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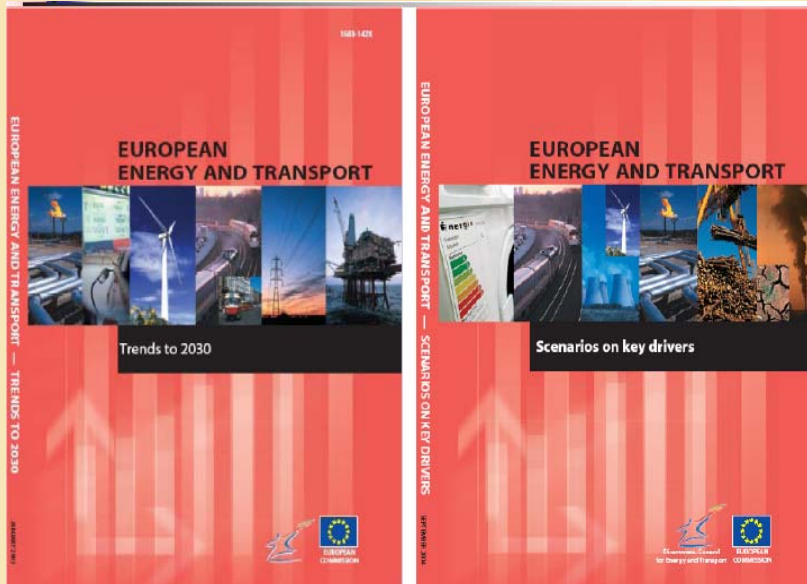
# Nuclear energy and the EU energy mix

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# Content

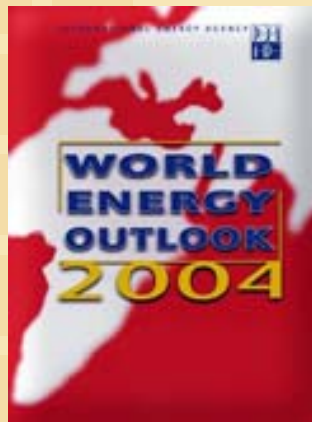
- **EU energy mix**
- **Nuclear energy perspectives ?**
- **EU policy issues**

# EU energy mix 2030



## EU DGTREN, jan 2003

- EU energy trends 2030
- Scenario's on key drivers



## IEA

- World Energy Outlook 2004

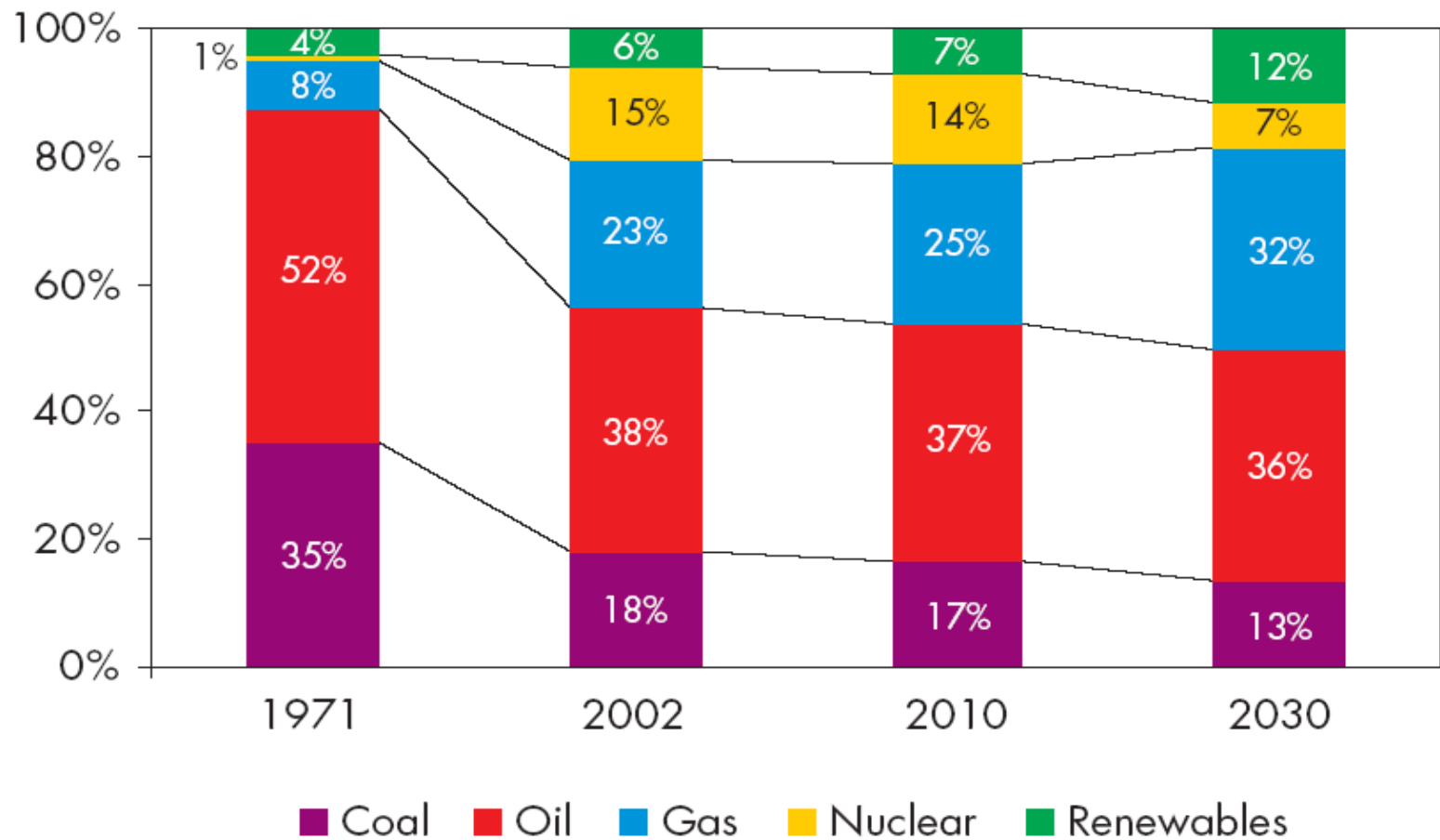
# Energy Supply & Emissions

- Primary energy production in the EU steadily declines (-1% per year), therefore energy imports significantly increase (in 2030, 60% higher than today). Gas supply is the key issue !
- Carbon emissions (EU-25) stabilise until 2010, but then increase again (in 2030, 14% higher than 1990), far away from climate targets
- Economic competitiveness maximize under current trends, would be undermined by
  - e.g. investment in more expensive sources, such as renewables and/or nuclear

# Power sector trends

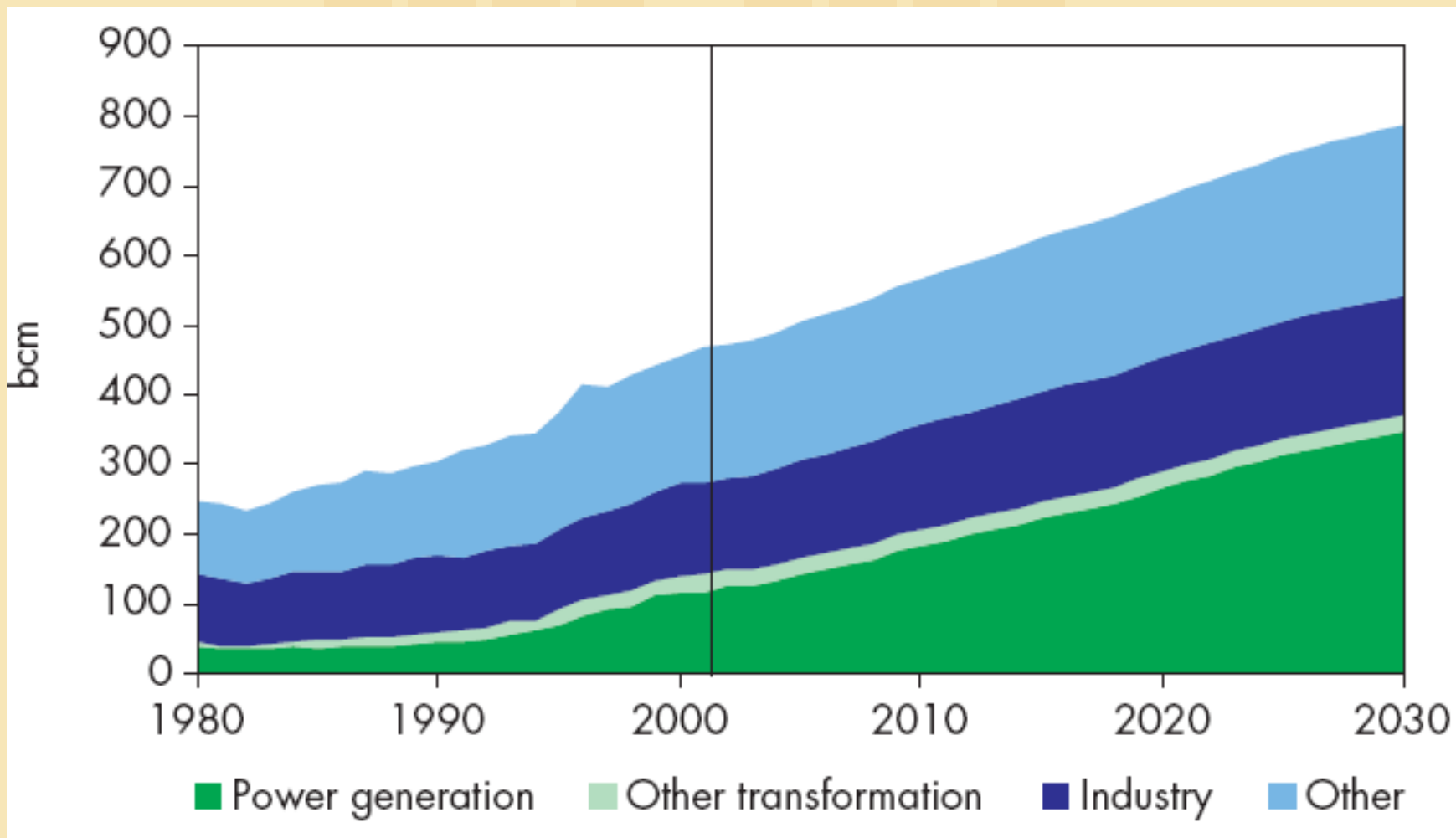
- Over the next 30 years, 500-600 GW of new power plants need to be built (50% higher total assets)
- Under current trends and under market competition, gas fuelled plants dominate investment:
  - More than 40% of power generation capacity shall depend on gas, against 11% today
  - This increases power generation efficiency and curbs emissions – but threatens security of supply
- Renewable energy is fast growing in power generation
  - The growth is driven by wind energy but also biomass exploitation
  - Still the share of renewables does not exceed 10% of primary energy needs in 2030 despite support policies
- Nuclear energy declines in the long term (in 2030, 22% less than today) – too much capital intensive for the market
- Coal comes back in the long term → Higher emissions..

# Fuel Shares in Primary Energy Demand of the EU



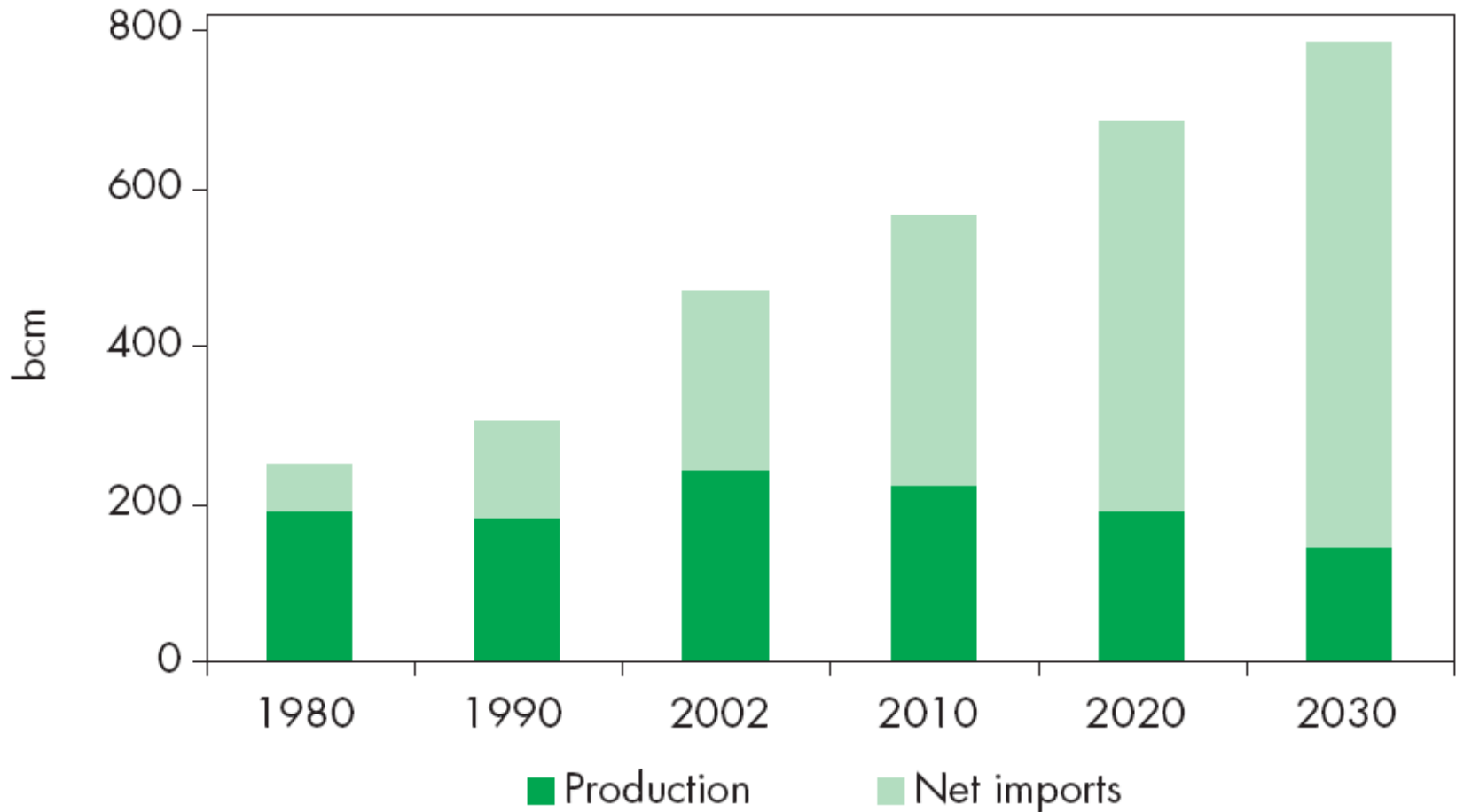
Source: IEA, WEO 2004

# Natural Gas Demand in the EU



Source: IEA, WEO 2004

# Gas Supply Balance in the EU



Source: IEA, WEO 2004

# EU Policy: challenges & options

## EU Policy Challenges

1. Security of Energy Supply, in relation to:
  - Dependency on imports of natural gas and oil (considerable turnaround of past trends)
  - Investment to ensure adequacy of electricity supply
2. High uncertainty about the future of nuclear after 2020 – lack of strategic choice
3. Increasing carbon emissions, in contrast with climate change objectives
4. Poor performance of policies supporting penetration of renewable energies
5. Continuous growth of road and air transport, source of congestion and air quality problems.

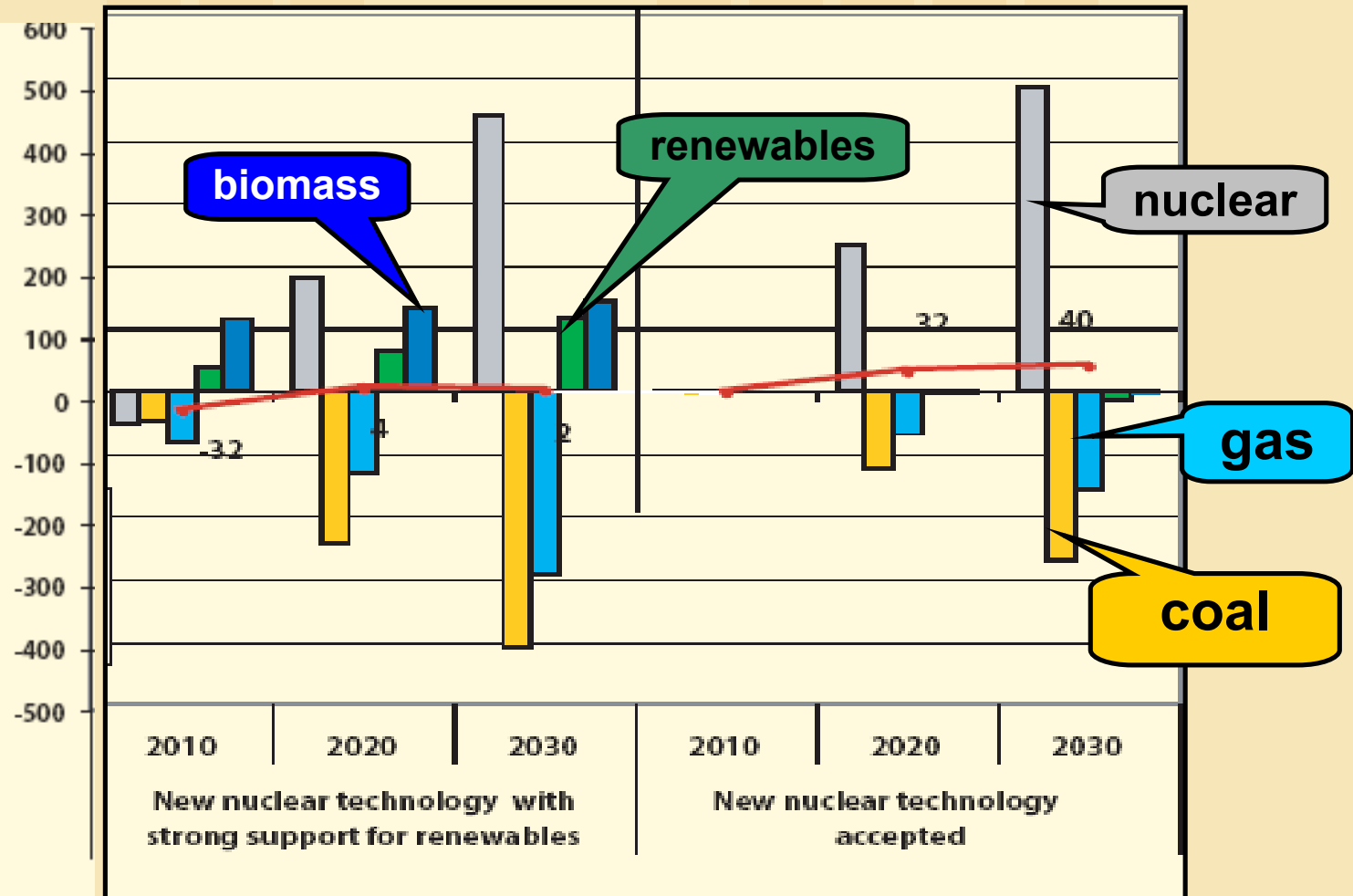
## EU Policy Options and their effects

- Meeting renewables obligations (12% of primary energy needs in 2010 – further growing to 15% in 2030) combined with additional policies and measures for energy efficiency
  - Primary energy needs stabilise over the next 25 years
  - CO2 emissions also stabilise at around -12% from 1990 levels
  - However import dependency still remains a concern
- Further implementation of measures leads to even more impressive results
  - + acceptance of new nuclear
  - + policies, new standards and fuels in transport
- CO2 emissions in 2030 limited to 75% of those in 1990
- 1/3 of energy needs comes from carbon free sources
- Import dependency in 2030 only reaches 55%

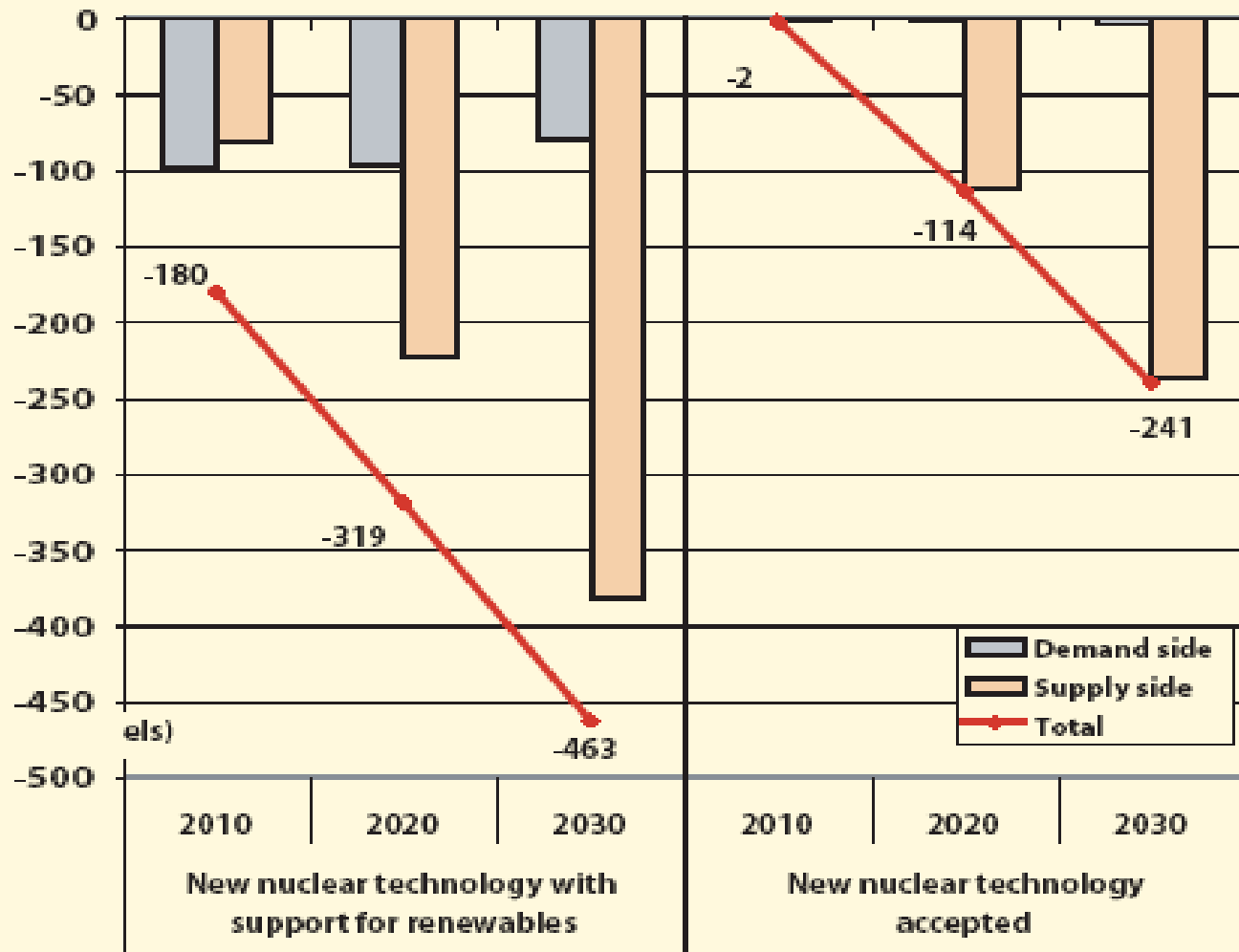
# Nuclear Uncertainty

- Nuclear capacity, from 140 GW in 2000, could go down to 100 GW in 2030 in the absence of new nuclear policy. Under most favourable conditions it could reach 175 GW in 2030. Under moderate nuclear policy, keeping the level of 140 GW combines well with other policy options, like renewables and energy efficiency improvement.
- A nuclear phase out would have considerable adverse effects on carbon emissions and import dependency
- Extending nuclear lifetimes does not address the key strategic issue that arise beyond 2020. Absence of strategic choice influences all investment decisions before that period
- It is unlikely that, up to 2030, accelerated renewables and/or hydrogen could equally perform in terms of costs, carbon emissions and import dependency
- Nuclear combined with accelerated renewables and energy efficiency deliver highest performance. What to do then?

# Fuel mix in accelerated nuclear scenario's (TWh-change from baseline levels)



# Impacts on CO-2 emissions (compared to baseline in Mt)



# Building Nuclear Confidence?

- **Market models & economics**
  - Long term investor assurances ?
- **Final waste disposal**
  - EU sites ?
- **Non-proliferation**
  - Sensitive fuel cycle technologies ?

• .....

- **The EU-framework**



**Euratom or  
EU ?**