degree of trade-off between the regional gas markets the price differentials are not expected to fully disappear over the next 30 years under baseline assumptions. In the European and the American market natural gas prices are projected to grow at rates well above those of oil in 2001-2030 (+2.0% pa and +3.1% pa respectively compared to a growth of +1.6% pa for the oil price). In the Asian market the growth reaches +1.5% pa in 2001-2030. Thus, in the "World Baseline" scenario the oil to gas price ratio for the European gas market amounts to 1.3 in 2030 from 2.0 in 2001. Coal prices are projected to grow faster in the American and Asian markets (+2.0 pa in 2001-2030) than in the European and African market (+1.6% pa). In 2030 the coal to oil price ratio for the European market is projected to be 0.26, similar to the ratio in 2001.

1.2.2. The "World medium gas and soaring oil prices" and "World soaring oil and gas prices" scenario

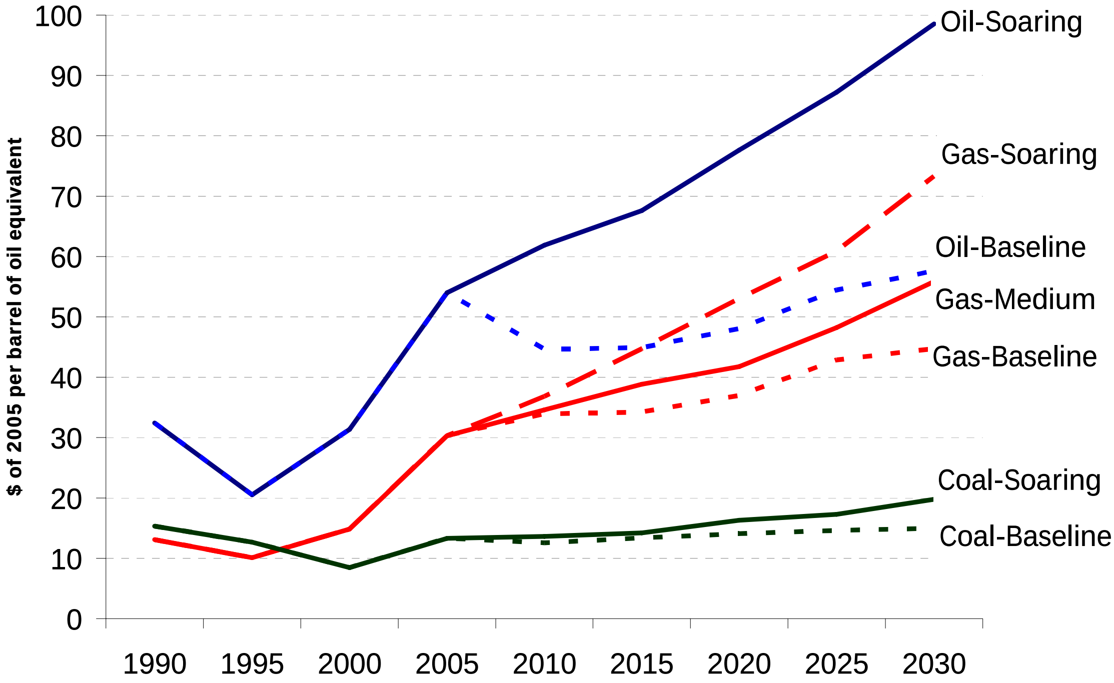
The assumption of abundant resources in the "World Baseline" scenario results in global energy markets that remain well supplied at a relatively modest cost throughout the projection period. This is a plausible setting but, of course, it is not the only one possible. Substantial uncertainties surround both world economic growth and global energy resources.

The “World medium gas and soaring oil prices” and “World soaring oil and gas prices” cases focus on the impacts that faster world economic growth in combination with relatively less abundant resources could have on the evolution of international fuel prices, which in turn affects the world energy outlook.

World GDP grows at a rate of 3.3% pa in 2001-2030 (0.2 percentage points above “World Baseline” levels per annum), leading to a GDP level that exceeds the Baseline case by 1.5%, 3.3% and 4.9% in 2010, 2020 and 2030 respectively. The additional growth occurs in China, India and the other Asian developing countries, whereas for reasons of comparability concerning the effects of different import prices as distinct from economic growth, GDP in the EU remains unchanged from Baseline levels.

Ultimate Recoverable Resources (URR) for oil and natural gas are also assumed to be significantly lower than in the “World Baseline”. The assumed oil URR is -19% lower in 2010 and -14% lower in 2030, whereas that for natural gas is -3.1% lower in 2010 and -13.8% lower in 2030.

Figure 1.2-1: International energy prices for the European energy market under alternative world scenarios



Source: POLES.

The difference between the two alternative cases examined for the world energy outlook concerns the approach retained as regards the evolution of natural gas prices in relation to the oil price. Thus, in the “World medium gas and soaring oil prices” natural gas prices are assumed to exhibit a strong de-linking from the evolution of the oil price whereas in the “World soaring oil and gas prices” natural gas prices remain linked to the oil price. Thus, while oil and coal prices exhibit the same growth pattern in both cases, the growth on top of “World Baseline” levels for the natural gas prices in the “World medium gas and soaring oil prices” scenario is significantly less pronounced than in the “World soaring oil and gas prices” case (see Figure 1.2-1).

The oil price in 2010 reaches 61.9$05 per barrel of oil equivalent (boe), up 14.6% from 2005 levels compared to a decline by -17.4% from 2005 levels projected in the “World Baseline” scenario. In 2030 the oil price is further rising to 98.5$05 per boe (compared to 57.6$05 per boe in the “World Baseline” scenario, an increase of more than 70%). The import price of coal is also projected to grow on top of Baseline levels, however at a much slower pace compared to oil. The price for imported coal for the European market increases by 8.7% from "World Baseline" levels in 2010 (reaching 13.6$05 per boe compared to 12.5$05 per boe in the Baseline) and exceeds the Baseline level by 32.1% in 2030 (reaching 19.8$05 per boe, +3.8$05 per boe).

In the "World medium gas and soaring oil prices" case, the price of natural gas in the European market reaches 34.6$05 per boe in 2010 and 55.9$05 per boe in 2030 (2.1% and 24.8% higher than in the "World Baseline" scenario, respectively). In the "World soaring oil and gas prices" case, natural gas prices exhibit an even higher growth over the projection period reaching 36.8$05 per boe in 2010 (+8.8% from "World Baseline" levels, +6.5% from "World medium gas and soaring oil prices" case) and 73.3$05 per boe in 2030 (+64.0% from "World Baseline" levels, +31.3% from "World medium gas and soaring oil prices" case).

The higher prices faced by the energy systems in the "World medium gas and soaring oil prices" and the "World soaring oil and gas prices" cases lead to significant changes in the evolution of world primary energy supply in comparison to the "World Baseline" scenario.

In the "World medium gas and soaring oil prices" case energy supply is projected to exhibit a slight growth on top of Baseline levels in 2010 (+0.2%) declining below Baseline levels thereafter (-1.7% in 2020, -1.4% in 2030) despite the higher economic growth (see Table 1.2-5). Furthermore, there are significant changes in the fuel mix with supply for oil and natural gas exhibiting a strong decline from Baseline levels (-4.3% and -0.1% respectively in 2010, -14.8% and -5.9% respectively in 2030). This is compensated by higher use of all other energy forms. For solid fuels the growth on top of Baseline levels ranges from +6.2% in 2010 up to +15.5% in 2030. Nuclear energy becomes a more cost effective option for power generation in the long run (+1.7% in 2010, +19.9% in 2030) while the growth on top of Baseline levels for renewable energy forms reaches up to +6.2% in 2030 (+0.8% in 2010).

Table 1.2-5: World Primary Energy Supply in the "World medium gas and soaring oil prices" scenario

	Mtoe				% change from baseline		
	2001	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Coal, lignite	2352	3372	4144	5066	6.2	15.4	15.5
Oil	3644	4181	5088	5734	-4.3	-12.1	-14.8
Natural gas	2082	2886	3684	4451	-0.1	-6.7	-5.9
Nuclear energy	671	748	916	1357	1.7	10.0	19.9
Renewable energy forms	1341	1550	1707	1875	0.8	4.0	6.2
Hydro & Geothermal	232	275	317	352	0.2	1.3	1.6
Biomass & Waste	1101	1254	1332	1379	1.0	4.2	6.3
Wind and other renewables	7	20	59	145	1.6	15.3	18.9
Total	**10090**	**12737**	**15540**	**18483**	**0.2**	**-1.7**	**-1.4**

Source: POLES.

The share of fossil fuels in primary energy supply is projected to reach 82.5% in 2030 (-2.0 percentage points from Baseline levels). The share of solid fuels is projected to grow from 2001 levels over the projection period up to 27.4% in 2030 (from 23.4% in the Baseline). Demand for liquid fuels is strongly affected by the prevailing higher prices accounting for 31.0% of primary energy supply in 2030 compared to 35.9% in the Baseline. Despite the higher natural gas prices prevailing in the "World medium gas and soaring oil prices" case, energy demand for natural gas grows at rates above average over the projection period though at a slower pace compared to the Baseline scenario; in 2030 natural gas account for 24.1% of primary energy supply from 25.2% in the Baseline scenario. The higher competitiveness of nuclear energy in the long run is also reflected in its market share which is projected to reach 7.3% in 2030 (+1.3 percentage points higher than in the Baseline). Renewables, account for 10.1% of primary energy needs in 2030 compared to 9.4% in the Baseline. The growth of renewables is mainly driven by the higher deployment of wind and solar energy (+18.9% from Baseline levels in 2030) but also by high consumption of biomass and waste (+6.3% in 2030).

Table 1.2-6: Key indicators for the world energy system in the "World medium gas and soaring oil prices" scenario

					% change from baseline		
	2001	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Population (million)	6112	6800	7510	8100	0.0	0.0	0.0
GDP (000 M$05-pps)	52991	75805	106041	140000	1.5	3.3	4.9
Per capita GDP ($05/cap)	8669	11148	14119	17284	1.5	3.3	4.9
Gross Inland Consumption (Mtoe)	10090	12737	15540	18483	0.2	-1.7	-1.4
Gross Inl Cons / GDP (toe/M$05)	190	168	147	132	-1.2	-4.8	-6.0
Gross Inland Cons./Capita (kgoe/cap)	1651	1873	2069	2282	0.2	-1.7	-1.4
CO_2 Emissions (Mtn CO_2)	23566	30772	38011	45055	0.8	-0.8	-1.5
CO_2 Emissions / Capita (t of CO_2/capita)	3.9	4.5	5.1	5.6	0.8	-0.8	-1.5
Carbon intensity (t of CO_2/toe of GIC)	2.3	2.4	2.4	2.4	0.6	0.9	-0.1

Source: POLES.

Concluding, the high energy import prices prevailing in the "World medium gas and soaring oil prices" case lead to a significant decrease on top of Baseline levels for energy intensity (-1.2% lower in 2010, -6.0% lower in 2030) achieved through the adoption of more efficient technologies and the more rational use of energy by consumers following higher energy prices (see Table 1.2-6). However, the changes in the fuel mix towards the use of solid fuels more than counterbalance the corresponding growth, on top of Baseline levels, for nuclear energy and renewable energy forms, leading to a worsening of carbon intensity in the short to medium term. It is only in the long run that carbon intensity is projected to be similar to the Baseline as a result of the strong deployment of nuclear energy on top of Baseline levels. In 2010, global CO_2 emissions are projected to be 0.8% higher than in the Baseline scenario, whereas in 2030 they decline by -1.5% from Baseline levels.

Table 1.2-7: Key indicators for the world energy system in the "Soaring oil and gas prices" scenario

					% change from baseline		
	2001	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Population (million)	6112	6800	7510	8100	0.0	0.0	0.0
GDP (000 M$05-pps)	52991	75805	106041	140000	1.5	3.3	4.9
Per capita GDP ($05/cap)	8669	11148	14119	17284	1.5	3.3	4.9
Gross Inland Consumption (Mtoe)	10090	12729	15441	18259	0.2	-2.3	-2.6
Gross Inl Cons / GDP (toe/M$05)	190	168	146	130	-1.3	-5.4	-7.2
Gross Inland Cons./Capita (kgoe/cap)	1651	1872	2056	2254	0.2	-2.3	-2.6
CO_2 Emissions (Mtn CO_2)	23566	30784	37966	44814	0.9	-0.9	-2.0
CO_2 Emissions / Capita (t of CO_2/capita)	3.9	4.5	5.1	5.5	0.9	-0.9	-2.0
Carbon intensity (t of CO_2/toe of GIC)	2.3	2.4	2.5	2.5	0.7	1.4	0.6

Source: POLES.

In the "World Soaring oil and gas prices", the particular strong growth of natural gas prices (even higher than in the "World medium gas and soaring oil prices" case) leads to further changes both as regards overall energy requirements as well as in the fuel mix. As can be seen in Table 1.2-7 consumers faced with even higher energy prices react also through further improvements in terms of energy intensity (down as much as -7.2% from Baseline levels in 2030).

In the "World Soaring oil and gas prices" case, solid fuels grow faster than total energy supply, so that the solid fuel share reaches 28.9% of primary energy supply in 2030. Moreover, solids increase their contribution more than under medium gas price conditions. Nuclear energy (7.9% in 2030) and renewables (10.4% in 2030) also grow faster than in the Baseline and in the "World medium gas and soaring oil prices" case. In addition, energy supply of liquid fuels declines at a slower pace from Baseline levels (-11.8% in 2030 compared to -14.8% in the “World medium gas and soaring oil prices” case). In 2030 oil is projected to account for 32.5% of world primary energy supply. On the contrary, supply for natural gas declines substantially (-21.4% from Baseline levels in 2030 compared to -5.9% in the “World medium gas and soaring oil prices” case) accounting for 20.3% of primary energy supply in 2030 (-4.9 percentage points in comparison to the Baseline, -3.7 percentage points in comparison to the “World medium gas and soaring oil prices” case).

The projected changes in the fuel mix lead to a worsening of carbon intensity (+0.7% from Baseline levels in 2010, +0.6% in 2030). However, global CO_2 emissions are projected to increase from Baseline levels only in 2010 (+0.9%). In 2020 and 2030 global CO_2 emissions are projected to decline by -0.9% and -2.0% from Baseline levels as lower energy requirements (-2.3% in 2020 and -2.6% in 2030) more than counterbalance the projected worsening of carbon intensity.

1.3. The “Medium gas and soaring oil prices” case

1.3.1. Modelling approach

The “Medium gas and soaring oil prices” case explores the possible evolution of the EU-25 energy system in the presence of much higher energy import prices (as derived by the POLES model in the “World medium gas and soaring oil prices” case) compared to the Baseline scenario.

All remaining assumptions (demographic, macroeconomic and policy ones) remain unchanged from Baseline levels. It is assumed that economic agents successfully anticipate the changes in prices so that the energy using capital stock over the projection period is the one that agents planned in advance; and they do not find themselves in a situation where they have to scrap or retrofit equipment that would prove uneconomic in the price environment assumed under each scenario.

1.3.2. “Medium gas and soaring oil prices” scenario results for EU-25[6]

1.3.2.1. Overview of main results

In the presence of higher energy import prices, leading to higher energy costs both on the demand and the supply sides, the energy system reacts through changes in the fuel mix as well as in terms of improving energy intensity. Table 1.3-1 illustrates the projected evolution of EU-25 primary energy needs under the “Medium gas and soaring oil prices” case assumptions. A slowdown of primary energy growth in the EU-25 energy system compared to the Baseline scenario is projected to occur, but this is rather limited over the projection period (reaching up to -1.7% from Baseline levels in 2030).

[6] Aggregate results by group of countries (EU-25, EU-15, NMS, EU-27, EU28 and Europe-30) can be found in Appendix 1.

Table 1.3-1: Primary Energy Demand in EU-25 in the "Medium gas and soaring oil prices" case

	Mtoe				% change from baseline		
	2000	2010	2020	2030	2010	2020	2030
Solid Fuels	306.5	288.7	267.5	285.8	0.7	3.1	-2.5
Liquid Fuels	634.7	636.4	618.4	590.0	-4.8	-7.7	-7.9
Natural Gas	376.3	473.6	533.2	510.1	2.5	0.7	-1.5
Nuclear	237.7	248.8	229.7	223.3	0.0	0.5	5.9
Renewable En. Sources	96.5	146.6	207.1	252.5	2.0	6.0	9.4
Total	**1653.8**	**1796.3**	**1858.0**	**1864.0**	**-0.9**	**-1.5**	**-1.7**
EU-15	1456.9	1573.2	1600.5	1581.3	-0.9	-1.4	-1.7
NMS	196.9	223.1	257.5	282.6	-1.1	-1.5	-1.4
Mt CO_2 emitted	**3674.1**	**3822.8**	**3824.7**	**3761.3**	**-1.5**	**-2.6**	**-4.9**
EU-15	3127.0	3239.9	3212.6	3146.2	-1.5	-2.7	-5.0
NMS	547.1	582.9	612.1	615.1	-1.4	-2.5	-4.5

Source: PRIMES.

The most important changes in the primary energy balance occur in the fuel mix. Demand for liquid fuels exhibits the strongest decline from Baseline levels (-4.8% in 2010, -7.9% in 2030). In 2010 primary energy demand for all other energy forms is projected to grow on top of Baseline levels with natural gas consumption increasing the most (+2.5% from Baseline levels) followed by renewable energy forms and solid fuels (+2.0% and +0.7% from Baseline levels in 2010, respectively), whereas demand for nuclear energy remains unchanged from Baseline levels. This rather surprising result for natural gas is explained by the fact that in 2010 the growth of natural gas prices on top of Baseline levels is less pronounced than that of oil and coal prices, and, thus, in relative terms, the use of natural gas becomes a more cost effective option than in the Baseline scenario (in the "Medium gas and soaring oil prices" case the oil to gas price ratio in 2010 reaches 1.79 from 1.32 in the Baseline scenario and the coal to gas price ratio 0.39 from 0.37 in the Baseline). On the other hand, the less pronounced growth in the use of renewables compared with gas indicates that the impact of the growth on top of Baseline levels for natural gas prices is less pronounced than the additional costs involved for the further exploitation of renewable options in the absence of additional supporting policies for renewables.

This is not the case beyond 2010 as the further growth of fossil fuel prices leads to a strong increase in the use of renewable energy forms (+6.0% from Baseline levels in 2020, +9.4% in 2030). Nuclear energy is also projected to become a more competitive option in the long run reaching at +5.9% from Baseline levels in 2030. It is only then that both demand for solid fuels and natural gas decline from Baseline levels (-2.5% and -1.5% respectively in 2030) following a growth on top of Baseline levels in 2020 (+3.1% and +0.7% respectively).

Changes in the fuel mix result in an increasing contribution of carbon free energy forms in the EU-25 energy system. Their share reaches 22.0% in 2010 (+0.3 percentage points from Baseline levels) further rising to 25.5% in 2030 (+2.2 percentage points from Baseline levels). Renewable energy forms account for 8.2% of primary energy needs in 2010 and 13.5% in 2030 (+0.2 and +1.4 percentage points, respectively, from Baseline levels). High fossil fuel prices facilitate the penetration of renewables, but their contribution towards achieving renewables targets, such as the 12% share in gross energy consumption for 2010, remains rather small.

The shares of natural gas and solid fuels are also projected to exhibit a growth on top of Baseline levels in the short term (+0.9 and +0.2 percentage points respectively in 2010) and reach similar to the Baseline levels in the long run (+0.0 and -0.1 percentage points respectively in 2030). Liquid fuels are projected to continuously lose market share accounting for 35.4% of primary energy needs in 2010 and 31.7% in 2030 (from 36.9% in 2010 and 33.8% in 2030 under Baseline assumptions).

As a result of these changes in the fuel mix, the carbon intensity of the EU-25 energy system improves by 0.6% from Baseline levels in 2010, by 1.2% in 2020 and 3.3% in 2030. This, in combination to the projected energy intensity gains (equivalent to the decline in primary energy needs as economic growth in the EU-25 is assumed to remain unaffected by rising energy import prices) leads to a decline of CO_2 emissions which are projected to reach -1.5% from Baseline levels in 2010 and -4.9% in 2030. In comparison to 1990 levels, CO_2 emissions are projected to increase by +1.2% in 2010 and +1.3% in 2020, declining thereafter to reach -0.4% from 1990 levels in 2030.

Table 1.3-2: Import dependency in EU-25 in the "Medium gas and soaring oil prices" case

	%				percentage points difference from baseline		
	2000	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Solid fuels	30.8	46.3	48.7	57.8	0.1	-0.8	-1.2
Liquid fuels	76.4	80.4	88.5	90.5	-3.3	-4.2	-3.2
Natural gas	49.6	62.5	80.9	83.0	-0.3	-0.6	-1.5
Total	**47.2**	**53.2**	**60.5**	**61.2**	**-1.8**	**-3.0**	**-3.7**
EU-15	49.5	54.6	62.2	63.0	-2.0	-3.2	-3.8
NMS	30.1	43.2	50.0	50.8	-0.9	-2.0	-2.9

Source: PRIMES.

Import dependency in the "Medium gas and soaring oil prices" case is projected to exhibit a significant decrease from Baseline levels (see Table 1.3-2) being limited to 53.2% in 2010 (from 55.0% in the Baseline scenario) and 61.2% in 2030 (-3.7 percentage points from Baseline levels). Changes in the fuel mix in combination to the higher exploitation of indigenous fossil fuel resources (becoming a more cost effective option in the presence of higher energy import prices) are the key drivers for this improvement.

1.3.2.2. Final energy demand

Higher energy import prices lead to a decline of energy requirements in the demand side, ranging from -0.9% from Baseline levels in 2010 up to -2.1% in 2030 (see Table 1.3-3). In the long run this decline is higher than the corresponding decline in primary energy needs reflecting the structural and behavioural changes that take place in an environment of high prices but also the changes in the fuel mix and the adoption of more efficient equipment occurring in the demand side.

Table 1.3-3: Final Energy Demand and CO_2 emission by Sector in EU-25 in the "Medium gas and soaring oil prices" case

	Mtoe				*% change from baseline*		
	2000	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Industry	330.1	355.4	379.8	387.2	-0.3	-0.7	-1.1
Residential	273.3	309.2	332.7	342.6	-0.9	-1.8	-2.5
Tertiary	159.0	186.6	207.7	219.2	-1.0	-2.0	-2.7
Transports	333.0	375.7	396.1	392.5	-1.4	-2.3	-2.4
Total	**1095.4**	**1226.9**	**1316.2**	**1341.5**	**-0.9**	**-1.7**	**-2.1**
EU-15	970.7	1077.0	1135.7	1139.4	-0.9	-1.7	-2.1
NMS	124.7	150.0	180.5	202.1	-0.9	-1.6	-2.2
	Mt CO_2 emissions				*% change from baseline*		
	2000	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Industry	567.7	565.7	577.4	544.2	-2.0	-3.0	-4.5
Residential	452.1	470.2	471.7	455.3	-2.6	-4.7	-6.5
Tertiary	244.6	255.4	263.8	264.1	-2.4	-4.4	-6.3
Transports	969.9	1057.1	1075.0	1041.6	-1.6	-3.6	-4.7
Total	**2234.3**	**2348.4**	**2387.9**	**2305.3**	**-2.0**	**-3.8**	**-5.2**
EU-15	1985.3	2071.8	2079.9	1982.0	-2.0	-3.8	-5.1
NMS	249.0	276.6	308.1	323.2	-1.8	-3.6	-5.6

Source: PRIMES.

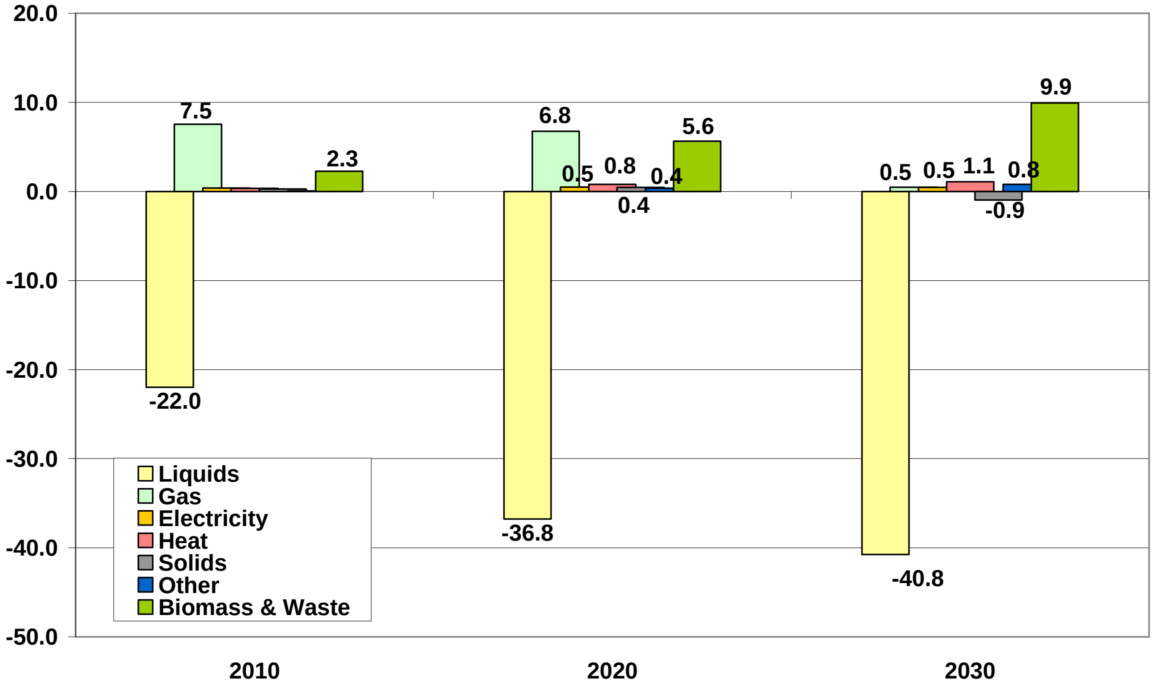
Industry exhibits only a small reaction to price increases whereas the tertiary, residential and transport sectors are more responsive to price changes.

Because of the relatively low taxation of energy products for industrial uses, one would expect that this sector would be the most responsive to the price shock as it experiences the sharpest increase in energy prices. However, this sector is also characterised by limited flexibility regarding both short-term structural change and further substitution among fuels above that projected in the Baseline projections. As a result energy use in industry exhibits only a limited decline from Baseline levels over the projection period. However, the sector undergoes some additional changes in the fuel mix towards the use of natural gas, electricity and co-generated steam as well as biomass and waste in industrial boilers, occurring to the detriment of liquid fuels. These shifts result in CO_2 emissions reduction well above the corresponding decline in energy requirements, -2.0% from Baseline levels in 2010 and -4.5% in 2030.

The tertiary and residential sectors are projected to be the most responsive to higher energy import prices in the long run. Besides energy intensity gains achieved through the adoption of more efficient technologies, higher fuel prices lead to a slowdown in the pace with which the energy consumers shift towards higher comfort standards. As a result energy demand in the tertiary sector falls by 2.7% from Baseline levels in 2030 with the corresponding decrease in residential energy demand reaching 2.5%. Furthermore, both sectors undergo significant changes in the fuel mix which in turn result in even more pronounced CO_2 emission reductions in 2030 (-6.3% from Baseline levels in the tertiary sector, -6.5% in the residential sector).

Energy consumers in the transport sector also respond to higher oil prices mainly through lowering their transport activity and shifts towards less energy intensive transport modes. These changes take place despite the fact that the high taxes on transport fuels greatly dampen the impact of further changes in international fuel prices. As a result energy demand in the transport sector in the “Medium gas and soaring oil prices” case is projected to be -1.4% lower from Baseline levels in 2010 and -2.4% lower in 2030. Furthermore, higher oil prices lead to some acceleration in the share of biofuels in gasoline and diesel consumption. The share of biofuels is projected to reach 4.1% in 2010 (compared to 3.9% under Baseline assumptions), 8.3% in 2020 (6.9% in Baseline) and 10.7% in 2030 (8.3% in Baseline). The accelerated penetration of biofuels in transport impacts on the evolution of CO_2 emissions in the sector, which are projected to decrease at rates well above those of energy demand over the projection period (reaching -4.7% from Baseline levels in 2030).

Figure 1.3-1: Changes in final energy demand by fuel in EU-25 (diff. from Baseline in Mtoe) in the "Medium gas and soaring oil prices" case



Source: PRIMES.

In terms of fuel use, the most pronounced changes, from Baseline levels, in the demand side occur for liquid fuels, natural gas and biomass and waste (see Figure 1.3-1). Demand for liquid fuels declines at rates well above those for total energy requirements in the demand side both in absolute terms (-22.0 Mtoe for oil compared to -11.1 Mtoe for total final energy in 2010, -40.8 Mtoe compared to -28.9 Mtoe in 2030) and in percentage terms (-4.2% and -8.0% for liquid fuels in 2010 and 2030 respectively, compared to -0.9% and -2.1% for total final energy demand). Taking into account the increase in the share of biofuels in gasoline and diesel oil used in the transport sector, the impact on mineral oil becomes even more pronounced reaching up to -10% from Baseline levels in 2030.

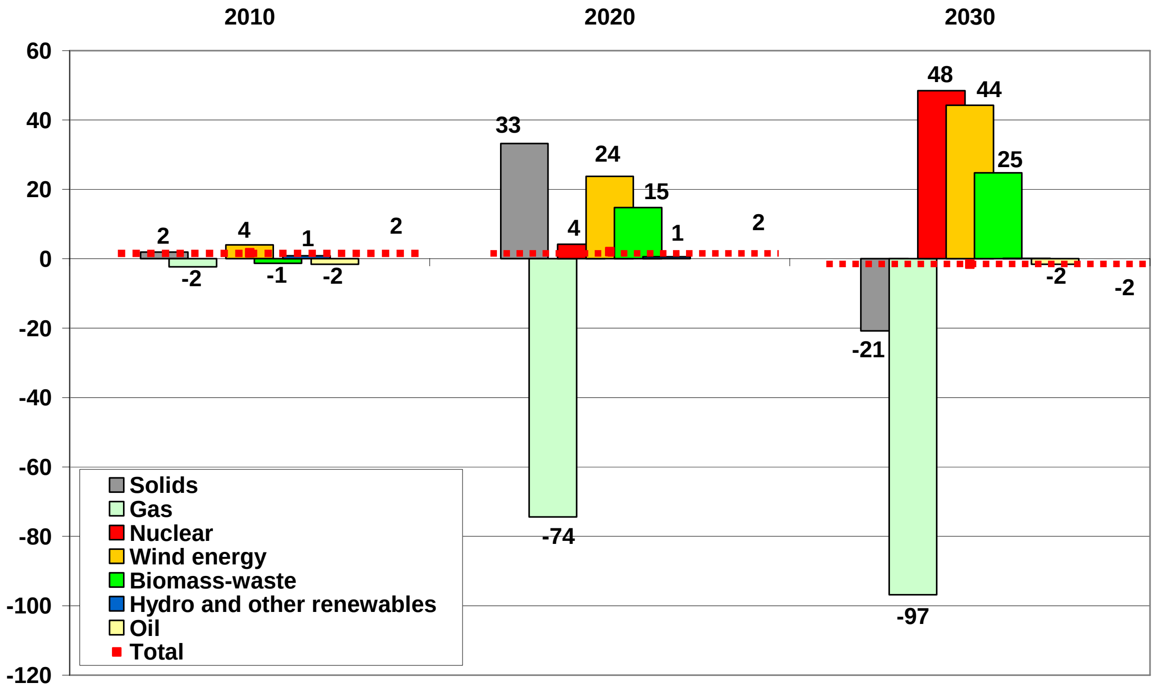
The use of all other energy forms in the demand side is projected to grow on top of Baseline levels over the projection period, with the only exception concerning demand for solid fuels in 2030 (-2.8% from Baseline levels). The most pronounced growth in absolute terms in 2010 and 2020 is projected for natural gas demand (+2.7% and +2.2% from Baseline levels, respectively), a result explained by the fact that, under the "Medium gas and soaring oil prices" case assumptions for international fuel prices, natural gas becomes a more cost effective option both against oil and coal. This is also the case for 2030, however, as natural gas prices further grow on top of Baseline levels the demand side shifts towards the use of other energy forms limiting the additional contribution of natural gas in satisfying final energy requirements to just +0.5 Mtoe (or +0.1% from Baseline levels). Biomass and waste continuously grow on top of Baseline levels (+4.2% in 2010; +14.7% in 2030) whereas solar energy also makes some significant inroads (+4.5% from Baseline levels in 2010; +29.6% in 2030). Demand for electricity and distributed steam exhibits only a limited growth from Baseline levels (+0.1% and +0.4% respectively in 2010; +0.1% and +1.1% respectively in 2030) despite the fact that structural changes in power generation lead to a partial absorption of additional costs imposed on the energy system as a result of higher fuel prices and, consequently, a less pronounced increase in the price of electricity than that for oil and gas. Therefore, the shares for both electricity and distributed steam in final energy demand increase from Baseline levels, which is also due to the decline of final energy requirements from Baseline levels.

In 2030, electricity accounts for 24.9% of energy requirements in the demand side (+0.5 percentage points from Baseline levels), and distributed steam for 7.2% from 7.0% in the Baseline scenario. The share of natural gas also exhibits a limited growth from Baseline levels in the long run (reaching 24.0% in 2030 from 23.5% in the Baseline scenario). The most pronounced increase is projected for the market share of biomass and waste (accounting for 5.8% of energy requirements in the demand side in 2030, +0.8 percentage points from Baseline levels). As already discussed, these changes take place to the detriment of liquid fuels, the share of which declines by 2.2 percentage points from Baseline levels down to 35.1% in 2030.

1.3.2.3. Electricity and steam generation

Higher energy import prices have only a limited impact on overall electricity generation (less than 0.1% higher from Baseline levels in 2010 and 2020, less than 0.1% lower in 2030). However, the different international prices profiles lead to substantial changes in producers' investment decisions as regards the expansion and/or replacement of existing power generation capacity.

Figure 1.3-2: Changes in electricity generation by energy form in EU-25 (diff. from Baseline in TWh) in the "Medium gas and soaring oil prices" case



Source: PRIMES.

As can be seen in Figure 1.3-2, only limited changes are projected to occur in electricity generation in 2010. The gap due to additional electricity generation (+2 TWh from Baseline levels) and the decline in generation using liquid fuels (-2 TWh or -1.2% from Baseline levels), natural gas (-2 TWh or -0.3%) and biomass/waste (-1 TWh or -1.4%) is closed by increased generation from solid fuels (+2 TWh or +0.2%) and other renewable energy forms (+4 TWh or +2.2% for wind energy, +1 TWh or +0.2% for hydro).

The impact of high energy import prices on the structure of electricity and steam generation becomes more pronounced in the long run. In 2020, electricity generation from natural gas declines by -6.5% from Baseline levels, with the corresponding decline in 2030 reaching -9.5%. The gap in 2020 is partly covered by solid fuels, (+3.7% higher electricity generation from Baseline levels), involving a higher exploitation of indigenous coal and lignite resources. Power generation from renewables grow significantly from Baseline levels in 2020 (+4.2% in total, +7.8% for wind energy and +6.0% for biomass/waste), whereas the growth in electricity generation from nuclear power plants is limited to 0.5% from Baseline levels in 2020. In 2030, the cost effectiveness advantage of nuclear energy due to higher fossil fuel costs in power generation becomes more pronounced with electricity generation from nuclear increasing by 5.9% from Baseline levels. Renewable energy options are also more deployed in a high fossil fuel price environment (+5.7% from Baseline levels for total electricity from renewables, +10.0% for wind energy, +7.0% for biomass/waste). On the contrary, the increasing cost effectiveness of nuclear has a negative effect on electricity generation from solid fuels, which is projected to produce -1.7% less electricity compared to the Baseline in 2030.

The changes in the sector lead to an increased share of renewable energy forms (including waste) in electricity generation, especially in the long run. The renewables share reaches 18.2% in 2010 (+0.1 percentage points above Baseline levels) and rises further to 29.2% in 2030 (compared to 27.6% in the Baseline scenario). Nuclear energy accounts for 19.8% of electricity generation in 2030 (+1.1 percentage points above Baseline levels). Thus, the market share of electricity generation from fossil fuels in the "Medium gas and soaring oil prices" case declines by -0.1 percentage points below Baseline levels in 2010 and -2.7 percentage points in 2030. The most pronounced impact is projected for natural gas (share declining by -0.1 percentage points from Baseline levels in 2010 and -2.2 percentage points in 2030), with the corresponding decline for solids reaching -0.5 percentage points in 2030 (from an increase of +0.8 percentage points compared to Baseline levels in 2020).

Table 1.3-4: Installed capacity by plant type in EU-25 in the "Medium gas and soaring oil prices" case

	GW installed				*change from baseline (in GW)*		
	2000	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Nuclear energy	141.1	136.4	117.5	107.5	0.0	0.5	6.3
Renewable energy (excl. biomass-waste)	110.1	185.9	251.4	330.4	1.7	9.9	24.4
Hydro (pumping excluded)	97.2	104.0	108.8	112.7	0.1	0.1	0.5
Lakes	52.2	56.1	58.0	59.0	0.1	0.1	0.4
Run of river	45.0	47.9	50.8	53.7	0.0	0.0	0.0
Wind power	12.8	80.0	137.4	206.9	1.6	9.7	24.0
Wind on-shore	12.8	70.5	111.5	158.5	0.4	2.6	19.8
Wind off-shore	0.0	9.5	25.8	48.4	1.2	7.2	4.2
Solar	0.2	1.7	4.8	10.4	0.0	0.0	0.0
Other renewables (tidal etc.)	0.0	0.2	0.4	0.4	0.0	0.0	0.0
Thermal power	410.5	494.7	588.0	688.1	4.6	3.5	-1.5
Solids fired	188.9	158.0	163.5	213.3	1.4	6.7	2.1
Oil fired	74.3	69.1	50.2	36.2	3.0	2.3	1.3
Gas fired	131.9	245.2	313.6	349.3	-0.2	-7.6	-10.8
Natural gas	119.2	233.4	304.1	341.0	-0.2	-7.6	-11.0
Derived gasses	12.7	11.8	9.5	8.3	0.0	0.0	0.2
Biomass-waste fired	14.5	21.1	59.2	87.5	0.4	2.1	5.9
Fuel cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal heat	1.0	1.4	1.5	1.7	0.0	0.0	0.0
Total	**661.7**	**817.1**	**956.9**	**1125.9**	**6.3**	**13.9**	**29.2**
EU-15	588.1	730.0	840.1	958.4	5.6	11.6	28.4
NMS	73.7	87.1	116.8	167.5	0.8	2.3	0.8
of which CHP	***113.0***	***154.9***	***212.7***	***249.1***	***4.0***	***3.7***	***1.1***
EU-15	*88.5*	*128.0*	*179.0*	*195.8*	*3.3*	*3.5*	*1.8*
NMS	*24.4*	*26.9*	*33.7*	*53.2*	*0.7*	*0.2*	*-0.7*

Source: PRIMES.

The above changes are also reflected in the investment decisions of power generators, which are clearly altered by these different fuel prices. More specifically, given higher gas prices, gas fired power plants lose much of their cost effectiveness, and are mainly replaced by renewable technologies (see Table 1.3-4). The higher deployment of renewables capacity and especially wind turbines (involving lower utilisation rates compared with e.g. natural gas power plants) leads to an increase of total installed capacity up to 1126 GW in 2030 (+29.2 GW or +2.7% from Baseline levels) compared to a rather stable electricity production. Renewables capacity (including biomass-waste and geothermal power plants) is projected to reach 420 GW in 2030 accounting for 37.3% of total installed capacity (from 35.5% in the Baseline scenario). Nuclear capacity is also projected to grow on top of Baseline levels in the long run (+6.3 GW or +6.2% from Baseline levels in 2030) accounting for 9.5% of total installed capacity in 2030 from 9.2% in the Baseline. On the contrary, natural gas fired power plants capacity is projected to grow at a slower pace than in the Baseline scenario to reach 341 GW in 2030 (-11.0 GW or -3.1% from Baseline levels).

The stronger penetration of renewable energy forms in the power generation sector partly counterbalances the slower deployment of gas fired power plants with overall power generation efficiency reaching rates slightly below those projected in the Baseline scenario (48.5% compared to 48.6% in 2030). As regards thermal power plants efficiency it is projected to reach 47.3% in 2030 compared to 47.5% in the Baseline scenario. Total fuel input in power generation exhibits a limited decline from Baseline levels ranging from -0.3% in 2010 to -0.4% in 2030 (see Table 1.3-5).

Table 1.3-5: Fuel input in the EU-25 power generation sector in the "Medium gas and soaring oil prices" case

	Mtoe				% change from baseline		
	2000	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Solids	214.5	216.5	206.5	236.0	0.7	4.0	-1.8
Oil products	41.9	30.0	22.2	19.7	-5.2	-4.9	-0.5
Gas	105.5	151.5	171.7	140.7	-0.9	-6.0	-9.4
Biomass-waste	21.2	28.6	56.0	73.2	-1.8	4.4	5.5
Nuclear energy	237.7	248.8	229.7	223.3	0.0	0.5	5.9
Geothermal heat	2.9	3.7	4.7	5.3	0.0	1.4	1.6
Total	**623.7**	**679.1**	**690.7**	**698.3**	**-0.3**	**-0.1**	**-0.4**
EU15	542.2	585.9	583.6	579.4	-0.3	-0.1	-0.6
NMS	81.5	93.2	107.1	118.9	-0.3	0.1	1.0
Mt CO_2 emitted	**1250.0**	**1325.8**	**1306.9**	**1341.1**	**-0.2**	**0.2**	**-3.7**
EU-15	997.8	1054.1	1032.6	1075.9	-0.1	0.4	-4.3
NMS	252.2	271.7	274.2	265.1	-0.3	-0.2	-1.0

Source: PRIMES.

Transformation input of solids is higher than in the Baseline up to 2020, exhibiting a decline from Baseline levels thereafter. The growth in gas fuels for power generation exhibits a significant slowdown over the projection period, with consumption of natural gas decreasing -9.4% from Baseline levels in 2030. Biomass and waste are projected to be exploited at fairly high rates beyond 2010 with considerable increases over the corresponding Baseline levels (up to +5.5% in 2030). Nuclear fuel also grows on top of Baseline levels in the long run reaching +5.9% in 2030.

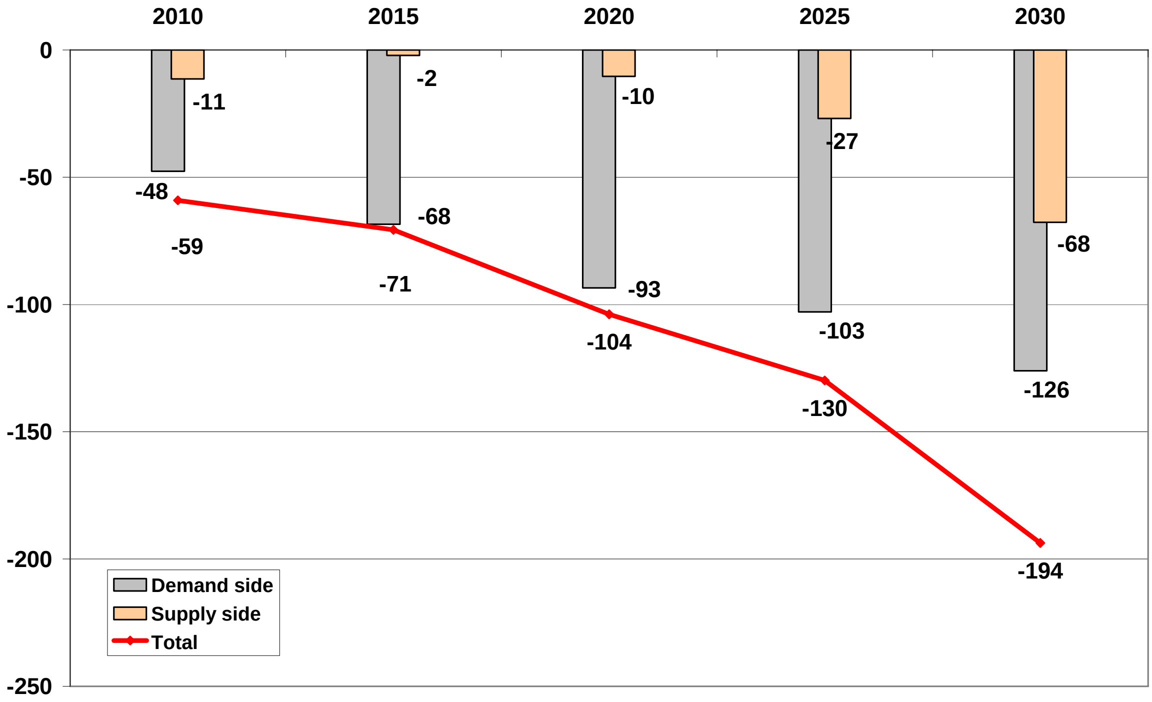
1.3.2.4. CO_2 emissions and concluding remarks

In the short term, the shift towards carbon free energy forms for power generation more than counterbalances the increase in electricity and steam demand and the higher utilisation of solid fuels resulting in lower CO_2 emissions from Baseline levels (-0.2% in 2010). However, in 2020 and as the changes in the fuel mix towards greater use of solid fuels and less natural gas become increasingly important, CO_2 emissions are projected to reach levels slightly above those in the Baseline (+0.2% in 2020 in EU-25). In 2030, lower electricity requirements in combination to the higher exploitation of nuclear energy and the decline in the use of solid fuels lead to a decline of CO_2 emissions by -3.7% compared to the Baseline scenario with carbon intensity improvements reaching 4.2%

from Baseline levels (compared to a 0.4% improvement in 2010 and unchanged carbon intensity in 2020).

In the "Medium gas and soaring oil prices" case total CO_2 emissions are projected to grow at a slower pace than in the Baseline scenario. In 2010 they are 1.2% higher than they had been in 1990 (compared to 2.8% higher in the Baseline) while in 2030 they are projected to fall slightly below the 1990 levels (minus 0.4% compared to an increase by +4.7% from 1990 levels in the Baseline scenario). As illustrated in Figure 1.3-3, the demand side (both because of changes in the fuel mix and efficiency gains) is the main driver for the projected reduction of CO_2 emissions in comparison to the Baseline; whereas the supply side contribution becomes increasingly important only in the long run. In 2010 the demand side accounts for 81% of total CO_2 emissions reduction achieved from Baseline levels, a share increasing to 90% in 2020, but dropping thereafter to 65% by 2030.

Figure 1.3-3: Changes in CO_2 emissions in EU-25 (diff. from Baseline in Mt CO_2) in the "Medium gas and soaring oil prices" case



Source: PRIMES.

Concluding, an environment of high energy prices, as examined in the "Medium gas and soaring oil prices" case, exerts only a small downward pressure on energy requirements for the EU-25 energy system with more pronounced shifts occurring in the fuel mix, mainly towards the higher exploitation of renewable energy options. The renewables share in gross energy consumption increases somewhat compared with Baseline (+0.2 and +1.4 percentage points in 2010 and 2030 respectively). However, higher fossil fuel prices alone deliver only a limited contribution towards achieving renewables targets, such as the 12% share in gross energy consumption in 2010.

As a result of these changes in the fuel mix CO_2 emissions grow at a slower pace than in the Baseline scenario in the short to medium term (+1.2% from 1990 levels in 2010, +1.3% in 2020), declining thereafter to reach at -0.4% from 1990 levels in 2030. Finally, the higher deployment of renewables and nuclear in the long run, in combination to the increasing cost effectiveness of exploiting indigenous fossil fuel resources, leads to an improvement of import dependency for the EU-25 energy system, which is projected to reach 61.2% in 2030(3.7 percentage points below Baseline levels).

1.4. "Soaring oil and gas prices" scenario results for EU-25[7]

The "Soaring oil and gas prices" case explores the possible evolution of the EU-25 energy system in the horizon to 2030 in an environment of particularly high energy import prices for oil and gas with gas prices following those of oil. Gas prices in this scenario exceed the gas prices in the "Medium gas and soaring oil prices" case by +6.5% in 2010 and by +31.5% in 2030.

Table 1.4-1: Evolution of primary energy needs in the EU-25 energy system in the "Soaring oil and gas prices" case

	Mtoe				% change from baseline		
	2000	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Solid Fuels	306.5	288.7	301.5	326.4	0.7	16.2	11.4
Liquid Fuels	634.7	639.8	628.2	598.2	-4.3	-6.2	-6.6
Natural Gas	376.3	467.4	482.2	449.2	1.1	-9.0	-13.3
Nuclear	237.7	248.8	230.2	224.6	0.0	0.7	6.5
Renewable En. Sources	96.5	147.3	211.7	259.7	2.5	8.3	12.5
Total	**1653.8**	**1794.2**	**1855.9**	**1860.3**	**-1.0**	**-1.6**	**-1.8**
EU-15	1456.9	1571.8	1599.9	1578.8	-1.0	-1.5	-1.8
NMS	196.9	222.4	256.0	281.5	-1.4	-2.1	-1.8
Mt CO_2 emitted	**3674.1**	**3818.9**	**3870.2**	**3804.6**	**-1.6**	**-1.5**	**-3.8**
EU-15	3127.0	3237.6	3257.2	3184.3	-1.6	-1.3	-3.8
NMS	547.1	581.4	613.0	620.2	-1.6	-2.3	-3.7

Source: PRIMES.

As was the case in the "Medium gas and soaring oil prices" case overall primary energy needs in the EU-25 energy system exhibit only a limited decline from Baseline levels, -1.0% in 2010, -1.8% in 2030 (see Table 1.4-1). However, changes in the fuel mix follow a different pattern with demand for solid fuels growing well above Baseline levels beyond 2010 (+16.2% in 2020, +11.4% in 2030) while natural gas demand is faced with strong downward pressures in the same period (-9.0% in 2020, -13.3% in 2030). Because of the stronger increase of natural gas prices the impact of high oil prices becomes less pronounced with oil requirements declining by up to -6.6% from Baseline levels in 2030 compared to -7.9% in the "Medium gas and soaring oil prices" case. Nuclear energy is projected to increase slightly more than in the "Medium gas and soaring oil prices" case reaching +6.5% from Baseline levels in 2030 (compared to +5.9% in the "Medium gas and soaring oil prices" case), while the increase in primary energy requirements for renewable energy forms reaches up to +12.5% from Baseline levels in 2030 (compared to an increase by +9.4% in the "Medium gas and soaring oil prices" case) with more than 70% of incremental renewable energy requirements being satisfied by biomass/waste in 2030.

The projected growth on top of Baseline levels for renewable energy forms and nuclear energy more than counterbalances the corresponding increase in solid fuels demand occurring to the detriment of liquid fuels and natural gas with carbon intensity declining by 0.6% from Baseline levels in 2010 and by 2.0% in 2030. Thus, CO_2 emissions in the "Soaring oil and gas prices" case are projected to decrease from Baseline levels by -1.6% and -3.8% in 2010 and 2030 respectively. It is only in 2020 that the substantial growth on top of Baseline levels for solid fuels demand results in a slight deterioration of carbon intensity in comparison to the Baseline scenario with CO_2 emissions declining nevertheless by -1.5% from Baseline levels compared to a decline of primary energy requirements by -1.6%.

[7] Aggregate results by group of countries (EU-25, EU-15, NMS, EU-27, EU28 and Europe-30) can be found in Appendix 2.

In the demand side, energy requirements fall by -1.0% from Baseline levels in 2010, reaching -2.9% in 2030. Demand for liquid fuels declines over the projection period (-4.0% in 2010, -5.9% in 2020 and -6.9% from Baseline levels in 2030) whereas natural gas consumption in the demand side exhibits a limited growth on top of Baseline levels in 2010 (+1.2%), declining thereafter (-3.8% in 2020 and -6.8% in 2030). Renewables are projected to grow well on top of Baseline levels (+5.2% in 2010 up to +17.5% in 2030) while energy demand for electricity, distributed steam and solid fuels is also projected to be somewhat higher than in the Baseline scenario. Furthermore, the share of biofuels in gasoline and diesel demand increases significantly from Baseline levels to reach 4.1% in 2010 and 10.7% in 2030 (+0.2 and +2.5 percentage points respectively from Baseline levels). As a combined effect of the above changes CO_2 emissions in the demand side are projected to decline from Baseline levels by -2.2% in 2010 and by -6.3% in 2030. The most pronounced carbon intensity improvement from Baseline levels is projected for the residential and the tertiary sector (5.8% and 4.6% respectively from Baseline levels in 2030). Carbon intensity improvements in industry reach +3.9% from Baseline levels in 2030, while in the transport sector they amount to +2.3%.

In power generation, prevailing high gas prices strongly affect the cost effectiveness of gas fired power plants with electricity generation from natural gas declining -30.3% from Baseline levels in 2030 (-22.0% in 2020). With overall electricity requirements remaining similar to those of the Baseline scenario, falling power generation from gas is compensated by higher electricity generation from solid fuels (+21.7% from Baseline levels in 2020, +13.2% in 2030), from renewables (+6.5% in 2020, +9.7% in 2030) and nuclear energy (+0.7% in 2020, +6.5% in 2030).

Among the renewable energy forms the most pronounced growth above Baseline levels in relative terms is projected for solar energy, exceeding Baseline levels in 2030 by 310% in power generation. Additional electricity production from solar energy accounts for 22.7% of the incremental renewable electricity in 2030 with wind energy accounting for 44.5% and electricity produced from biomass and waste for 32.6%.

The renewables share in electricity generation increases to 30.1% in 2030 (+2.5 percentage points from Baseline levels) while the share of nuclear energy is projected to reach 19.8% in 2030 (compared to 18.7% in the Baseline). With the share of fossil fuels in total electricity generation being limited to 50.0% in 2030 (from 53.7% in the Baseline scenario), solid fuels are projected to increase their share up to 31% in 2030 (+3.5 percentage points compared to the Baseline) whereas electricity generation in gas fired power plants is limited to 16.1% of total production in 2030 (from 23.2% in the Baseline), a result clearly reflecting the strong impact that the high natural gas prices of the “Soaring oil and gas prices” cases would have on the cost effectiveness of this type of power plants. CO_2 emissions in the power generation sector decline by -0.3% from Baseline levels in 2010, increasing thereafter by +5.1% in 2020 and +0.9% in 2030 as the higher exploitation of renewable energy forms and nuclear energy (in 2030) is not sufficient to counterbalance the increased use of solid fuels.

Thus, the projected CO_2 emissions reduction from Baseline levels in the “Soaring oil and gas prices” case arises mainly from energy intensity improvements and changes in the fuel mix occurring in the demand side (accounting for 82% of total CO_2 emissions reduction in 2010 and 101% in 2030) whereas the supply side has a negative contribution to CO_2 emissions reduction beyond 2010, i.e. changes in power generation put some upward pressure on CO2 emissions..

Concluding, the high import energy prices assumed in the “Soaring oil and gas prices” case lead to a limited reduction of energy requirements in the EU-25 energy system in comparison to the Baseline scenario and a more favourable development for CO_2 emissions (reaching +0.8% from 1990 levels in 2030 compared to +4.7% in the Baseline scenario). The import dependency of the EU-25 energy system also improves reaching

59.7% in 2030 compared to 64.8% in the Baseline scenario. Similarly, the “Soaring oil and gas prices” case produces somewhat higher renewables shares.

However, in comparison with the “Medium gas and soaring oil price” case, the linking of gas to oil prices exhibits some disadvantages. In addition to the competitiveness disadvantages of higher gas prices for the EU economy, such higher gas prices would also lead to higher CO_2 emission in the long term. Whereas CO_2 emissions fall slightly below the 1990 level in 2030 in the “Medium gas and soaring oil price” case, they stay above the 1990 level in the entire projection period with soaring gas prices, i.e. when gas and oil prices are coupled. It is far from clear whether the slightly higher renewables share in the “Soaring oil and gas price case” in 2030 (14.0% in gross energy consumption instead of 13.5% with medium gas prices) as well as the somewhat lower import dependency (59.7% in 2030 instead of 61.2%) can outweigh these disadvantages.

Glossary

Carbon intensity: The amount of CO2 by weight emitted per unit of energy consumed or produced (t of CO2/tonne of oil equivalent (toe) or MWh)

Clean coal units: A number of innovative, new technologies designed to use coal in a more efficient and cost-effective manner while enhancing environmental protection. Among the most promising technologies are fluidised-bed combustion (PFBC), integrated gasification combined cycle (IGCC), coal liquefaction and coal gasification.

CO_2 Emissions to GDP: The amount of CO_2 by weight emitted per unit of GDP (carbon intensity of GDP - t of CO_2/MEuro'00).

Cogeneration thermal plant: A system using a common energy source to produce both electricity and steam for other uses, resulting in increased fuel efficiency (see also: CHP).

Combined Cycle Gas Turbine plant (CCGT): A technology which combines gas turbines and steam turbines, connected to one or more electrical generators at the same plant. The gas turbine (usually fuelled by natural gas or oil) produces mechanical power, which drives the generator, and heat in the form of hot exhaust gases. These gases are fed to a boiler, where steam is raised at pressure to drive a conventional steam turbine, which is also connected to an electrical generator. This has the effect of producing additional electricity from the same fuel compared to an open cycle turbine.

Combined Heat and Power: This means cogeneration of useful heat and power (electricity) in a single process. In contrast to conventional power plants that convert only a limited part of the primary energy into electricity with the remainder of this energy being discharged as waste heat. CHP makes use of large parts of this energy for e.g. industrial processes, district heating, and space heating. CHP therefore improves energy efficiency (see also: cogeneration thermal plant).

Efficiency for thermal electricity production: A measure of the efficiency of converting a fuel to electricity and useful heat; heat and electricity output divided by the calorific value of input fuel times 100 (for expressing this ratio in percent).

Efficiency indicator in freight transport (activity related): Energy efficiency in freight transport is computed on the basis of energy use per tonne-km. Given the existence of 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 numbers given are only illustrative of the trends in certain cases.

Efficiency indicator in passenger transport (activity related): Energy efficiency in passenger transport is computed on the basis of energy use per passenger-km travelled. Issues related to consistency of transport and energy statistics also apply to passenger transport (see also: Efficiency indicator in freight transport).

Energy branch consumption: Energy consumed in refineries, electricity and steam generation and in other transformation processes; it does not include the energy input for transformation as such.

Energy intensity: energy consumption/GDP or another indicator for economic activity

Energy intensive industries: Iron and steel, non-ferrous, chemicals, non-metallic minerals, and paper and pulp industries.

Final energy demand: Energy finally consumed in the transport, industrial, household and tertiary sectors with tertiary comprising services and agriculture. It excludes deliveries to the energy transformation sector (e.g. power plants) and to the energy branch. It includes electricity consumption in the above final demand sectors.

Freight transport activity: Expressed in tonne kilometres (1 Gtkm = 10^9 tkm); one tkm = one tonne transported a distance of one km. It should be noted that inland navigation includes both waterborne inland 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.

Fuel cells: A fuel cell is an electrochemical energy conversion device converting hydrogen and oxygen into electricity and heat with the help of catalysts. The fuel cell provides a direct current voltage that can be used to power various electrical devices including motors and lights.

Fuel input to power generation: Fuel use in electricity, CHP plants and heat plants.

Gas: Includes natural gas, blast furnace gas, coke-oven gas and gasworks gas.

Generation capacity: The maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer.

Geothermal plant: A plant in which the prime mover is a steam turbine. The turbine is driven either by steam produced from hot water or by natural steam that derives its energy from heat in rocks or fluids beneath the surface of the earth. The energy is extracted by drilling and/or pumping.

Gross Inland Consumption: Quantity of energy consumed within the borders of a country. It is calculated as primary production + recovered products + imports +/- stock changes – exports – bunkers (i.e. quantities supplied to sea-going ships).

Gross Inland Consumption/GDP: Energy intensity indicator calculated as the ratio of total energy consumption to GDP – (toe/MEuro'00).

Hydro power plant: A plant producing energy with the use of moving water. For the purposes of these energy balance projections, hydro excludes pumped storage plants that generate electricity during peak load periods by using water previously pumped into an elevated storage reservoir during off-peak periods when excess generating capacity is available.

Non fossil fuels: Nuclear and renewable energy sources.

Non-energy uses: Non-energy consumption of energy carriers in petrochemicals and other sectors, such as chemical feedstocks, lubricants and asphalt for road construction.

Nuclear power plant: A plant in which a nuclear fission chain reaction can be initiated, controlled, and sustained at a specific rate. They include new nuclear designs (such as the EPR as well as the AP1000 and AP600) with passive safety features (which reduce core fusion probability from 10^{-5}/year of existing nuclear plants to less than 5.10^{-7}/year).

Oil: Includes refinery gas, liquefied petroleum gas, kerosene, gasoline, diesel oil, fuel oil, crude oil, naphtha and feedstocks.

Open cycle units: A turbine connected to an electrical generator. Less efficient than a combined cycle gas turbine (CCGT) because it does not recover and use the heat of the exhaust gases. Open cycle units include polyvalent units, monovalent coal-lignite units, monovalent oil-gas units and monovalent biomass-waste units.

Passenger transport activity: Expressed in passenger kilometres (1 Gpkm = 10^9 pkm); one pkm relates to one person travelling a distance of one km. Passenger transport activity includes energy consuming passenger transport on roads (public and private), by rail, in airplanes and on ships as far as this takes place on rivers, canals, lakes and as domestic sea shipping; international short sea shipping is not included as, according to

EUROSTAT energy balances, energy needs for international shipping are allocated to bunkers.

Primary production: Total indigenous production.

Renewable energy sources: Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include: biomass, hydro, wind, geothermal, solar, wave and tidal energy.

Solar power plant: A plant producing energy with the use of radiant energy from the sun; includes solar thermal and photovoltaic (direct conversion of solar energy into electricity) plants.

Solids: Include both primary products (hard coal and lignite) and derived fuels (patent fuels, coke, tar, pitch and benzol).

Supercritical polyvalent units: A power plant for which the evaporator part of the boiler operates at pressures above 22.1 MegaPascals (MPa). The cycle-medium in this case is a single phase fluid with homogenous properties and thus there is no need to separate steam from water in a drum, allowing for higher efficiency in power generation.

Thermal power plants: Type of electric generating station in which the source of energy for the prime mover is heat.

Wind power plant: Typically a group of wind turbines interconnected to a common utility system through a system of transformers, distribution lines, and (usually) one substation. Operation, control, and maintenance functions are often centralised through a network of computerised monitoring systems, supplemented by visual inspection.

APPENDIX 1: "Medium gas and soaring oil prices" case results

Summary results by groups of countries (comparison to Baseline)

EU25: Medium gas and soaring oil prices case — SUMMARY ENERGY BALANCE AND INDICATORS (A)

Comparison to Baseline scenario

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**877543**	**898598**	**862200**	**753400**	**743928**	**25784**	**46879**	**58825**	**3.1**	**6.6**	**8.6**
Solids	351650	204139	155151	137318	120701	624	6236	504	0.4	4.8	0.4
Oil	120396	163631	134054	77157	60876	16875	24199	17427	14.4	45.7	40.1
Natural gas	139723	196665	177628	102076	86487	5450	3726	6681	3.2	3.8	8.4
Nuclear	196920	237664	248776	229716	223318	0	1077	12510	0.0	0.5	5.9
Renewable energy sources	68855	96499	146591	207134	252545	2836	11641	21702	2.0	6.0	9.4
Hydro	23391	28982	29952	32245	33883	74	42	2	0.2	0.1	0.0
Biomass & Waste	42151	61865	94762	138317	165619	2354	9125	16739	2.5	7.1	11.2
Wind	67	1913	16134	28281	41745	348	2040	3803	2.2	7.8	10.0
Solar and others	145	417	1551	3120	5477	61	374	1082	4.1	13.6	24.6
Geothermal	3101	3322	4192	5170	5821	-2	60	75	0.0	1.2	1.3
Net Imports	**711300**	**801061**	**980467**	**1154578**	**1172079**	**-43808**	**-77113**	**-93488**	**-4.3**	**-6.3**	**-7.4**
Solids	75449	94307	133566	130156	165128	1279	1762	-7792	1.0	1.4	-4.5
Oil	510017	518147	548731	591197	581177	-50967	-78668	-71272	-8.5	-11.7	-10.9
- Crude oil and Feedstocks	479112	496826	512887	561297	557618	-48471	-75378	-68632	-8.6	-11.8	-11.0
- Oil products	30905	21321	35844	29900	23559	-2497	-3290	-2640	-6.5	-9.9	-10.1
Natural gas	123653	186463	295937	431108	423579	5884	-201	-14418	2.0	0.0	-3.3
Electricity	2181	2144	2233	2116	2195	-4	-5	-6	-0.2	-0.2	-0.3
Gross Inland Consumption	**1556194**	**1653841**	**1796260**	**1857997**	**1863954**	**-16273**	**-27339**	**-31283**	**-0.9**	**-1.5**	**-1.7**
Solids	431944	306538	288717	267474	285829	1902	7998	-7288	0.7	3.1	-2.5
Oil	595746	634711	636378	618374	590001	-32340	-51575	-50465	-4.8	-7.7	-7.9
Natural gas	260548	376284	473565	533184	510066	11333	3525	-7736	2.5	0.7	-1.5
Nuclear	196920	237664	248776	229716	223318	0	1077	12510	0.0	0.5	5.9
Electricity	2181	2144	2233	2116	2195	-4	-5	-6	-0.2	-0.2	-0.3
Renewable energy forms	68855	96499	146591	207134	252545	2836	11641	21702	2.0	6.0	9.4
as % in Gross Inland Consumption											
Solids	27.8	18.5	16.1	14.4	15.3	0.2	0.6	-0.1	1.6	4.6	-0.8
Oil	38.3	38.4	35.4	33.3	31.7	-1.5	-2.3	-2.1	-4.0	-6.3	-6.3
Natural gas	16.7	22.8	26.4	28.7	27.4	0.9	0.6	0.0	3.4	2.1	0.2
Nuclear	12.7	14.4	13.8	12.4	12.0	0.1	0.2	0.9	0.9	1.9	7.7
Renewable energy forms	4.4	5.8	8.2	11.1	13.5	0.2	0.8	1.4	2.9	7.5	11.2
Electricity Generation in GWh_e	**2455674**	**2900835**	**3484905**	**4007842**	**4365041**	**1720**	**2067**	**-1558**	**0.0**	**0.1**	**0.0**
Nuclear	780056	921193	964265	890384	865580	0	4177	48489	0.0	0.5	5.9
Hydro & wind	272788	359249	537453	708062	887978	4909	24211	44254	0.9	3.5	5.2
Thermal (incl. biomass)	1402830	1620392	1983187	2409396	2611483	-3189	-26321	-94301	-0.2	-1.1	-3.5
Fuel Inputs for Thermal Power Generation [1]	**355362**	**385987**	**430310**	**461015**	**474970**	**-1930**	**-1756**	**-15068**	**-0.4**	**-0.4**	**-3.1**
Solids	246377	214488	216504	206489	235973	1555	7988	-4338	0.7	4.0	-1.8
Oil (including refinery gas)	48954	41870	29989	22160	19699	-1645	-1151	-95	-5.2	-4.9	-0.5
Gas	47057	105480	151515	171723	140710	-1311	-11008	-14538	-0.9	-6.0	-9.4
Biomass & Waste	10201	21211	28618	55970	73243	-529	2351	3820	-1.8	4.4	5.5
Geothermal heat	2774	2939	3685	4673	5344	0	66	83	0.0	1.4	1.6
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**797634**	**796450**	**778958**	**773710**	**750430**	**-33938**	**-50385**	**-46634**	**-4.2**	**-6.1**	**-5.9**
Refineries	642275	710448	694214	679084	653464	-34708	-54941	-54639	-4.8	-7.5	-7.7
Biofuels and hydrogen production	2	637	17359	36183	45588	567	5179	9213	3.4	16.7	25.3
District heating	31035	17261	15338	13693	15027	88	-124	294	0.6	-0.9	2.0
Others	124322	68104	52048	44750	36351	115	-499	-1502	0.2	-1.1	-4.0
Energy Branch Consumption	**73032**	**80377**	**79369**	**77728**	**74445**	**-2129**	**-3438**	**-3689**	**-2.6**	**-4.2**	**-4.7**
Non-Energy Uses	**94476**	**105950**	**106418**	**108383**	**108919**	**-1430**	**-2817**	**-3246**	**-1.3**	**-2.5**	**-2.9**
Final Energy Demand	**1021913**	**1095359**	**1226925**	**1316223**	**1341508**	**-11081**	**-22281**	**-28945**	**-0.9**	**-1.7**	**-2.1**
by sector											
Industry[1]	341087	330062	355408	379782	387228	-1013	-2620	-4338	-0.3	-0.7	-1.1
- energy intensive industries	216809	211616	219969	226431	221494	-791	-1962	-3438	-0.4	-0.9	-1.5
- other industrial sectors	124278	118446	135439	153351	165734	-222	-659	-900	-0.2	-0.4	-0.5
Residential	261006	273302	309223	332655	342589	-2742	-6086	-8696	-0.9	-1.8	-2.5
Tertiary	146622	158975	186560	207698	219215	-1927	-4158	-6101	-1.0	-2.0	-2.7
Transport	273198	333020	375734	396088	392476	-5399	-9417	-9810	-1.4	-2.3	-2.4
by fuel [1]											
Solids	123937	56633	45481	39862	33077	280	442	-948	0.6	1.1	-2.8
Oil	428121	468312	495363	493114	471079	-21979	-36782	-40758	-4.2	-6.9	-8.0
Gas	200242	251885	286714	316476	321862	7540	6750	464	2.7	2.2	0.1
Electricity	176468	211352	259692	303405	334496	382	488	453	0.1	0.2	0.1
Heat (from CHP and District Heating)	63092	68712	80529	88495	96414	352	804	1089	0.4	0.9	1.1
Other	30053	38465	59146	74871	84580	2344	6017	10754	4.1	8.7	14.6
CO2 Emissions (Mt of CO2)	**3776.1**	**3674.1**	**3822.8**	**3824.7**	**3761.3**	**-59.1**	**-103.9**	**-193.7**	**-1.5**	**-2.6**	**-4.9**
Power generation/District heating	1362.6	1294.9	1358.0	1334.7	1367.0	-3.9	1.5	-57.1	-0.3	0.1	-4.0
Energy Branch	141.5	144.9	116.4	102.0	89.0	-7.5	-11.9	-10.6	-6.1	-10.4	-10.6
Industry	698.9	567.7	565.7	577.4	544.2	-11.3	-17.8	-25.7	-2.0	-3.0	-4.5
Residential	506.1	452.1	470.2	471.7	455.3	-12.4	-23.2	-31.4	-2.6	-4.7	-6.5
Tertiary	274.2	244.6	255.4	263.8	264.1	-6.4	-12.0	-17.7	-2.4	-4.4	-6.3
Transport	792.7	969.9	1057.1	1075.0	1041.6	-17.6	-40.5	-51.3	-1.6	-3.6	-4.7
CO2 Emissions Index (1990=100)	**100.0**	**97.3**	**101.2**	**101.3**	**99.6**	-1.6	-2.8	-5.1	-1.5	-2.6	-4.9

Source: PRIMES

EU25: Medium gas and soaring oil prices case — SUMMARY ENERGY BALANCE AND INDICATORS (B)
Comparison to Baseline scenario

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	440.788	452.915	464.054	469.270	469.365	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	7294.7	8947.0	10946.8	13656.3	16051.4	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	213.3	184.8	164.1	136.1	116.1	-1.5	-2.0	-1.9	-0.9	-1.5	-1.7
Gross Inl. Cons./Capita (toe/inhabitant)	3.53	3.65	3.87	3.96	3.97	-0.04	-0.06	-0.07	-0.9	-1.5	-1.7
Electricity Generated/Capita (kWh/inhabitant)	5571	6405	7510	8541	9300	4	4	-3	0.0	0.1	0.0
Carbon intensity (t of CO_2/toe of GIC)	2.43	2.22	2.13	2.06	2.02	-0.01	-0.03	-0.07	-0.6	-1.2	-3.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.57	8.11	8.24	8.15	8.01	-0.13	-0.22	-0.41	-1.5	-2.6	-4.9
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	517.7	410.7	349.2	280.1	234.3	-5.4	-7.6	-12.1	-1.5	-2.6	-4.9
Import Dependency %	44.7	47.2	53.2	60.5	61.2	-1.8	-3.0	-3.7	-3.3	-4.8	-5.7
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	83.8	77.1	66.2	57.9	-0.2	-0.5	-0.6	-0.3	-0.7	-1.1
Residential (Energy on Private Income)	100.0	85.8	79.7	69.3	60.9	-0.7	-1.3	-1.5	-0.9	-1.8	-2.5
Tertiary (Energy on Value added)	100.0	84.9	78.7	69.3	61.7	-0.8	-1.4	-1.7	-1.0	-2.0	-2.7
Transport (Energy on GDP)	100.0	99.4	91.6	77.4	65.3	-1.3	-1.8	-1.6	-1.4	-2.3	-2.4
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.41	0.30	0.26	0.23	0.22	0.00	0.00	-0.01	-0.4	0.0	-4.2
Final energy demand (t of CO_2/toe)	2.22	2.04	1.91	1.81	1.72	-0.02	-0.04	-0.06	-1.1	-2.1	-3.1
Industry	2.05	1.72	1.59	1.52	1.41	-0.03	-0.04	-0.05	-1.7	-2.3	-3.4
Residential	1.94	1.65	1.52	1.42	1.33	-0.03	-0.04	-0.06	-1.7	-2.9	-4.1
Tertiary	1.87	1.54	1.37	1.27	1.20	-0.02	-0.03	-0.05	-1.4	-2.4	-3.7
Transport	2.90	2.91	2.81	2.71	2.65	-0.01	-0.04	-0.06	-0.2	-1.3	-2.3
Electricity and steam generation											
Generation Capacity in MW_e		**661750**	**816818**	**956490**	**1125484**	**6311**	**13909**	**29192**	**0.8**	**1.5**	**2.7**
Nuclear		141082	136430	117477	107488	0	541	6271	0.0	0.5	6.2
Hydro (pumping excluded)		97168	103997	108767	112678	63	150	477	0.1	0.1	0.4
Wind		12785	80003	137363	206894	1612	9740	23963	2.1	7.6	13.1
Solar		176	1658	4850	10364	0	0	0	0.0	0.0	0.0
Thermal		410539	494730	588033	688060	4636	3479	-1520	0.9	0.6	-0.2
of which cogeneration units		112958	154884	212666	249066	4014	3704	1067	2.7	1.8	0.4
Solids fired		188879	157968	163462	213323	1431	6656	2087	0.9	4.2	1.0
Gas fired		131875	245205	313627	349314	-234	-7581	-10820	-0.1	-2.4	-3.0
Oil fired		74302	69088	50222	36218	3039	2291	1252	4.6	4.8	3.6
Biomass-waste fired		14462	21113	59187	87537	399	2093	5936	1.9	3.7	7.3
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1022	1356	1536	1668	0	19	25	0.0	1.3	1.5
Indicators											
Efficiency for thermal electricity production (%)		36.1	39.6	44.9	47.3	0.1	-0.3	-0.2	0.3	-0.7	-0.4
Load factor for gross electric capacities (%)		50.0	48.7	47.8	44.3	-0.4	-0.7	-1.2	-0.7	-1.4	-2.6
CHP indicator (% of electricity from CHP)		14.5	17.9	22.0	23.8	0.1	0.1	-0.4	0.4	0.6	-1.8
Non fossil fuels in electricity generation (%)		46.5	45.8	46.6	49.0	0.1	1.1	2.7	0.2	2.3	5.9
- nuclear		31.8	27.7	22.2	19.8	0.0	0.1	1.1	0.0	0.4	6.0
- renewable energy forms		14.7	18.2	24.4	29.2	0.1	1.0	1.6	0.5	4.1	5.8
Transport sector											
Passenger transport activity (Gpkm)	**4640.8**	**5466.3**	**6368.7**	**7248.1**	**7908.6**	-80.7	-153.9	-221.6	-1.3	-2.1	-2.7
Public road transport	504.1	480.1	493.4	481.5	469.4	-1.7	0.9	2.6	-0.3	0.2	0.6
Private cars and motorcycles	3529.3	4253.1	4940.7	5638.0	6157.8	-75.9	-142.7	-200.7	-1.5	-2.5	-3.2
Rail	411.9	402.7	449.3	484.4	513.4	2.8	5.8	7.8	0.6	1.2	1.5
Aviation	166.3	296.9	445.6	598.4	718.0	-6.0	-18.2	-31.8	-1.3	-3.0	-4.2
Inland navigation	29.2	33.6	39.7	45.8	50.0	0.0	0.3	0.5	0.0	0.6	1.0
Travel per person (km per capita)	10528	12069	13724	15446	16850	-173.9	-327.9	-472.0	-1.3	-2.1	-2.7
Freight transport activity (Gtkm)	**1753.9**	**2131.5**	**2547.4**	**2980.8**	**3331.8**	-34.8	-68.0	-100.1	-1.3	-2.2	-2.9
Trucks	1034.1	1486.3	1854.5	2238.6	2550.6	-36.6	-73.1	-106.8	-1.9	-3.2	-4.0
Rail	461.7	374.2	404.9	426.5	444.8	2.9	5.1	5.8	0.7	1.2	1.3
Inland navigation	258.1	271.0	287.9	315.6	336.4	-1.0	0.0	0.8	-0.4	0.0	0.2
Freight activity per unit of GDP (tkm/000 Euro'00)	240	238	233	218	208	-3.2	-5.0	-6.2	-1.3	-2.2	-2.9
Energy demand in transport (ktoe)	**273198**	**333020**	**375734**	**396088**	**392476**	-5399	-9417	-9810	-1.4	-2.3	-2.4
Public road transport	7841	7018	6994	6282	5269	-26	8	-52	-0.4	0.1	-1.0
Private cars and motorcycles	138202	158349	168073	166589	157668	-2103	-2312	-2183	-1.2	-1.4	-1.4
Trucks	82444	108068	133152	152286	160894	-2496	-4544	-3491	-1.8	-2.9	-2.1
Rail	9066	8897	8333	6546	6066	26	28	47	0.3	0.4	0.8
Aviation	28932	45320	53410	58198	56227	-764	-2579	-4132	-1.4	-4.2	-6.8
Inland navigation	6714	5368	5771	6187	6353	-37	-18	0	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	39.3	39.9	37.0	32.7	28.4	0.0	0.0	0.0	0.0	0.1	0.0
Freight transport (toe/Mtkm)	51.7	53.9	55.1	53.4	50.4	-0.2	-0.3	0.5	-0.4	-0.6	0.9

Source: PRIMES

EU15: Medium gas and soaring oil prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**707946**	**761643**	**734858**	**624101**	**604154**	**25221**	**43602**	**52421**	**3.6**	**7.5**	**9.5**
Solids	210737	100172	68758	65615	59966	499	5619	1349	0.7	9.4	2.3
Oil	117782	160552	131586	74647	58614	16769	23819	17016	14.6	46.9	40.9
Natural gas	132975	190581	171843	96537	81411	5423	3502	6394	3.3	3.8	8.5
Nuclear	181439	222846	231522	207161	187221	0	0	9634	0.0	0.0	5.4
Renewable energy sources	65014	87491	131148	180141	216943	2529	10662	18027	2.0	6.3	9.1
Hydro	22275	27627	28488	30585	32014	71	42	0	0.3	0.1	0.0
Biomass & Waste	39426	54257	81381	114817	135834	2062	8593	13427	2.6	8.1	11.0
Wind	67	1912	15723	26814	38478	342	1635	3571	2.2	6.5	10.2
Solar and others	145	381	1381	2777	4822	56	332	955	4.2	13.6	24.7
Geothermal	3101	3315	4176	5149	5795	-2	59	74	-0.1	1.2	1.3
Net Imports	**643284**	**741591**	**883667**	**1025141**	**1027965**	**-40758**	**-69759**	**-82878**	**-4.4**	**-6.4**	**-7.5**
Solids	89663	110142	136384	125092	151980	1303	1615	-7973	1.0	1.3	-5.0
Oil	458793	472543	495629	531357	515837	-47131	-72206	-63581	-8.7	-12.0	-11.0
- Crude oil and Feedstocks	435365	455606	468543	511307	502783	-45289	-69824	-62118	-8.8	-12.0	-11.0
- Oil products	23428	16937	27086	20049	13054	-1842	-2382	-1462	-6.4	-10.6	-10.1
Natural gas	92495	155262	247834	364922	355192	5073	837	-11319	2.1	0.2	-3.1
Electricity	2333	3644	3821	3770	4956	-3	-4	-5	-0.1	-0.1	-0.1
Gross Inland Consumption	**1319965**	**1456936**	**1573206**	**1600455**	**1581333**	**-13839**	**-23343**	**-27167**	**-0.9**	**-1.4**	**-1.7**
Solids	303612	215739	205142	190707	211946	1802	7234	-6625	0.9	3.9	-3.0
Oil	544159	587926	581896	557215	523665	-28664	-45574	-43274	-4.7	-7.6	-7.6
Natural gas	223408	339289	419678	461459	436602	10496	4339	-4925	2.6	0.9	-1.1
Nuclear	181439	222846	231522	207161	187221	0	0	9634	0.0	0.0	5.4
Electricity	2333	3644	3821	3770	4956	-3	-4	-5	-0.1	-0.1	-0.1
Renewable energy forms	65014	87491	131148	180141	216943	2529	10662	18027	2.0	6.3	9.1
as % in Gross Inland Consumption											
Solids	23.0	14.8	13.0	11.9	13.4	0.2	0.6	-0.2	1.8	5.5	-1.4
Oil	41.2	40.4	37.0	34.8	33.1	-1.5	-2.3	-2.1	-3.9	-6.2	-6.0
Natural gas	16.9	23.3	26.7	28.8	27.6	0.9	0.7	0.2	3.5	2.4	0.6
Nuclear	13.7	15.3	14.7	12.9	11.8	0.1	0.2	0.8	0.9	1.5	7.2
Renewable energy forms	4.9	6.0	8.3	11.3	13.7	0.2	0.8	1.4	2.9	7.8	10.9
Electricity Generation in GWh_e	**2138940**	**2576502**	**3084261**	**3485715**	**3732714**	**1512**	**973**	**-2731**	**0.0**	**0.0**	**-0.1**
Nuclear	720059	863760	897389	802961	725662	0	0	37343	0.0	0.0	5.4
Hydro & wind	259810	343478	515623	671532	827588	4807	19508	41522	0.9	3.0	5.3
Thermal (incl. biomass)	1159070	1369264	1671249	2011223	2179464	-3296	-18535	-81596	-0.2	-0.9	-3.6
Fuel Inputs for Thermal Power Generation [1]	**282186**	**319336**	**354351**	**376441**	**392160**	**-1629**	**-783**	**-13402**	**-0.5**	**-0.2**	**-3.3**
Solids	184170	158097	157706	149661	178285	1350	6856	-5902	0.9	4.8	-3.2
Oil (including refinery gas)	43718	38588	27577	19945	17599	-1123	-1014	126	-3.9	-4.8	0.7
Gas	41697	99188	139632	154842	128809	-1303	-9011	-11026	-0.9	-5.5	-7.9
Biomass & Waste	9827	20524	25752	47320	62123	-554	2320	3316	-2.1	5.2	5.6
Geothermal heat	2774	2939	3685	4673	5344	0	66	83	0.0	1.4	1.6
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**704402**	**725664**	**709259**	**697675**	**668669**	**-30689**	**-45177**	**-41152**	**-4.1**	**-6.1**	**-5.8**
Refineries	595036	665476	646496	625505	595192	-31590	-49682	-48420	-4.7	-7.4	-7.5
Biofuels and hydrogen production	2	604	16054	32911	40853	529	4717	8333	3.4	16.7	25.6
District heating	13085	8717	6880	5454	5606	144	-8	-41	2.1	-0.1	-0.7
Others	96279	50868	39829	33806	27018	228	-205	-1024	0.6	-0.6	-3.7
Energy Branch Consumption	**63555**	**67696**	**67130**	**64800**	**61240**	**-1715**	**-2721**	**-2968**	**-2.5**	**-4.0**	**-4.6**
Non-Energy Uses	**84387**	**95815**	**95817**	**95449**	**94100**	**-1245**	**-2347**	**-2682**	**-1.3**	**-2.4**	**-2.8**
Final Energy Demand	**866453**	**970663**	**1076961**	**1135725**	**1139436**	**-9774**	**-19380**	**-24490**	**-0.9**	**-1.7**	**-2.1**
by sector											
Industry[1]	272481	284781	305794	320662	322275	-975	-2395	-3857	-0.3	-0.7	-1.2
- energy intensive industries	182306	182967	190780	193529	187245	-734	-1762	-3008	-0.4	-0.9	-1.6
- other industrial sectors	90175	101814	115013	127133	135030	-241	-634	-849	-0.2	-0.5	-0.6
Residential	220020	238404	266736	281753	285698	-2385	-5244	-7416	-0.9	-1.8	-2.5
Tertiary	121346	137376	160035	173848	179549	-1587	-3369	-4940	-1.0	-1.9	-2.7
Transport	252606	310102	344396	359461	351913	-4828	-8372	-8277	-1.4	-2.3	-2.3
by fuel [1]											
Solids	79761	35330	28791	25606	21086	166	292	-526	0.6	1.2	-2.4
Oil	393325	434547	453285	444527	418225	-19852	-32729	-35630	-4.2	-6.9	-7.9
Gas	173014	226415	251804	272166	272416	7138	6673	1316	2.9	2.5	0.5
Electricity	155929	191711	233479	266920	289407	315	313	310	0.1	0.1	0.1
Heat (from CHP and District Heating)	36558	50708	60125	65317	69766	233	561	775	0.4	0.9	1.1
Other	27865	31953	49478	61189	68537	2225	5510	9265	4.7	9.9	15.6
CO_2 Emissions (Mt of CO_2)	**3068.4**	**3127.0**	**3239.9**	**3212.6**	**3146.2**	**-51.0**	**-88.5**	**-164.8**	**-1.5**	**-2.7**	**-5.0**
Power generation/District heating	1021.1	1014.7	1061.7	1040.0	1083.6	-2.0	3.5	-49.0	-0.2	0.3	-4.3
Energy Branch	127.2	127.0	106.3	92.7	80.5	-6.4	-10.0	-9.0	-5.6	-9.7	-10.0
Industry	545.2	471.6	465.9	465.7	430.7	-9.9	-14.9	-20.5	-2.1	-3.1	-4.5
Residential	419.7	401.5	415.8	414.0	398.0	-11.5	-20.8	-27.2	-2.7	-4.8	-6.4
Tertiary	220.7	207.4	220.2	223.4	218.1	-5.5	-10.0	-14.5	-2.4	-4.3	-6.2
Transport	734.5	904.8	970.0	976.7	935.2	-15.8	-36.3	-44.6	-1.6	-3.6	-4.6
CO_2 Emissions Index (1990=100)	**100.0**	**101.9**	**105.6**	**104.7**	**102.5**	-1.7	-2.9	-5.4	-1.5	-2.7	-5.0

Source: PRIMES

EU15: Medium gas and soaring oil prices case — SUMMARY ENERGY BALANCE AND INDICATORS (B)
Comparison to Baseline scenario

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	365.749	378.062	390.652	397.458	398.737	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	6981.9	8572.2	10391.5	12835.7	14948.8	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	189.1	170.0	151.4	124.7	105.8	-1.3	-1.8	-1.8	-0.9	-1.4	-1.7
Gross Inl. Cons./Capita (toe/inhabitant)	3.61	3.85	4.03	4.03	3.97	-0.04	-0.06	-0.07	-0.9	-1.4	-1.7
Electricity Generated/Capita (kWh/inhabitant)	5848	6815	7895	8770	9361	4	2	-7	0.0	0.0	-0.1
Carbon intensity (t of CO_2/toe of GIC)	2.32	2.15	2.06	2.01	1.99	-0.01	-0.03	-0.07	-0.7	-1.3	-3.3
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.39	8.27	8.29	8.08	7.89	-0.13	-0.22	-0.41	-1.5	-2.7	-5.0
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	439.5	364.8	311.8	250.3	210.5	-4.9	-6.9	-11.0	-1.5	-2.7	-5.0
Import Dependency %	47.5	49.5	54.6	62.2	63.0	-2.0	-3.2	-3.8	-3.5	-4.9	-5.7
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	90.9	85.1	72.8	63.4	-0.3	-0.5	-0.8	-0.3	-0.7	-1.2
Residential (Energy on Private Income)	100.0	88.8	82.4	71.2	62.3	-0.7	-1.3	-1.6	-0.9	-1.8	-2.5
Tertiary (Energy on Value added)	100.0	88.7	82.2	71.1	62.4	-0.8	-1.4	-1.7	-1.0	-1.9	-2.7
Transport (Energy on GDP)	100.0	100.0	91.6	77.4	65.1	-1.3	-1.8	-1.5	-1.4	-2.3	-2.3
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.39	0.27	0.24	0.21	0.21	0.00	0.00	-0.01	-0.2	0.3	-4.4
Final energy demand (t of CO_2/toe)	2.22	2.05	1.92	1.83	1.74	-0.02	-0.04	-0.06	-1.1	-2.1	-3.1
Industry	2.00	1.66	1.52	1.45	1.34	-0.03	-0.04	-0.05	-1.8	-2.4	-3.4
Residential	1.91	1.68	1.56	1.47	1.39	-0.03	-0.05	-0.06	-1.8	-3.0	-4.0
Tertiary	1.82	1.51	1.38	1.28	1.21	-0.02	-0.03	-0.05	-1.5	-2.4	-3.7
Transport	2.91	2.92	2.82	2.72	2.66	-0.01	-0.04	-0.06	-0.2	-1.3	-2.3
Electricity and steam generation											
Generation Capacity in MW_e		**588083**	**729726**	**839656**	**957963**	**5557**	**11566**	**28410**	**0.8**	**1.4**	**3.1**
Nuclear		131758	127644	106198	89529	0	0	4861	0.0	0.0	5.7
Hydro (pumping excluded)		90794	97168	101417	104865	55	150	469	0.1	0.1	0.4
Wind		12769	77719	129059	189622	1587	7728	22812	2.1	6.4	13.7
Solar		176	1645	4712	9827	0	0	0	0.0	0.0	0.0
Thermal		352586	425550	498270	564121	3915	3688	267	0.9	0.7	0.0
of which cogeneration units		88543	127986	179004	195822	3288	3455	1809	2.6	2.0	0.9
Solids fired		144882	117724	122207	154152	1203	5058	-33	1.0	4.3	0.0
Gas fired		125804	227879	283508	308495	-73	-6114	-6885	0.0	-2.1	-2.2
Oil fired		67470	61753	44305	31671	2773	2577	2256	4.7	6.2	7.7
Biomass-waste fired		13407	16837	46713	68135	12	2149	4906	0.1	4.8	7.8
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1022	1356	1536	1668	0	19	25	0.0	1.3	1.5
Indicators											
Efficiency for thermal electricity production (%)		36.9	40.6	45.9	47.8	0.1	-0.3	-0.2	0.3	-0.7	-0.3
Load factor for gross electric capacities (%)		50.0	48.2	47.4	44.5	-0.3	-0.6	-1.4	-0.7	-1.3	-3.0
CHP indicator (% of electricity from CHP)		13.4	16.8	20.6	21.3	0.1	0.1	-0.4	0.7	0.7	-1.8
Non fossil fuels in electricity generation (%)		49.4	48.6	48.8	50.4	0.1	0.9	2.7	0.2	2.0	5.7
- nuclear		33.5	29.1	23.0	19.4	0.0	0.0	1.0	0.0	0.0	5.5
- renewable energy forms		15.9	19.5	25.7	31.0	0.1	1.0	1.7	0.5	3.8	5.8
Transport sector											
Passenger transport activity (Gpkm)	**4130.1**	**4997.7**	**5760.3**	**6510.4**	**7036.3**	-71.8	-135.5	-192.5	-1.2	-2.0	-2.7
Public road transport	369.0	401.8	420.9	414.7	406.6	-1.5	0.7	2.1	-0.4	0.2	0.5
Private cars and motorcycles	3265.7	3928.0	4479.1	5050.4	5439.8	-66.8	-124.0	-171.9	-1.5	-2.4	-3.1
Rail	309.8	351.3	398.4	434.4	463.8	2.2	4.8	6.7	0.6	1.1	1.5
Aviation	157.3	283.6	422.7	565.9	676.9	-5.7	-17.2	-29.9	-1.3	-3.0	-4.2
Inland navigation	28.4	33.0	39.1	45.0	49.2	0.0	0.3	0.5	0.0	0.6	1.0
Travel per person (km per capita)	11292	13219	14745	16380	17646	-183.7	-340.9	-482.9	-1.2	-2.0	-2.7
Freight transport activity (Gtkm)	**1419.2**	**1825.6**	**2114.0**	**2436.5**	**2696.7**	-29.1	-54.9	-79.5	-1.4	-2.2	-2.9
Trucks	914.2	1309.3	1560.8	1841.8	2072.3	-29.5	-57.9	-84.2	-1.9	-3.0	-3.9
Rail	254.9	249.5	269.6	283.6	292.6	1.5	3.0	3.9	0.5	1.1	1.3
Inland navigation	250.1	266.8	283.7	311.1	331.8	-1.0	0.0	0.8	-0.4	0.0	0.2
Freight activity per unit of GDP (tkm/000 Euro'00)	203	213	203	190	180	-2.8	-4.3	-5.3	-1.4	-2.2	-2.9
Energy demand in transport (ktoe)	**252606**	**310102**	**344396**	**359461**	**351913**	-4828	-8372	-8277	-1.4	-2.3	-2.3
Public road transport	6250	5860	5932	5359	4502	-24	3	-52	-0.4	0.0	-1.1
Private cars and motorcycles	129911	146708	153336	150185	139038	-1846	-1984	-1697	-1.2	-1.3	-1.2
Trucks	75351	100615	120980	136559	143090	-2205	-3932	-2623	-1.8	-2.8	-1.8
Rail	6970	7579	7131	5561	5167	17	16	34	0.2	0.3	0.7
Aviation	27742	44025	51304	55671	53827	-733	-2456	-3939	-1.4	-4.2	-6.8
Inland navigation	6383	5314	5714	6126	6289	-37	-18	0	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	41.2	40.7	37.7	33.3	28.8	0.0	0.0	0.0	0.1	0.0	-0.1
Freight transport (toe/Mtkm)	58.0	58.5	60.2	58.6	55.4	-0.2	-0.3	0.6	-0.4	-0.5	1.2

Source: PRIMES

NMS: Medium gas and soaring oil prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**169598**	**136955**	**127342**	**129298**	**139774**	**563**	**3277**	**6404**	**0.4**	**2.6**	**4.8**
Solids	140913	103966	86393	71703	60735	124	616	-845	0.1	0.9	-1.4
Oil	2614	3079	2467	2510	2263	106	380	411	4.5	17.8	22.2
Natural gas	6749	6084	5785	5539	5077	26	224	287	0.5	4.2	6.0
Nuclear	15481	14818	17254	22554	36097	0	1077	2876	0.0	5.0	8.7
Renewable energy sources	3841	9008	15443	26992	35602	307	979	3675	2.0	3.8	11.5
Hydro	1116	1355	1464	1660	1869	2	0	2	0.2	0.0	0.1
Biomass & Waste	2725	7609	13381	23501	29785	292	532	3312	2.2	2.3	12.5
Wind	0	1	412	1467	3267	6	404	233	1.6	38.1	7.7
Solar and others	0	35	170	343	655	5	41	127	3.1	13.7	24.1
Geothermal	0	8	16	22	26	0	1	1	1.6	3.6	4.3
Net Imports	**68016**	**59470**	**96799**	**129437**	**144114**	**-3051**	**-7354**	**-10610**	**-3.1**	**-5.4**	**-6.9**
Solids	-14214	-15836	-2817	5064	13148	-24	147	182	0.9	3.0	1.4
Oil	51224	45604	53102	59841	65340	-3837	-6462	-7692	-6.7	-9.7	-10.5
- Crude oil and Feedstocks	43747	41220	44343	49990	54835	-3182	-5554	-6514	-6.7	-10.0	-10.6
- Oil products	7477	4384	8759	9851	10505	-655	-908	-1178	-7.0	-8.4	-10.1
Natural gas	31158	31202	48102	66186	68387	811	-1038	-3099	1.7	-1.5	-4.3
Electricity	-152	-1500	-1588	-1654	-2761	-1	-1	-1	0.1	0.1	0.0
Gross Inland Consumption	**236229**	**196904**	**223054**	**257543**	**282621**	**-2433**	**-3996**	**-4116**	**-1.1**	**-1.5**	**-1.4**
Solids	128332	90799	83576	76767	73883	100	763	-663	0.1	1.0	-0.9
Oil	51587	46785	54482	61158	66336	-3676	-6001	-7191	-6.3	-8.9	-9.8
Natural gas	37140	36994	53887	71725	73463	837	-814	-2812	1.6	-1.1	-3.7
Nuclear	15481	14818	17254	22554	36097	0	1077	2876	0.0	5.0	8.7
Electricity	-152	-1500	-1588	-1654	-2761	-1	-1	-1	0.1	0.1	0.0
Renewable energy forms	3841	9008	15443	26992	35602	307	979	3675	2.0	3.8	11.5
as % in Gross Inland Consumption											
Solids	54.3	46.1	37.5	29.8	26.1	0.4	0.7	0.1	1.2	2.6	0.6
Oil	21.8	23.8	24.4	23.7	23.5	-1.4	-1.9	-2.2	-5.3	-7.5	-8.5
Natural gas	15.7	18.8	24.2	27.8	26.0	0.6	0.1	-0.6	2.7	0.4	-2.3
Nuclear	6.6	7.5	7.7	8.8	12.8	0.1	0.5	1.2	1.1	6.6	10.2
Renewable energy forms	1.6	4.6	6.9	10.5	12.6	0.2	0.5	1.5	3.1	5.4	13.1
Electricity Generation in GWh_e	**316734**	**324333**	**400644**	**522126**	**632327**	**208**	**1093**	**1173**	**0.1**	**0.2**	**0.2**
Nuclear	59996	57434	66876	87423	139918	0	4177	11146	0.0	5.0	8.7
Hydro & wind	12978	15771	21830	36530	60389	101	4703	2732	0.5	14.8	4.7
Thermal (incl. biomass)	243760	251128	311938	398174	432020	107	-7787	-12705	0.0	-1.9	-2.9
Fuel Inputs for Thermal Power Generation (1)	**73176**	**66652**	**75960**	**84574**	**82810**	**-301**	**-973**	**-1666**	**-0.4**	**-1.1**	**-2.0**
Solids	62206	56391	58799	56827	57688	204	1131	1563	0.3	2.0	2.8
Oil (including refinery gas)	5236	3281	2412	2215	2101	-522	-138	-221	-17.8	-5.9	-9.5
Gas	5360	6292	11883	16881	11901	-9	-1998	-3512	-0.1	-10.6	-22.8
Biomass & Waste	374	687	2866	8650	11120	25	31	504	0.9	0.4	4.7
Geothermal heat	0	0	0	0	0	0	0	0			
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**93232**	**70786**	**69699**	**76035**	**81761**	**-3249**	**-5208**	**-5482**	**-4.5**	**-6.4**	**-6.3**
Refineries	47239	44972	47718	53579	58272	-3117	-5259	-6219	-6.1	-8.9	-9.6
Biofuels and hydrogen production	0	33	1305	3273	4734	38	462	880	3.0	16.4	22.8
District heating	17949	8544	8457	8240	9421	-57	-117	335	-0.7	-1.4	3.7
Others	28043	17236	12218	10944	9334	-113	-294	-478	-0.9	-2.6	-4.9
Energy Branch Consumption	**9477**	**12681**	**12239**	**12928**	**13205**	**-414**	**-716**	**-722**	**-3.3**	**-5.3**	**-5.2**
Non-Energy Uses	**10089**	**10135**	**10600**	**12934**	**14819**	**-184**	**-470**	**-564**	**-1.7**	**-3.5**	**-3.7**
Final Energy Demand	**155460**	**124696**	**149965**	**180499**	**202072**	**-1307**	**-2901**	**-4456**	**-0.9**	**-1.6**	**-2.2**
by sector											
Industry(1)	68606	45281	49614	59120	64952	-38	-225	-480	-0.1	-0.4	-0.7
- energy intensive industries	34503	28649	29189	32902	34249	-56	-200	-430	-0.2	-0.6	-1.2
- other industrial sectors	34103	16632	20425	26218	30703	19	-25	-51	0.1	-0.1	-0.2
Residential	40986	34898	42488	50902	56891	-357	-841	-1281	-0.8	-1.6	-2.2
Tertiary	25276	21599	26525	33849	39666	-340	-789	-1161	-1.3	-2.3	-2.8
Transport	20592	22917	31338	36628	40563	-572	-1045	-1533	-1.8	-2.8	-3.6
by fuel (1)											
Solids	44176	21303	16691	14256	11991	114	151	-421	0.7	1.1	-3.4
Oil	34795	33764	42078	48587	52854	-2127	-4052	-5128	-4.8	-7.7	-8.8
Gas	27229	25471	34910	44310	49446	402	77	-852	1.2	0.2	-1.7
Electricity	20539	19641	26213	36485	45089	66	175	142	0.3	0.5	0.3
Heat (from CHP and District Heating)	26534	18005	20404	23178	26648	118	243	314	0.6	1.1	1.2
Other	2188	6512	9668	13682	16043	119	507	1489	1.3	3.8	10.2
CO_2 Emissions (Mt of CO_2)	**707.7**	**547.1**	**582.9**	**612.1**	**615.1**	**-8.1**	**-15.4**	**-28.9**	**-1.4**	**-2.5**	**-4.5**
Power generation/District heating	341.5	280.2	296.3	294.7	283.3	-1.9	-2.0	-8.1	-0.6	-0.7	-2.8
Energy Branch	14.3	17.9	10.1	9.3	8.6	-1.2	-1.9	-1.6	-10.4	-16.9	-16.0
Industry	153.7	96.1	99.8	111.7	113.5	-1.4	-2.9	-5.1	-1.3	-2.5	-4.3
Residential	86.4	50.6	54.5	57.7	57.3	-0.9	-2.4	-4.2	-1.7	-4.0	-6.8
Tertiary	53.5	37.2	35.2	40.5	46.0	-0.9	-2.1	-3.2	-2.6	-4.8	-6.6
Transport	58.2	65.1	87.0	98.2	106.4	-1.8	-4.2	-6.6	-2.0	-4.1	-5.9
CO_2 Emissions Index (1990=100)	**100.0**	**77.3**	**82.4**	**86.5**	**86.9**	-1.1	-2.2	-4.1	-1.4	-2.5	-4.5

Source: PRIMES

NMS: Medium gas and soaring oil prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (B)

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	75.039	74.853	73.401	71.813	70.628	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	312.8	374.8	555.3	820.6	1102.7	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	755.2	525.3	401.7	313.8	256.3	-4.4	-4.9	-3.7	-1.1	-1.5	-1.4
Gross Inl. Cons./Capita (toe/inhabitant)	3.15	2.63	3.04	3.59	4.00	-0.03	-0.06	-0.06	-1.1	-1.5	-1.4
Electricity Generated/Capita (kWh/inhabitant)	4221	4333	5458	7271	8953	3	15	17	0.1	0.2	0.2
Carbon intensity (t of CO_2/toe of GIC)	3.00	2.78	2.61	2.38	2.18	-0.01	-0.02	-0.07	-0.3	-0.9	-3.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	9.43	7.31	7.94	8.52	8.71	-0.11	-0.21	-0.41	-1.4	-2.5	-4.5
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	2262.2	1459.6	1049.7	746.0	557.9	-14.6	-18.8	-26.2	-1.4	-2.5	-4.5
Import Dependency %	28.7	30.1	43.2	50.0	50.8	-0.9	-2.0	-2.9	-2.0	-3.9	-5.5
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	52.9	35.2	28.2	23.8	0.0	-0.1	-0.2	-0.1	-0.4	-0.7
Residential (Energy on Private Income)	100.0	70.0	56.6	45.4	37.5	-0.5	-0.8	-0.8	-0.8	-1.6	-2.2
Tertiary (Energy on Value added)	100.0	65.9	54.4	46.2	39.0	-0.7	-1.1	-1.1	-1.3	-2.3	-2.8
Transport (Energy on GDP)	100.0	92.9	85.7	67.8	55.9	-1.6	-1.9	-2.1	-1.8	-2.8	-3.6
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.50	0.46	0.40	0.33	0.27	0.00	0.00	-0.01	-1.0	-1.2	-3.5
Final energy demand (t of CO_2/toe)	2.26	2.00	1.84	1.71	1.60	-0.02	-0.04	-0.06	-0.9	-2.1	-3.5
Industry	2.24	2.12	2.01	1.89	1.75	-0.03	-0.04	-0.07	-1.3	-2.1	-3.6
Residential	2.11	1.45	1.28	1.13	1.01	-0.01	-0.03	-0.05	-0.8	-2.4	-4.7
Tertiary	2.12	1.72	1.33	1.20	1.16	-0.02	-0.03	-0.05	-1.3	-2.6	-3.8
Transport	2.83	2.84	2.78	2.68	2.62	-0.01	-0.04	-0.06	-0.3	-1.4	-2.3
Electricity and steam generation											
Generation Capacity in MW_e		**73667**	**87092**	**116833**	**167521**	**754**	**2343**	**783**	**0.9**	**2.0**	**0.5**
Nuclear		9324	8786	11278	17958	0	541	1410	0.0	5.0	8.5
Hydro (pumping excluded)		6374	6828	7350	7814	8	0	8	0.1	0.0	0.1
Wind		16	2284	8304	17272	25	2012	1151	1.1	32.0	7.1
Solar		0	13	138	537	0	0	0	0.0	0.0	0.0
Thermal		57953	69180	89763	123939	721	-209	-1787	1.1	-0.2	-1.4
of which cogeneration units		24415	26898	33662	53244	726	249	-742	2.8	0.7	-1.4
Solids fired		43996	40244	41255	59171	228	1598	2121	0.6	4.0	3.7
Gas fired		6071	17325	30118	40819	-161	-1467	-3935	-0.9	-4.6	-8.8
Oil fired		6832	7335	5916	4546	266	-285	-1004	3.8	-4.6	-18.1
Biomass-waste fired		1055	4275	12474	19402	387	-56	1030	9.9	-0.4	5.6
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		0	0	0	0	0	0	0			
Indicators											
Efficiency for thermal electricity production (%)		32.4	35.3	40.5	44.9	0.2	-0.3	-0.4	0.4	-0.8	-0.9
Load factor for gross electric capacities (%)		50.3	52.5	51.0	43.1	-0.4	-0.9	-0.1	-0.8	-1.8	-0.3
CHP indicator (% of electricity from CHP)		23.5	26.5	31.1	39.1	-0.2	0.1	-0.8	-0.8	0.2	-2.0
Non fossil fuels in electricity generation (%)		23.3	24.8	32.2	40.6	0.0	1.8	2.8	0.2	6.0	7.4
- nuclear		17.7	16.7	16.7	22.1	0.0	0.8	1.7	-0.1	4.8	8.5
- renewable energy forms		5.6	8.1	15.4	18.5	0.1	1.1	1.1	0.7	7.4	6.1
Transport sector											
Passenger transport activity (Gpkm)	**510.7**	**468.6**	**608.4**	**737.8**	**872.4**	-8.9	-18.4	-29.0	-1.4	-2.4	-3.2
Public road transport	135.1	78.3	72.4	66.8	62.8	-0.2	0.3	0.5	-0.2	0.4	0.8
Private cars and motorcycles	263.6	325.1	461.6	587.7	718.0	-9.1	-18.7	-28.8	-1.9	-3.1	-3.9
Rail	102.1	51.4	50.8	50.0	49.6	0.7	1.0	1.1	1.3	2.1	2.3
Aviation	9.0	13.3	22.9	32.5	41.1	-0.3	-1.0	-1.8	-1.5	-3.0	-4.2
Inland navigation	0.8	0.6	0.7	0.7	0.8	0.0	0.0	0.0	0.7	1.4	2.0
Travel per person (km per capita)	6805	6261	8289	10273	12352	-121.6	-256.3	-410.7	-1.4	-2.4	-3.2
Freight transport activity (Gtkm)	**334.6**	**305.9**	**433.3**	**544.3**	**635.1**	-5.7	-13.0	-20.6	-1.3	-2.3	-3.1
Trucks	119.9	177.1	293.8	396.9	478.3	-7.1	-15.2	-22.6	-2.4	-3.7	-4.5
Rail	206.8	124.7	135.3	142.9	152.2	1.4	2.1	2.0	1.0	1.5	1.3
Inland navigation	7.9	4.2	4.3	4.5	4.6	0.0	0.0	0.0	-0.1	0.5	0.8
Freight activity per unit of GDP (tkm/000 Euro'00)	1070	816	780	663	576	-10.3	-15.9	-18.7	-1.3	-2.3	-3.1
Energy demand in transport (ktoe)	**20592**	**22917**	**31338**	**36628**	**40563**	-572	-1045	-1533	-1.8	-2.8	-3.6
Public road transport	1591	1159	1062	922	767	-2	5	0	-0.2	0.6	0.0
Private cars and motorcycles	8290	11641	14738	16404	18631	-257	-328	-486	-1.7	-2.0	-2.5
Trucks	7093	7453	12172	15727	17804	-291	-613	-868	-2.3	-3.7	-4.6
Rail	2096	1317	1202	986	898	9	12	13	0.7	1.3	1.4
Aviation	1190	1294	2107	2527	2399	-31	-123	-193	-1.5	-4.6	-7.4
Inland navigation	331	54	56	61	64	0	0	0	-0.2	0.3	0.7
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	23.9	31.4	30.3	27.4	25.3	0.0	0.1	0.1	-0.1	0.3	0.3
Freight transport (toe/Mtkm)	25.0	26.7	29.8	30.2	29.1	-0.3	-0.4	-0.4	-0.9	-1.3	-1.3

Source: PRIMES

EU27: Medium gas and soaring oil prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**928078**	**937145**	**904460**	**800453**	**794386**	**26272**	**49384**	**61740**	**3.0**	**6.6**	**8.4**
Solids	364706	214324	166502	149608	132896	626	6619	1372	0.4	4.6	1.0
Oil	128402	170011	140787	84907	68034	17362	25735	18379	14.1	43.5	37.0
Natural gas	162645	207644	190373	113445	96676	5468	3919	6926	3.0	3.6	7.7
Nuclear	200702	243761	253537	237162	234454	0	1471	13146	0.0	0.6	5.9
Renewable energy sources	71623	101405	153261	215330	262327	2816	11640	21917	1.9	5.7	9.1
Hydro	25013	30483	31791	34419	36413	74	42	2	0.2	0.1	0.0
Biomass & Waste	43297	65264	99452	143935	172294	2299	9113	16928	2.4	6.8	10.9
Wind	67	1913	16218	28441	41934	383	2040	3803	2.4	7.7	10.0
Solar and others	145	417	1576	3253	5724	62	380	1103	4.1	13.2	23.9
Geothermal	3101	3329	4224	5282	5961	-2	64	80	0.0	1.2	1.4
Net Imports	**749474**	**817569**	**1003244**	**1189526**	**1217095**	**-45301**	**-82289**	**-98234**	**-4.3**	**-6.5**	**-7.5**
Solids	81418	98469	139336	138779	176583	1359	1240	-8090	1.0	0.9	-4.4
Oil	529724	525771	559037	604308	598061	-53192	-82134	-74316	-8.7	-12.0	-11.1
- Crude oil and Feedstocks	503451	507009	526421	578379	579095	-51003	-79210	-72077	-8.8	-12.0	-11.1
- Oil products	26273	18762	32616	25930	18966	-2189	-2924	-2240	-6.3	-10.1	-10.6
Natural gas	135011	191643	303259	444858	440717	6537	-1389	-15820	2.2	-0.3	-3.5
Electricity	3321	1687	1612	1580	1735	-4	-6	-7	-0.3	-0.4	-0.4
Gross Inland Consumption	**1645474**	**1709133**	**1861178**	**1939841**	**1959238**	**-17274**	**-30005**	**-33105**	**-0.9**	**-1.5**	**-1.7**
Solids	450795	320708	305838	288388	309479	1985	7859	-6718	0.7	2.8	-2.1
Oil	624250	648970	653298	639078	613852	-34074	-53499	-52548	-5.0	-7.7	-7.9
Natural gas	294782	392603	493631	558303	537393	12005	2530	-8895	2.5	0.5	-1.6
Nuclear	200702	243761	253537	237162	234454	0	1471	13146	0.0	0.6	5.9
Electricity	3321	1687	1612	1580	1735	-4	-6	-7	-0.3	-0.4	-0.4
Renewable energy forms	71623	101405	153261	215330	262327	2816	11640	21917	1.9	5.7	9.1
as % in Gross Inland Consumption											
Solids	27.4	18.8	16.4	14.9	15.8	0.3	0.6	-0.1	1.6	4.4	-0.5
Oil	37.9	38.0	35.1	32.9	31.3	-1.5	-2.2	-2.1	-4.1	-6.3	-6.3
Natural gas	17.9	23.0	26.5	28.8	27.4	0.9	0.6	0.0	3.4	2.0	0.0
Nuclear	12.2	14.3	13.6	12.2	12.0	0.1	0.3	0.9	0.9	2.2	7.7
Renewable energy forms	4.4	5.9	8.2	11.1	13.4	0.2	0.8	1.3	2.8	7.3	11.0
Electricity Generation in GWh_e	**2561205**	**2993398**	**3603521**	**4165732**	**4564566**	**1355**	**2023**	**149**	**0.0**	**0.0**	**0.0**
Nuclear	794718	944823	982718	919246	908741	0	5701	50953	0.0	0.6	5.9
Hydro & wind	291642	376697	559813	735214	919684	5311	24211	44254	1.0	3.4	5.1
Thermal (incl. biomass)	1474844	1671878	2060990	2511271	2736141	-3957	-27889	-95059	-0.2	-1.1	-3.4
Fuel Inputs for Thermal Power Generation [1]	**384763**	**402753**	**449895**	**485252**	**500148**	**-2534**	**-2761**	**-15051**	**-0.6**	**-0.6**	**-2.9**
Solids	261342	225135	229662	223336	255778	1569	7789	-3459	0.7	3.6	-1.3
Oil (including refinery gas)	56108	43691	31485	23074	20006	-2294	-1166	-130	-6.8	-4.8	-0.6
Gas	54301	109769	156017	177424	144937	-1279	-11800	-15365	-0.8	-6.2	-9.6
Biomass & Waste	10237	21219	29047	56746	74082	-529	2351	3820	-1.8	4.3	5.4
Geothermal heat	2774	2939	3685	4673	5344	0	66	83	0.0	1.4	1.6
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**840016**	**818581**	**803107**	**802337**	**783064**	**-35883**	**-52622**	**-49074**	**-4.3**	**-6.2**	**-5.9**
Refineries	673728	727122	714482	703915	682097	-36752	-57237	-57131	-4.9	-7.5	-7.7
Biofuels and hydrogen production	2	637	17472	36548	46797	569	5224	9426	3.4	16.7	25.2
District heating	38458	19291	15560	13798	15089	124	-118	244	0.8	-0.8	1.6
Others	127829	71530	55593	48076	39081	176	-491	-1613	0.3	-1.0	-4.0
Energy Branch Consumption	**78427**	**85834**	**86166**	**85375**	**82894**	**-2420**	**-3979**	**-4172**	**-2.7**	**-4.5**	**-4.8**
Non-Energy Uses	**98844**	**109187**	**108919**	**111256**	**112221**	**-1467**	**-2908**	**-3368**	**-1.3**	**-2.5**	**-2.9**
Final Energy Demand	**1071205**	**1126314**	**1269583**	**1373825**	**1412548**	**-11577**	**-23363**	**-30717**	**-0.9**	**-1.7**	**-2.1**
by sector											
Industry [1]	372041	342654	372996	403696	417247	-1075	-2825	-4689	-0.3	-0.7	-1.1
- energy intensive industries	239834	220752	232360	242658	241616	-842	-2113	-3716	-0.4	-0.9	-1.5
- other industrial sectors	132206	121902	140635	161038	175631	-233	-712	-973	-0.2	-0.4	-0.6
Residential	267394	283857	320978	347083	358560	-2902	-6366	-9098	-0.9	-1.8	-2.5
Tertiary	151680	161545	189924	212483	225438	-1977	-4262	-6265	-1.0	-2.0	-2.7
Transport	280091	338258	385685	410563	411303	-5623	-9910	-10665	-1.4	-2.4	-2.5
by fuel [1]											
Solids	128087	58191	47602	42060	35288	283	450	-1202	0.6	1.1	-3.3
Oil	441141	476894	508767	511071	492583	-22702	-38212	-42544	-4.3	-7.0	-8.0
Gas	219636	259889	298628	333401	342872	7905	7001	-7	2.7	2.1	0.0
Electricity	183815	216343	266971	314005	348502	386	523	609	0.1	0.2	0.2
Heat (from CHP and District Heating)	67635	73194	84189	93397	102731	266	868	1498	0.3	0.9	1.5
Other	30892	41802	63426	79892	90572	2285	6007	10929	3.7	8.1	13.7
CO_2 Emissions (Mt of CO_2)	**4009.9**	**3800.2**	**3980.3**	**4019.6**	**3980.6**	**-62.6**	**-112.1**	**-199.8**	**-1.5**	**-2.7**	**-4.8**
Power generation/District heating	1483.5	1359.8	1428.3	1420.5	1458.8	-5.8	-1.1	-55.7	-0.4	-0.1	-3.7
Energy Branch	151.1	154.0	126.0	107.9	93.4	-7.7	-13.8	-10.6	-5.8	-11.4	-10.2
Industry	761.0	594.1	600.1	620.0	593.1	-11.6	-18.9	-28.4	-1.9	-3.0	-4.6
Residential	516.6	459.7	481.2	485.9	470.9	-12.6	-23.9	-32.6	-2.6	-4.7	-6.5
Tertiary	285.7	247.7	259.1	268.9	270.6	-6.6	-12.3	-18.2	-2.5	-4.4	-6.3
Transport	812.0	984.9	1085.7	1116.4	1093.9	-18.3	-42.1	-54.3	-1.7	-3.6	-4.7
CO_2 Emissions Index (1990=100)	**100.0**	**94.8**	**99.3**	**100.2**	**99.3**	-1.6	-2.8	-5.0	-1.5	-2.7	-4.8

Source: PRIMES

EU27: Medium gas and soaring oil prices case — SUMMARY ENERGY BALANCE AND INDICATORS (B)
Comparison to Baseline scenario

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	472.712	483.520	492.838	496.408	494.784	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	7358.9	9001.0	11044.1	13825.4	16315.6	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	223.6	189.9	168.5	140.3	120.1	-1.6	-2.2	-2.0	-0.9	-1.5	-1.7
Gross Inl. Cons./Capita (toe/inhabitant)	3.48	3.53	3.78	3.91	3.96	-0.04	-0.06	-0.07	-0.9	-1.5	-1.7
Electricity Generated/Capita (kWh/inhabitant)	5418	6191	7312	8392	9225	3	4	0	0.0	0.0	0.0
Carbon intensity (t of CO_2/toe of GIC)	2.44	2.22	2.14	2.07	2.03	-0.01	-0.03	-0.07	-0.6	-1.2	-3.2
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.48	7.86	8.08	8.10	8.05	-0.13	-0.23	-0.40	-1.5	-2.7	-4.8
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	544.9	422.2	360.4	290.7	244.0	-5.7	-8.1	-12.2	-1.5	-2.7	-4.8
Import Dependency %	44.6	46.7	52.6	59.8	60.5	-1.8	-3.1	-3.7	-3.4	-4.9	-5.8
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	80.2	74.2	64.3	56.6	-0.2	-0.4	-0.6	-0.3	-0.7	-1.1
Residential (Energy on Private Income)	100.0	87.2	80.6	70.3	61.8	-0.7	-1.3	-1.6	-0.9	-1.8	-2.5
Tertiary (Energy on Value added)	100.0	83.5	77.4	68.3	61.0	-0.8	-1.4	-1.7	-1.0	-2.0	-2.7
Transport (Energy on GDP)	100.0	98.7	91.8	78.0	66.2	-1.3	-1.9	-1.7	-1.4	-2.4	-2.5
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.42	0.30	0.27	0.23	0.22	0.00	0.00	-0.01	-0.5	-0.2	-3.9
Final energy demand (t of CO_2/toe)	2.22	2.03	1.91	1.81	1.72	-0.02	-0.04	-0.06	-1.1	-2.1	-3.2
Industry	2.05	1.73	1.61	1.54	1.42	-0.03	-0.04	-0.05	-1.6	-2.3	-3.5
Residential	1.93	1.62	1.50	1.40	1.31	-0.03	-0.04	-0.06	-1.7	-2.9	-4.1
Tertiary	1.88	1.53	1.36	1.27	1.20	-0.02	-0.03	-0.05	-1.5	-2.5	-3.7
Transport	2.90	2.91	2.81	2.72	2.66	-0.01	-0.04	-0.06	-0.2	-1.3	-2.3
Electricity and steam generation											
Generation Capacity in MW_e		**697174**	**856372**	**1000433**	**1186192**	**7050**	**16959**	**29874**	**0.8**	**1.7**	**2.6**
Nuclear		145542	139130	121509	113025	0	741	6588	0.0	0.6	6.2
Hydro (pumping excluded)		105185	112439	118031	122647	63	150	477	0.1	0.1	0.4
Wind		12786	80705	138696	208467	1899	9740	23963	2.4	7.6	13.0
Solar		176	1661	4865	10435	0	0	0	0.0	0.0	0.0
Thermal		433485	522437	617332	731618	5088	6328	-1154	1.0	1.0	-0.2
of which cogeneration units		120284	168107	230848	275563	4465	5131	1387	2.7	2.3	0.5
Solids fired		203503	172169	180307	234280	1726	8272	2921	1.0	4.8	1.3
Gas fired		135927	254293	322783	368028	-76	-6915	-11270	0.0	-2.1	-3.0
Oil fired		78309	72925	51423	36555	3039	2271	1224	4.3	4.6	3.5
Biomass-waste fired		14723	21694	61283	91087	399	2680	5946	1.9	4.6	7.0
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1022	1356	1536	1668	0	19	25	0.0	1.3	1.5
Indicators											
Efficiency for thermal electricity production (%)		35.7	39.4	44.5	47.0	0.1	-0.2	-0.2	0.4	-0.5	-0.4
Load factor for gross electric capacities (%)		49.0	48.0	47.5	43.9	-0.4	-0.8	-1.1	-0.8	-1.6	-2.5
CHP indicator (% of electricity from CHP)		14.9	18.7	23.0	25.3	0.1	0.3	-0.4	0.7	1.2	-1.7
Non fossil fuels in electricity generation (%)		46.4	45.5	46.3	48.6	0.1	1.1	2.6	0.2	2.3	5.7
- nuclear		31.6	27.3	22.1	19.9	0.0	0.1	1.1	0.0	0.6	5.9
- renewable energy forms		14.9	18.2	24.2	28.7	0.1	0.9	1.5	0.6	4.0	5.6
Transport sector											
Passenger transport activity (Gpkm)	**4769.3**	**5568.5**	**6512.7**	**7462.4**	**8193.2**	-83.3	-160.0	-231.8	-1.3	-2.1	-2.8
Public road transport	554.1	502.3	515.5	505.7	497.4	-1.4	1.4	3.3	-0.3	0.3	0.7
Private cars and motorcycles	3567.1	4316.4	5047.9	5804.9	6376.9	-78.5	-148.9	-210.8	-1.5	-2.5	-3.2
Rail	450.2	417.8	460.5	499.5	533.7	2.7	5.8	7.8	0.6	1.2	1.5
Aviation	168.5	298.4	449.0	606.4	735.0	-6.1	-18.5	-32.5	-1.3	-3.0	-4.2
Inland navigation	29.4	33.6	39.8	45.8	50.1	0.0	0.3	0.5	0.0	0.6	1.0
Travel per person (km per capita)	10089	11517	13215	15033	16559	-169.0	-322.3	-468.4	-1.3	-2.1	-2.8
Freight transport activity (Gtkm)	**1861.5**	**2177.1**	**2648.2**	**3129.6**	**3537.9**	-36.6	-72.2	-107.8	-1.4	-2.3	-3.0
Trucks	1075.1	1507.0	1920.5	2347.8	2709.4	-38.5	-77.6	-114.9	-2.0	-3.2	-4.1
Rail	524.7	396.1	429.1	451.7	472.5	2.9	5.3	6.2	0.7	1.2	1.3
Inland navigation	261.8	274.0	298.5	330.2	356.0	-1.1	0.0	0.8	-0.4	0.0	0.2
Freight activity per unit of GDP (tkm/000 Euro'00)	253	242	240	226	217	-3.3	-5.2	-6.6	-1.4	-2.3	-3.0
Energy demand in transport (ktoe)	**280091**	**338258**	**385685**	**410563**	**411303**	-5623	-9910	-10665	-1.4	-2.4	-2.5
Public road transport	8685	7514	7451	6721	5703	-21	16	-41	-0.3	0.2	-0.7
Private cars and motorcycles	139578	160719	171745	171633	163861	-2189	-2454	-2442	-1.3	-1.4	-1.5
Trucks	85770	109568	137825	159610	170687	-2623	-4850	-3993	-1.9	-2.9	-2.3
Rail	9564	9423	8635	6818	6349	22	27	46	0.3	0.4	0.7
Aviation	29449	45553	53854	59063	57658	-773	-2629	-4235	-1.4	-4.3	-6.8
Inland navigation	7044	5481	6176	6717	7045	-39	-19	0	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	38.9	39.8	36.9	32.6	28.4	0.0	0.0	0.0	0.0	0.1	0.0
Freight transport (toe/Mtkm)	50.8	53.6	54.9	53.4	50.4	-0.2	-0.3	0.4	-0.4	-0.6	0.8

Source: PRIMES

EU28: Medium gas and soaring oil prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**961237**	**963855**	**930633**	**836340**	**845077**	**26333**	**50597**	**66357**	**2.9**	**6.4**	**8.5**
Solids	377116	227617	177052	163326	147840	642	6684	1428	0.4	4.3	1.0
Oil	132112	172757	144031	88289	71772	17362	25735	18379	13.7	41.1	34.4
Natural gas	162820	208170	191480	114800	98096	5501	3919	6926	3.0	3.5	7.6
Nuclear	200702	243761	253537	237162	237922	0	1471	13146	0.0	0.6	5.8
Renewable energy sources	88487	111549	164534	232762	289446	2829	12788	26477	1.7	5.8	10.1
Hydro	27003	33138	34938	37947	40563	74	42	2	0.2	0.1	0.0
Biomass & Waste	57710	71804	105471	151333	181324	2304	9073	17113	2.2	6.4	10.4
Wind	67	1916	16579	29181	43450	589	2040	4019	3.7	7.5	10.2
Solar and others	173	679	2450	7871	16661	142	1822	5420	6.1	30.1	48.2
Geothermal	3534	4012	5095	6429	7448	-279	-189	-78	-5.2	-2.9	-1.0
Net Imports	**776740**	**868442**	**1072571**	**1293080**	**1362520**	**-46563**	**-86136**	**-106282**	**-4.2**	**-6.2**	**-7.2**
Solids	85626	107717	152215	155077	197894	1557	1704	-7897	1.0	1.1	-3.8
Oil	550163	555056	590588	652192	664137	-54627	-86070	-80163	-8.5	-11.7	-10.8
- Crude oil and Feedstocks	523502	528467	555735	622967	640683	-52346	-82893	-77547	-8.6	-11.7	-10.8
- Oil products	26661	26589	34852	29225	23453	-2281	-3177	-2616	-6.1	-9.8	-10.0
Natural gas	137693	203694	328473	484464	499065	6511	-1764	-18214	2.0	-0.4	-3.5
Electricity	3259	1975	1295	1347	1423	-5	-6	-8	-0.4	-0.5	-0.5
Gross Inland Consumption	**1704962**	**1786487**	**1956190**	**2078664**	**2154608**	**-18464**	**-32616**	**-36505**	**-0.9**	**-1.5**	**-1.7**
Solids	467717	343986	329267	318403	345735	2198	8389	-6469	0.7	2.7	-1.8
Oil	647159	679975	687604	689725	682920	-35498	-57412	-58363	-4.9	-7.7	-7.9
Natural gas	297637	405241	519953	599264	597162	12012	2155	-11288	2.4	0.4	-1.9
Nuclear	200702	243761	253537	237162	237922	0	1471	13146	0.0	0.6	5.8
Electricity	3259	1975	1295	1347	1423	-5	-6	-8	-0.4	-0.5	-0.5
Renewable energy forms	88487	111549	164534	232762	289446	2829	12788	26477	1.7	5.8	10.1
as % in Gross Inland Consumption											
Solids	27.4	19.3	16.8	15.3	16.0	0.3	0.6	0.0	1.6	4.3	-0.2
Oil	38.0	38.1	35.2	33.2	31.7	-1.5	-2.2	-2.1	-4.0	-6.2	-6.3
Natural gas	17.5	22.7	26.6	28.8	27.7	0.9	0.5	-0.1	3.3	1.9	-0.2
Nuclear	11.8	13.6	13.0	11.4	11.0	0.1	0.2	0.8	0.9	2.2	7.6
Renewable energy forms	5.2	6.2	8.4	11.2	13.4	0.2	0.8	1.4	2.7	7.5	11.9
Electricity Generation in GWh_e	**2618738**	**3118298**	**3777094**	**4424906**	**4962866**	**1991**	**2383**	**-1032**	**0.1**	**0.1**	**0.0**
Nuclear	794718	944823	982718	919246	922186	0	5701	50953	0.0	0.6	5.8
Hydro & wind	314786	407604	600608	784893	985744	7706	24211	46762	1.3	3.2	5.0
Thermal (incl. biomass)	1509233	1765871	2193768	2720767	3054936	-5715	-27529	-98747	-0.3	-1.0	-3.1
Fuel Inputs for Thermal Power Generation [1]	**393649**	**424378**	**477113**	**524454**	**552714**	**-3045**	**-3077**	**-16187**	**-0.6**	**-0.6**	**-2.8**
Solids	266482	235098	239792	242416	283794	1569	7791	-3213	0.7	3.3	-1.1
Oil (including refinery gas)	57294	46624	33339	24074	20788	-2383	-1261	-257	-6.7	-5.0	-1.2
Gas	56793	118348	170560	195176	166777	-1702	-12023	-16621	-1.0	-5.8	-9.1
Biomass & Waste	10237	21304	29544	57922	75725	-529	2351	3820	-1.8	4.2	5.3
Geothermal heat	2842	3004	3878	4866	5630	0	66	83	0.0	1.4	1.5
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**867592**	**846345**	**839045**	**853616**	**852175**	**-37205**	**-56284**	**-54466**	**-4.2**	**-6.2**	**-6.0**
Refineries	696742	750941	747040	751885	747425	-38095	-60919	-62602	-4.9	-7.5	-7.7
Biofuels and hydrogen production	2	637	17565	36865	47901	572	5267	9605	3.4	16.7	25.1
District heating	38458	19291	15598	13930	15316	125	-112	254	0.8	-0.8	1.7
Others	132391	75474	58842	50936	41533	192	-519	-1723	0.3	-1.0	-4.0
Energy Branch Consumption	**80396**	**88538**	**89046**	**89150**	**87647**	**-2519**	**-4164**	**-4443**	**-2.8**	**-4.5**	**-4.8**
Non-Energy Uses	**101612**	**112692**	**112243**	**115125**	**116632**	**-1533**	**-3025**	**-3496**	**-1.3**	**-2.6**	**-2.9**
Final Energy Demand	**1109885**	**1180941**	**1342799**	**1485873**	**1575509**	**-12260**	**-25410**	**-33013**	**-0.9**	**-1.7**	**-2.1**
by sector											
Industry[1]	384219	363322	400092	444215	478253	-1155	-3097	-5576	-0.3	-0.7	-1.2
- energy intensive industries	245670	228215	240625	252968	254780	-887	-2237	-3949	-0.4	-0.9	-1.5
- other industrial sectors	138549	135107	159467	191247	223473	-268	-860	-1627	-0.2	-0.4	-0.7
Residential	281949	300854	340152	374766	397444	-3165	-7044	-10256	-0.9	-1.8	-2.5
Tertiary	154275	166339	198533	226011	244357	-2074	-4562	-5154	-1.0	-2.0	-2.1
Transport	289441	350426	404022	440881	455454	-5866	-10708	-12026	-1.4	-2.4	-2.6
by fuel [1]											
Solids	136126	68674	59247	51559	42362	481	993	-1122	0.8	2.0	-2.6
Oil	458929	499706	537760	556988	556817	-23857	-41859	-48036	-4.2	-7.0	-7.9
Gas	220792	264489	311018	357094	380766	8304	6786	-1254	2.7	1.9	-0.3
Electricity	187680	224587	279318	333628	378805	451	581	565	0.2	0.2	0.1
Heat (from CHP and District Heating)	67875	74443	84977	94969	106858	270	940	1609	0.3	1.0	1.5
Other	38483	49041	70479	91633	109901	2091	7149	15225	3.1	8.5	16.1
CO_2 Emissions (Mt of CO_2)	**4136.3**	**3998.9**	**4226.0**	**4372.3**	**4454.4**	**-65.9**	**-122.3**	**-221.5**	**-1.5**	**-2.7**	**-4.7**
Power generation/District heating	1515.0	1431.1	1510.3	1543.8	1626.7	-7.1	-1.9	-58.1	-0.5	-0.1	-3.4
Energy Branch	155.8	159.9	127.6	108.5	93.8	-8.0	-13.8	-10.6	-5.9	-11.3	-10.2
Industry	796.2	650.1	672.2	715.2	719.4	-12.1	-20.4	-32.6	-1.8	-2.8	-4.3
Residential	538.0	481.6	506.6	523.0	521.3	-12.6	-25.1	-35.9	-2.4	-4.6	-6.4
Tertiary	291.5	255.8	270.4	278.5	274.8	-7.2	-16.7	-25.6	-2.6	-5.6	-8.5
Transport	839.9	1020.5	1138.9	1203.4	1218.5	-19.0	-44.5	-58.7	-1.6	-3.6	-4.6
CO_2 Emissions Index (1990=100)	**100.0**	**96.7**	**102.2**	**105.7**	**107.7**	-1.6	-3.0	-5.4	-1.5	-2.7	-4.7

Source: PRIMES

EU28: Medium gas and soaring oil prices case — SUMMARY ENERGY BALANCE AND INDICATORS (B)
Comparison to Baseline scenario

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	528.913	550.981	569.992	582.152	587.546	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	7511.4	9217.8	11370.5	14408.7	17374.7	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	227.0	193.8	172.0	144.3	124.0	-1.6	-2.3	-2.1	-0.9	-1.5	-1.7
Gross Inl. Cons./Capita (toe/inhabitant)	3.22	3.24	3.43	3.57	3.67	-0.03	-0.06	-0.06	-0.9	-1.5	-1.7
Electricity Generated/Capita (kWh/inhabitant)	4951	5660	6627	7601	8447	3	4	-2	0.1	0.1	0.0
Carbon intensity (t of CO_2/toe of GIC)	2.43	2.24	2.16	2.10	2.07	-0.01	-0.03	-0.07	-0.6	-1.2	-3.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	7.82	7.26	7.41	7.51	7.58	-0.12	-0.21	-0.38	-1.5	-2.7	-4.7
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	550.7	433.8	371.7	303.5	256.4	-5.8	-8.5	-12.7	-1.5	-2.7	-4.7
Import Dependency %	44.6	47.5	53.5	60.7	61.7	-1.8	-3.0	-3.6	-3.2	-4.7	-5.6
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	81.8	75.7	66.1	58.7	-0.2	-0.5	-0.7	-0.3	-0.7	-1.2
Residential (Energy on Private Income)	100.0	87.3	80.4	70.5	62.1	-0.7	-1.3	-1.6	-0.9	-1.8	-2.5
Tertiary (Energy on Value added)	100.0	84.3	78.9	70.1	62.5	-0.8	-1.4	-1.3	-1.0	-2.0	-2.1
Transport (Energy on GDP)	100.0	98.7	92.2	79.4	68.0	-1.3	-1.9	-1.8	-1.4	-2.4	-2.6
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.42	0.30	0.27	0.24	0.23	0.00	0.00	-0.01	-0.5	-0.2	-3.6
Final energy demand (t of CO_2/toe)	2.22	2.04	1.93	1.83	1.74	-0.02	-0.04	-0.06	-1.0	-2.1	-3.3
Industry	2.07	1.79	1.68	1.61	1.50	-0.03	-0.03	-0.05	-1.5	-2.1	-3.2
Residential	1.91	1.60	1.49	1.40	1.31	-0.02	-0.04	-0.05	-1.5	-2.8	-4.0
Tertiary	1.89	1.54	1.36	1.23	1.12	-0.02	-0.05	-0.08	-1.6	-3.7	-6.6
Transport	2.90	2.91	2.82	2.73	2.68	-0.01	-0.03	-0.06	-0.2	-1.2	-2.1
Electricity and steam generation											
Generation Capacity in MW_e		**725459**	**896692**	**1055939**	**1278712**	**7869**	**17854**	**33586**	**0.9**	**1.7**	**2.7**
Nuclear		145542	139130	121509	114739	0	741	6588	0.0	0.6	6.1
Hydro (pumping excluded)		116592	123997	130314	136296	63	150	477	0.1	0.1	0.4
Wind		12806	82122	142021	218465	2703	9740	26210	3.4	7.4	13.6
Solar		176	1661	4896	10583	0	0	0	0.0	0.0	0.0
Thermal		450343	549782	657199	798629	5103	7224	310	0.9	1.1	0.0
of which cogeneration units		122684	173039	240730	293266	4477	4990	1404	2.7	2.1	0.5
Solids fired		210547	182871	193479	262666	2337	8788	5163	1.3	4.8	2.0
Gas fired		143140	267025	346366	402930	-584	-6432	-11487	-0.2	-1.8	-2.8
Oil fired		80801	76406	53428	38433	2951	2183	1136	4.0	4.3	3.0
Biomass-waste fired		14814	22056	62323	92841	399	2665	5474	1.8	4.5	6.3
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1040	1424	1604	1760	0	19	25	0.0	1.2	1.4
Indicators											
Efficiency for thermal electricity production (%)		35.8	39.5	44.6	47.5	0.1	-0.2	-0.1	0.4	-0.4	-0.3
Load factor for gross electric capacities (%)		49.1	48.1	47.8	44.3	-0.4	-0.8	-1.2	-0.8	-1.6	-2.6
CHP indicator (% of electricity from CHP)		14.8	18.3	22.7	24.8	0.1	0.2	-0.5	0.6	1.1	-1.8
Non fossil fuels in electricity generation (%)		45.6	44.5	44.8	46.4	0.1	1.0	2.5	0.3	2.3	5.6
- nuclear		30.3	26.0	20.8	18.6	0.0	0.1	1.0	-0.1	0.6	5.9
- renewable energy forms		15.3	18.5	24.0	27.9	0.2	0.9	1.4	0.9	3.8	5.5
Transport sector											
Passenger transport activity (Gpkm)	**4881.2**	**5752.9**	**6810.7**	**8091.1**	**9230.0**	-86.6	-173.7	-264.4	-1.3	-2.1	-2.8
Public road transport	618.4	589.7	617.3	627.8	610.9	-1.3	2.2	4.6	-0.2	0.4	0.8
Private cars and motorcycles	3601.6	4397.4	5219.0	6250.4	7185.3	-81.7	-162.6	-242.2	-1.5	-2.5	-3.3
Rail	456.6	423.6	469.0	520.1	573.2	2.7	5.8	7.9	0.6	1.1	1.4
Aviation	170.7	304.7	460.3	637.1	796.9	-6.2	-19.5	-35.3	-1.3	-3.0	-4.2
Inland navigation	33.9	37.4	45.0	55.7	63.7	0.0	0.3	0.6	0.0	0.5	0.9
Travel per person (km per capita)	9229	10441	11949	13899	15709	-151.8	-298.4	-450.0	-1.3	-2.1	-2.8
Freight transport activity (Gtkm)	**1958.3**	**2352.3**	**2907.2**	**3530.8**	**4107.1**	-40.1	-81.2	-124.4	-1.4	-2.2	-2.9
Trucks	1159.5	1668.6	2162.3	2722.5	3241.9	-42.0	-86.7	-131.6	-1.9	-3.1	-3.9
Rail	532.6	405.9	441.0	470.3	499.1	3.0	5.4	6.4	0.7	1.2	1.3
Inland navigation	266.3	277.8	303.9	338.0	366.1	-1.1	0.0	0.9	-0.4	0.0	0.2
Freight activity per unit of GDP (tkm/000 Euro'00)	261	255	256	245	236	-3.5	-5.6	-7.2	-1.4	-2.2	-2.9
Energy demand in transport (ktoe)	**289441**	**350426**	**404022**	**440881**	**455454**	-5866	-10708	-12026	-1.4	-2.4	-2.6
Public road transport	9634	8758	8891	8358	7097	-19	30	-22	-0.2	0.4	-0.3
Private cars and motorcycles	140266	162549	175236	179687	178218	-2248	-2648	-2759	-1.3	-1.5	-1.5
Trucks	92511	116941	148842	175782	192088	-2776	-5222	-4631	-1.8	-2.9	-2.4
Rail	9807	9691	8902	7109	6783	21	25	42	0.2	0.4	0.6
Aviation	29928	46814	55707	62783	63643	-805	-2873	-4658	-1.4	-4.4	-6.8
Inland navigation	7295	5673	6443	7162	7625	-40	-19	2	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	38.5	39.3	36.3	31.8	27.7	0.0	0.0	0.0	0.0	0.0	0.0
Freight transport (toe/Mtkm)	51.8	52.8	53.9	52.0	48.7	-0.2	-0.3	0.3	-0.4	-0.5	0.7

Source: PRIMES

Europe-30: Medium gas and soaring oil prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**1091087**	**1200143**	**1188151**	**1134002**	**1100586**	**29821**	**74111**	**91168**	**2.6**	**7.0**	**9.0**
Solids	377317	228042	177577	163686	148165	633	6717	1450	0.4	4.3	1.0
Oil	216359	337714	276095	234018	182517	17889	47145	47288	6.9	25.2	35.0
Natural gas	186970	253987	289168	236558	211006	8193	5524	1910	2.9	2.4	0.9
Nuclear	206883	250675	260539	244305	245493	0	1471	13730	0.0	0.6	5.9
Renewable energy sources	103557	129725	184773	255436	313405	3106	13254	26790	1.7	5.5	9.3
Hydro	40003	48250	50018	54366	57509	75	79	39	0.1	0.1	0.1
Biomass & Waste	59720	74749	110021	156823	187248	2443	9457	17339	2.3	6.4	10.2
Wind	67	1919	17072	29813	44388	726	2084	4068	4.4	7.5	10.1
Solar and others	173	703	2479	7913	16725	143	1826	5426	6.1	30.0	48.0
Geothermal	3595	4103	5183	6521	7534	-281	-192	-82	-5.1	-2.9	-1.1
Net Imports	**695727**	**684878**	**873262**	**1056341**	**1167231**	**-50472**	**-110286**	**-132168**	**-5.5**	**-9.5**	**-10.2**
Solids	86632	108508	152982	155623	198302	1510	1714	-7912	1.0	1.1	-3.8
Oil	490237	412700	480527	527903	573532	-56137	-108773	-110725	-10.5	-17.1	-16.2
- Crude oil and Feedstocks	458354	384418	443630	496844	548898	-53753	-105316	-107764	-10.8	-17.5	-16.4
- Oil products	31883	28282	36897	31058	24634	-2384	-3457	-2961	-6.1	-10.0	-10.7
Natural gas	117149	163941	239863	372793	395356	4161	-3220	-13522	1.8	-0.9	-3.3
Electricity	1710	-272	-109	22	41	-5	-6	-8	4.6	-22.4	-16.2
Gross Inland Consumption	**1751588**	**1839144**	**2013359**	**2138332**	**2213371**	**-18866**	**-33216**	**-37523**	**-0.9**	**-1.5**	**-1.7**
Solids	468937	345317	330559	319309	346467	2142	8431	-6462	0.7	2.7	-1.8
Oil	669257	702393	708567	709909	701604	-36463	-58669	-59960	-4.9	-7.6	-7.9
Natural gas	301245	411306	529030	609351	606362	12354	2303	-11613	2.4	0.4	-1.9
Nuclear	206883	250675	260539	244305	245493	0	1471	13730	0.0	0.6	5.9
Electricity	1710	-272	-109	22	41	-5	-6	-8	4.6	-22.4	-16.2
Renewable energy forms	103557	129725	184773	255436	313405	3106	13254	26790	1.7	5.5	9.3
as % in Gross Inland Consumption											
Solids	26.8	18.8	16.4	14.9	15.7	0.3	0.6	0.0	1.6	4.3	-0.2
Oil	38.2	38.2	35.2	33.2	31.7	-1.5	-2.2	-2.1	-4.0	-6.2	-6.3
Natural gas	17.2	22.4	26.3	28.5	27.4	0.9	0.5	-0.1	3.4	1.9	-0.2
Nuclear	11.8	13.6	12.9	11.4	11.1	0.1	0.2	0.8	0.9	2.2	7.7
Renewable energy forms	5.9	7.1	9.2	11.9	14.2	0.2	0.8	1.4	2.7	7.1	11.2
Electricity Generation in GWh_e	**2794856**	**3323905**	**3994944**	**4666022**	**5218308**	**3355**	**3682**	**670**	**0.1**	**0.1**	**0.0**
Nuclear	818651	971593	1009830	946903	951503	0	5701	53217	0.0	0.6	5.9
Hydro & wind	465941	583374	781709	983221	1193856	9315	25148	47750	1.2	2.6	4.2
Thermal (incl. biomass)	1510263	1768938	2203405	2735898	3072949	-5960	-27166	-100296	-0.3	-1.0	-3.2
Fuel Inputs for Thermal Power Generation [1]	**394358**	**425676**	**479478**	**527938**	**556847**	**-3108**	**-2941**	**-16389**	**-0.6**	**-0.6**	**-2.9**
Solids	266510	235114	239987	242438	283794	1569	7791	-3213	0.7	3.3	-1.1
Oil (including refinery gas)	57394	46636	33499	24142	20855	-2383	-1262	-256	-6.6	-5.0	-1.2
Gas	56913	118562	171416	195989	167228	-1715	-12144	-16824	-1.0	-5.8	-9.1
Biomass & Waste	10698	22359	30699	60502	79340	-579	2609	3820	-1.8	4.5	5.1
Geothermal heat	2842	3004	3878	4866	5630	0	66	83	0.0	1.4	1.5
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**884427**	**866713**	**858917**	**874006**	**872358**	**-38035**	**-57101**	**-55472**	**-4.2**	**-6.1**	**-6.0**
Refineries	713481	771184	766257	770926	765905	-38936	-61884	-63863	-4.8	-7.4	-7.7
Biofuels and hydrogen production	2	637	17913	37802	49148	584	5402	9835	3.4	16.7	25.0
District heating	38512	19379	15879	14320	15761	125	-99	282	0.8	-0.7	1.8
Others	132432	75512	58868	50958	41544	192	-520	-1727	0.3	-1.0	-4.0
Energy Branch Consumption	**83789**	**92950**	**93740**	**93606**	**91205**	**-2475**	**-4194**	**-4618**	**-2.6**	**-4.3**	**-4.8**
Non-Energy Uses	**103762**	**115166**	**114421**	**117208**	**118746**	**-1566**	**-3083**	**-3565**	**-1.4**	**-2.6**	**-2.9**
Final Energy Demand	**1145388**	**1220510**	**1386378**	**1531962**	**1621607**	**-12643**	**-26206**	**-34166**	**-0.9**	**-1.7**	**-2.1**
by sector											
Industry[1]	394004	375356	412651	457892	492354	-1155	-3141	-5675	-0.3	-0.7	-1.1
- energy intensive industries	252212	236839	249553	262529	264405	-883	-2264	-4022	-0.4	-0.9	-1.5
- other industrial sectors	141792	138517	163097	195362	227949	-272	-877	-1653	-0.2	-0.4	-0.7
Residential	290806	310280	350276	385354	408009	-3300	-7293	-10548	-0.9	-1.9	-2.5
Tertiary	160718	172911	206630	234730	253348	-2156	-4765	-5398	-1.0	-2.0	-2.1
Transport	299860	361964	416822	453987	467896	-6031	-11007	-12544	-1.4	-2.4	-2.6
by fuel [1]											
Solids	137278	69933	60248	52365	43027	439	1035	-1113	0.7	2.0	-2.5
Oil	477192	518412	556281	575146	573514	-24648	-43162	-49615	-4.2	-7.0	-8.0
Gas	222317	266915	315164	362160	385978	8470	6982	-1280	2.8	2.0	-0.3
Electricity	200044	238509	294988	351453	397890	563	691	708	0.2	0.2	0.2
Heat (from CHP and District Heating)	68198	75229	85963	96504	109138	280	1009	1732	0.3	1.1	1.6
Other	40359	51512	73734	94334	112061	2254	7240	15402	3.2	8.3	15.9
CO2 Emissions (Mt of CO2)	**4207.7**	**4076.8**	**4308.4**	**4453.5**	**4528.4**	**-68.1**	**-126.0**	**-227.0**	**-1.6**	**-2.8**	**-4.8**
Power generation/District heating	1515.7	1431.7	1514.0	1546.7	1629.0	-7.2	-2.2	-58.5	-0.5	-0.1	-3.5
Energy Branch	163.4	170.4	137.4	117.5	100.8	-7.9	-13.9	-11.0	-5.4	-10.6	-9.8
Industry	807.4	663.2	683.5	728.4	732.9	-12.7	-20.7	-33.2	-1.8	-2.8	-4.3
Residential	551.3	493.5	518.4	533.6	530.3	-13.2	-26.0	-37.0	-2.5	-4.7	-6.5
Tertiary	300.2	264.5	280.4	288.3	283.9	-7.7	-17.4	-26.6	-2.7	-5.7	-8.6
Transport	869.6	1053.4	1174.7	1239.0	1251.5	-19.5	-45.7	-60.8	-1.6	-3.6	-4.6
CO2 Emissions Index (1990=100)	**100.0**	**96.9**	**102.4**	**105.8**	**107.6**	-1.6	-3.0	-5.4	-1.6	-2.8	-4.8

Source: PRIMES

Europe-30: Medium gas and soaring oil prices case **SUMMARY ENERGY BALANCE AND INDICATORS (B)**
Comparison to Baseline scenario

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	539.950	562.681	582.130	594.587	600.252	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	7877.3	9665.6	11898.8	15057.8	18137.4	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	222.4	190.3	169.2	142.0	122.0	-1.6	-2.2	-2.1	-0.9	-1.5	-1.7
Gross Inl. Cons./Capita (toe/inhabitant)	3.24	3.27	3.46	3.60	3.69	-0.03	-0.06	-0.06	-0.9	-1.5	-1.7
Electricity Generated/Capita (kWh/inhabitant)	5176	5907	6863	7847	8694	6	6	1	0.1	0.1	0.0
Carbon intensity (t of CO_2/toe of GIC)	2.40	2.22	2.14	2.08	2.05	-0.01	-0.03	-0.07	-0.6	-1.2	-3.2
CO_2 Emissions/Capita (t of CO_2/inhabitant)	7.79	7.25	7.40	7.49	7.54	-0.12	-0.21	-0.38	-1.6	-2.8	-4.8
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	534.2	421.8	362.1	295.8	249.7	-5.7	-8.4	-12.5	-1.6	-2.8	-4.8
Import Dependency %	38.9	36.4	42.4	48.2	51.5	-2.0	-4.2	-4.8	-4.5	-8.0	-8.5
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	81.7	75.6	66.0	58.6	-0.2	-0.5	-0.7	-0.3	-0.7	-1.1
Residential (Energy on Private Income)	100.0	87.4	80.3	70.4	62.0	-0.8	-1.3	-1.6	-0.9	-1.9	-2.5
Tertiary (Energy on Value added)	100.0	84.5	79.3	70.3	62.7	-0.8	-1.4	-1.3	-1.0	-2.0	-2.1
Transport (Energy on GDP)	100.0	98.4	92.0	79.2	67.8	-1.3	-1.9	-1.8	-1.4	-2.4	-2.6
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.40	0.29	0.26	0.23	0.22	0.00	0.00	-0.01	-0.6	-0.3	-3.7
Final energy demand (t of CO_2/toe)	2.21	2.03	1.92	1.82	1.73	-0.02	-0.04	-0.06	-1.1	-2.1	-3.3
Industry	2.05	1.77	1.66	1.59	1.49	-0.03	-0.03	-0.05	-1.5	-2.1	-3.2
Residential	1.90	1.59	1.48	1.38	1.30	-0.02	-0.04	-0.06	-1.6	-2.8	-4.1
Tertiary	1.87	1.53	1.36	1.23	1.12	-0.02	-0.05	-0.08	-1.6	-3.8	-6.6
Transport	2.90	2.91	2.82	2.73	2.67	-0.01	-0.03	-0.06	-0.2	-1.2	-2.1
Electricity and steam generation											
Generation Capacity in MW_e		**769539**	**946310**	**1109473**	**1335687**	**8501**	**18234**	**34128**	**0.9**	**1.7**	**2.6**
Nuclear		148992	142580	124959	118452	0	741	6877	0.0	0.6	6.2
Hydro (pumping excluded)		155831	165281	173512	179865	65	198	526	0.0	0.1	0.3
Wind		12886	84249	144930	222624	3288	9912	26400	4.1	7.3	13.5
Solar		195	1705	5007	10814	0	0	0	0.0	0.0	0.0
Thermal		451636	552495	661065	803932	5148	7383	325	0.9	1.1	0.0
of which cogeneration units		123656	174265	242859	296838	4475	5319	1589	2.6	2.2	0.5
Solids fired		210703	182965	193494	262666	2337	8788	5163	1.3	4.8	2.0
Gas fired		143723	268897	348445	404816	-540	-6462	-11517	-0.2	-1.8	-2.8
Oil fired		80968	76549	53495	38494	2951	2184	1137	4.0	4.3	3.0
Biomass-waste fired		15202	22661	64027	96196	400	2854	5518	1.8	4.7	6.1
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1040	1424	1604	1760	0	19	25	0.0	1.2	1.4
Indicators											
Efficiency for thermal electricity production (%)		35.7	39.5	44.6	47.5	0.1	-0.2	-0.1	0.4	-0.4	-0.3
Load factor for gross electric capacities (%)		49.3	48.2	48.0	44.6	-0.4	-0.8	-1.2	-0.8	-1.6	-2.5
CHP indicator (% of electricity from CHP)		14.0	17.5	21.7	23.9	0.1	0.3	-0.4	0.5	1.2	-1.7
Non fossil fuels in electricity generation (%)		48.9	47.4	47.5	49.0	0.2	1.0	2.4	0.3	2.1	5.2
- nuclear		29.2	25.3	20.3	18.2	0.0	0.1	1.0	-0.1	0.5	5.9
- renewable energy forms		19.6	22.1	27.2	30.8	0.2	0.9	1.4	0.8	3.3	4.7
Transport sector											
Passenger transport activity (Gpkm)	**5032.5**	**5925.5**	**7009.5**	**8310.1**	**9459.5**	-88.8	-178.0	-270.2	-1.3	-2.1	-2.8
Public road transport	625.6	596.9	625.5	636.6	620.0	-1.3	2.3	4.7	-0.2	0.4	0.8
Private cars and motorcycles	3720.2	4530.1	5370.2	6416.0	7358.4	-83.9	-166.6	-247.8	-1.5	-2.5	-3.3
Rail	473.5	443.8	492.1	545.1	599.1	2.9	6.2	8.5	0.6	1.1	1.4
Aviation	178.7	316.3	475.5	655.4	816.8	-6.4	-20.0	-36.1	-1.3	-3.0	-4.2
Inland navigation	34.5	38.4	46.2	57.0	65.1	0.0	0.3	0.6	0.0	0.5	0.9
Travel per person (km per capita)	9320	10531	12041	13976	15759	-152.5	-299.3	-450.2	-1.3	-2.1	-2.8
Freight transport activity (Gtkm)	**2026.8**	**2447.9**	**3018.7**	**3660.2**	**4249.2**	-41.3	-83.4	-127.7	-1.3	-2.2	-2.9
Trucks	1179.2	1705.6	2212.9	2790.2	3325.1	-42.9	-88.7	-135.0	-1.9	-3.1	-3.9
Rail	544.1	419.3	456.9	486.9	515.9	3.1	5.6	6.7	0.7	1.2	1.3
Inland navigation	303.5	323.0	348.9	383.1	408.2	-1.5	-0.3	0.5	-0.4	-0.1	0.1
Freight activity per unit of GDP (tkm/000 Euro'00)	257	253	254	243	234	-3.5	-5.5	-7.0	-1.3	-2.2	-2.9
Energy demand in transport (ktoe)	**299860**	**361964**	**416822**	**453987**	**467896**	-6031	-11007	-12544	-1.4	-2.4	-2.6
Public road transport	9802	8917	9069	8530	7247	-19	31	-24	-0.2	0.4	-0.3
Private cars and motorcycles	145794	168062	180966	185052	182862	-2313	-2717	-3048	-1.3	-1.4	-1.6
Trucks	94266	119351	152157	179989	196752	-2829	-5333	-4703	-1.8	-2.9	-2.3
Rail	10142	10079	9301	7435	7073	21	27	44	0.2	0.4	0.6
Aviation	31627	49160	58157	65096	65669	-845	-2990	-4811	-1.4	-4.4	-6.8
Inland navigation	8229	6394	7172	7884	8291	-45	-25	-3	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	38.9	39.6	36.5	31.9	27.7	0.0	0.0	0.0	0.0	0.0	-0.1
Freight transport (toe/Mtkm)	51.4	52.0	53.3	51.5	48.3	-0.2	-0.3	0.3	-0.4	-0.5	0.7

Source: PRIMES

(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.

Abbreviations

GIC: Gross Inland Consumption
CHP: combined heat and power

Geographical regions
EU15: EU15 Member States
EU25: EU15 Member States + New Member States
NMS: New Member States (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia)
EU27: EU25 Member States + Bulgaria + Romania
EU28: EU27 + Turkey
Europe 30: EU28 + Norway + Switzerland

Units
toe: tonne of oil equivalent, or 10^7 kilocalories, or 41.86 GJ (Gigajoule)
Mtoe: million toe

GW: Gigawatt or 10^9 watt
kWh: kilowatt-hour or 10^3 watt-hour
MWh: megawatt-hour or 10^6 watt-hour
TWh: Terawatt-hour or 10^{12} watt-hour

t: metric tonnes, or 1000 kilogrammes
Mt: Million metric tonnes

km: kilometre
pkm: passenger-kilometre (one passenger transported a distance of one kilometre)
tkm: tonne-kilometre (one tonne transported a distance of one kilometre)
Gpkm: Giga passenger-kilometre, or 10^9 passenger-kilometre
Gtkm: Giga tonne-kilometre, or 10^9 tonne-kilometre

APPENDIX 2: "Soaring oil and gas prices" case results

Summary results by groups of countries (comparison to Baseline)

EU25: Soaring oil and gas prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**877543**	**898598**	**859763**	**775922**	**769749**	**23347**	**69401**	**84647**	**2.8**	**9.8**	**12.4**
Solids	351650	204139	156204	142588	123880	1676	11506	3683	1.1	8.8	3.1
Oil	120396	163631	134233	77346	60989	17054	24387	17540	14.6	46.1	40.4
Natural gas	139723	196665	173249	114040	100529	1071	15690	20723	0.6	16.0	26.0
Nuclear	196920	237664	248776	230221	224609	0	1583	13802	0.0	0.7	6.5
Renewable energy sources	68855	96499	147301	211728	259742	3545	16235	28899	2.5	8.3	12.5
Hydro	23391	28982	29960	32348	33883	82	145	2	0.3	0.5	0.0
Biomass & Waste	42151	61865	95431	140920	169420	3023	11728	20541	3.3	9.1	13.8
Wind	67	1913	16147	29242	42430	361	3000	4488	2.3	11.4	11.8
Solar and others	145	417	1566	4034	8166	76	1287	3772	5.1	46.9	85.8
Geothermal	3101	3322	4196	5184	5842	2	74	96	0.1	1.4	1.7
Net Imports	**711300**	**801061**	**980875**	**1129974**	**1142586**	**-43401**	**-101717**	**-122981**	**-4.2**	**-8.3**	**-9.7**
Solids	75449	94307	132476	158886	202521	189	30491	29602	0.1	23.7	17.1
Oil	510017	518147	552010	600844	589239	-47688	-69022	-63210	-8.0	-10.3	-9.7
- Crude oil and Feedstocks	479112	496826	515711	570775	564775	-45646	-65900	-61476	-8.1	-10.4	-9.8
- Oil products	30905	21321	36299	30069	24465	-2042	-3122	-1734	-5.3	-9.4	-6.6
Natural gas	123653	186463	294156	368129	348631	4103	-63181	-89366	1.4	-14.6	-20.4
Electricity	2181	2144	2232	2116	2195	-4	-6	-7	-0.2	-0.3	-0.3
Gross Inland Consumption	**1556194**	**1653841**	**1794231**	**1855915**	**1860283**	**-18302**	**-29421**	**-34955**	**-1.0**	**-1.6**	**-1.8**
Solids	431944	306538	288680	301473	326401	1865	41997	33284	0.7	16.2	11.4
Oil	595746	634711	639836	628209	598176	-28882	-41740	-42290	-4.3	-6.2	-6.6
Natural gas	260548	376284	467405	482169	449160	5174	-47490	-68642	1.1	-9.0	-13.3
Nuclear	196920	237664	248776	230221	224609	0	1583	13802	0.0	0.7	6.5
Electricity	2181	2144	2232	2116	2195	-4	-6	-7	-0.2	-0.3	-0.3
Renewable energy forms	68855	96499	147301	211728	259742	3545	16235	28899	2.5	8.3	12.5
as % in Gross Inland Consumption											
Solids	27.8	18.5	16.1	16.2	17.5	0.3	2.5	2.1	1.7	18.0	13.4
Oil	38.3	38.4	35.7	33.8	32.2	-1.2	-1.7	-1.6	-3.3	-4.7	-4.8
Natural gas	16.7	22.8	26.1	26.0	24.1	0.5	-2.1	-3.2	2.2	-7.5	-11.6
Nuclear	12.7	14.4	13.9	12.4	12.1	0.1	0.3	1.0	1.0	2.3	8.5
Renewable energy forms	4.4	5.8	8.2	11.4	14.0	0.3	1.0	1.8	3.5	10.0	14.6
Electricity Generation in GWh_e	**2455674**	**2900835**	**3484916**	**4015411**	**4386744**	**1730**	**9636**	**20145**	**0.0**	**0.2**	**0.5**
Nuclear	780056	921193	964265	892343	870586	0	6136	53494	0.0	0.7	6.5
Hydro & wind	272788	359249	537702	729278	922558	5158	45427	78835	1.0	6.6	9.3
Thermal (incl. biomass)	1402830	1620392	1982949	2393790	2593601	-3427	-41928	-112184	-0.2	-1.7	-4.1
Fuel Inputs for Thermal Power Generation [1]	**355362**	**385987**	**430031**	**465977**	**480192**	**-2210**	**3206**	**-9846**	**-0.5**	**0.7**	**-2.0**
Solids	246377	214488	215668	237236	270641	718	38735	30329	0.3	19.5	12.6
Oil (including refinery gas)	48954	41870	30953	22827	19600	-680	-485	-195	-2.2	-2.1	-1.0
Gas	47057	105480	151095	145871	109692	-1731	-36860	-45556	-1.1	-20.2	-29.3
Biomass & Waste	10201	21211	28624	55349	74889	-522	1730	5465	-1.8	3.2	7.9
Geothermal heat	2774	2939	3691	4693	5372	6	85	111	0.2	1.9	2.1
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**797634**	**796450**	**782094**	**784309**	**758244**	**-30802**	**-39787**	**-38821**	**-3.8**	**-4.8**	**-4.9**
Refineries	642275	710448	697581	689954	661931	-31341	-44071	-46172	-4.3	-6.0	-6.5
Biofuels and hydrogen production	2	637	17360	36182	45572	568	5177	9197	3.4	16.7	25.3
District heating	31035	17261	15368	14162	15562	118	344	828	0.8	2.5	5.6
Others	124322	68104	51785	44011	35179	-147	-1238	-2675	-0.3	-2.7	-7.1
Energy Branch Consumption	**73032**	**80377**	**79437**	**78100**	**74978**	**-2061**	**-3067**	**-3156**	**-2.5**	**-3.8**	**-4.0**
Non-Energy Uses	**94476**	**105950**	**106409**	**108335**	**108791**	**-1439**	**-2865**	**-3373**	**-1.3**	**-2.6**	**-3.0**
Final Energy Demand	**1021913**	**1095359**	**1225229**	**1308203**	**1331203**	**-12777**	**-30301**	**-39250**	**-1.0**	**-2.3**	**-2.9**
by sector											
Industry[1]	341087	330062	355202	378606	385380	-1219	-3796	-6185	-0.3	-1.0	-1.6
- energy intensive industries	216809	211616	219754	225458	219902	-1006	-2934	-5030	-0.5	-1.3	-2.2
- other industrial sectors	124278	118446	135448	153148	165478	-213	-862	-1155	-0.2	-0.6	-0.7
Residential	261006	273302	308251	328341	337353	-3715	-10400	-13932	-1.2	-3.1	-4.0
Tertiary	146622	158975	186033	205138	215974	-2454	-6718	-9342	-1.3	-3.2	-4.1
Transport	273198	333020	375744	396118	392495	-5389	-9387	-9791	-1.4	-2.3	-2.4
by fuel [1]											
Solids	123937	56633	45953	42021	35691	751	2601	1667	1.7	6.6	4.9
Oil	428121	468312	496648	498529	476468	-20694	-31366	-35369	-4.0	-5.9	-6.9
Gas	200242	251885	282664	298078	299505	3489	-11648	-21893	1.2	-3.8	-6.8
Electricity	176468	211352	259710	303654	335840	400	736	1796	0.2	0.2	0.5
Heat (from CHP and District Heating)	63092	68712	80513	88801	96931	336	1110	1606	0.4	1.3	1.7
Other	30053	38465	59742	77120	86768	2940	8266	12942	5.2	12.0	17.5
CO_2 Emissions (Mt of CO_2)	**3776.1**	**3674.1**	**3818.9**	**3870.2**	**3804.6**	**-63.0**	**-58.4**	**-150.5**	**-1.6**	**-1.5**	**-3.8**
Power generation/District heating	1362.6	1294.9	1357.7	1399.3	1437.7	-4.2	66.0	13.7	-0.3	5.0	1.0
Energy Branch	141.5	144.9	116.7	101.7	88.0	-7.2	-12.2	-11.7	-5.8	-10.7	-11.7
Industry	698.9	567.7	564.8	573.7	539.2	-12.2	-21.5	-30.6	-2.1	-3.6	-5.4
Residential	506.1	452.1	467.9	460.5	440.1	-14.8	-34.4	-46.6	-3.1	-6.9	-9.6
Tertiary	274.2	244.6	254.7	259.7	257.7	-7.1	-16.1	-24.2	-2.7	-5.8	-8.6
Transport	792.7	969.9	1057.1	1075.2	1041.9	-17.5	-40.2	-51.0	-1.6	-3.6	-4.7
CO_2 Emissions Index (1990=100)	**100.0**	**97.3**	**101.1**	**102.5**	**100.8**	-1.7	-1.5	-4.0	-1.6	-1.5	-3.8

Source: PRIMES

EU25: Soaring oil and gas prices case — SUMMARY ENERGY BALANCE AND INDICATORS (B)
Comparison to Baseline scenario

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	440.788	452.915	464.054	469.270	469.365	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	7294.7	8947.0	10946.8	13656.3	16051.4	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	213.3	184.8	163.9	135.9	115.9	-1.7	-2.2	-2.2	-1.0	-1.6	-1.8
Gross Inl. Cons./Capita (toe/inhabitant)	3.53	3.65	3.87	3.95	3.96	-0.04	-0.06	-0.07	-1.0	-1.6	-1.8
Electricity Generated/Capita (kWh/inhabitant)	5571	6405	7510	8557	9346	4	21	43	0.0	0.2	0.5
Carbon intensity (t of CO_2/toe of GIC)	2.43	2.22	2.13	2.09	2.05	-0.01	0.00	-0.04	-0.6	0.1	-2.0
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.57	8.11	8.23	8.25	8.11	-0.14	-0.12	-0.32	-1.6	-1.5	-3.8
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	517.7	410.7	348.9	283.4	237.0	-5.8	-4.3	-9.4	-1.6	-1.5	-3.8
Import Dependency %	44.7	47.2	53.3	59.3	59.7	-1.8	-4.3	-5.1	-3.2	-6.7	-7.9
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	83.8	77.0	66.0	57.6	-0.3	-0.7	-0.9	-0.3	-1.0	-1.6
Residential (Energy on Private Income)	100.0	85.8	79.4	68.4	60.0	-1.0	-2.2	-2.5	-1.2	-3.1	-4.0
Tertiary (Energy on Value added)	100.0	84.9	78.5	68.4	60.7	-1.0	-2.2	-2.6	-1.3	-3.2	-4.1
Transport (Energy on GDP)	100.0	99.4	91.7	77.4	65.3	-1.3	-1.8	-1.6	-1.4	-2.3	-2.4
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.41	0.30	0.26	0.24	0.23	0.00	0.01	0.00	-0.4	4.5	0.1
Final energy demand (t of CO_2/toe)	2.22	2.04	1.91	1.81	1.71	-0.02	-0.04	-0.06	-1.1	-2.3	-3.5
Industry	2.05	1.72	1.59	1.52	1.40	-0.03	-0.04	-0.06	-1.8	-2.6	-3.9
Residential	1.94	1.65	1.52	1.40	1.30	-0.03	-0.06	-0.08	-1.9	-4.0	-5.8
Tertiary	1.87	1.54	1.37	1.27	1.19	-0.02	-0.04	-0.06	-1.4	-2.7	-4.6
Transport	2.90	2.91	2.81	2.71	2.65	-0.01	-0.04	-0.06	-0.2	-1.3	-2.3
Electricity and steam generation											
Generation Capacity in MW_e		**661750**	**816139**	**969787**	**1155385**	**5632**	**27206**	**59093**	**0.7**	**2.9**	**5.4**
Nuclear		141082	136430	117730	108106	0	794	6890	0.0	0.7	6.8
Hydro (pumping excluded)		97168	104039	109036	112688	105	418	487	0.1	0.4	0.4
Wind		12785	80047	142313	210513	1656	14690	27581	2.1	11.5	15.1
Solar		176	1658	10620	27727	0	5771	17363	0.0	119.0	167.5
Thermal		410539	493965	590088	696351	3871	5534	6772	0.8	0.9	1.0
of which cogeneration units		112958	154867	219747	257602	3997	10785	9603	2.6	5.2	3.9
Solids fired		188879	158522	187827	240033	1986	31021	28797	1.3	19.8	13.6
Gas fired		131875	244648	291783	328852	-790	-29425	-31282	-0.3	-9.2	-8.7
Oil fired		74302	68265	49861	36015	2216	1931	1049	3.4	4.0	3.0
Biomass-waste fired		14462	21171	59075	89776	457	1981	8175	2.2	3.5	10.0
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1022	1358	1542	1676	2	25	33	0.1	1.7	2.0
Indicators											
Efficiency for thermal electricity production (%)		36.1	39.7	44.2	46.5	0.1	-1.1	-1.0	0.3	-2.4	-2.2
Load factor for gross electric capacities (%)		50.0	48.7	47.3	43.3	-0.3	-1.2	-2.1	-0.6	-2.6	-4.7
CHP indicator (% of electricity from CHP)		14.5	17.9	22.5	24.2	0.1	0.6	-0.1	0.3	2.9	-0.5
Non fossil fuels in electricity generation (%)		46.5	45.9	47.1	50.0	0.1	1.6	3.7	0.2	3.4	7.9
- nuclear		31.8	27.7	22.2	19.8	0.0	0.1	1.1	0.0	0.5	6.1
- renewable energy forms		14.7	18.2	24.9	30.1	0.1	1.5	2.5	0.6	6.3	9.2
Transport sector											
Passenger transport activity (Gpkm)	**4640.8**	**5466.3**	**6368.3**	**7246.9**	**7907.4**	-81.1	-155.1	-222.8	-1.3	-2.1	-2.7
Public road transport	504.1	480.1	493.4	481.6	469.5	-1.6	1.0	2.7	-0.3	0.2	0.6
Private cars and motorcycles	3529.3	4253.1	4940.9	5638.8	6158.5	-75.6	-141.9	-200.0	-1.5	-2.5	-3.1
Rail	411.9	402.7	448.6	482.1	511.2	2.2	3.6	5.6	0.5	0.8	1.1
Aviation	166.3	296.9	445.6	598.5	718.1	-6.0	-18.1	-31.6	-1.3	-2.9	-4.2
Inland navigation	29.2	33.6	39.7	45.8	50.0	0.0	0.3	0.5	0.0	0.6	1.0
Travel per person (km per capita)	10528	12069	13723	15443	16847	-174.7	-330.6	-474.7	-1.3	-2.1	-2.7
Freight transport activity (Gtkm)	**1753.9**	**2131.5**	**2547.1**	**2980.0**	**3331.3**	-35.1	-68.7	-100.6	-1.4	-2.3	-2.9
Trucks	1034.1	1486.3	1854.7	2239.2	2551.0	-36.5	-72.5	-106.3	-1.9	-3.1	-4.0
Rail	461.7	374.2	404.4	425.2	443.8	2.4	3.8	4.9	0.6	0.9	1.1
Inland navigation	258.1	271.0	288.0	315.7	336.5	-1.0	0.1	0.9	-0.4	0.0	0.3
Freight activity per unit of GDP (tkm/000 Euro'00)	240	238	233	218	208	-3.2	-5.0	-6.3	-1.4	-2.3	-2.9
Energy demand in transport (ktoe)	**273198**	**333020**	**375744**	**396118**	**392495**	-5389	-9387	-9791	-1.4	-2.3	-2.4
Public road transport	7841	7018	6995	6282	5270	-26	8	-51	-0.4	0.1	-1.0
Private cars and motorcycles	138202	158349	168082	166615	157686	-2094	-2286	-2165	-1.2	-1.4	-1.4
Trucks	82444	108068	133163	152320	160927	-2485	-4510	-3459	-1.8	-2.9	-2.1
Rail	9066	8897	8320	6505	6022	13	-13	3	0.2	-0.2	0.0
Aviation	28932	45320	53413	58208	56237	-761	-2569	-4121	-1.4	-4.2	-6.8
Inland navigation	6714	5368	5771	6188	6353	-37	-17	1	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	39.3	39.9	37.0	32.7	28.4	0.0	0.0	0.0	0.1	0.1	0.0
Freight transport (toe/Mtkm)	51.7	53.9	55.1	53.4	50.4	-0.2	-0.3	0.5	-0.4	-0.5	0.9

Source: PRIMES

EU15: Soaring oil and gas prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**707946**	**761643**	**731362**	**642079**	**625672**	**21724**	**61580**	**73939**	**3.1**	**10.6**	**13.4**
Solids	210737	100172	68993	67998	61060	735	8002	2443	1.1	13.3	4.2
Oil	117782	160552	131760	74822	58722	16942	23994	17125	14.8	47.2	41.2
Natural gas	132975	190581	167395	108148	95043	975	15113	20027	0.6	16.2	26.7
Nuclear	181439	222846	231522	207161	188050	0	0	10464	0.0	0.0	5.9
Renewable energy sources	65014	87491	131692	183950	222796	3073	14471	23880	2.4	8.5	12.0
Hydro	22275	27627	28495	30687	32014	79	144	0	0.3	0.5	0.0
Biomass & Waste	39426	54257	81886	117036	138414	2567	10813	16008	3.2	10.2	13.1
Wind	67	1912	15736	27389	39090	355	2210	4183	2.3	8.8	12.0
Solar and others	145	381	1395	3676	7462	70	1231	3596	5.3	50.4	93.0
Geothermal	3101	3315	4180	5162	5816	2	73	94	0.0	1.4	1.6
Net Imports	**643284**	**741591**	**885791**	**1006597**	**1003924**	**-38634**	**-88303**	**-106919**	**-4.2**	**-8.1**	**-9.6**
Solids	89663	110142	136107	152932	184715	1026	29454	24762	0.8	23.9	15.5
Oil	458793	472543	498661	539973	523137	-44099	-63590	-56281	-8.1	-10.5	-9.7
- Crude oil and Feedstocks	435365	455606	471167	519824	509204	-42665	-61308	-55698	-8.3	-10.5	-9.9
- Oil products	23428	16937	27494	20149	13933	-1433	-2282	-583	-5.0	-10.2	-4.0
Natural gas	92495	155262	247203	309922	291117	4441	-54163	-75394	1.8	-14.9	-20.6
Electricity	2333	3644	3820	3770	4956	-3	-4	-6	-0.1	-0.1	-0.1
Gross Inland Consumption	**1319965**	**1456936**	**1571833**	**1599888**	**1578810**	**-15212**	**-23909**	**-29690**	**-1.0**	**-1.5**	**-1.8**
Solids	303612	215739	205100	220930	245775	1761	37457	27204	0.9	20.4	12.4
Oil	544159	587926	585101	566007	531073	-25458	-36782	-35865	-4.2	-6.1	-6.3
Natural gas	223408	339289	414597	418071	386160	5416	-39050	-55367	1.3	-8.5	-12.5
Nuclear	181439	222846	231522	207161	188050	0	0	10464	0.0	0.0	5.9
Electricity	2333	3644	3820	3770	4956	-3	-4	-6	-0.1	-0.1	-0.1
Renewable energy forms	65014	87491	131692	183950	222796	3073	14471	23880	2.4	8.5	12.0
as % in Gross Inland Consumption											
Solids	23.0	14.8	13.0	13.8	15.6	0.2	2.5	2.0	1.8	22.2	14.6
Oil	41.2	40.4	37.2	35.4	33.6	-1.2	-1.7	-1.6	-3.2	-4.7	-4.6
Natural gas	16.9	23.3	26.4	26.1	24.5	0.6	-2.0	-3.0	2.3	-7.2	-10.9
Nuclear	13.7	15.3	14.7	12.9	11.9	0.1	0.2	0.9	1.0	1.5	7.9
Renewable energy forms	4.9	6.0	8.4	11.5	14.1	0.3	1.1	1.7	3.4	10.2	14.1
Electricity Generation in GWh_e	**2138940**	**2576502**	**3084372**	**3492473**	**3750317**	**1622**	**7731**	**14872**	**0.1**	**0.2**	**0.4**
Nuclear	720059	863760	897389	802961	728878	0	0	40559	0.0	0.0	5.9
Hydro & wind	259810	343478	515860	688244	861320	5044	36221	75254	1.0	5.6	9.6
Thermal (incl. biomass)	1159070	1369264	1671123	2001268	2160119	-3422	-28490	-100940	-0.2	-1.4	-4.5
Fuel Inputs for Thermal Power Generation [1]	**282186**	**319336**	**354439**	**382375**	**397192**	**-1541**	**5150**	**-8370**	**-0.4**	**1.4**	**-2.1**
Solids	184170	158097	157476	179207	211654	1121	36402	27468	0.7	25.5	14.9
Oil (including refinery gas)	43718	38588	28504	20603	17518	-196	-355	45	-0.7	-1.7	0.3
Gas	41697	99188	138991	130196	99748	-1944	-33656	-40087	-1.4	-20.5	-28.7
Biomass & Waste	9827	20524	25777	47675	62900	-529	2674	4092	-2.0	5.9	7.0
Geothermal heat	2774	2939	3691	4693	5372	6	85	111	0.2	1.9	2.1
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**704402**	**725664**	**712224**	**707218**	**675503**	**-27725**	**-35634**	**-34318**	**-3.7**	**-4.8**	**-4.8**
Refineries	595036	665476	649652	635383	602897	-28434	-39804	-40715	-4.2	-5.9	-6.3
Biofuels and hydrogen production	2	604	16055	32909	40839	529	4716	8319	3.4	16.7	25.6
District heating	13085	8717	6874	5614	5613	138	152	-34	2.1	2.8	-0.6
Others	96279	50868	39643	33312	26154	41	-698	-1888	0.1	-2.1	-6.7
Energy Branch Consumption	**63555**	**67696**	**67217**	**65197**	**61745**	**-1627**	**-2324**	**-2463**	**-2.4**	**-3.4**	**-3.8**
Non-Energy Uses	**84387**	**95815**	**95812**	**95418**	**94005**	**-1251**	**-2378**	**-2777**	**-1.3**	**-2.4**	**-2.9**
Final Energy Demand	**866453**	**970663**	**1075565**	**1128915**	**1130686**	**-11170**	**-26189**	**-33240**	**-1.0**	**-2.3**	**-2.9**
by sector											
Industry[1]	272481	284781	305610	319631	320568	-1158	-3427	-5565	-0.4	-1.1	-1.7
- energy intensive industries	182306	182967	190593	192680	185818	-922	-2611	-4435	-0.5	-1.3	-2.3
- other industrial sectors	90175	101814	115017	126951	134749	-237	-816	-1130	-0.2	-0.6	-0.8
Residential	220020	238404	265951	278121	281375	-3170	-8877	-11738	-1.2	-3.1	-4.0
Tertiary	121346	137376	159599	171679	176809	-2022	-5538	-7680	-1.3	-3.1	-4.2
Transport	252606	310102	344404	359485	351934	-4819	-8347	-8256	-1.4	-2.3	-2.3
by fuel [1]											
Solids	79761	35330	29157	26842	22127	532	1528	515	1.9	6.0	2.4
Oil	393325	434547	454472	449477	423173	-18665	-27779	-30682	-3.9	-5.8	-6.8
Gas	173014	226415	248332	257149	254455	3666	-8344	-16646	1.5	-3.1	-6.1
Electricity	155929	191711	233492	267088	290424	329	482	1328	0.1	0.2	0.5
Heat (from CHP and District Heating)	36558	50708	60134	65474	70175	243	718	1185	0.4	1.1	1.7
Other	27865	31953	49978	62885	70332	2725	7206	11060	5.8	12.9	18.7
CO_2 Emissions (Mt of CO_2)	**3068.4**	**3127.0**	**3237.6**	**3257.2**	**3184.3**	**-53.3**	**-43.8**	**-126.7**	**-1.6**	**-1.3**	**-3.8**
Power generation/District heating	1021.1	1014.7	1062.3	1100.7	1146.2	-1.3	64.2	13.6	-0.1	6.2	1.2
Energy Branch	127.2	127.0	106.7	92.3	79.5	-6.0	-10.4	-9.9	-5.4	-10.1	-11.1
Industry	545.2	471.6	465.1	462.2	424.3	-10.7	-18.5	-26.9	-2.3	-3.8	-6.0
Residential	419.7	401.5	413.9	405.0	386.0	-13.4	-29.8	-39.2	-3.1	-6.9	-9.2
Tertiary	220.7	207.4	219.6	220.0	212.8	-6.1	-13.3	-19.8	-2.7	-5.7	-8.5
Transport	734.5	904.8	970.1	977.0	935.4	-15.7	-36.0	-44.4	-1.6	-3.6	-4.5
CO_2 Emissions Index (1990=100)	**100.0**	**101.9**	**105.5**	**106.2**	**103.8**	-1.7	-1.4	-4.1	-1.6	-1.3	-3.8

Source: PRIMES

EU15: Soaring oil and gas prices case — SUMMARY ENERGY BALANCE AND INDICATORS (B)
Comparison to Baseline scenario

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	365.749	378.062	390.652	397.458	398.737	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	6981.9	8572.2	10391.5	12835.7	14948.8	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	189.1	170.0	151.3	124.6	105.6	-1.5	-1.9	-2.0	-1.0	-1.5	-1.8
Gross Inl. Cons./Capita (toe/inhabitant)	3.61	3.85	4.02	4.03	3.96	-0.04	-0.06	-0.07	-1.0	-1.5	-1.8
Electricity Generated/Capita (kWh/inhabitant)	5848	6815	7895	8787	9405	4	19	37	0.1	0.2	0.4
Carbon intensity (t of CO_2/toe of GIC)	2.32	2.15	2.06	2.04	2.02	-0.01	0.00	-0.04	-0.7	0.1	-2.0
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.39	8.27	8.29	8.20	7.99	-0.14	-0.11	-0.32	-1.6	-1.3	-3.8
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	439.5	364.8	311.6	253.8	213.0	-5.1	-3.4	-8.5	-1.6	-1.3	-3.8
Import Dependency %	47.5	49.5	54.8	61.1	61.6	-1.8	-4.3	-5.2	-3.2	-6.6	-7.8
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	90.9	85.0	72.6	63.0	-0.3	-0.8	-1.1	-0.4	-1.1	-1.7
Residential (Energy on Private Income)	100.0	88.8	82.1	70.3	61.3	-1.0	-2.2	-2.6	-1.2	-3.1	-4.0
Tertiary (Energy on Value added)	100.0	88.7	81.9	70.2	61.5	-1.0	-2.3	-2.7	-1.3	-3.1	-4.2
Transport (Energy on GDP)	100.0	100.0	91.6	77.4	65.1	-1.3	-1.8	-1.5	-1.4	-2.3	-2.3
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.39	0.27	0.24	0.23	0.22	0.00	0.01	0.00	-0.2	5.8	0.5
Final energy demand (t of CO_2/toe)	2.22	2.05	1.92	1.83	1.73	-0.02	-0.04	-0.06	-1.2	-2.3	-3.5
Industry	2.00	1.66	1.52	1.45	1.32	-0.03	-0.04	-0.06	-1.9	-2.8	-4.3
Residential	1.91	1.68	1.56	1.46	1.37	-0.03	-0.06	-0.08	-2.0	-3.9	-5.4
Tertiary	1.82	1.51	1.38	1.28	1.20	-0.02	-0.04	-0.06	-1.5	-2.7	-4.5
Transport	2.91	2.92	2.82	2.72	2.66	-0.01	-0.04	-0.06	-0.2	-1.3	-2.3
Electricity and steam generation											
Generation Capacity in MW_e		**588083**	**728815**	**850573**	**985663**	**4646**	**22483**	**56109**	**0.6**	**2.7**	**6.0**
Nuclear		131758	127644	106198	89920	0	0	5251	0.0	0.0	6.2
Hydro (pumping excluded)		90794	97207	101680	104865	93	413	469	0.1	0.4	0.4
Wind		12769	77763	131775	192386	1631	10444	25577	2.1	8.6	15.3
Solar		176	1645	10483	27189	0	5771	17363	0.0	122.5	176.7
Thermal		352586	424556	500437	571303	2921	5856	7449	0.7	1.2	1.3
of which cogeneration units		88543	128218	185487	203250	3519	9938	9236	2.8	5.7	4.8
Solids fired		144882	118175	145060	179642	1654	27911	25456	1.4	23.8	16.5
Gas fired		125804	227273	262662	289690	-680	-26960	-25690	-0.3	-9.3	-8.1
Oil fired		67470	60851	43712	31244	1870	1983	1828	3.2	4.8	6.2
Biomass-waste fired		13407	16899	47461	69052	74	2897	5823	0.4	6.5	9.2
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1022	1358	1542	1676	2	25	33	0.1	1.7	2.0
Indicators											
Efficiency for thermal electricity production (%)		36.9	40.5	45.0	46.8	0.1	-1.3	-1.2	0.2	-2.7	-2.5
Load factor for gross electric capacities (%)		50.0	48.3	46.9	43.4	-0.3	-1.2	-2.4	-0.6	-2.4	-5.3
CHP indicator (% of electricity from CHP)		13.4	16.8	21.1	21.5	0.1	0.7	-0.1	0.6	3.4	-0.5
Non fossil fuels in electricity generation (%)		49.4	48.6	49.3	51.4	0.1	1.5	3.6	0.2	3.2	7.6
- nuclear		33.5	29.1	23.0	19.4	0.0	-0.1	1.0	-0.1	-0.2	5.5
- renewable energy forms		15.9	19.5	26.4	31.9	0.1	1.6	2.6	0.6	6.3	9.0
Transport sector											
Passenger transport activity (Gpkm)	**4130.1**	**4997.7**	**5759.9**	**6509.2**	**7035.0**	-72.1	-136.7	-193.8	-1.2	-2.1	-2.7
Public road transport	369.0	401.8	421.0	414.8	406.7	-1.5	0.8	2.2	-0.4	0.2	0.5
Private cars and motorcycles	3265.7	3928.0	4479.3	5051.1	5440.5	-66.6	-123.3	-171.2	-1.5	-2.4	-3.1
Rail	309.8	351.3	397.8	432.3	461.7	1.5	2.7	4.6	0.4	0.6	1.0
Aviation	157.3	283.6	422.8	566.0	677.0	-5.6	-17.1	-29.8	-1.3	-2.9	-4.2
Inland navigation	28.4	33.0	39.1	45.0	49.2	0.0	0.3	0.5	0.0	0.6	1.0
Travel per person (km per capita)	11292	13219	14744	16377	17643	-184.6	-343.8	-486.0	-1.2	-2.1	-2.7
Freight transport activity (Gtkm)	**1419.2**	**1825.6**	**2113.9**	**2436.0**	**2696.2**	-29.3	-55.4	-80.0	-1.4	-2.2	-2.9
Trucks	914.2	1309.3	1560.9	1842.1	2072.7	-29.4	-57.5	-83.8	-1.8	-3.0	-3.9
Rail	254.9	249.5	269.3	282.7	291.7	1.1	2.0	2.9	0.4	0.7	1.0
Inland navigation	250.1	266.8	283.7	311.1	331.9	-1.0	0.1	0.8	-0.4	0.0	0.2
Freight activity per unit of GDP (tkm/000 Euro'00)	203	213	203	190	180	-2.8	-4.3	-5.4	-1.4	-2.2	-2.9
Energy demand in transport (ktoe)	**252606**	**310102**	**344404**	**359485**	**351934**	-4819	-8347	-8256	-1.4	-2.3	-2.3
Public road transport	6250	5860	5932	5360	4503	-24	3	-51	-0.4	0.1	-1.1
Private cars and motorcycles	129911	146708	153344	150209	139054	-1838	-1960	-1680	-1.2	-1.3	-1.2
Trucks	75351	100615	120989	136586	143119	-2196	-3904	-2594	-1.8	-2.8	-1.8
Rail	6970	7579	7119	5523	5130	5	-22	-3	0.1	-0.4	-0.1
Aviation	27742	44025	51306	55680	53838	-730	-2446	-3928	-1.4	-4.2	-6.8
Inland navigation	6383	5314	5714	6127	6290	-37	-18	0	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	41.2	40.7	37.7	33.3	28.8	0.0	0.0	0.0	0.1	0.1	0.0
Freight transport (toe/Mtkm)	58.0	58.5	60.2	58.6	55.4	-0.2	-0.3	0.7	-0.4	-0.5	1.2

Source: PRIMES

NMS: Soaring oil and gas prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**169598**	**136955**	**128401**	**133843**	**144077**	**1622**	**7821**	**10708**	**1.3**	**6.2**	**8.0**
Solids	140913	103966	87210	74590	62820	941	3504	1240	1.1	4.9	2.0
Oil	2614	3079	2473	2524	2267	112	394	415	4.8	18.5	22.4
Natural gas	6749	6084	5855	5891	5486	96	577	696	1.7	10.9	14.5
Nuclear	15481	14818	17254	23060	36559	0	1583	3337	0.0	7.4	10.0
Renewable energy sources	3841	9008	15609	27778	36946	473	1764	5019	3.1	6.8	15.7
Hydro	1116	1355	1465	1661	1869	3	2	2	0.2	0.1	0.1
Biomass & Waste	2725	7609	13545	23883	31006	456	915	4533	3.5	4.0	17.1
Wind	0	1	412	1853	3340	6	790	306	1.6	74.4	10.1
Solar and others	0	35	171	358	704	6	56	176	3.9	18.7	33.4
Geothermal	0	8	16	22	26	0	1	1	1.9	5.4	5.8
Net Imports	**68016**	**59470**	**95084**	**123377**	**138662**	**-4766**	**-13414**	**-16063**	**-4.8**	**-9.8**	**-10.4**
Solids	-14214	-15836	-3631	5954	17806	-838	1037	4840	30.0	21.1	37.3
Oil	51224	45604	53350	60870	66102	-3589	-5432	-6930	-6.3	-8.2	-9.5
- Crude oil and Feedstocks	43747	41220	44545	50951	55571	-2981	-4593	-5778	-6.3	-8.3	-9.4
- Oil products	7477	4384	8805	9919	10531	-609	-839	-1151	-6.5	-7.8	-9.9
Natural gas	31158	31202	46953	58206	57514	-338	-9017	-13972	-0.7	-13.4	-19.5
Electricity	-152	-1500	-1588	-1654	-2761	-1	-2	-1	0.1	0.1	0.1
Gross Inland Consumption	**236229**	**196904**	**222397**	**256027**	**281472**	**-3090**	**-5512**	**-5265**	**-1.4**	**-2.1**	**-1.8**
Solids	128332	90799	83579	80544	80626	103	4540	6080	0.1	6.0	8.2
Oil	51587	46785	54735	62202	67102	-3423	-4957	-6425	-5.9	-7.4	-8.7
Natural gas	37140	36994	52808	64098	63000	-242	-8440	-13275	-0.5	-11.6	-17.4
Nuclear	15481	14818	17254	23060	36559	0	1583	3337	0.0	7.4	10.0
Electricity	-152	-1500	-1588	-1654	-2761	-1	-2	-1	0.1	0.1	0.1
Renewable energy forms	3841	9008	15609	27778	36946	473	1764	5019	3.1	6.8	15.7
as % in Gross Inland Consumption											
Solids	54.3	46.1	37.6	31.5	28.6	0.6	2.4	2.6	1.5	8.3	10.2
Oil	21.8	23.8	24.6	24.3	23.8	-1.2	-1.4	-1.8	-4.6	-5.4	-7.0
Natural gas	15.7	18.8	23.7	25.0	22.4	0.2	-2.7	-4.2	0.9	-9.7	-15.9
Nuclear	6.6	7.5	7.8	9.0	13.0	0.1	0.8	1.4	1.4	9.7	12.1
Renewable energy forms	1.6	4.6	7.0	10.8	13.1	0.3	0.9	2.0	4.6	9.1	17.9
Electricity Generation in GWh_e	**316734**	**324333**	**400544**	**522938**	**636427**	**108**	**1905**	**5274**	**0.0**	**0.4**	**0.8**
Nuclear	59996	57434	66876	89382	141708	0	6136	12936	0.0	7.4	10.0
Hydro & wind	12978	15771	21842	41034	61238	114	9206	3581	0.5	28.9	6.2
Thermal (incl. biomass)	243760	251128	311826	392522	433481	-5	-13438	-11243	0.0	-3.3	-2.5
Fuel Inputs for Thermal Power Generation (1)	**73176**	**66652**	**75592**	**83602**	**83000**	**-668**	**-1945**	**-1476**	**-0.9**	**-2.3**	**-1.7**
Solids	62206	56391	58192	58030	58986	-403	2333	2861	-0.7	4.2	5.1
Oil (including refinery gas)	5236	3281	2449	2224	2081	-484	-129	-240	-16.5	-5.5	-10.4
Gas	5360	6292	12104	15675	9944	212	-3204	-5469	1.8	-17.0	-35.5
Biomass & Waste	374	687	2847	7674	11989	7	-945	1373	0.2	-11.0	12.9
Geothermal heat	0	0	0	0	0	0	0	0			
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**93232**	**70786**	**69871**	**77091**	**82741**	**-3077**	**-4152**	**-4503**	**-4.2**	**-5.1**	**-5.2**
Refineries	47239	44972	47929	54571	59034	-2906	-4266	-5457	-5.7	-7.3	-8.5
Biofuels and hydrogen production	0	33	1305	3273	4732	38	462	878	3.0	16.4	22.8
District heating	17949	8544	8494	8548	9949	-20	192	862	-0.2	2.3	9.5
Others	28043	17236	12142	10699	9025	-189	-539	-786	-1.5	-4.8	-8.0
Energy Branch Consumption	**9477**	**12681**	**12219**	**12902**	**13233**	**-434**	**-743**	**-693**	**-3.4**	**-5.4**	**-5.0**
Non-Energy Uses	**10089**	**10135**	**10597**	**12917**	**14786**	**-188**	**-487**	**-596**	**-1.7**	**-3.6**	**-3.9**
Final Energy Demand	**155460**	**124696**	**149664**	**179287**	**200517**	**-1607**	**-4112**	**-6011**	**-1.1**	**-2.2**	**-2.9**
by sector											
Industry (1)	68606	45281	49591	58976	64812	-61	-369	-620	-0.1	-0.6	-0.9
- energy intensive industries	34503	28649	29161	32778	34084	-84	-324	-595	-0.3	-1.0	-1.7
- other industrial sectors	34103	16632	20430	26198	30729	24	-46	-25	0.1	-0.2	-0.1
Residential	40986	34898	42300	50220	55978	-545	-1523	-2194	-1.3	-2.9	-3.8
Tertiary	25276	21599	26434	33458	39165	-432	-1180	-1662	-1.6	-3.4	-4.1
Transport	20592	22917	31340	36633	40561	-570	-1040	-1535	-1.8	-2.8	-3.6
by fuel (1)											
Solids	44176	21303	16796	15178	13564	219	1073	1152	1.3	7.6	9.3
Oil	34795	33764	42176	49052	53295	-2029	-3587	-4687	-4.6	-6.8	-8.1
Gas	27229	25471	34332	40929	45050	-177	-3304	-5247	-0.5	-7.5	-10.4
Electricity	20539	19641	26218	36566	45416	72	255	469	0.3	0.7	1.0
Heat (from CHP and District Heating)	26534	18005	20379	23327	26756	93	392	422	0.5	1.7	1.6
Other	2188	6512	9764	14235	16436	216	1060	1882	2.3	8.0	12.9
CO_2 Emissions (Mt of CO_2)	**707.7**	**547.1**	**581.4**	**613.0**	**620.2**	**-9.7**	**-14.6**	**-23.8**	**-1.6**	**-2.3**	**-3.7**
Power generation/District heating	341.5	280.2	295.4	298.5	291.5	-2.8	1.8	0.1	-0.9	0.6	0.0
Energy Branch	14.3	17.9	10.1	9.4	8.4	-1.2	-1.9	-1.8	-10.3	-16.6	-17.3
Industry	153.7	96.1	99.7	111.6	114.9	-1.5	-3.0	-3.7	-1.5	-2.6	-3.1
Residential	86.4	50.6	54.0	55.5	54.1	-1.4	-4.6	-7.4	-2.5	-7.6	-12.0
Tertiary	53.5	37.2	35.1	39.8	44.8	-1.0	-2.8	-4.4	-2.9	-6.5	-8.9
Transport	58.2	65.1	87.0	98.3	106.4	-1.8	-4.2	-6.6	-2.0	-4.1	-5.9
CO_2 Emissions Index (1990=100)	**100.0**	**77.3**	**82.2**	**86.6**	**87.6**	-1.4	-2.1	-3.4	-1.6	-2.3	-3.7

Source: PRIMES

NMS: Soaring oil and gas prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (B)

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	75.039	74.853	73.401	71.813	70.628	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	312.8	374.8	555.3	820.6	1102.7	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	755.2	525.3	400.5	312.0	255.3	-5.6	-6.7	-4.8	-1.4	-2.1	-1.8
Gross Inl. Cons./Capita (toe/inhabitant)	3.15	2.63	3.03	3.57	3.99	-0.04	-0.08	-0.07	-1.4	-2.1	-1.8
Electricity Generated/Capita (kWh/inhabitant)	4221	4333	5457	7282	9011	1	27	75	0.0	0.4	0.8
Carbon intensity (t of CO_2/toe of GIC)	3.00	2.78	2.61	2.39	2.20	-0.01	-0.01	-0.04	-0.3	-0.2	-1.9
CO_2 Emissions/Capita (t of CO_2/inhabitant)	9.43	7.31	7.92	8.54	8.78	-0.13	-0.20	-0.34	-1.6	-2.3	-3.7
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	2262.2	1459.6	1046.9	747.0	562.5	-17.4	-17.7	-21.6	-1.6	-2.3	-3.7
Import Dependency %	28.7	30.1	42.5	48.0	49.0	-1.5	-4.1	-4.7	-3.4	-7.8	-8.7
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	52.9	35.2	28.1	23.7	0.0	-0.2	-0.2	-0.1	-0.6	-0.9
Residential (Energy on Private Income)	100.0	70.0	56.3	44.8	36.9	-0.7	-1.4	-1.4	-1.3	-2.9	-3.8
Tertiary (Energy on Value added)	100.0	65.9	54.2	45.6	38.5	-0.9	-1.6	-1.6	-1.6	-3.4	-4.1
Transport (Energy on GDP)	100.0	92.9	85.7	67.8	55.9	-1.6	-1.9	-2.1	-1.8	-2.8	-3.6
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.50	0.46	0.40	0.33	0.27	-0.01	0.00	0.00	-1.3	-0.2	-1.6
Final energy demand (t of CO_2/toe)	2.26	2.00	1.84	1.70	1.60	-0.02	-0.04	-0.06	-1.0	-2.4	-3.7
Industry	2.24	2.12	2.01	1.89	1.77	-0.03	-0.04	-0.04	-1.3	-2.0	-2.2
Residential	2.11	1.45	1.28	1.10	0.97	-0.02	-0.06	-0.09	-1.2	-4.8	-8.6
Tertiary	2.12	1.72	1.33	1.19	1.14	-0.02	-0.04	-0.06	-1.3	-3.2	-5.1
Transport	2.83	2.84	2.78	2.68	2.62	-0.01	-0.04	-0.06	-0.3	-1.4	-2.3
Electricity and steam generation											
Generation Capacity in MW_e		**73667**	**87324**	**119214**	**169722**	**986**	**4723**	**2983**	**1.1**	**4.1**	**1.8**
Nuclear		9324	8786	11532	18187	0	794	1639	0.0	7.4	9.9
Hydro (pumping excluded)		6374	6832	7355	7823	12	5	18	0.2	0.1	0.2
Wind		16	2284	10538	18126	25	4246	2005	1.1	67.5	12.4
Solar		0	13	138	537	0	0	0	0.0	0.0	0.0
Thermal		57953	69409	89651	125048	950	-322	-678	1.4	-0.4	-0.5
of which cogeneration units		24415	26649	34260	54353	477	847	367	1.8	2.5	0.7
Solids fired		43996	40347	42767	60391	331	3110	3341	0.8	7.8	5.9
Gas fired		6071	17376	29121	39162	-110	-2464	-5592	-0.6	-7.8	-12.5
Oil fired		6832	7414	6149	4771	345	-52	-779	4.9	-0.8	-14.0
Biomass-waste fired		1055	4272	11613	20724	383	-916	2352	9.9	-7.3	12.8
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		0	0	0	0	0	0	0			
Indicators											
Efficiency for thermal electricity production (%)		32.4	35.5	40.4	44.9	0.3	-0.4	-0.4	0.9	-1.1	-0.8
Load factor for gross electric capacities (%)		50.3	52.4	50.1	42.8	-0.6	-1.9	-0.4	-1.1	-3.6	-0.9
CHP indicator (% of electricity from CHP)		23.5	26.4	31.2	39.6	-0.3	0.2	-0.3	-1.0	0.6	-0.7
Non fossil fuels in electricity generation (%)		23.3	24.9	32.3	41.8	0.1	2.0	4.0	0.4	6.6	10.5
- nuclear		17.7	16.7	17.1	22.3	0.0	1.1	1.9	0.0	7.0	9.1
- renewable energy forms		5.6	8.2	15.2	19.5	0.1	0.9	2.1	1.2	6.2	12.1
Transport sector											
Passenger transport activity (Gpkm)	**510.7**	**468.6**	**608.4**	**737.7**	**872.3**	-9.0	-18.5	-29.0	-1.5	-2.4	-3.2
Public road transport	135.1	78.3	72.4	66.8	62.8	-0.2	0.3	0.5	-0.2	0.4	0.8
Private cars and motorcycles	263.6	325.1	461.6	587.7	718.1	-9.1	-18.6	-28.8	-1.9	-3.1	-3.9
Rail	102.1	51.4	50.8	49.8	49.5	0.6	0.9	1.0	1.2	1.8	2.1
Aviation	9.0	13.3	22.9	32.5	41.1	-0.3	-1.0	-1.8	-1.5	-3.0	-4.2
Inland navigation	0.8	0.6	0.7	0.7	0.8	0.0	0.0	0.0	0.7	1.4	2.0
Travel per person (km per capita)	6805	6261	8288	10272	12351	-122.1	-257.4	-411.3	-1.5	-2.4	-3.2
Freight transport activity (Gtkm)	**334.6**	**305.9**	**433.2**	**544.1**	**635.1**	-5.9	-13.2	-20.6	-1.3	-2.4	-3.1
Trucks	119.9	177.1	293.8	397.0	478.4	-7.1	-15.0	-22.5	-2.4	-3.6	-4.5
Rail	206.8	124.7	135.1	142.5	152.1	1.2	1.7	1.9	0.9	1.2	1.3
Inland navigation	7.9	4.2	4.3	4.5	4.6	0.0	0.0	0.0	0.0	0.5	0.9
Freight activity per unit of GDP (tkm/000 Euro'00)	1070	816	780	663	576	-10.5	-16.1	-18.6	-1.3	-2.4	-3.1
Energy demand in transport (ktoe)	**20592**	**22917**	**31340**	**36633**	**40561**	-570	-1040	-1535	-1.8	-2.8	-3.6
Public road transport	1591	1159	1062	923	767	-2	5	0	-0.2	0.6	0.0
Private cars and motorcycles	8290	11641	14738	16406	18632	-256	-326	-484	-1.7	-1.9	-2.5
Trucks	7093	7453	12175	15734	17808	-289	-606	-864	-2.3	-3.7	-4.6
Rail	2096	1317	1201	982	891	8	9	6	0.6	0.9	0.7
Aviation	1190	1294	2107	2528	2399	-31	-122	-192	-1.4	-4.6	-7.4
Inland navigation	331	54	56	61	64	0	0	0	-0.2	0.3	0.7
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	23.9	31.4	30.3	27.4	25.3	0.0	0.1	0.1	-0.1	0.3	0.3
Freight transport (toe/Mtkm)	25.0	26.7	29.9	30.2	29.1	-0.2	-0.4	-0.4	-0.8	-1.2	-1.4

Source: PRIMES

EU27: Soaring oil and gas prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**928078**	**937145**	**902087**	**823428**	**822357**	**23899**	**72359**	**89712**	**2.7**	**9.6**	**12.2**
Solids	364706	214324	167556	154885	136083	1680	11895	4559	1.0	8.3	3.5
Oil	128402	170011	140966	85096	68146	17542	25924	18492	14.2	43.8	37.2
Natural gas	162645	207644	186045	125707	111084	1141	16181	21334	0.6	14.8	23.8
Nuclear	200702	243761	253537	237694	237025	0	2002	15718	0.0	0.8	7.1
Renewable energy sources	71623	101405	153982	220047	270020	3536	16357	29610	2.4	8.0	12.3
Hydro	25013	30483	31799	34522	36413	82	145	2	0.3	0.4	0.0
Biomass & Waste	43297	65264	100132	146656	176584	2979	11834	21218	3.1	8.8	13.7
Wind	67	1913	16231	29402	42619	396	3000	4488	2.5	11.4	11.8
Solar and others	145	417	1591	4170	8419	77	1297	3798	5.1	45.1	82.2
Geothermal	3101	3329	4229	5298	5985	3	80	103	0.1	1.5	1.8
Net Imports	**749474**	**817569**	**1003458**	**1163700**	**1185673**	**-45087**	**-108115**	**-129656**	**-4.3**	**-8.5**	**-9.9**
Solids	81418	98469	138253	168408	214953	276	30869	30281	0.2	22.4	16.4
Oil	529724	525771	562384	614336	606680	-49845	-72107	-65697	-8.1	-10.5	-9.8
- Crude oil and Feedstocks	503451	507009	529325	588305	586905	-48099	-69284	-64266	-8.3	-10.5	-9.9
- Oil products	26273	18762	33059	26031	19775	-1746	-2823	-1431	-5.0	-9.8	-6.7
Natural gas	135011	191643	301209	379377	362306	4487	-66870	-94231	1.5	-15.0	-20.6
Electricity	3321	1687	1611	1579	1734	-5	-7	-8	-0.3	-0.4	-0.5
Gross Inland Consumption	**1645474**	**1709133**	**1859019**	**1936990**	**1955788**	**-19433**	**-32855**	**-36555**	**-1.0**	**-1.7**	**-1.8**
Solids	450795	320708	305809	323292	351036	1956	42764	34840	0.6	15.2	11.0
Oil	624250	648970	656824	649294	622584	-30548	-43282	-43817	-4.4	-6.2	-6.6
Natural gas	294782	392603	487255	505084	473390	5628	-50689	-72897	1.2	-9.1	-13.3
Nuclear	200702	243761	253537	237694	237025	0	2002	15718	0.0	0.8	7.1
Electricity	3321	1687	1611	1579	1734	-5	-7	-8	-0.3	-0.4	-0.5
Renewable energy forms	71623	101405	153982	220047	270020	3536	16357	29610	2.4	8.0	12.3
as % in Gross Inland Consumption											
Solids	27.4	18.8	16.5	16.7	17.9	0.3	2.4	2.1	1.7	17.2	13.1
Oil	37.9	38.0	35.3	33.5	31.8	-1.3	-1.6	-1.6	-3.4	-4.7	-4.8
Natural gas	17.9	23.0	26.2	26.1	24.2	0.6	-2.1	-3.2	2.2	-7.6	-11.7
Nuclear	12.2	14.3	13.6	12.3	12.1	0.1	0.3	1.0	1.0	2.6	9.1
Renewable energy forms	4.4	5.9	8.3	11.4	13.8	0.3	1.0	1.7	3.4	9.9	14.4
Electricity Generation in GWh_e	**2561205**	**2993398**	**3603573**	**4173825**	**4588415**	**1407**	**10117**	**23998**	**0.0**	**0.2**	**0.5**
Nuclear	794718	944823	982718	921306	918709	0	7760	60921	0.0	0.8	7.1
Hydro & wind	291642	376697	560062	756430	954264	5560	45427	78835	1.0	6.4	9.0
Thermal (incl. biomass)	1474844	1671878	2060793	2496089	2715442	-4154	-43071	-115758	-0.2	-1.7	-4.1
Fuel Inputs for Thermal Power Generation [1]	**384763**	**402753**	**449649**	**489900**	**505104**	**-2780**	**1887**	**-10095**	**-0.6**	**0.4**	**-2.0**
Solids	261342	225135	228825	254383	290295	732	38835	31058	0.3	18.0	12.0
Oil (including refinery gas)	56108	43691	32449	23740	19906	-1330	-499	-229	-3.9	-2.1	-1.1
Gas	54301	109769	155630	150959	113803	-1666	-38265	-46500	-1.1	-20.2	-29.0
Biomass & Waste	10237	21219	29053	56125	75728	-522	1730	5465	-1.8	3.2	7.8
Geothermal heat	2774	2939	3691	4693	5372	6	85	111	0.2	1.9	2.1
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**840016**	**818581**	**806297**	**813414**	**791583**	**-32693**	**-41544**	**-40555**	**-3.9**	**-4.9**	**-4.9**
Refineries	673728	727122	717929	715234	691219	-33306	-45917	-48009	-4.4	-6.0	-6.5
Biofuels and hydrogen production	2	637	17473	36546	46780	570	5222	9410	3.4	16.7	25.2
District heating	38458	19291	15578	14359	15777	142	443	932	0.9	3.2	6.3
Others	127829	71530	55317	47275	37806	-100	-1292	-2888	-0.2	-2.7	-7.1
Energy Branch Consumption	**78427**	**85834**	**86236**	**85741**	**83389**	**-2350**	**-3614**	**-3677**	**-2.7**	**-4.0**	**-4.2**
Non-Energy Uses	**98844**	**109187**	**108909**	**111201**	**112079**	**-1477**	**-2963**	**-3509**	**-1.3**	**-2.6**	**-3.0**
Final Energy Demand	**1071205**	**1126314**	**1267813**	**1365526**	**1402006**	**-13347**	**-31662**	**-41258**	**-1.0**	**-2.3**	**-2.9**
by sector											
Industry[1]	372041	342654	372773	402470	415424	-1298	-4050	-6513	-0.3	-1.0	-1.5
- energy intensive industries	239834	220752	232131	241643	240028	-1072	-3127	-5303	-0.5	-1.3	-2.2
- other industrial sectors	132206	121902	140643	160827	175395	-226	-923	-1210	-0.2	-0.6	-0.7
Residential	267394	283857	319956	342597	353137	-3924	-10852	-14522	-1.2	-3.1	-3.9
Tertiary	151680	161545	189388	209863	222121	-2513	-6882	-9582	-1.3	-3.2	-4.1
Transport	280091	338258	385696	410595	411325	-5612	-9877	-10642	-1.4	-2.3	-2.5
by fuel [1]											
Solids	128087	58191	48100	44761	38946	780	3150	2456	1.6	7.6	6.7
Oil	441141	476894	510106	516798	498469	-21363	-32485	-36657	-4.0	-5.9	-6.9
Gas	219636	259889	294406	313790	318085	3683	-12610	-24794	1.3	-3.9	-7.2
Electricity	183815	216343	266994	314295	350022	409	813	2129	0.2	0.3	0.6
Heat (from CHP and District Heating)	67635	73194	84174	93618	103239	251	1090	2006	0.3	1.2	2.0
Other	30892	41802	64034	82263	93245	2893	8378	13602	4.7	11.3	17.1
CO_2 Emissions (Mt of CO_2)	**4009.9**	**3800.2**	**3976.1**	**4064.7**	**4022.3**	**-66.7**	**-66.9**	**-158.1**	**-1.6**	**-1.6**	**-3.8**
Power generation/District heating	1483.5	1359.8	1428.1	1485.2	1529.2	-6.0	63.5	14.7	-0.4	4.5	1.0
Energy Branch	151.1	154.0	126.2	106.9	91.2	-7.6	-14.8	-12.8	-5.7	-12.2	-12.3
Industry	761.0	594.1	599.1	617.1	589.0	-12.5	-21.8	-32.5	-2.0	-3.4	-5.2
Residential	516.6	459.7	478.7	474.1	454.7	-15.1	-35.6	-48.8	-3.1	-7.0	-9.7
Tertiary	285.7	247.7	258.3	264.8	264.1	-7.3	-16.4	-24.7	-2.7	-5.8	-8.6
Transport	812.0	984.9	1085.7	1116.6	1094.2	-18.2	-41.8	-54.0	-1.6	-3.6	-4.7
CO_2 Emissions Index (1990=100)	**100.0**	**94.8**	**99.2**	**101.4**	**100.3**	-1.7	-1.7	-3.9	-1.6	-1.6	-3.8

Source: PRIMES

EU27: Soaring oil and gas prices case
Comparison to Baseline scenario

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	472.712	483.520	492.838	496.408	494.784	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	7358.9	9001.0	11044.1	13825.4	16315.6	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	223.6	189.9	168.3	140.1	119.9	-1.8	-2.4	-2.2	-1.0	-1.7	-1.8
Gross Inl. Cons./Capita (toe/inhabitant)	3.48	3.53	3.77	3.90	3.95	-0.04	-0.07	-0.07	-1.0	-1.7	-1.8
Electricity Generated/Capita (kWh/inhabitant)	5418	6191	7312	8408	9274	3	20	49	0.0	0.2	0.5
Carbon intensity (t of CO_2/toe of GIC)	2.44	2.22	2.14	2.10	2.06	-0.01	0.00	-0.04	-0.6	0.0	-2.0
CO_2 Emissions/Capita (t of CO_2/inhabitant)	8.48	7.86	8.07	8.19	8.13	-0.14	-0.13	-0.32	-1.6	-1.6	-3.8
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	544.9	422.2	360.0	294.0	246.5	-6.0	-4.8	-9.7	-1.6	-1.6	-3.8
Import Dependency %	44.6	46.7	52.7	58.6	59.0	-1.8	-4.3	-5.2	-3.2	-6.9	-8.1
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	80.2	74.2	64.1	56.3	-0.3	-0.6	-0.9	-0.3	-1.0	-1.5
Residential (Energy on Private Income)	100.0	87.2	80.4	69.4	60.8	-1.0	-2.2	-2.5	-1.2	-3.1	-3.9
Tertiary (Energy on Value added)	100.0	83.5	77.2	67.5	60.1	-1.0	-2.2	-2.6	-1.3	-3.2	-4.1
Transport (Energy on GDP)	100.0	98.7	91.8	78.0	66.2	-1.3	-1.9	-1.7	-1.4	-2.3	-2.5
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.42	0.30	0.27	0.24	0.23	0.00	0.01	0.00	-0.5	4.1	0.1
Final energy demand (t of CO_2/toe)	2.22	2.03	1.91	1.81	1.71	-0.02	-0.04	-0.06	-1.1	-2.3	-3.5
Industry	2.05	1.73	1.61	1.53	1.42	-0.03	-0.04	-0.06	-1.7	-2.4	-3.7
Residential	1.93	1.62	1.50	1.38	1.29	-0.03	-0.06	-0.08	-1.9	-4.0	-6.0
Tertiary	1.88	1.53	1.36	1.26	1.19	-0.02	-0.04	-0.06	-1.5	-2.8	-4.6
Transport	2.90	2.91	2.81	2.72	2.66	-0.01	-0.04	-0.06	-0.2	-1.3	-2.2
Electricity and steam generation											
Generation Capacity in MW_e		**697174**	**855945**	**1014866**	**1216984**	**6623**	**31392**	**60667**	**0.8**	**3.2**	**5.2**
Nuclear		145542	139130	121776	114295	0	1008	7858	0.0	0.8	7.4
Hydro (pumping excluded)		105185	112481	118299	122656	105	418	487	0.1	0.4	0.4
Wind		12786	80749	143645	212085	1943	14690	27581	2.5	11.4	14.9
Solar		176	1661	10636	27798	0	5771	17363	0.0	118.6	166.4
Thermal		433485	521924	620509	740150	4574	9506	7377	0.9	1.6	1.0
of which cogeneration units		120284	167969	238446	284573	4328	12729	10398	2.6	5.6	3.8
Solids fired		203503	172828	205841	261147	2386	33806	29787	1.4	19.7	12.9
Gas fired		135927	253883	300893	347632	-486	-28805	-31666	-0.2	-8.7	-8.3
Oil fired		78309	72101	51062	36351	2216	1911	1021	3.2	3.9	2.9
Biomass-waste fired		14723	21753	61171	93343	457	2569	8202	2.1	4.4	9.6
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1022	1358	1542	1676	2	25	33	0.1	1.7	2.0
Indicators											
Efficiency for thermal electricity production (%)		35.7	39.4	43.8	46.2	0.2	-0.9	-1.0	0.4	-2.1	-2.2
Load factor for gross electric capacities (%)		49.0	48.1	46.9	43.0	-0.4	-1.4	-2.0	-0.7	-2.9	-4.5
CHP indicator (% of electricity from CHP)		14.9	18.7	23.5	25.6	0.1	0.8	-0.2	0.5	3.4	-0.6
Non fossil fuels in electricity generation (%)		46.4	45.5	46.8	49.6	0.1	1.5	3.6	0.2	3.4	7.9
- nuclear		31.6	27.3	22.1	20.0	0.0	0.1	1.2	0.0	0.6	6.5
- renewable energy forms		14.9	18.3	24.7	29.6	0.1	1.4	2.4	0.7	6.1	8.9
Transport sector											
Passenger transport activity (Gpkm)	**4769.3**	**5568.5**	**6512.3**	**7461.1**	**8191.8**	-83.7	-161.3	-233.1	-1.3	-2.1	-2.8
Public road transport	554.1	502.3	515.6	505.8	497.5	-1.4	1.5	3.4	-0.3	0.3	0.7
Private cars and motorcycles	3567.1	4316.4	5048.1	5805.7	6377.7	-78.3	-148.1	-210.1	-1.5	-2.5	-3.2
Rail	450.2	417.8	459.8	497.2	531.3	2.0	3.5	5.5	0.4	0.7	1.0
Aviation	168.5	298.4	449.0	606.5	735.2	-6.0	-18.4	-32.4	-1.3	-2.9	-4.2
Inland navigation	29.4	33.6	39.8	45.8	50.1	0.0	0.3	0.5	0.0	0.6	1.0
Travel per person (km per capita)	10089	11517	13214	15030	16556	-169.8	-324.9	-471.2	-1.3	-2.1	-2.8
Freight transport activity (Gtkm)	**1861.5**	**2177.1**	**2647.9**	**3128.9**	**3537.4**	-36.9	-73.0	-108.3	-1.4	-2.3	-3.0
Trucks	1075.1	1507.0	1920.7	2348.3	2710.0	-38.3	-77.0	-114.3	-2.0	-3.2	-4.0
Rail	524.7	396.1	428.6	450.3	471.4	2.4	3.9	5.1	0.6	0.9	1.1
Inland navigation	261.8	274.0	298.6	330.3	356.1	-1.0	0.1	0.9	-0.3	0.0	0.3
Freight activity per unit of GDP (tkm/000 Euro'00)	253	242	240	226	217	-3.3	-5.3	-6.6	-1.4	-2.3	-3.0
Energy demand in transport (ktoe)	**280091**	**338258**	**385696**	**410595**	**411325**	-5612	-9877	-10642	-1.4	-2.3	-2.5
Public road transport	8685	7514	7451	6722	5704	-21	17	-40	-0.3	0.2	-0.7
Private cars and motorcycles	139578	160719	171754	171660	163879	-2180	-2428	-2424	-1.3	-1.4	-1.5
Trucks	85770	109568	137837	159647	170724	-2611	-4813	-3956	-1.9	-2.9	-2.3
Rail	9564	9423	8621	6775	6303	9	-16	0	0.1	-0.2	0.0
Aviation	29449	45553	53857	59073	57669	-770	-2619	-4224	-1.4	-4.2	-6.8
Inland navigation	7044	5481	6176	6718	7046	-38	-18	2	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	38.9	39.8	36.9	32.6	28.4	0.0	0.0	0.0	0.0	0.1	0.0
Freight transport (toe/Mtkm)	50.8	53.6	54.9	53.5	50.4	-0.2	-0.3	0.4	-0.4	-0.5	0.8

Source: PRIMES

EU28: Soaring oil and gas prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**961237**	**963855**	**928645**	**860330**	**874554**	**24345**	**74587**	**95833**	**2.7**	**9.5**	**12.3**
Solids	377116	227617	178120	168688	151069	1710	12046	4657	1.0	7.7	3.2
Oil	132112	172757	144210	88478	71885	17542	25924	18492	13.8	41.4	34.6
Natural gas	162820	208170	187159	127062	112504	1180	16181	21334	0.6	14.6	23.4
Nuclear	200702	243761	253537	237694	240493	0	2002	15718	0.0	0.8	7.0
Renewable energy sources	88487	111549	165618	238409	298602	3913	18434	35633	2.4	8.4	13.6
Hydro	27003	33138	34947	38051	40563	82	145	2	0.2	0.4	0.0
Biomass & Waste	57710	71804	106196	154295	185365	3029	12035	21153	2.9	8.5	12.9
Wind	67	1916	16626	30142	44301	636	3000	4870	4.0	11.1	12.4
Solar and others	173	679	2483	9265	20882	174	3216	9642	7.6	53.2	85.8
Geothermal	3534	4012	5367	6656	7491	-8	38	-35	-0.1	0.6	-0.5
Net Imports	**776740**	**868442**	**1072277**	**1263992**	**1327669**	**-46857**	**-115224**	**-141133**	**-4.2**	**-8.4**	**-9.6**
Solids	85626	107717	151134	184871	236613	475	31498	30822	0.3	20.5	15.0
Oil	550163	555056	593778	662765	674261	-51436	-75496	-70039	-8.0	-10.2	-9.4
- Crude oil and Feedstocks	523502	528467	558493	633404	649902	-49588	-72455	-68328	-8.2	-10.3	-9.5
- Oil products	26661	26589	35285	29361	24359	-1848	-3041	-1710	-5.0	-9.4	-6.6
Natural gas	137693	203694	326070	415009	415372	4109	-71219	-101907	1.3	-14.6	-19.7
Electricity	3259	1975	1295	1347	1422	-5	-7	-8	-0.4	-0.5	-0.6
Gross Inland Consumption	**1704962**	**1786487**	**1953908**	**2073565**	**2149233**	**-20746**	**-37715**	**-41879**	**-1.1**	**-1.8**	**-1.9**
Solids	467717	343986	329254	353559	387683	2185	43544	35479	0.7	14.0	10.1
Oil	647159	679975	690974	700487	693157	-32128	-46650	-48126	-4.4	-6.2	-6.5
Natural gas	297637	405241	513230	542071	527876	5288	-55039	-80574	1.0	-9.2	-13.2
Nuclear	200702	243761	253537	237694	240493	0	2002	15718	0.0	0.8	7.0
Electricity	3259	1975	1295	1347	1422	-5	-7	-8	-0.4	-0.5	-0.6
Renewable energy forms	88487	111549	165618	238409	298602	3913	18434	35633	2.4	8.4	13.6
as % in Gross Inland Consumption											
Solids	27.4	19.3	16.9	17.1	18.0	0.3	2.4	2.0	1.7	16.1	12.2
Oil	38.0	38.1	35.4	33.8	32.3	-1.3	-1.6	-1.6	-3.4	-4.5	-4.7
Natural gas	17.5	22.7	26.3	26.1	24.6	0.5	-2.1	-3.2	2.1	-7.6	-11.6
Nuclear	11.8	13.6	13.0	11.5	11.2	0.1	0.3	0.9	1.1	2.7	9.1
Renewable energy forms	5.2	6.2	8.5	11.5	13.9	0.3	1.1	1.9	3.5	10.4	15.8
Electricity Generation in GWh_e	**2618738**	**3118298**	**3777233**	**4431577**	**4984515**	**2131**	**9055**	**20618**	**0.1**	**0.2**	**0.4**
Nuclear	794718	944823	982718	921306	932153	0	7760	60921	0.0	0.8	7.0
Hydro & wind	314786	407604	601253	806109	1023353	8351	45427	84371	1.4	6.0	9.0
Thermal (incl. biomass)	1509233	1765871	2193262	2704163	3029009	-6221	-44133	-124674	-0.3	-1.6	-4.0
Fuel Inputs for Thermal Power Generation [1]	**393649**	**424378**	**476781**	**527085**	**556760**	**-3377**	**-447**	**-12141**	**-0.7**	**-0.1**	**-2.1**
Solids	266482	235098	238955	271881	316719	732	37256	29713	0.3	15.9	10.4
Oil (including refinery gas)	57294	46624	34284	24735	20689	-1438	-600	-356	-4.0	-2.4	-1.7
Gas	56793	118348	170107	168281	135819	-2155	-38917	-47579	-1.3	-18.8	-25.9
Biomass & Waste	10237	21304	29551	57301	77875	-522	1730	5970	-1.7	3.1	8.3
Geothermal heat	2842	3004	3884	4886	5658	6	85	111	0.2	1.8	2.0
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**867592**	**846345**	**842068**	**865154**	**862078**	**-34182**	**-44746**	**-44563**	**-3.9**	**-4.9**	**-4.9**
Refineries	696742	750941	750341	763715	757955	-34795	-49089	-52072	-4.4	-6.0	-6.4
Biofuels and hydrogen production	2	637	17566	36862	47883	573	5264	9588	3.4	16.7	25.0
District heating	38458	19291	15615	14498	16024	143	455	961	0.9	3.2	6.4
Others	132391	75474	58546	50078	40216	-104	-1377	-3040	-0.2	-2.7	-7.0
Energy Branch Consumption	**80396**	**88538**	**89128**	**89481**	**88203**	**-2437**	**-3832**	**-3887**	**-2.7**	**-4.1**	**-4.2**
Non-Energy Uses	**101612**	**112692**	**112234**	**115071**	**116491**	**-1543**	**-3079**	**-3636**	**-1.4**	**-2.6**	**-3.0**
Final Energy Demand	**1109885**	**1180941**	**1340956**	**1477251**	**1563372**	**-14103**	**-34031**	**-45149**	**-1.0**	**-2.3**	**-2.8**
by sector											
Industry[1]	384219	363322	399857	443128	476460	-1390	-4184	-7369	-0.3	-0.9	-1.5
- energy intensive industries	245670	228215	240386	251960	253165	-1127	-3246	-5565	-0.5	-1.3	-2.2
- other industrial sectors	138549	135107	159471	191168	223296	-264	-939	-1804	-0.2	-0.5	-0.8
Residential	281949	300854	339095	369987	390423	-4223	-11823	-17277	-1.2	-3.1	-4.2
Tertiary	154275	166339	197972	223221	241009	-2635	-7351	-8502	-1.3	-3.2	-3.4
Transport	289441	350426	404033	440915	455480	-5855	-10673	-12000	-1.4	-2.4	-2.6
by fuel [1]											
Solids	136126	68674	59778	56089	47877	1012	5523	4394	1.7	10.9	10.1
Oil	458929	499706	538922	563228	564130	-22695	-35619	-40723	-4.0	-5.9	-6.7
Gas	220792	264489	306499	333997	350721	3785	-16311	-31298	1.3	-4.7	-8.2
Electricity	187680	224587	279349	333862	380160	481	815	1920	0.2	0.2	0.5
Heat (from CHP and District Heating)	67875	74443	84992	95141	107214	284	1112	1966	0.3	1.2	1.9
Other	38483	49041	71418	94934	113270	3030	10449	18593	4.4	12.4	19.6
CO2 Emissions (Mt of CO2)	**4136.3**	**3998.9**	**4220.7**	**4410.9**	**4489.9**	**-71.2**	**-83.8**	**-186.0**	**-1.7**	**-1.9**	**-4.0**
Power generation/District heating	1515.0	1431.1	1509.9	1601.3	1691.6	-7.5	55.6	6.8	-0.5	3.6	0.4
Energy Branch	155.8	159.9	127.9	107.4	91.6	-7.7	-14.9	-12.8	-5.7	-12.2	-12.3
Industry	796.2	650.1	671.2	715.9	719.6	-13.1	-19.6	-32.3	-1.9	-2.7	-4.3
Residential	538.0	481.6	503.3	509.4	503.0	-16.0	-38.7	-54.1	-3.1	-7.1	-9.7
Tertiary	291.5	255.8	269.6	273.2	265.2	-8.0	-22.0	-35.2	-2.9	-7.5	-11.7
Transport	839.9	1020.5	1139.0	1203.6	1218.8	-18.9	-44.2	-58.4	-1.6	-3.5	-4.6
CO2 Emissions Index (1990=100)	**100.0**	**96.7**	**102.0**	**106.6**	**108.5**	-1.7	-2.0	-4.5	-1.7	-1.9	-4.0

Source: PRIMES

EU28: Soaring oil and gas prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (B)

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	528.913	550.981	569.992	582.152	587.546	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	7511.4	9217.8	11370.5	14408.7	17374.7	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	227.0	193.8	171.8	143.9	123.7	-1.8	-2.6	-2.4	-1.1	-1.8	-1.9
Gross Inl. Cons./Capita (toe/inhabitant)	3.22	3.24	3.43	3.56	3.66	-0.04	-0.06	-0.07	-1.1	-1.8	-1.9
Electricity Generated/Capita (kWh/inhabitant)	4951	5660	6627	7612	8484	4	16	35	0.1	0.2	0.4
Carbon intensity (t of CO_2/toe of GIC)	2.43	2.24	2.16	2.13	2.09	-0.01	0.00	-0.04	-0.6	-0.1	-2.1
CO_2 Emissions/Capita (t of CO_2/inhabitant)	7.82	7.26	7.40	7.58	7.64	-0.12	-0.14	-0.32	-1.7	-1.9	-4.0
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	550.7	433.8	371.2	306.1	258.4	-6.3	-5.8	-10.7	-1.7	-1.9	-4.0
Import Dependency %	44.6	47.5	53.6	59.5	60.3	-1.7	-4.2	-5.1	-3.1	-6.6	-7.7
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	81.8	75.7	65.9	58.5	-0.3	-0.6	-0.9	-0.3	-0.9	-1.5
Residential (Energy on Private Income)	100.0	87.3	80.1	69.6	61.0	-1.0	-2.2	-2.7	-1.2	-3.1	-4.2
Tertiary (Energy on Value added)	100.0	84.3	78.7	69.2	61.6	-1.0	-2.3	-2.2	-1.3	-3.2	-3.4
Transport (Energy on GDP)	100.0	98.7	92.2	79.4	68.0	-1.3	-1.9	-1.8	-1.4	-2.4	-2.6
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.42	0.30	0.27	0.25	0.24	0.00	0.01	0.00	-0.6	3.3	-0.3
Final energy demand (t of CO_2/toe)	2.22	2.04	1.93	1.83	1.73	-0.02	-0.04	-0.06	-1.1	-2.2	-3.5
Industry	2.07	1.79	1.68	1.62	1.51	-0.03	-0.03	-0.04	-1.6	-1.7	-2.8
Residential	1.91	1.60	1.48	1.38	1.29	-0.03	-0.06	-0.08	-1.9	-4.1	-5.7
Tertiary	1.89	1.54	1.36	1.22	1.10	-0.02	-0.06	-0.10	-1.6	-4.4	-8.6
Transport	2.90	2.91	2.82	2.73	2.68	-0.01	-0.03	-0.06	-0.2	-1.2	-2.1
Electricity and steam generation											
Generation Capacity in MW_e		**725459**	**896383**	**1074933**	**1311326**	**7561**	**36848**	**66201**	**0.9**	**3.5**	**5.3**
Nuclear		145542	139130	121776	116009	0	1008	7858	0.0	0.8	7.3
Hydro (pumping excluded)		116592	124039	130582	136305	105	418	487	0.1	0.3	0.4
Wind		12806	82300	146971	223999	2880	14690	31744	3.6	11.1	16.5
Solar		176	1661	10667	28663	0	5771	18080	0.0	117.9	170.8
Thermal		450343	549254	664937	806350	4575	14962	8031	0.8	2.3	1.0
of which cogeneration units		122684	172887	248774	302183	4324	13034	10321	2.6	5.5	3.5
Solids fired		210547	183592	219688	288143	3058	34998	30640	1.7	18.9	11.9
Gas fired		143140	266508	328394	382568	-1100	-24403	-31850	-0.4	-6.9	-7.7
Oil fired		80801	75613	53098	38260	2158	1853	963	2.9	3.6	2.6
Biomass-waste fired		14814	22114	62147	95612	457	2489	8245	2.1	4.2	9.4
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1040	1426	1610	1768	2	25	33	0.1	1.6	1.9
Indicators											
Efficiency for thermal electricity production (%)		35.8	39.6	44.1	46.8	0.2	-0.7	-0.9	0.4	-1.5	-1.9
Load factor for gross electric capacities (%)		49.1	48.1	47.1	43.4	-0.4	-1.6	-2.1	-0.8	-3.2	-4.7
CHP indicator (% of electricity from CHP)		14.8	18.3	23.2	25.1	0.1	0.8	-0.2	0.3	3.6	-0.7
Non fossil fuels in electricity generation (%)		45.6	44.6	45.3	47.5	0.2	1.5	3.6	0.4	3.4	8.1
- nuclear		30.3	26.0	20.8	18.7	0.0	0.1	1.1	-0.1	0.6	6.5
- renewable energy forms		15.3	18.5	24.5	28.8	0.2	1.3	2.4	1.0	5.8	9.1
Transport sector											
Passenger transport activity (Gpkm)	**4881.2**	**5752.9**	**6810.3**	**8089.8**	**9228.5**	-86.9	-175.1	-265.9	-1.3	-2.1	-2.8
Public road transport	618.4	589.7	617.3	627.9	611.0	-1.3	2.4	4.8	-0.2	0.4	0.8
Private cars and motorcycles	3601.6	4397.4	5219.2	6251.2	7186.1	-81.4	-161.8	-241.5	-1.5	-2.5	-3.3
Rail	456.6	423.6	468.3	517.8	570.7	2.0	3.4	5.4	0.4	0.7	1.0
Aviation	170.7	304.7	460.4	637.2	797.0	-6.2	-19.4	-35.1	-1.3	-3.0	-4.2
Inland navigation	33.9	37.4	45.0	55.7	63.7	0.0	0.3	0.6	0.0	0.5	0.9
Travel per person (km per capita)	9229	10441	11948	13896	15707	-152.5	-300.8	-452.6	-1.3	-2.1	-2.8
Freight transport activity (Gtkm)	**1958.3**	**2352.3**	**2906.9**	**3530.0**	**4106.5**	-40.4	-82.0	-124.9	-1.4	-2.3	-3.0
Trucks	1159.5	1668.6	2162.5	2723.1	3242.5	-41.8	-86.1	-131.0	-1.9	-3.1	-3.9
Rail	532.6	405.9	440.5	468.8	497.8	2.4	3.9	5.1	0.6	0.8	1.0
Inland navigation	266.3	277.8	303.9	338.1	366.2	-1.1	0.1	0.9	-0.4	0.0	0.3
Freight activity per unit of GDP (tkm/000 Euro'00)	261	255	256	245	236	-3.6	-5.7	-7.2	-1.4	-2.3	-3.0
Energy demand in transport (ktoe)	**289441**	**350426**	**404033**	**440915**	**455480**	-5855	-10673	-12000	-1.4	-2.4	-2.6
Public road transport	9634	8758	8892	8359	7098	-18	31	-21	-0.2	0.4	-0.3
Private cars and motorcycles	140266	162549	175245	179714	178237	-2239	-2621	-2740	-1.3	-1.4	-1.5
Trucks	92511	116941	148855	175821	192129	-2764	-5183	-4590	-1.8	-2.9	-2.3
Rail	9807	9691	8889	7065	6734	7	-19	-7	0.1	-0.3	-0.1
Aviation	29928	46814	55710	62794	63655	-802	-2863	-4646	-1.4	-4.4	-6.8
Inland navigation	7295	5673	6443	7163	7627	-39	-18	4	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	38.5	39.3	36.3	31.8	27.7	0.0	0.0	0.0	0.0	0.0	0.0
Freight transport (toe/Mtkm)	51.8	52.8	53.9	52.0	48.7	-0.2	-0.3	0.4	-0.4	-0.5	0.7

Source: PRIMES

Europe-30: Soaring oil and gas prices case
Comparison to Baseline scenario

SUMMARY ENERGY BALANCE AND INDICATORS (A)

ktoe	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Primary Production	**1091087**	**1200143**	**1185159**	**1126629**	**1087915**	**26829**	**66737**	**78496**	**2.3**	**6.3**	**7.8**
Solids	377317	228042	178648	169202	151569	1704	12233	4854	1.0	7.8	3.3
Oil	216359	337714	276504	236401	182630	18298	49528	47401	7.1	26.5	35.1
Natural gas	186970	253987	283604	215071	182054	2630	-15964	-27042	0.9	-6.9	-12.9
Nuclear	206883	250675	260539	244836	249016	0	2002	17253	0.0	0.8	7.4
Renewable energy sources	103557	129725	185864	261119	322645	4196	18938	36030	2.3	7.8	12.6
Hydro	40003	48250	50026	54469	57509	83	182	39	0.2	0.3	0.1
Biomass & Waste	59720	74749	110757	159851	191386	3179	12485	21476	3.0	8.5	12.6
Wind	67	1919	17114	30746	45226	768	3017	4906	4.7	10.9	12.2
Solar and others	173	703	2512	9307	20948	176	3221	9649	7.5	52.9	85.4
Geothermal	3595	4103	5455	6746	7576	-9	33	-40	-0.2	0.5	-0.5
Net Imports	**695727**	**684878**	**873917**	**1057726**	**1174193**	**-49817**	**-108902**	**-125205**	**-5.4**	**-9.3**	**-9.6**
Solids	86632	108508	151898	185662	237506	425	31752	31292	0.3	20.6	15.2
Oil	490237	412700	483540	536596	583929	-53124	-100080	-100328	-9.9	-15.7	-14.7
- Crude oil and Feedstocks	458354	384418	446204	505390	558406	-51178	-96770	-98256	-10.3	-16.1	-15.0
- Oil products	31883	28282	37336	31206	25523	-1946	-3310	-2072	-5.0	-9.6	-7.5
Natural gas	117149	163941	238589	335447	352718	2887	-40567	-56160	1.2	-10.8	-13.7
Electricity	1710	-272	-110	21	40	-5	-7	-9	4.8	-24.8	-17.7
Gross Inland Consumption	**1751588**	**1839144**	**2011021**	**2132344**	**2207663**	**-21204**	**-39204**	**-43232**	**-1.0**	**-1.8**	**-1.9**
Solids	468937	345317	330546	354864	389076	2129	43985	36146	0.6	14.1	10.2
Oil	669257	702393	711989	720985	712114	-33041	-47592	-49450	-4.4	-6.2	-6.5
Natural gas	301245	411306	522194	550518	534773	5517	-56530	-83202	1.1	-9.3	-13.5
Nuclear	206883	250675	260539	244836	249016	0	2002	17253	0.0	0.8	7.4
Electricity	1710	-272	-110	21	40	-5	-7	-9	4.8	-24.8	-17.7
Renewable energy forms	103557	129725	185864	261119	322645	4196	18938	36030	2.3	7.8	12.6
as % in Gross Inland Consumption											
Solids	26.8	18.8	16.4	16.6	17.6	0.3	2.3	1.9	1.7	16.2	12.4
Oil	38.2	38.2	35.4	33.8	32.3	-1.3	-1.6	-1.6	-3.4	-4.5	-4.7
Natural gas	17.2	22.4	26.0	25.8	24.2	0.5	-2.1	-3.2	2.1	-7.6	-11.8
Nuclear	11.8	13.6	13.0	11.5	11.3	0.1	0.3	1.0	1.1	2.7	9.5
Renewable energy forms	5.9	7.1	9.2	12.2	14.6	0.3	1.1	1.9	3.4	9.8	14.8
Electricity Generation in GWh_e	**2794856**	**3323905**	**3995231**	**4672742**	**5240531**	**3642**	**10402**	**22894**	**0.1**	**0.2**	**0.4**
Nuclear	818651	971593	1009830	948963	965153	0	7760	66866	0.0	0.8	7.4
Hydro & wind	465941	583374	782291	1004116	1231316	9897	46043	85211	1.3	4.8	7.4
Thermal (incl. biomass)	1510263	1768938	2203111	2719663	3044062	-6254	-43401	-129183	-0.3	-1.6	-4.1
Fuel Inputs for Thermal Power Generation [1]	**394358**	**425676**	**479175**	**530582**	**560482**	**-3411**	**-296**	**-12754**	**-0.7**	**-0.1**	**-2.2**
Solids	266510	235114	239150	271903	316719	732	37256	29713	0.3	15.9	10.4
Oil (including refinery gas)	57394	46636	34444	24803	20745	-1438	-600	-366	-4.0	-2.4	-1.7
Gas	56913	118562	171008	169109	135869	-2123	-39024	-48182	-1.2	-18.7	-26.2
Biomass & Waste	10698	22359	30689	59881	81491	-588	1987	5970	-1.9	3.4	7.9
Geothermal heat	2842	3004	3884	4886	5658	6	85	111	0.2	1.8	2.0
Hydrogen - Methanol	0	0	0	0	0	0	0	0			
Fuel Input in other transformation proc.	**884427**	**866713**	**861977**	**885820**	**882532**	**-34974**	**-45287**	**-45298**	**-3.9**	**-4.9**	**-4.9**
Refineries	713481	771184	769595	783029	776694	-35598	-49781	-53074	-4.4	-6.0	-6.4
Biofuels and hydrogen production	2	637	17914	37798	49129	585	5399	9816	3.4	16.7	25.0
District heating	38512	19379	15897	14894	16484	143	475	1004	0.9	3.3	6.5
Others	132432	75512	58571	50099	40226	-104	-1379	-3044	-0.2	-2.7	-7.0
Energy Branch Consumption	**83789**	**92950**	**93786**	**93188**	**91058**	**-2428**	**-4612**	**-4765**	**-2.5**	**-4.7**	**-5.0**
Non-Energy Uses	**103762**	**115166**	**114411**	**117152**	**118601**	**-1576**	**-3139**	**-3710**	**-1.4**	**-2.6**	**-3.0**
Final Energy Demand	**1145388**	**1220510**	**1384508**	**1523228**	**1609380**	**-14513**	**-34941**	**-46393**	**-1.0**	**-2.2**	**-2.8**
by sector											
Industry[1]	394004	375356	412415	456817	490591	-1390	-4216	-7438	-0.3	-0.9	-1.5
- energy intensive industries	252212	236839	249314	261530	262813	-1122	-3264	-5614	-0.4	-1.2	-2.1
- other industrial sectors	141792	138517	163102	195287	227778	-268	-953	-1824	-0.2	-0.5	-0.8
Residential	290806	310280	349200	380498	400918	-4376	-12149	-17639	-1.2	-3.1	-4.2
Tertiary	160718	172911	206059	231891	249949	-2727	-7603	-8796	-1.3	-3.2	-3.4
Transport	299860	361964	416833	454022	467921	-6020	-10972	-12519	-1.4	-2.4	-2.6
by fuel [1]											
Solids	137278	69933	60779	57231	49100	970	5901	4960	1.6	11.5	11.2
Oil	477192	518412	557473	581513	580852	-23456	-36795	-42277	-4.0	-6.0	-6.8
Gas	222317	266915	310548	338420	355114	3854	-16758	-32144	1.3	-4.7	-8.3
Electricity	200044	238509	295030	351690	399287	605	929	2105	0.2	0.3	0.5
Heat (from CHP and District Heating)	68198	75229	85982	96685	109516	298	1189	2110	0.3	1.2	2.0
Other	40359	51512	74695	97688	115511	3216	10594	18853	4.5	12.2	19.5
CO_2 Emissions (Mt of CO_2)	**4207.7**	**4076.8**	**4303.0**	**4490.7**	**4561.8**	**-73.5**	**-88.7**	**-193.6**	**-1.7**	**-1.9**	**-4.1**
Power generation/District heating	1515.7	1431.7	1513.6	1604.3	1693.1	-7.5	55.4	5.6	-0.5	3.6	0.3
Energy Branch	163.4	170.4	137.6	114.8	97.0	-7.7	-16.6	-14.8	-5.3	-12.6	-13.2
Industry	807.4	663.2	682.4	729.6	733.8	-13.7	-19.5	-32.3	-2.0	-2.6	-4.2
Residential	551.3	493.5	515.0	519.9	511.8	-16.7	-39.8	-55.4	-3.1	-7.1	-9.8
Tertiary	300.2	264.5	279.6	282.8	274.3	-8.5	-22.9	-36.2	-2.9	-7.5	-11.7
Transport	869.6	1053.4	1174.8	1239.3	1251.8	-19.4	-45.4	-60.5	-1.6	-3.5	-4.6
CO_2 Emissions Index (1990=100)	**100.0**	**96.9**	**102.3**	**106.7**	**108.4**	-1.7	-2.1	-4.6	-1.7	-1.9	-4.1

Source: PRIMES

Europe-30: Soaring oil and gas prices case — SUMMARY ENERGY BALANCE AND INDICATORS (B)
Comparison to Baseline scenario

	1990	2000	2010	2020	2030	2010	2020	2030	2010	2020	2030
						Difference from Baseline			% Diff. from Baseline		
Main Energy System Indicators											
Population (Million)	539.950	562.681	582.130	594.587	600.252	0.000	0.000	0.000	0.0	0.0	0.0
GDP (in 000 MEUR'00)	7877.3	9665.6	11898.8	15057.8	18137.4	0.0	0.0	0.0	0.0	0.0	0.0
Gross Inl. Cons./GDP (toe/MEUR'00)	222.4	190.3	169.0	141.6	121.7	-1.8	-2.6	-2.4	-1.0	-1.8	-1.9
Gross Inl. Cons./Capita (toe/inhabitant)	3.24	3.27	3.45	3.59	3.68	-0.04	-0.07	-0.07	-1.0	-1.8	-1.9
Electricity Generated/Capita (kWh/inhabitant)	5176	5907	6863	7859	8731	6	17	38	0.1	0.2	0.4
Carbon intensity (t of CO_2/toe of GIC)	2.40	2.22	2.14	2.11	2.07	-0.01	0.00	-0.05	-0.6	-0.1	-2.2
CO_2 Emissions/Capita (t of CO_2/inhabitant)	7.79	7.25	7.39	7.55	7.60	-0.13	-0.15	-0.32	-1.7	-1.9	-4.1
CO_2 Emissions to GDP (t of CO_2/MEUR'00)	534.2	421.8	361.6	298.2	251.5	-6.2	-5.9	-10.7	-1.7	-1.9	-4.1
Import Dependency %	38.9	36.4	42.4	48.4	51.9	-1.9	-4.0	-4.4	-4.3	-7.6	-7.8
Energy intensity indicators (1990=100)											
Industry (Energy on Value added)	100.0	81.7	75.6	65.8	58.4	-0.3	-0.6	-0.9	-0.3	-0.9	-1.5
Residential (Energy on Private Income)	100.0	87.4	80.1	69.5	60.9	-1.0	-2.2	-2.7	-1.2	-3.1	-4.2
Tertiary (Energy on Value added)	100.0	84.5	79.1	69.5	61.8	-1.0	-2.3	-2.2	-1.3	-3.2	-3.4
Transport (Energy on GDP)	100.0	98.4	92.0	79.2	67.8	-1.3	-1.9	-1.8	-1.4	-2.4	-2.6
Carbon Intensity indicators											
Electricity and Steam production (t of CO_2/MWh)	0.40	0.29	0.26	0.24	0.23	0.00	0.01	0.00	-0.6	3.2	-0.4
Final energy demand (t of CO_2/toe)	2.21	2.03	1.92	1.82	1.72	-0.02	-0.04	-0.06	-1.1	-2.2	-3.5
Industry	2.05	1.77	1.65	1.60	1.50	-0.03	-0.03	-0.04	-1.6	-1.7	-2.8
Residential	1.90	1.59	1.47	1.37	1.28	-0.03	-0.06	-0.08	-1.9	-4.1	-5.8
Tertiary	1.87	1.53	1.36	1.22	1.10	-0.02	-0.06	-0.10	-1.7	-4.5	-8.6
Transport	2.90	2.91	2.82	2.73	2.68	-0.01	-0.03	-0.06	-0.2	-1.2	-2.1
Electricity and steam generation											
Generation Capacity in MW_e		**769539**	**946000**	**1128537**	**1368749**	**8191**	**37297**	**67190**	**0.9**	**3.4**	**5.2**
Nuclear		148992	142580	125226	120193	0	1008	8618	0.0	0.8	7.7
Hydro (pumping excluded)		155831	165323	173781	179874	107	466	535	0.1	0.3	0.3
Wind		12886	84405	149772	228108	3444	14755	31884	4.3	10.9	16.2
Solar		195	1705	10777	28895	0	5771	18080	0.0	115.3	167.2
Thermal		451636	551987	668980	811679	4640	15298	8072	0.8	2.3	1.0
of which cogeneration units		123656	174112	251107	305808	4322	13568	10560	2.5	5.7	3.6
Solids fired		210703	183686	219704	288143	3058	34998	30640	1.7	18.9	11.9
Gas fired		143723	268400	330486	384467	-1037	-24420	-31867	-0.4	-6.9	-7.7
Oil fired		80968	75756	53165	38321	2158	1854	964	2.9	3.6	2.6
Biomass-waste fired		15202	22719	64015	98980	459	2842	8302	2.1	4.6	9.2
Fuel Cells		0	0	0	0	0	0	0			
Geothermal heat		1040	1426	1610	1768	2	25	33	0.1	1.6	1.9
Indicators											
Efficiency for thermal electricity production (%)		35.7	39.5	44.1	46.7	0.2	-0.7	-0.9	0.4	-1.5	-1.9
Load factor for gross electric capacities (%)		49.3	48.2	47.3	43.7	-0.4	-1.5	-2.1	-0.8	-3.1	-4.5
CHP indicator (% of electricity from CHP)		14.0	17.4	22.2	24.1	0.1	0.8	-0.1	0.3	3.8	-0.6
Non fossil fuels in electricity generation (%)		48.9	47.4	48.0	50.1	0.2	1.4	3.5	0.4	3.1	7.5
- nuclear		29.2	25.3	20.3	18.4	0.0	0.1	1.2	-0.1	0.6	7.0
- renewable energy forms		19.6	22.1	27.7	31.6	0.2	1.3	2.3	0.9	4.9	7.8
Transport sector											
Passenger transport activity (Gpkm)	**5032.5**	**5925.5**	**7009.1**	**8308.7**	**9458.0**	-89.2	-179.3	-271.7	-1.3	-2.1	-2.8
Public road transport	625.6	596.9	625.5	636.7	620.2	-1.3	2.4	4.8	-0.2	0.4	0.8
Private cars and motorcycles	3720.2	4530.1	5370.5	6416.8	7359.2	-83.6	-165.8	-247.0	-1.5	-2.5	-3.2
Rail	473.5	443.8	491.4	542.7	596.5	2.2	3.8	5.9	0.4	0.7	1.0
Aviation	178.7	316.3	475.5	655.5	817.0	-6.4	-19.9	-36.0	-1.3	-3.0	-4.2
Inland navigation	34.5	38.4	46.2	57.0	65.1	0.0	0.3	0.6	0.0	0.5	0.9
Travel per person (km per capita)	9320	10531	12041	13974	15757	-153.2	-301.6	-452.7	-1.3	-2.1	-2.8
Freight transport activity (Gtkm)	**2026.8**	**2447.9**	**3018.4**	**3659.4**	**4248.6**	-41.6	-84.2	-128.3	-1.4	-2.3	-2.9
Trucks	1179.2	1705.6	2213.1	2790.8	3325.8	-42.7	-88.1	-134.3	-1.9	-3.1	-3.9
Rail	544.1	419.3	456.3	485.4	514.6	2.5	4.1	5.4	0.6	0.8	1.1
Inland navigation	303.5	323.0	348.9	383.2	408.3	-1.5	-0.3	0.6	-0.4	-0.1	0.2
Freight activity per unit of GDP (tkm/000 Euro'00)	257	253	254	243	234	-3.5	-5.6	-7.1	-1.4	-2.3	-2.9
Energy demand in transport (ktoe)	**299860**	**361964**	**416833**	**454022**	**467921**	-6020	-10972	-12519	-1.4	-2.4	-2.6
Public road transport	9802	8917	9069	8531	7249	-18	32	-22	-0.2	0.4	-0.3
Private cars and motorcycles	145794	168062	180975	185079	182882	-2304	-2689	-3028	-1.3	-1.4	-1.6
Trucks	94266	119351	152169	180029	196793	-2817	-5293	-4661	-1.8	-2.9	-2.3
Rail	10142	10079	9287	7390	7023	7	-18	-7	0.1	-0.2	-0.1
Aviation	31627	49160	58160	65107	65681	-843	-2979	-4799	-1.4	-4.4	-6.8
Inland navigation	8229	6394	7172	7885	8293	-45	-23	-1	-0.6	-0.3	0.0
Efficiency indicator (activity related)											
Passenger transport (toe/Mpkm)	38.9	39.6	36.5	31.9	27.7	0.0	0.0	0.0	0.0	0.0	-0.1
Freight transport (toe/Mtkm)	51.4	52.0	53.3	51.5	48.4	-0.2	-0.3	0.4	-0.4	-0.5	0.7

Source: PRIMES

(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.

Abbreviations

GIC: Gross Inland Consumption
CHP: combined heat and power

Geographical regions
EU15: EU15 Member States
EU25: EU15 Member States + New Member States
NMS: New Member States (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia)
EU27: EU25 Member States + Bulgaria + Romania
EU28: EU27 + Turkey
Europe 30: EU28 + Norway + Switzerland

Units
toe: tonne of oil equivalent, or 10^7 kilocalories, or 41.86 GJ (Gigajoule)
Mtoe: million toe

GW: Gigawatt or 10^9 watt
kWh: kilowatt-hour or 10^3 watt-hour
MWh: megawatt-hour or 10^6 watt-hour
TWh: Terawatt-hour or 10^{12} watt-hour

t: metric tonnes, or 1000 kilogrammes
Mt: Million metric tonnes

km: kilometre
pkm: passenger-kilometre (one passenger transported a distance of one kilometre)
tkm: tonne-kilometre (one tonne transported a distance of one kilometre)
Gpkm: Giga passenger-kilometre, or 10^9 passenger-kilometre
Gtkm: Giga tonne-kilometre, or 10^9 tonne-kilometre

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