



European Commission  
Directorate-General for Energy and Transport  
Unit A 2

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# EU–Trend and Energy Policy Scenarios

## **EU – OPEC Roundtable on Energy Policies**

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Session 1 (second part): Energy Demand

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## Trend and policy scenarios for EU

Presentation: Trend scenario (baseline) and alternative scenarios

- focusing on oil and gas demand
- show how policy scenarios impact on important variables for EU – OPEC relations, such as:
  - net imports of oil and gas;
  - CO2 emissions.
- Scenarios of interest for this exercise:
  - combined high RES and energy efficiency scenario (20% RES share and 14% better energy intensity in 2020);
  - combined RES and efficiency scenario plus better environment for nuclear (incl. assumed revision of nuclear phase-out decisions);
  - alternative fuels in transport (more biofuels, natural gas and hydrogen);
  - higher world oil and gas prices with gas prices following oil prices.



## Modelling and scenario approach

- Trend (baseline) and policy scenarios for the EU draw on PRIMES model operated by a consortium led by NTUA;
- Baseline reflects current trends and policies of the EU and the Member States;
- Baseline is a starting point for scenarios on alternative framework conditions and policy approaches:
  - different framework conditions concern e.g. higher energy import prices;
  - alternative policy approaches are about e.g. better energy efficiency, more renewables penetration, on nuclear or transport policies.
- Model produces a complete representation of the energy economy of EU-27 up to 2030;
- Approach includes macro-economic analyses, world energy modelling (import prices from the POLES model) and in depth analyses on specific areas.
- World energy modelling with POLES completes EU analysis providing broader picture including energy import prices – world energy analyses to follow later in 2007/2008



## Assumptions for baseline and policy scenarios

- Population increase is small with a stagnation from 2020 onwards;
- Aging and lifestyle changes lead to smaller households; their number increases by almost 25% over 30 years to 2030;
- GDP in EU-25 increases by 2.0% pa in 2000-2030:
  - rather low growth in this decade reflecting disappointing statistics in the earlier years;
  - low growth also in 2020-30 due to stagnant and rapidly aging population.
- Sectoral growth rates (for industries and services) consistent with GDP;
- Growth of passenger and freight transport activity in line with the analyses for the mid-term review of the Transport White Paper;
- Future weather conditions as of 2000 (warmer than long-term average);
- Oil import price of 58 \$/bbl in 2030 (in money of 2005 – in nominal terms, price in 2030 could come close to 100\$)

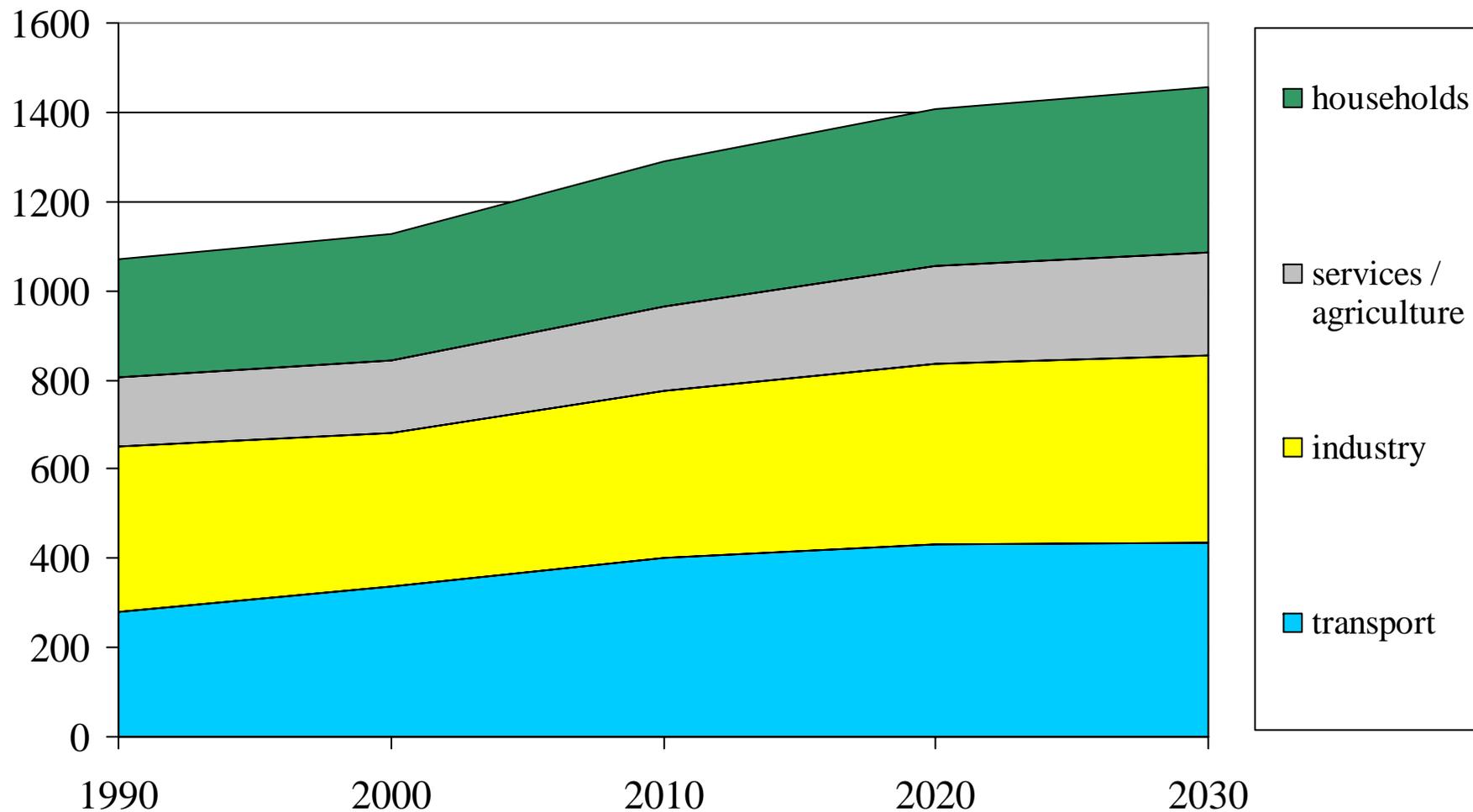


## Policy Assumption for the baseline

- 2005 Baseline includes policies implemented in the Member States by the end of 2004;
- Tax rates kept constant in real terms (grow with inflation) unless there is better knowledge (e.g. transition phases for rising tax rates);
- Continuation of the economic reform process (e.g. Lisbon strategy) and completion of the internal electricity and gas markets by 2010;
- Continuation of active policies to promote better technologies;
- Continued policies on energy efficiency including fuel efficiency of private cars;
- Nuclear phase-out in certain old Member states and agreed closure of plants with safety concerns in new MS;
- Continued promotion of renewables;
- Modelling is based on measures to promote renewables rather than assuming that indicative targets are met;
- Similarly, no further strengthening of climate change policies - CO<sub>2</sub> emissions are modelling results; ETS reflected through permit price of 5€/t CO<sub>2</sub>.

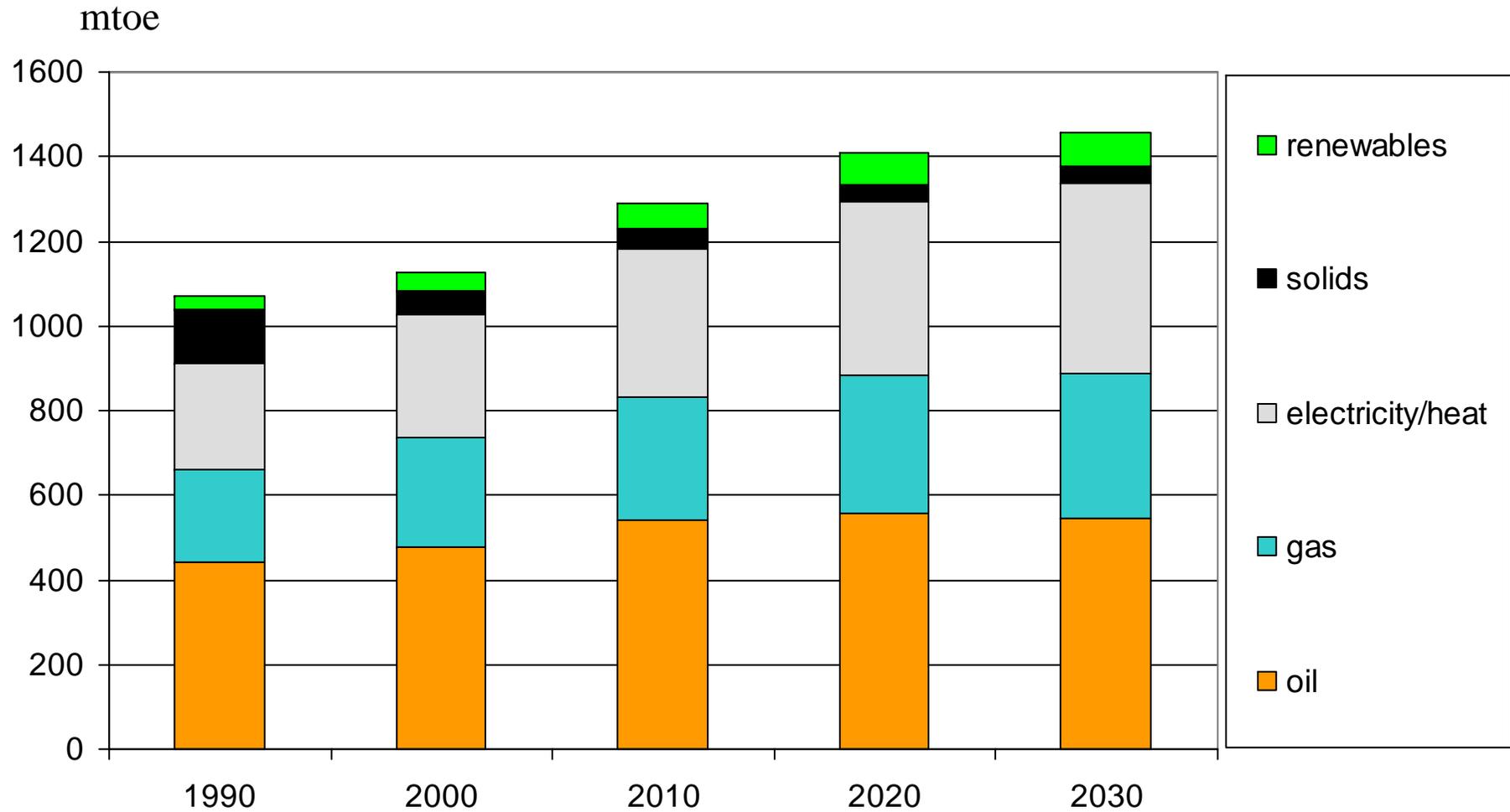


# EU-27: Baseline: Final energy demand by sector (in mtoe)



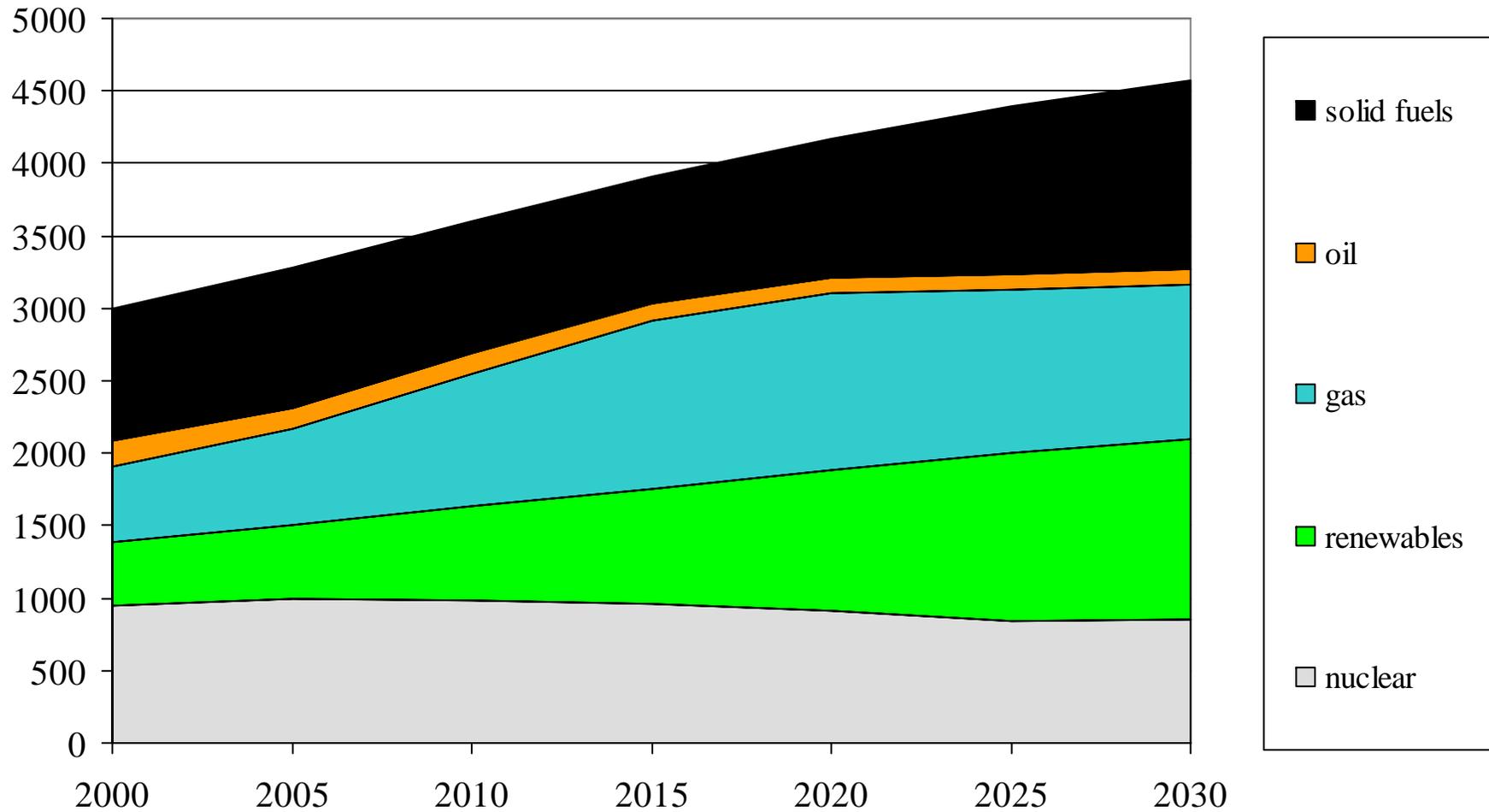


# EU-27: Baseline: Final energy demand by fuel



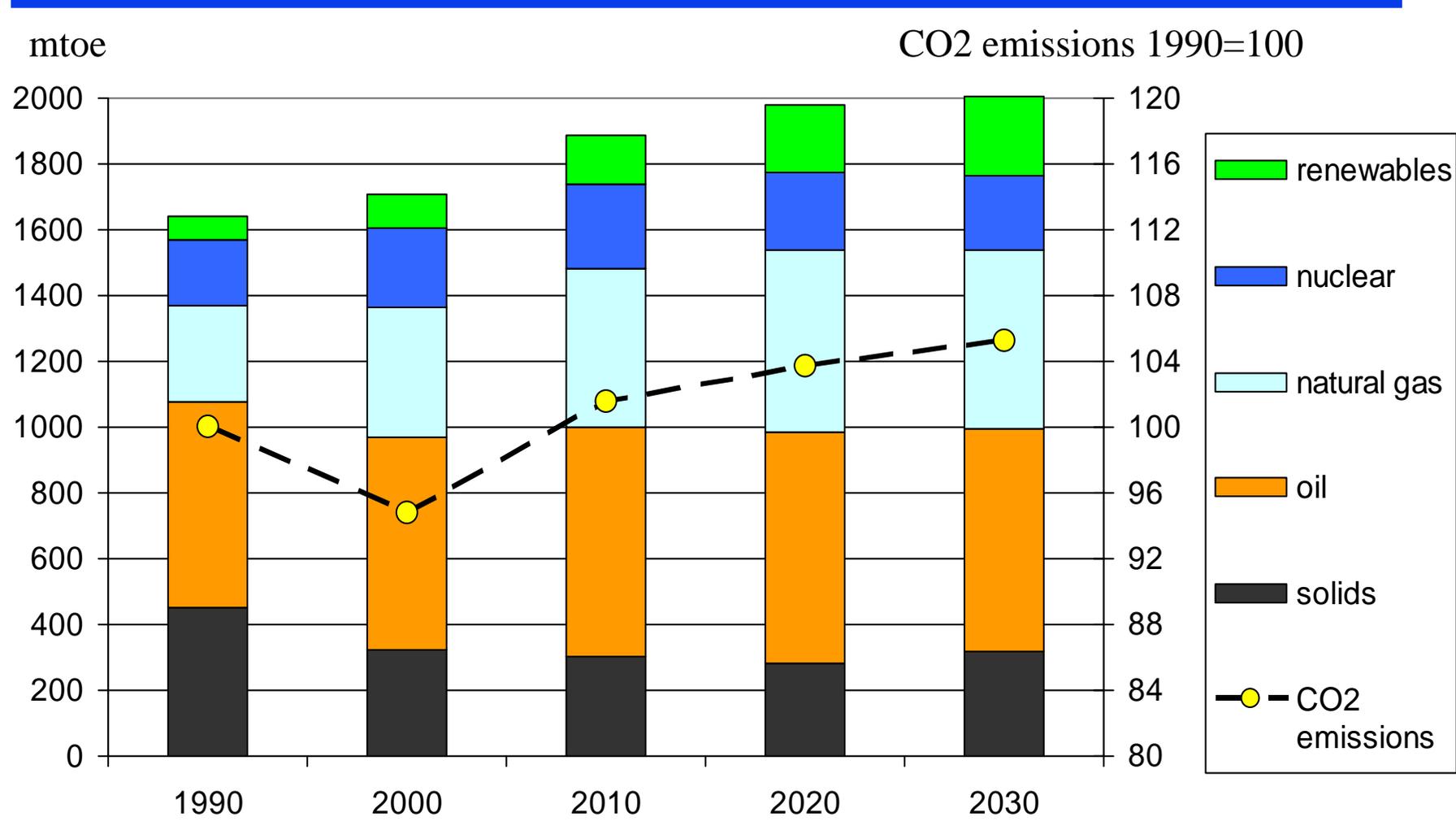


# EU-27: Baseline: Electricity generation by fuel (in TWh)



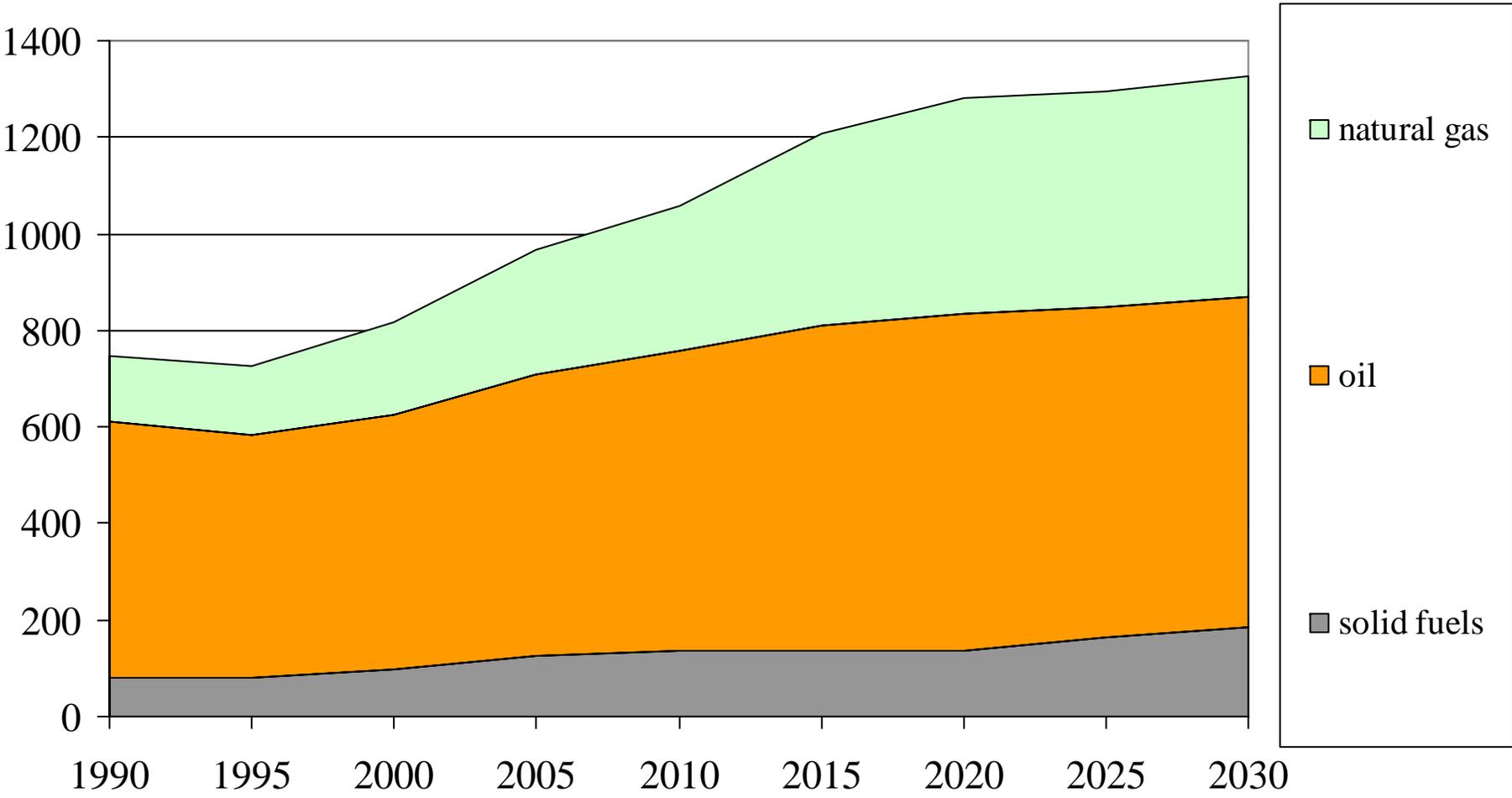


# EU-27: Baseline: Energy consumption by fuel and CO2 emissions





# EU-27: Net imports of fossil fuels in the baseline (in Mtoe)





## Assumption for alternative cases (1)

- Combined high RES and efficiency scenario aims at
  - 20% RES in 2020 in a cost effective manner;
  - vigorous implementation of all adopted EU energy efficiency policies (e.g. energy services and eco-design directives) plus better perception of real costs by energy consumers;
  - economic efficiency is pursued through equating marginal costs for RES promotion in power generation across RES sources and MS; similar approaches for other final demand sectors;
  - energy efficiency policies (Action Plan measures) help energy consumers acquire a better perception of real costs so that they choose more energy efficient solutions despite higher initial costs, overcoming also largely lack of information issues.
- Combined high efficiency and renewables case combines these assumptions to explore possible synergies and overlaps;



## Assumption for alternative cases (2)

- Policy case including RES, efficiency and nuclear combines these assumptions on energy efficiency and RES and adds more nuclear deployment:
  - For all existing nuclear power plants, extension of lifetime to 50 years (where technically/economically feasible) plus a climate more conducive to new nuclear investment;
  - the case explores synergies and overlaps (e.g. electricity savings through efficiency policies restrict the scope for nuclear investment);
- Third policy case: more alternative fuels (natural gas, biofuels and hydrogen compared with baseline) in transport;
- Finally, higher oil and gas world market prices of some 100 \$/bbl in real terms for oil, with gas prices following oil prices, such price changes entail important impacts on oil and gas demand import prices in 2006 money:

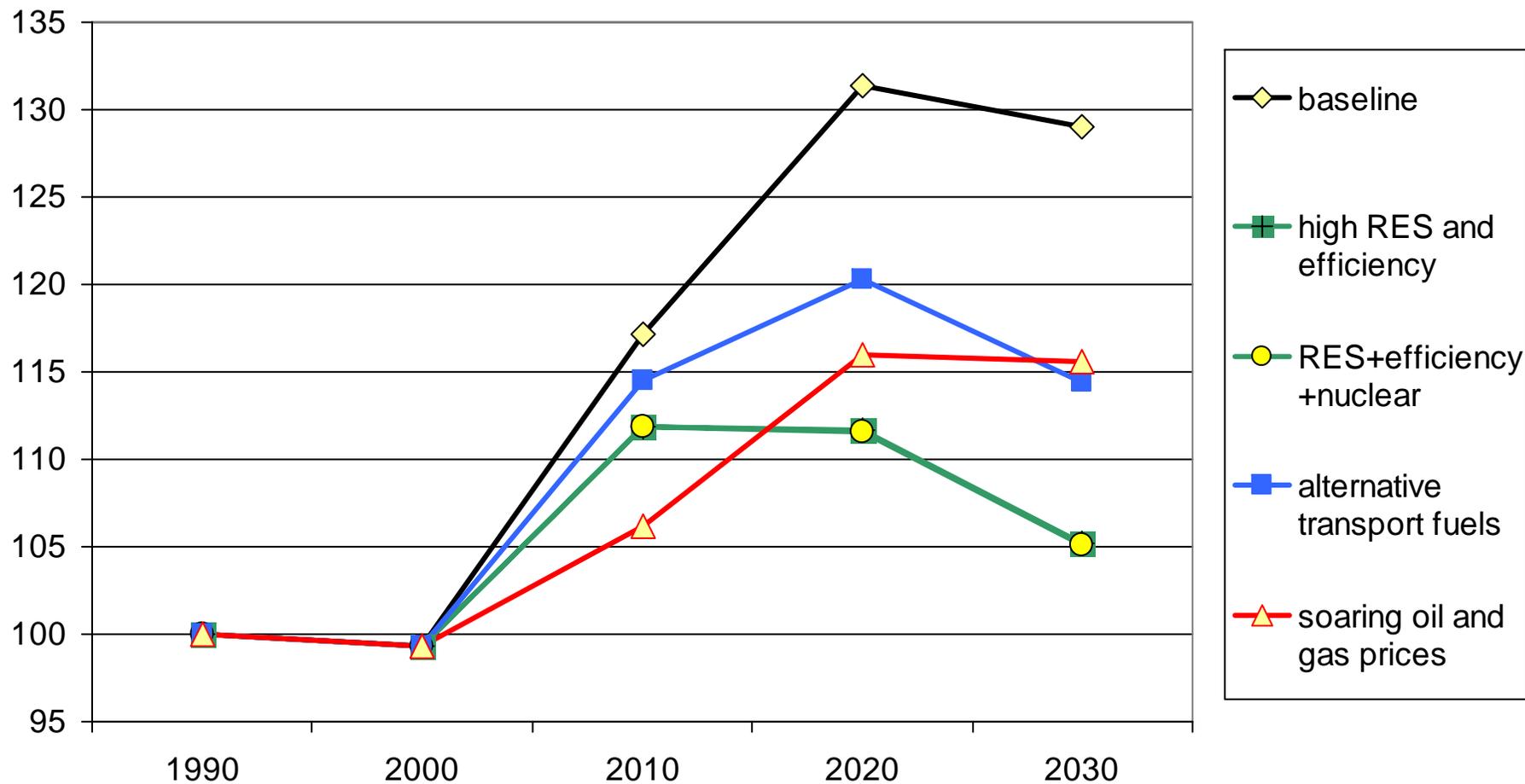
oil: 100 \$/boe;

gas: 75 \$/boe;

coal: 20 \$/boe

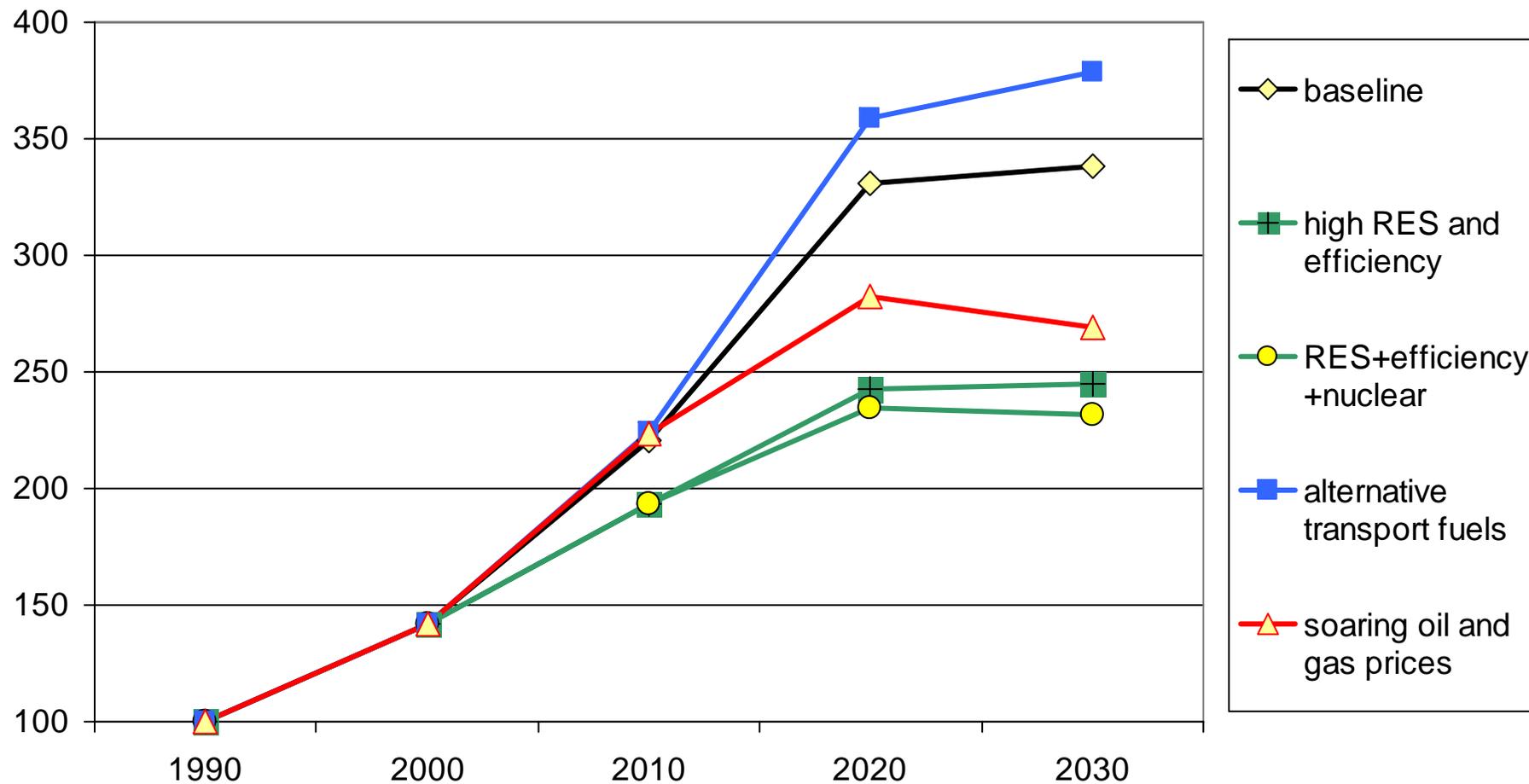


# EU-27: net oil imports: Baseline and Scenarios: 1990 = 100



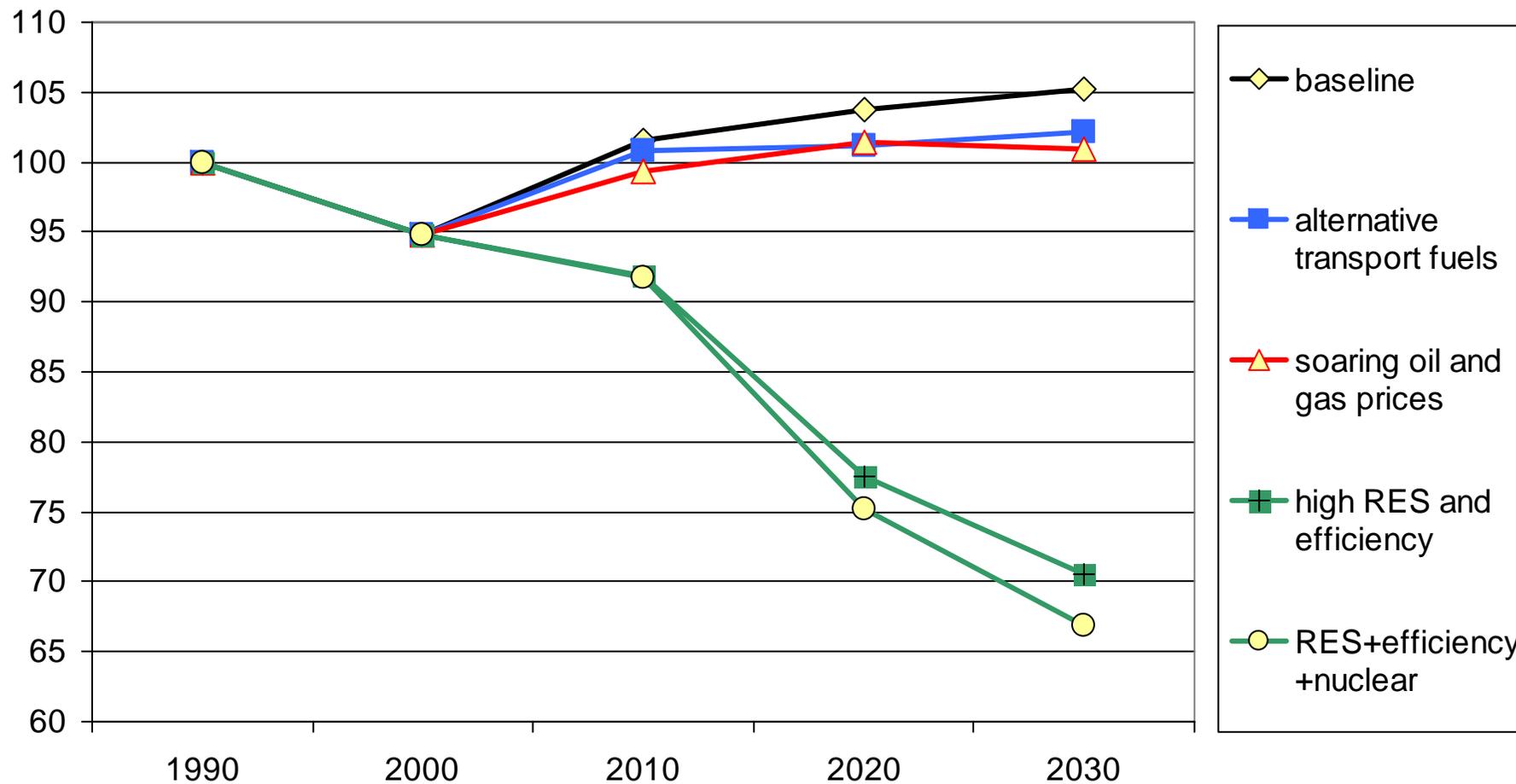


# EU-27: net gas imports: Baseline and Scenarios: 1990 = 100





# EU-27: CO2 emissions: Baseline and Scenarios: 1990 = 100





## Conclusions

- EU policies on RES and energy efficiency have important effects on CO<sub>2</sub> emissions, so that the agreed ghg targets for 2020 can be achieved;
- Adding nuclear could reduce CO<sub>2</sub> somewhat more in the long term;
- Higher world oil and gas prices would do little for reducing CO<sub>2</sub>;
- Imports of oil increase under trend developments as well as under all policy cases;
- Even with very strong policies to reduce CO<sub>2</sub> through fostering RES and energy efficiency EU oil imports remain significantly above the 2000 level;
- Considerably higher oil prices in 2030 (100 \$/bbl instead of some 60 \$/bbl) curtail the oil import increase by about half;
- EU gas imports continue increasing substantially under all scenarios;
- Gas imports grow most in the alternative transport fuel scenario (some 10% gas share in 2030) leading to more than a doubling of gas imports from current levels;
- Very high gas prices (75 \$/boe in 2030) would reduce gas imports after 2020.