



European
Commission



Energy Roadmap 2050

Sandra Stevens

DG Energy, European Commission

Energy

- **The Energy Roadmap 2050 :**

a basis for developing a long-term policy framework,

supported by scenario analyses

European Council :

- EU objective for 2050 – GHG emissions down to 80-95% below 1990 levels
- Looks forward to elaboration of a low-carbon 2050 strategy – a framework for longer-term action in energy and related sectors

Aim of the roadmap :

- Give more certainty to governments and investors
- Explore routes towards a low-carbon energy system by 2050 which improve competitiveness and security of supply
- Basis for developing the 2030 policy framework and concrete milestones with MS, EP and stakeholders

● Outline of presentation

1 Scenario design

2 Results and policy conclusions

- **Scenarios explore routes to decarbonisation of energy system**
 - Reference scenario (as of March 2010)
 - Current Policy Initiatives (as of April 2011)
- ➔ 40% GHG reduction by 2050

Decarbonisation scenarios :

- High Energy Efficiency
- Diversified Supply Technologies
- High RES
- Delayed CCS
- Low Nuclear

➔ 80% GHG reduction

● Rationale for scenario design

- Four main routes to cut energy related CO₂ emissions:
 - » Reducing energy consumption through efficiency
 - » Making energy supply less carbon intensive – RES, Nuclear and CCS

● High Energy Efficiency

- Very stringent implementation of the Energy Efficiency Plan
- Strong energy efficiency policies are also pursued thereafter: high renovation rates of existing buildings; additional Eco-design, full rollout of smart grids and meters and significant penetration of decentralised RES

● High RES

- Very strong policy measures to achieve a high overall RES share and very high RES penetration in power generation using mainly domestic resources
- Market integration allowing for more RES trade
- Infrastructure, back-up, storage and demand side management

● Diversified supply technologies scenario

- Carbon price driven with no additional targeted support policies for EE and RES
- MS and investors have confidence in CCS as a credible and commercially viable technology; acceptance of storage and CO2 networks is high
- MS, investors and society at large have confidence in nuclear as safety is considered adequate and waste issues solved

● Delayed CCS

- Carbon price driven with no additional targeted support policies for EE and RES
- Acceptance difficulties for CCS regarding storage sites and transport, which allow large scale development only after 2040
- MS, investors and society at large have confidence in nuclear as safety is considered adequate and waste issues are solved

● Low Nuclear

- Carbon price driven with no additional targeted support policies for EE and RES
- Nuclear safety and waste issues remain unsolved (no new nuclear plants are being built besides reactors under construction and no lifetime extension after 2030)
- MS and investors have confidence in CCS as a credible and commercially viable technology; acceptance of storage and CO₂ networks is high

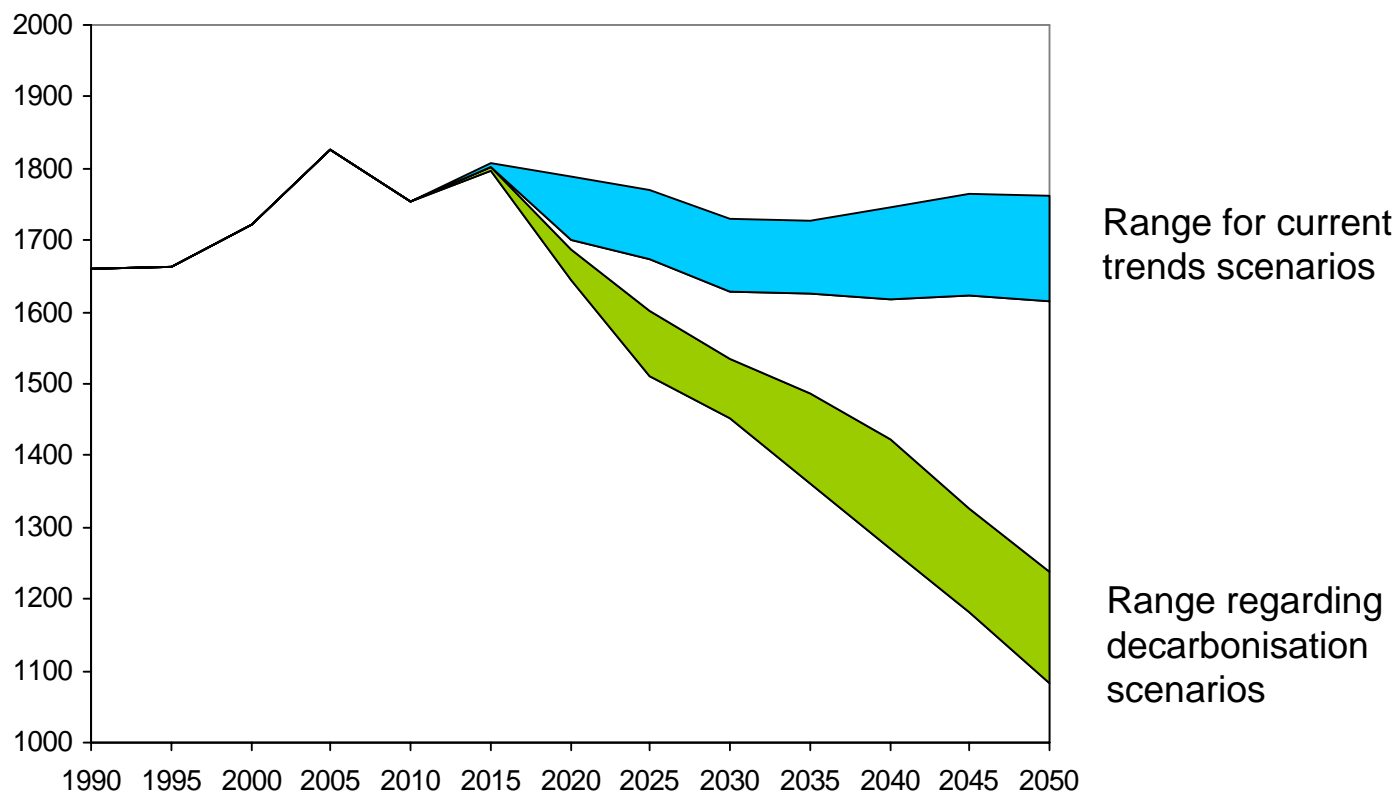
● Outline of presentation

1 Scenario design

2 Results and policy conclusions

Energy savings throughout the system are crucial

Gross energy consumption - range in current trend (REF/CPI) and decarbonisation scenarios (in Mtoe)

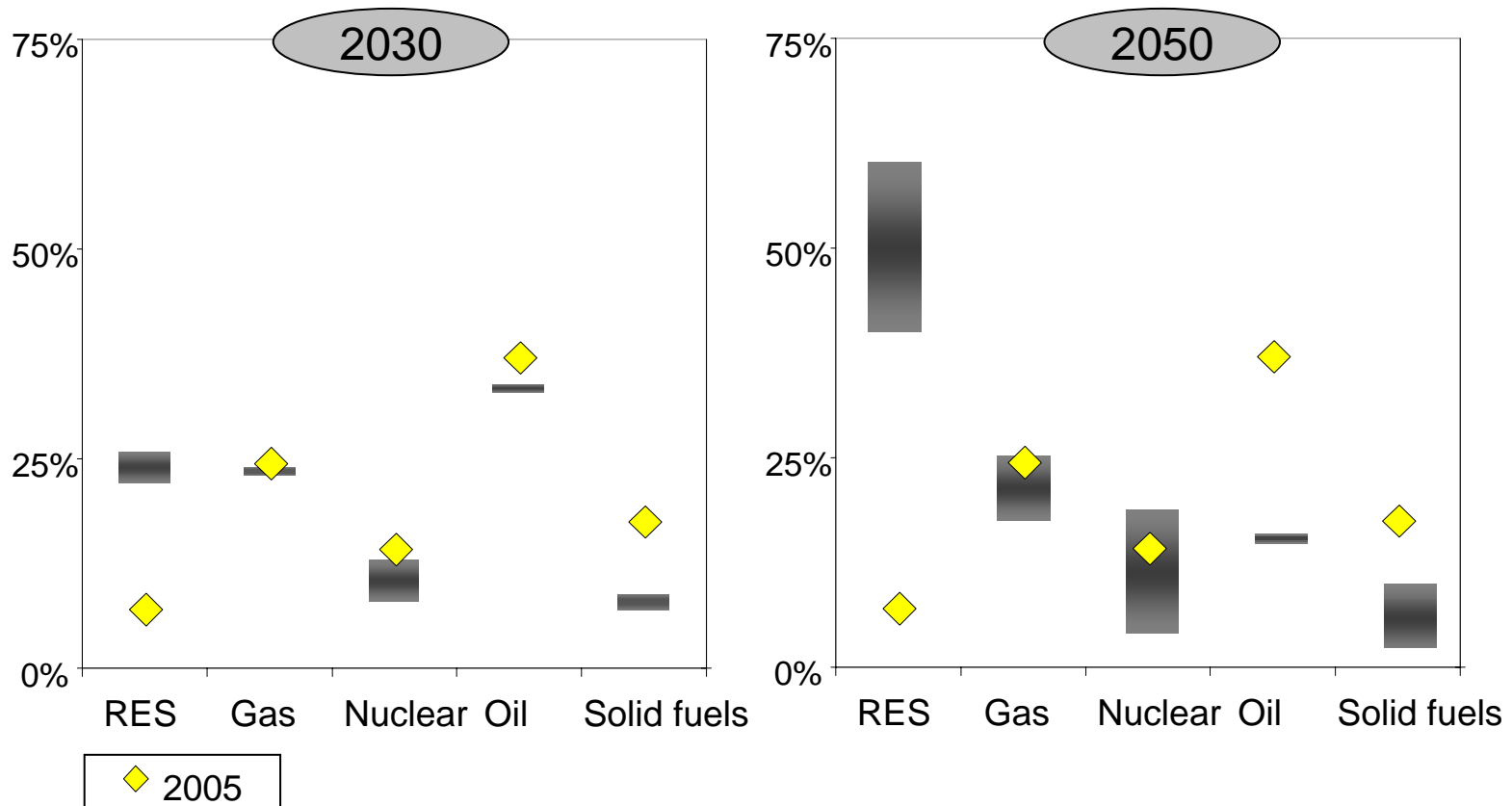




European
Commission

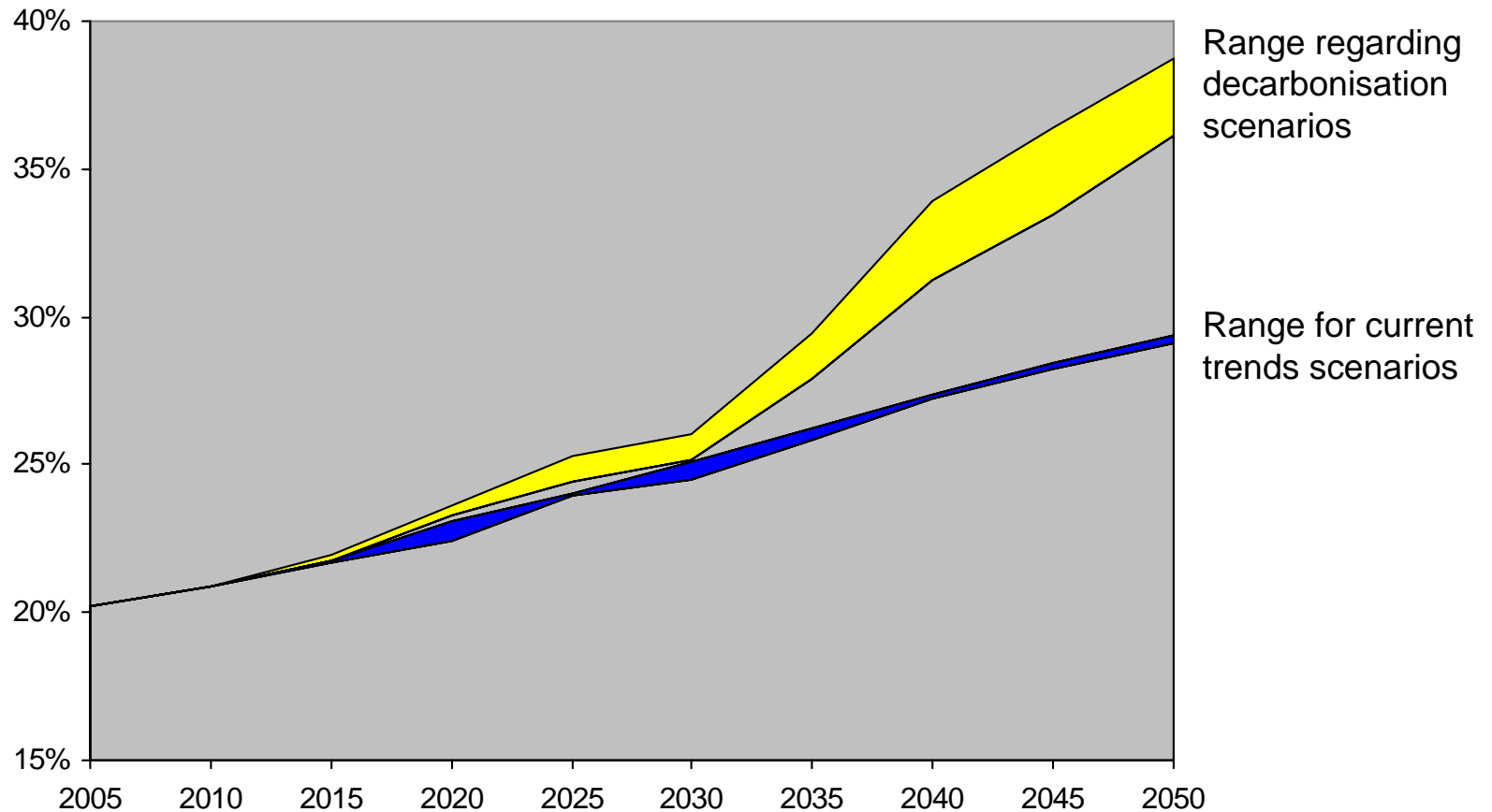
Renewables move centre stage – but all fuels can contribute in the long-run

Decarbonisation scenarios - fuel ranges (primary energy consumption in %)



● Electricity plays an increasing role

Share of electricity in current trend and decarbonisation scenarios
(in % of final energy demand)



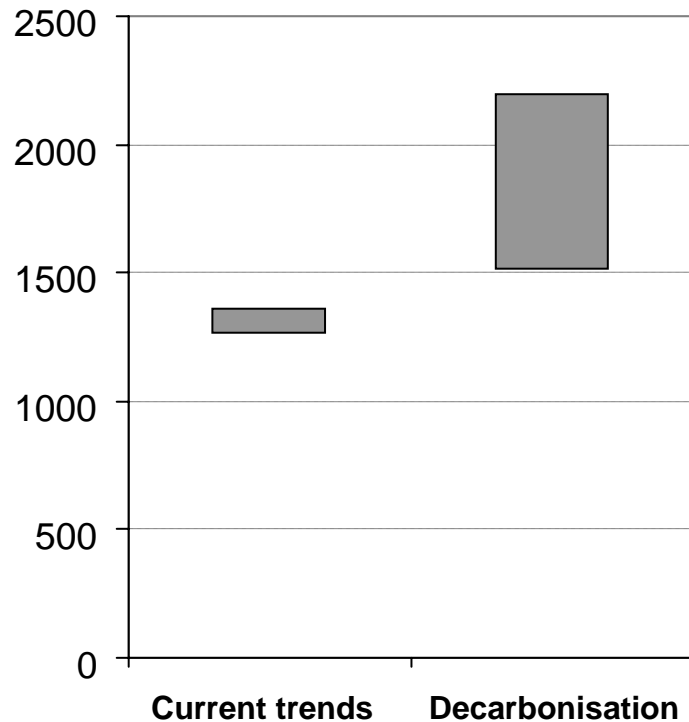


European
Commission

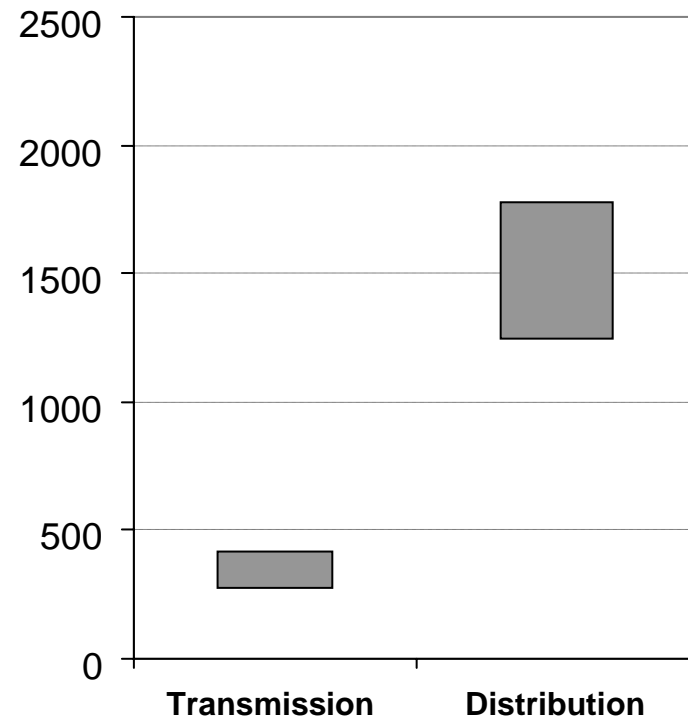
● Grid investment costs increase

Cumulative costs 2011-2050 in bn € (in ranges)

Grid investment (current trends and decarbonisation)



Transmission and distribution in decarbonisation scenarios





European
Commission

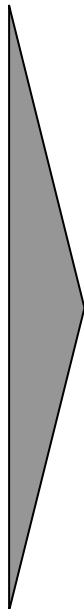
● Rethinking energy markets in Europe

Interdependence and increasing shares of renewables

More electricity

More RES

More trade



Need for flexible resources.

⇒ **Ensure that market arrangements offer cost-effective solutions, allowing all resources to be used (including demand side)**

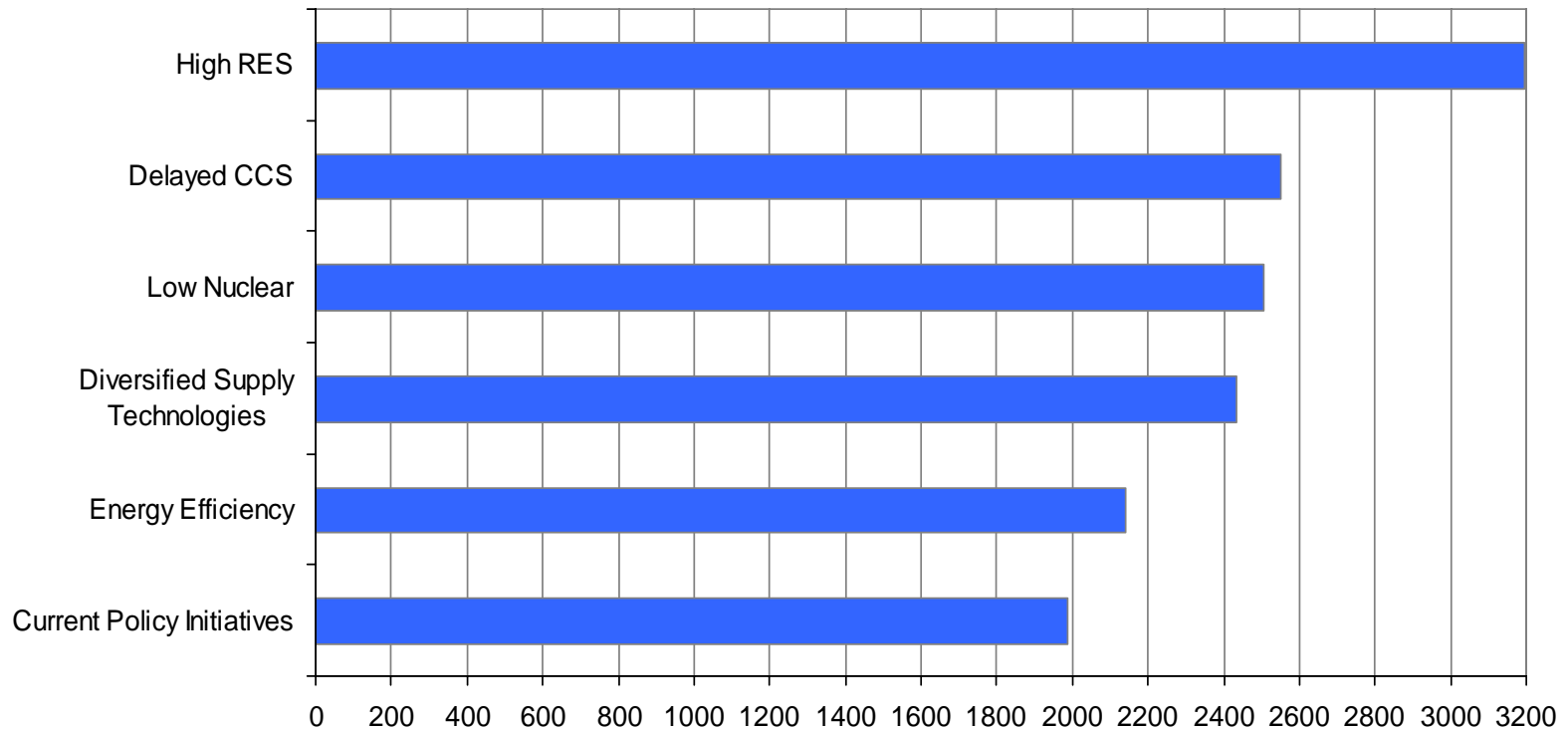
⇒ **Ensure that policy developments do not create new barriers to electricity - or gas - market integration**

● Decarbonisation is possible – and can be less costly than current policies in the long-run

- Capital expenditure increases steadily over time, throughout the system, but would anyhow be needed
- Fuel costs drop in long-run
- Investment expenditure goes into the EU economy rather than to non-EU for energy imports; households can gain more control (e.g. as micro generation increases, use of smart appliances)

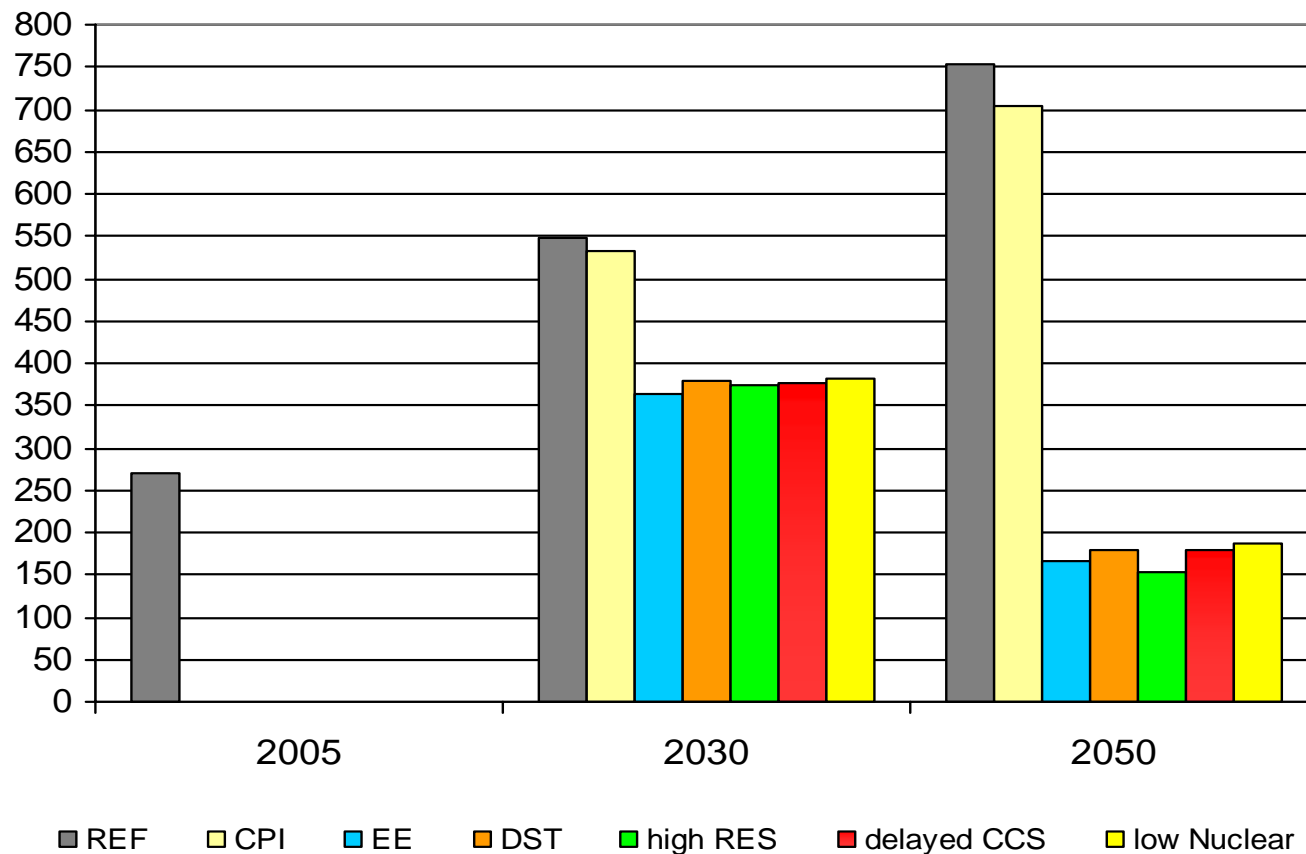
Large investment for power generation is needed

Cumulative investment expenditure for power generation from 2011 to 2050 (in billion €(08))



More investments are needed in power generation, grid infrastructure and storage.

● EU: External Fossil Fuel Bill (in bn € of 2008)



Decarbonisation brings substantial fuel bill savings in 2050 with respect to 2005 and Reference/CPI

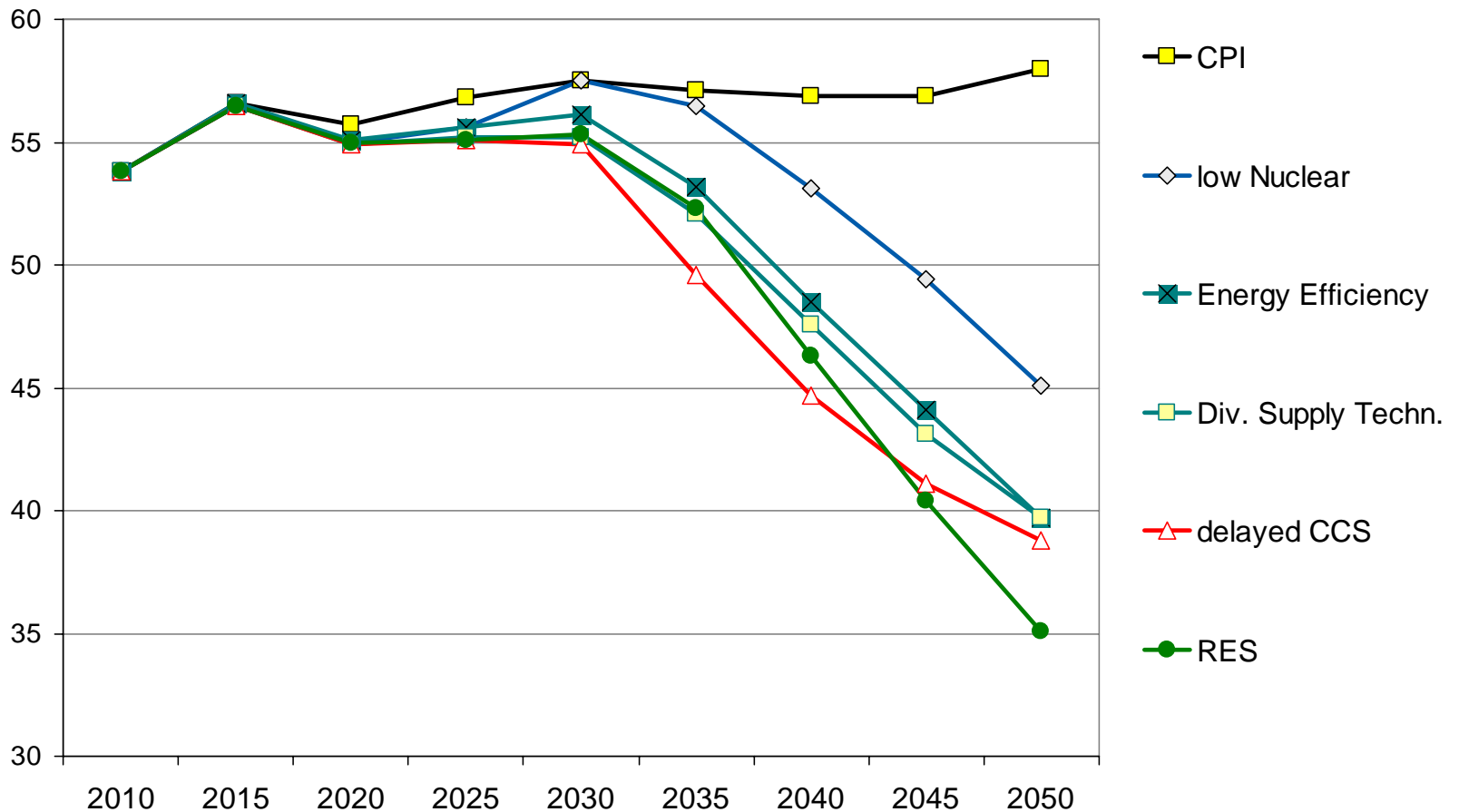
Compared with CPI the EU economy could save between 518 and 550 bn € in 2050 through decarbonisation under global climate action

Savings are largest in the high RES scenario



European
Commission

● Import dependency under current trends and decarbonisation (%)



● Act in time, act together

**Timely
Investments cost
less**

Acting timely can avoid costly changes in later decades and reduces lock-in effects

**Wider market,
best use of
resources**

A European approach can result in lower costs – with increasing trade and more renewables, a well-connected and well-functioning European market ensures, for example, that electricity is produced where it is most economical.

**First mover
advantage**

The energy system transformation will drive growth and employment in a wide range of sectors – competition for energy technology leadership is already on globally

● The Way Forward

- 2020 strategy – precondition
- No regret options: energy efficiency, renewable energy, more and smarter infrastructure
- Need for fully integrated, well-designed markets for gas and electricity
- Innovation for low-carbon solutions
- Nuclear safety
- Broader and coordinated approach

- ⇒ **(1) Develop milestones for 2030 in an iterative process with Member States, European Parliament, stakeholders**

- ⇒ **(2) Launch a dialogue on the development of future energy systems/transformation**

Thank you for your attention !

Documents:

http://ec.europa.eu/energy/energy2020/roadmap/index_en.htm