Energy Roadmap 2050

European Commission

Peter FAROSS

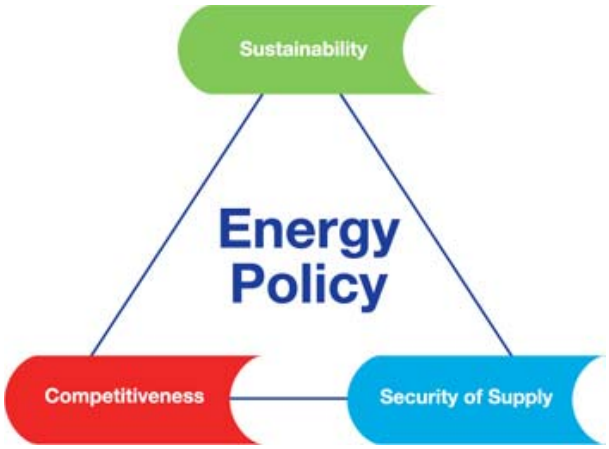
Deputy Director-General for Nuclear Energy

DG ENER, European Commission

Energy

Energy policy for Europe

- **Year 2020 objectives:**
  - increase energy efficiency by 20%
  - reduce CO_2 emissions by 20%
  - increase the share of renewable sources to 20%



- **2030 framework for climate and energy policies: what after 2020?**
- **Energy Roadmap 2050: decarbonisation**

Policy Framework for 2030

- March 2013: the Commission adopted a Green Paper on "A 2030 framework for climate and energy policies"
- The process has started with a public consultation (open until 2 July)
- The Commission intends to table more concrete proposals by the end of 2013
- It will build on the experience and lessons learnt from the 2020 framework
- CO_2 reduction target may exceed 30%

Energy Roadmap 2050:a basis for 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

Scenarios explore routes to decarbonisation of energy system

Current trends scenarios

- Reference scenario (as of March 2010)
- Current Policy Initiatives (as of April 2011)

➔ **40%** GHG reduction by 2050

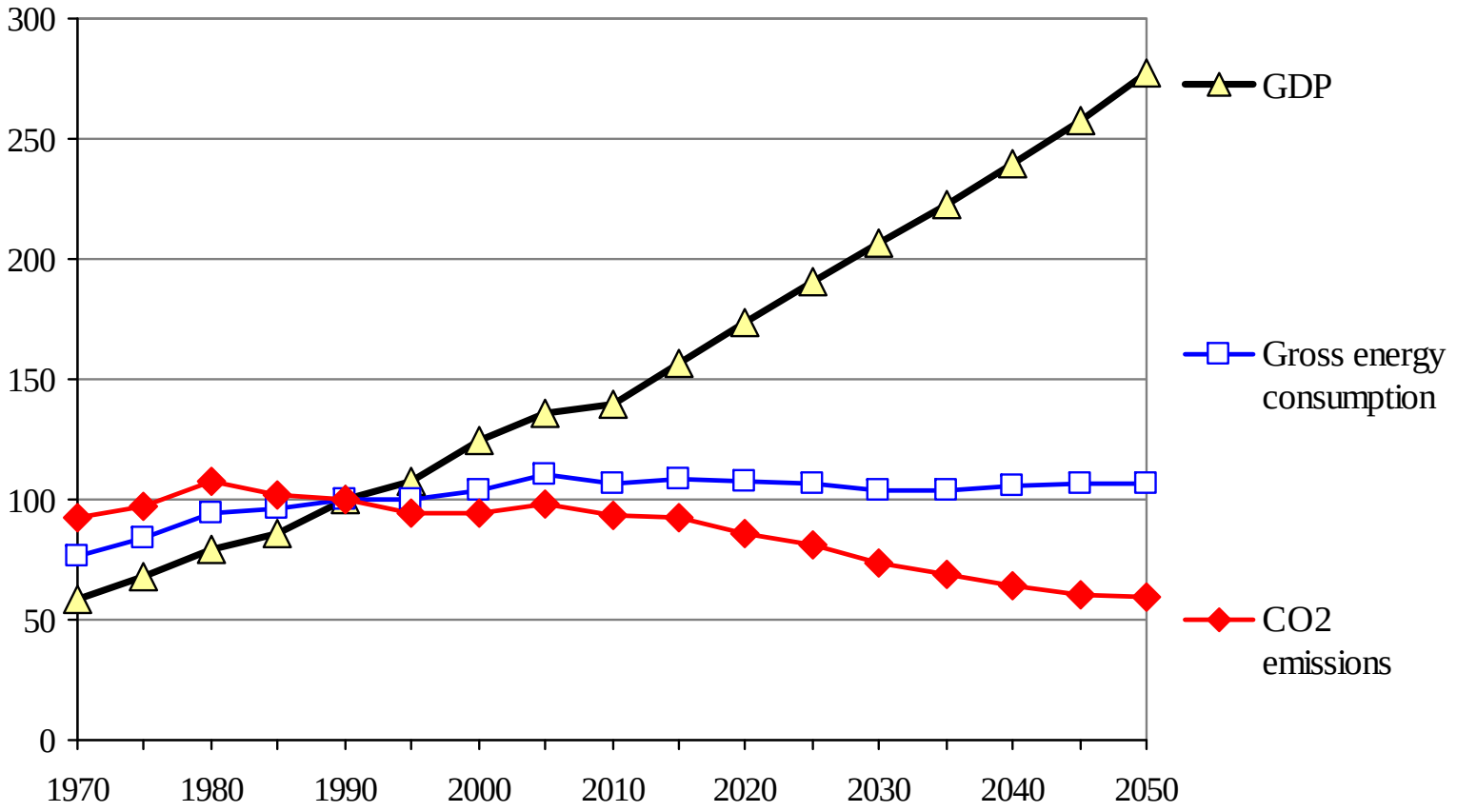
Decarbonisation scenarios

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

➔ **80%** GHG reduction

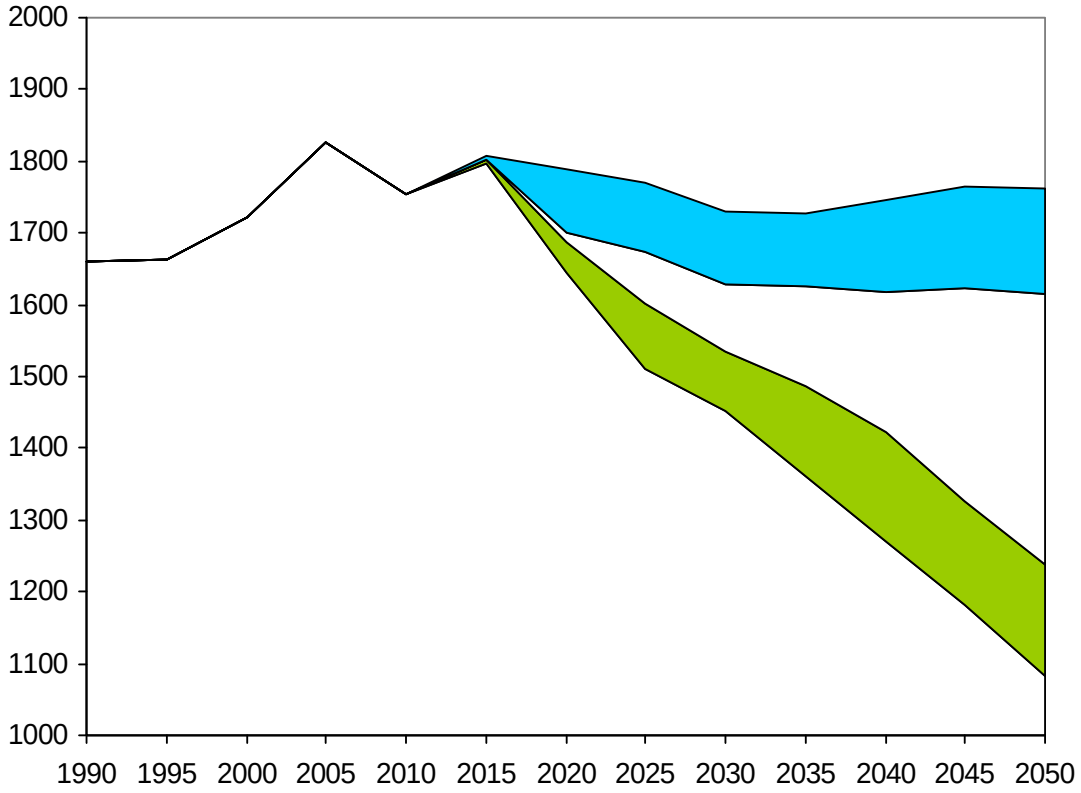
EU-27: Reference scenario

GDP, energy consumption and CO_2 emissions 40 years back and ahead (1990 = 100)



Energy savings are crucial

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

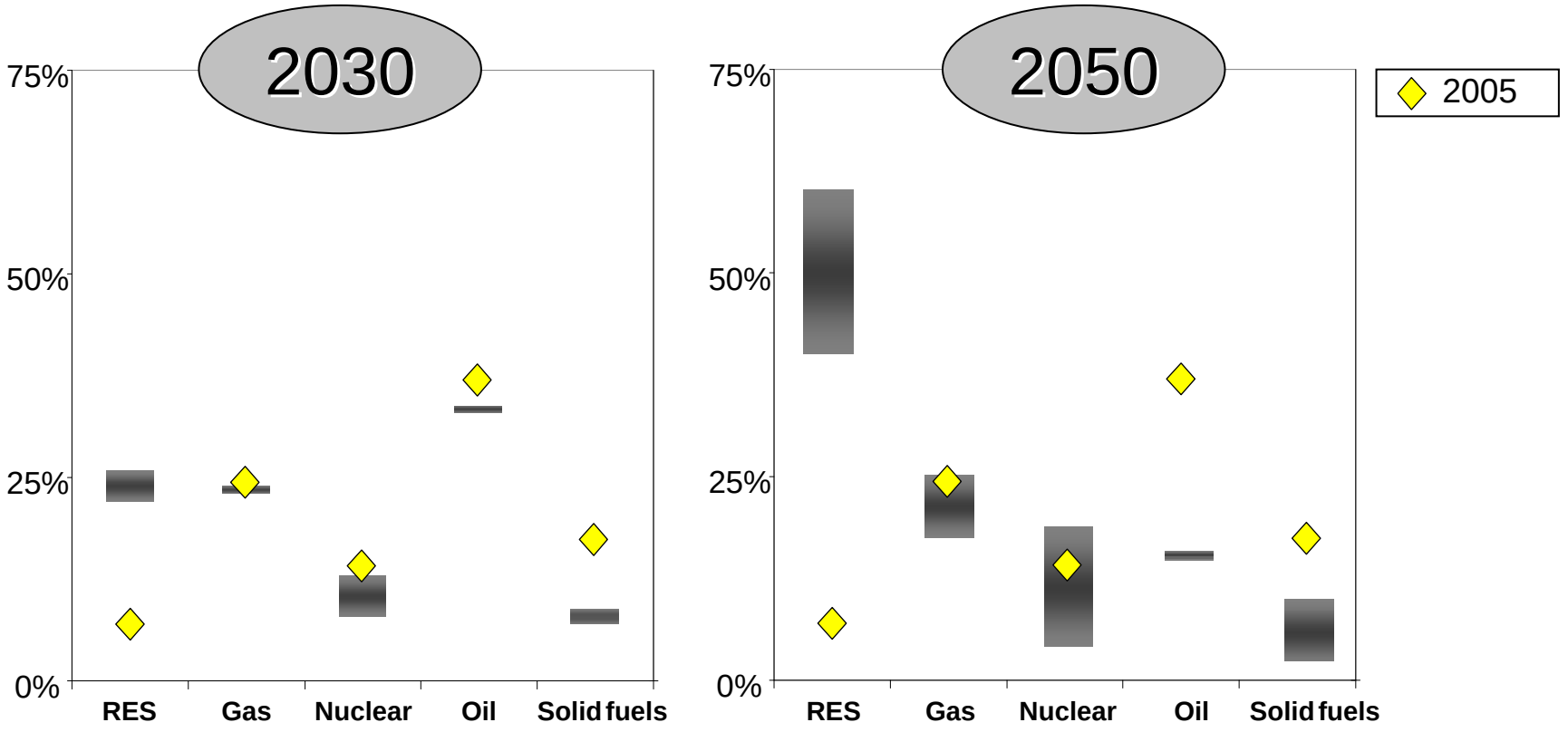


Range for current trends scenarios

Range regarding decarbonisation scenarios

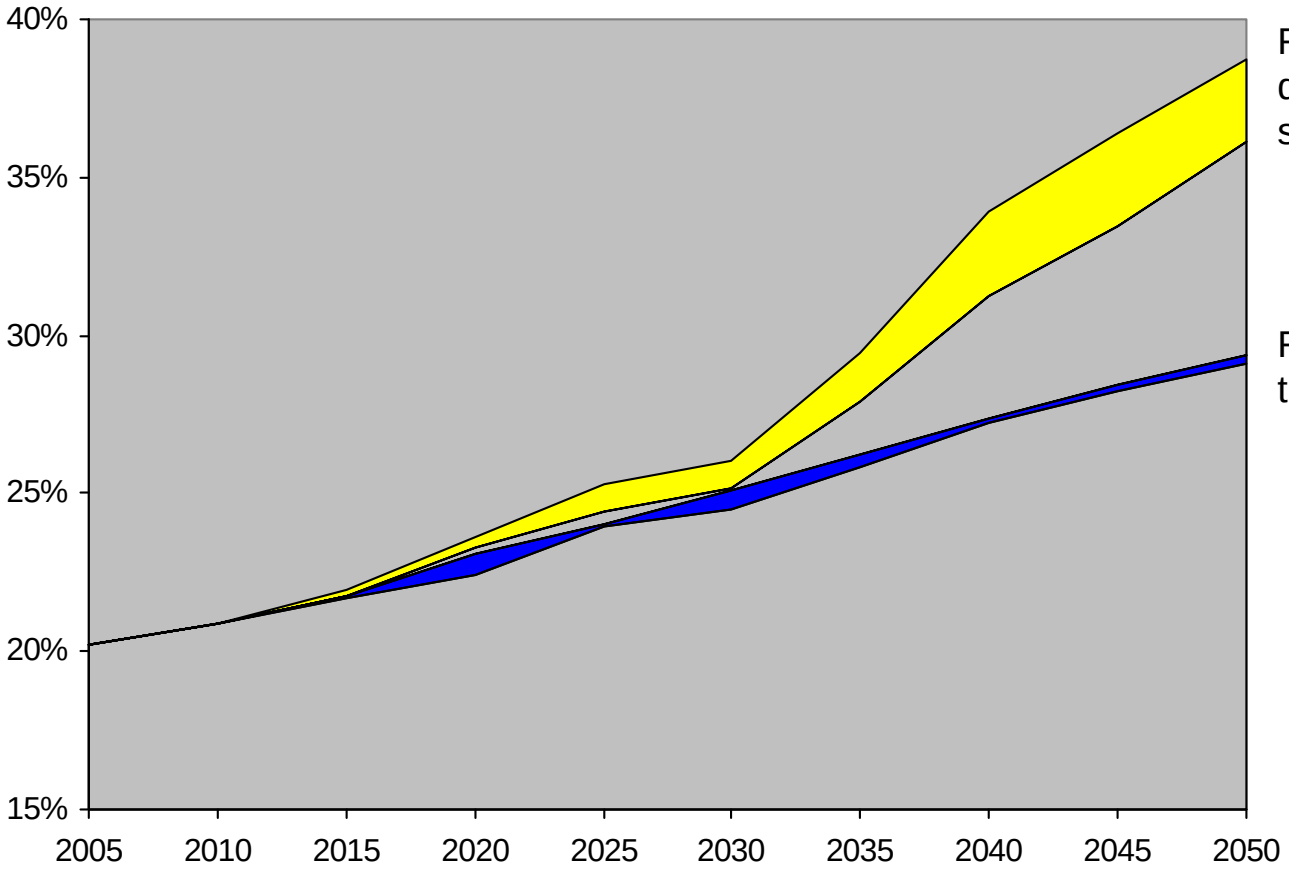
Renewables move centre stage, but all fuels can contribute in the long-run

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



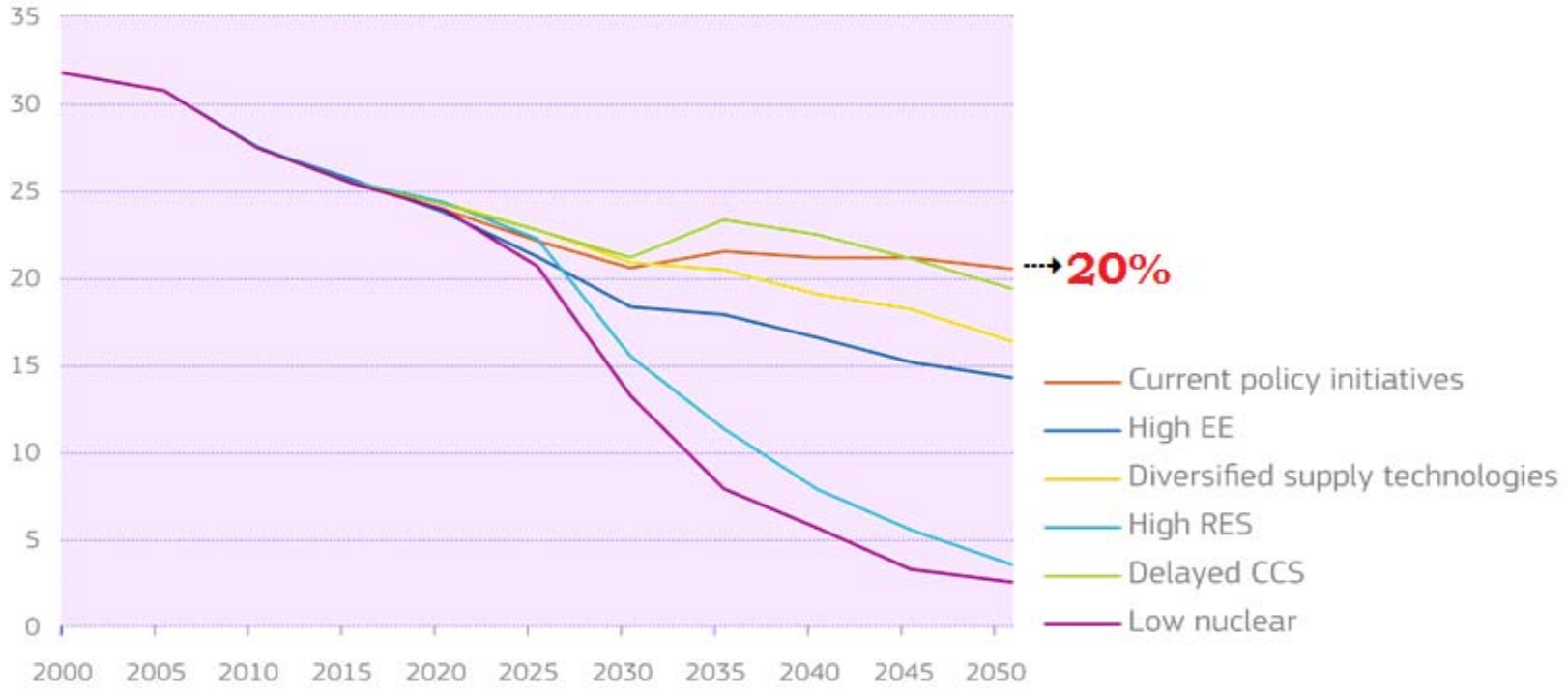
Electricity plays an increasing role

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



Role of nuclear energy depends on scenario

Share of nuclear in power generation (in %)



Source: European Commission

Nuclear production will contribute more or less, depending on the scenario.
80% GHG reduction can also be achieved with a very low nuclear contribution.

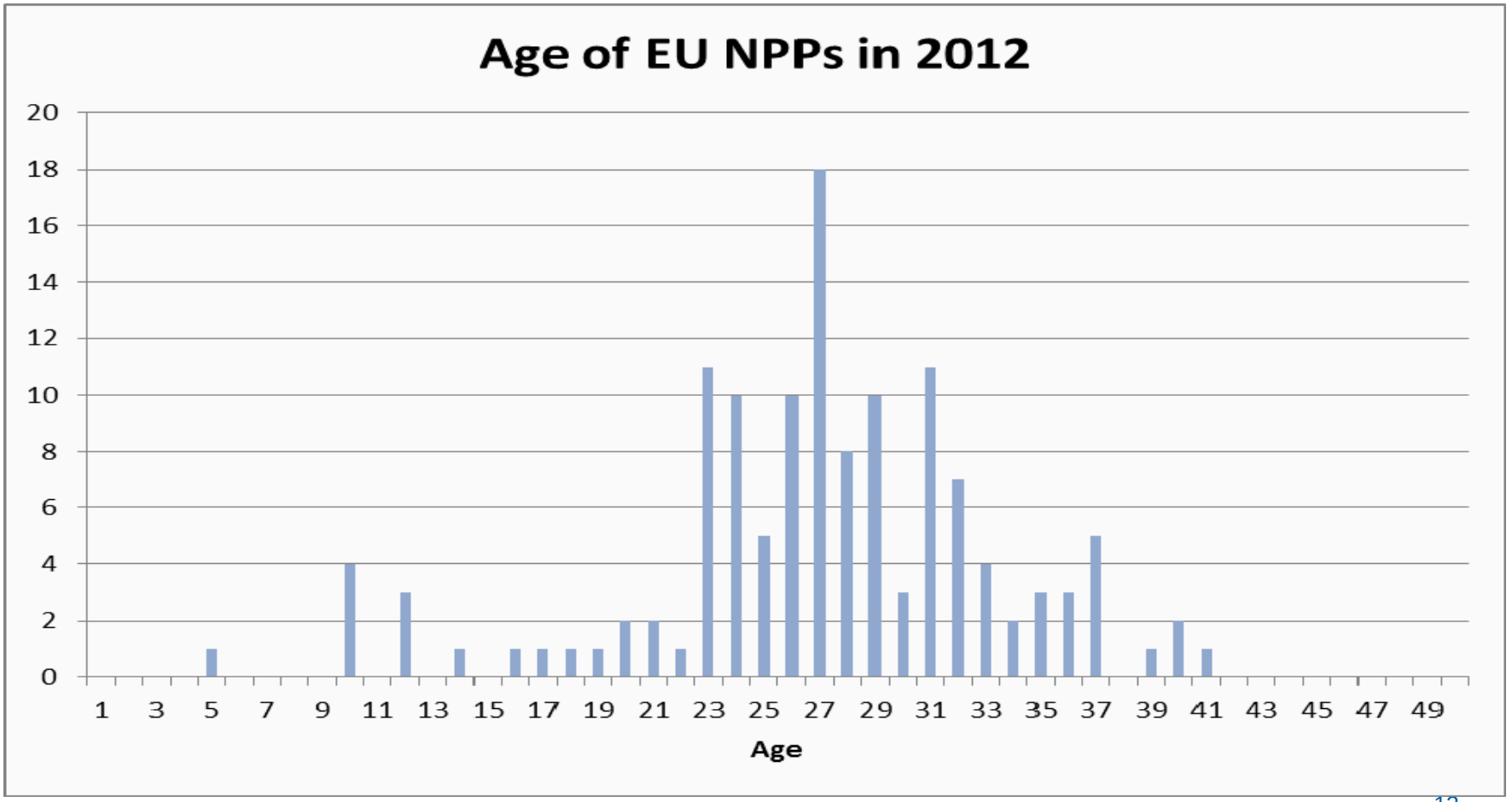
Role of Nuclear Energy

GHG reduction target in 2050	Energy RM 2050 Scenarios	Nuclear in electricity generation in 2050 [eq. capacity operating in GWe vs 125 GWe today]	
40%	Reference Scenario	26,4%	[161 GWe]
40%	Current Policy Initiatives	20,6%	[117 GWe]
80%	High Energy Efficiency	14,2%	[79 GWe]
80%	Diversified supply technologies	16,1%	[102 GWe]
80%	High Renewables	3,6%	[41 GWe]
80%	Delayed CCS	19,2%	[127 GWe]
80%	Low Nuclear	2,5%	[16 GWe]

What does 20% of nuclear electricity imply?

EU Roadmap 2050	up to 20% nuclear electricity:
4800 TWh per year	~140 Gwe (for 7000 hours per year) **100 Units of 1400 Mwe each (average)**
Today ***3100 TWh per year***	28% nuclear electricity = 125 Gwe – 135 Units Closing DE+BE+UK ageing reactors remain 100 units (LTO)
Average age of NPPs	**30 years (in EU today)**

What does 20% of nuclear electricity imply?



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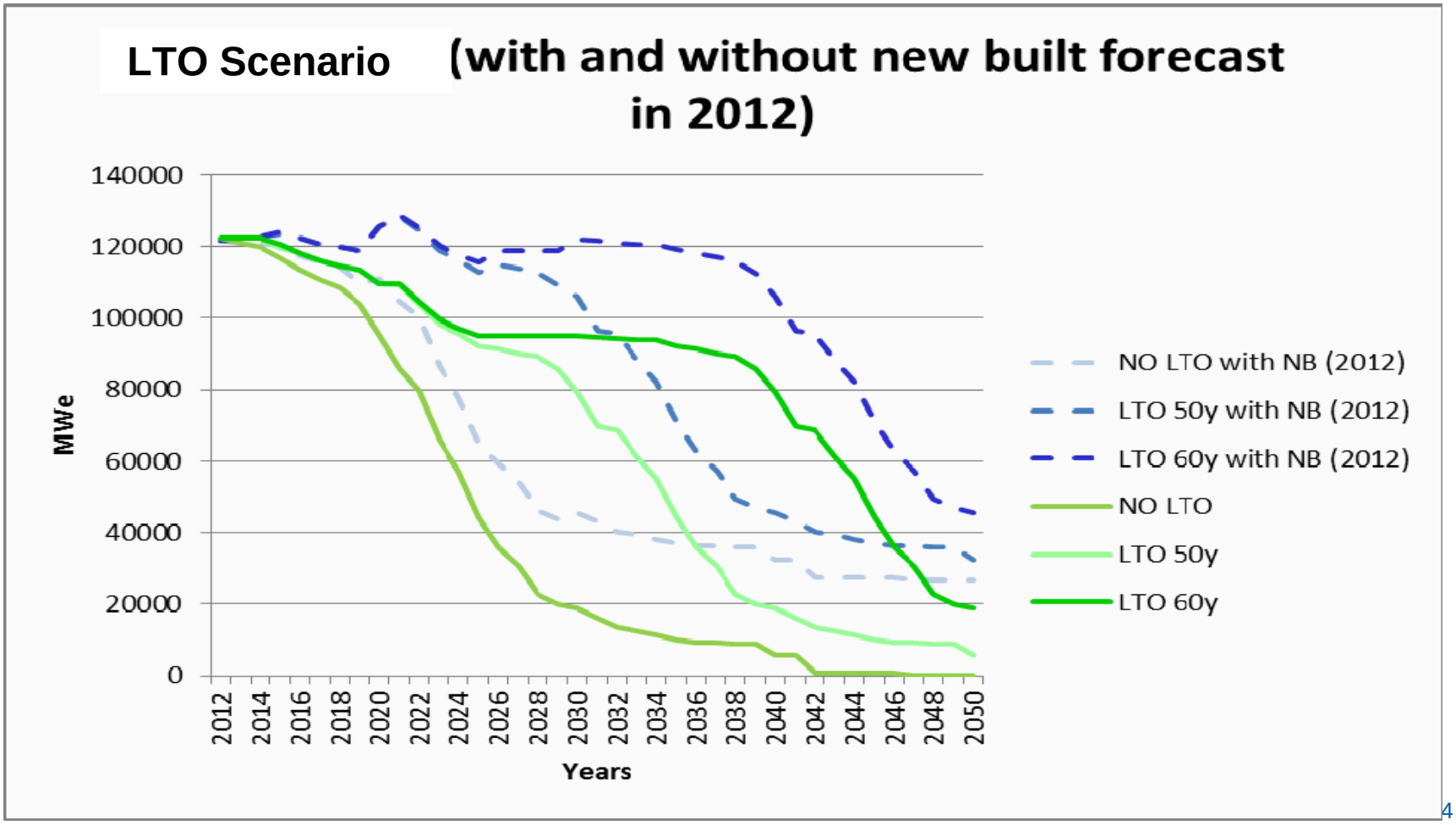


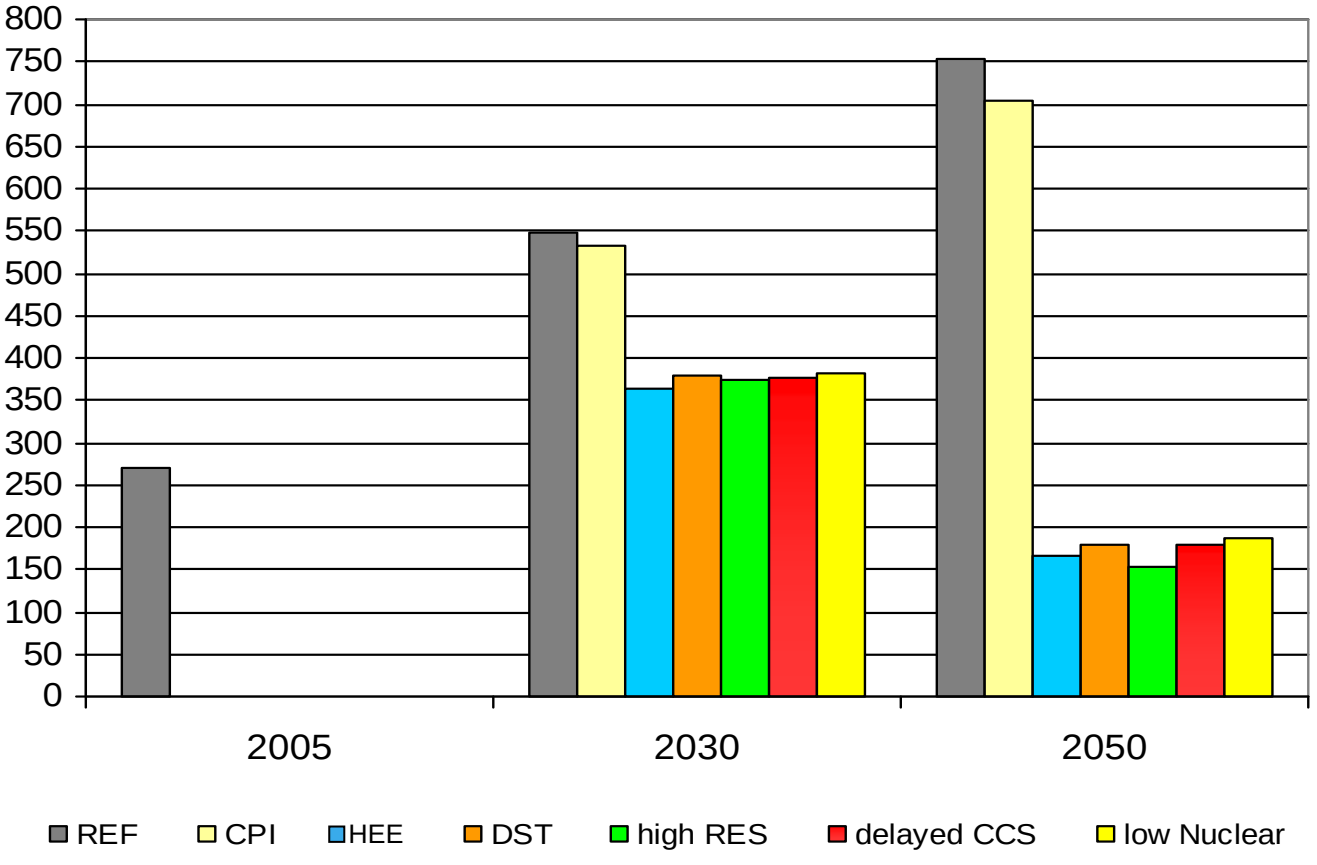
Impact on Investments, Growth and Jobs

Long Term Operation (100 Units)

New Built (100 Units)
Several units built in parallel

	Long term operation (2015-2035)	New Built (2025-2045)
Investments	900 M€ per Unit	5 B€ per Unit
Jobs **900,000 (base)**	In addition **50,000 jobs** (LTO + ST upgrades)	In addition **250,000 jobs** (New Built)
Value added **70 B€/y (base)**	In addition **5 B€/y**	In addition **25 B€/y**

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

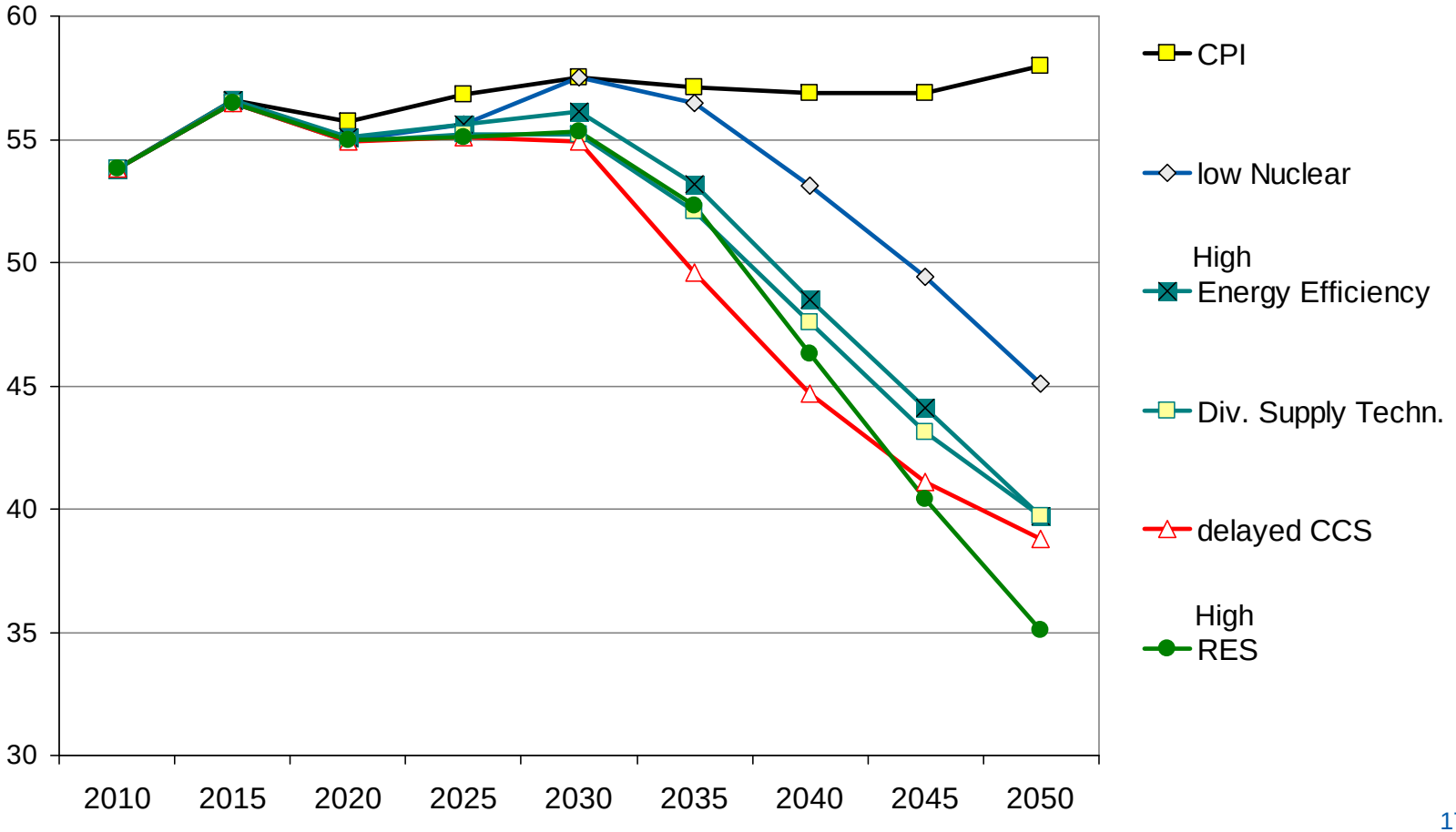


Decarbonisation brings substantial fuel bill savings in 2050 with respect to 2005 and Reference/CPI

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

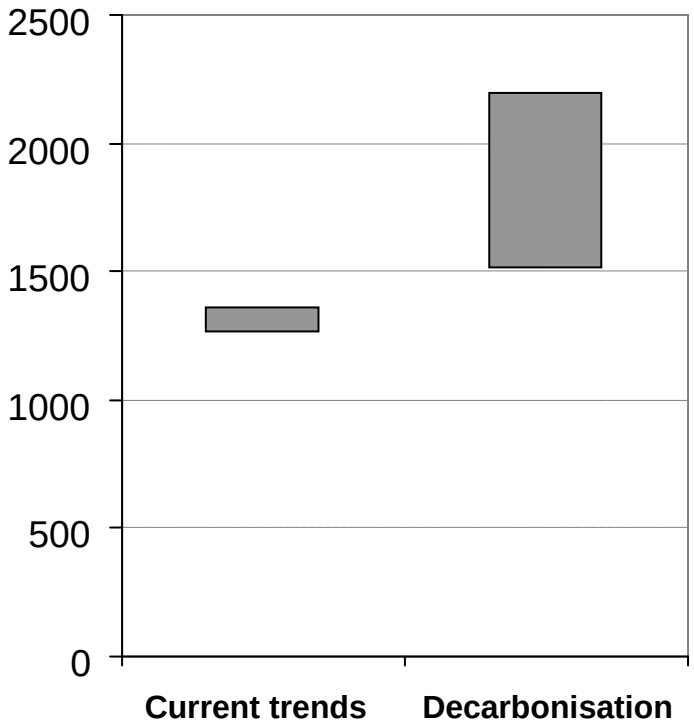
Import dependency under current trends and decarbonisation (%)



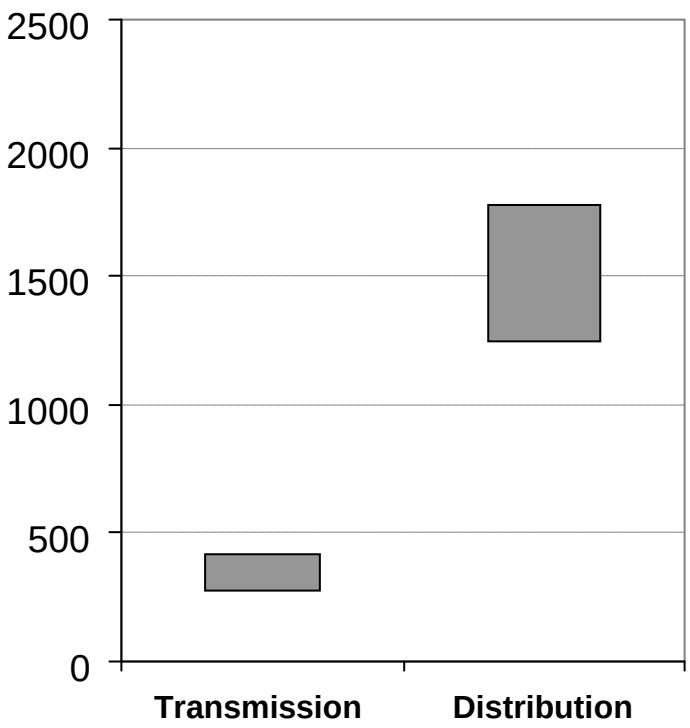
Grid investment costs increase

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

Grid investment (current trends and decarbonisation)



Transmission and distribution in *decarbonisation* scenarios



The Way Forward

- 2020 strategy (20-20-20) – 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**