

# Barriers to low carbon growth: lessons from EU Roadmap 2050

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The objective is to develop a fact based report that is supported by key stakeholders and feeds in directly to EU decision making

### Key deliverables

- A set of **plausible and visionary emissions pathways with an 80% reduction** across the EU-27 below 1990 levels by 2050
- Deep dive on the **decarbonization of the power sector**
- Implications on **strategic options** for the EU
- A related **set of policy options** highlighting potential decisions for the next 5 years

### Overarching objective

Develop a **fact based report** to support the European Commission and Member State policy-makers to chart an energy strategy for 2010-2014 consistent with the EU's 2050 climate and energy security commitments



### Political agenda

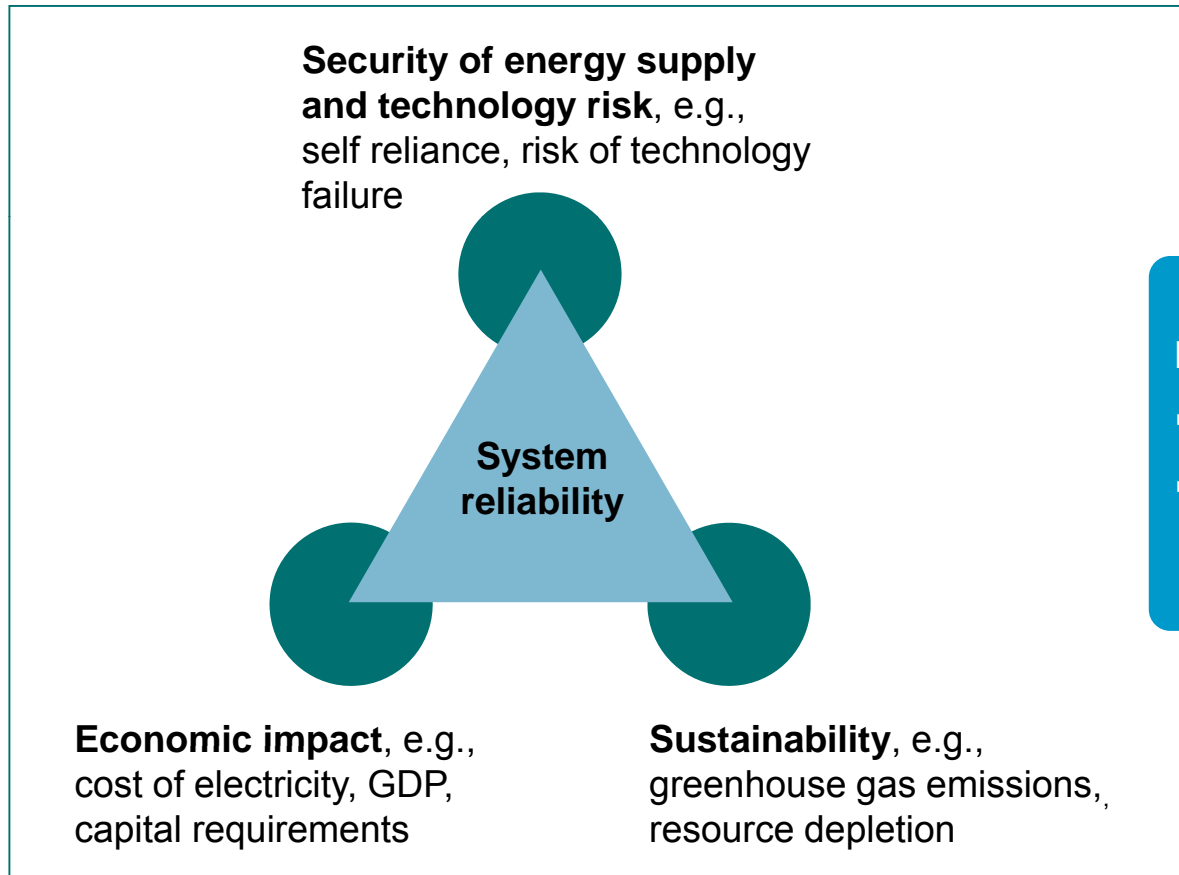
Post-Copenhagen **political agenda for the new European Commission**

- **June 2010**
  - Commission to publish an "issues paper" on 2050 strategy and launch stakeholder consultation
- **November 2010**
  - Commission to present European Infrastructure Package
- **Early 2011**
  - Commission to present Communication on 2050 Energy Strategy
  - Commission to present Energy Action Plan 2011-2014



The decarbonization pathways should be sustainable, technically feasible and have a positive impact on the economy

### Assessment criteria



**Not assessed:**

- Public acceptance
- National energy policies



## Back casting first solves 2050 and works back to today



- Power demand by sector after efficiency measures
- Impact of transport, building and industry electrification

- Feasible (not optimized) power production mixes that produce close to zero emissions
- Grid designs that deliver today's reliability

- Build up of power demand, generation and grid construction
- All plants retired at end of assumed lifetime (e.g., coal plants retired after 40 years)<sup>1</sup>. There is no need for early retirement of existing assets

- Comparison by pathway on cost of electricity, reliability, capex, macro-economic implications, energy security
- Sensitivities on fuel cost, capital cost, learning rates, etc.

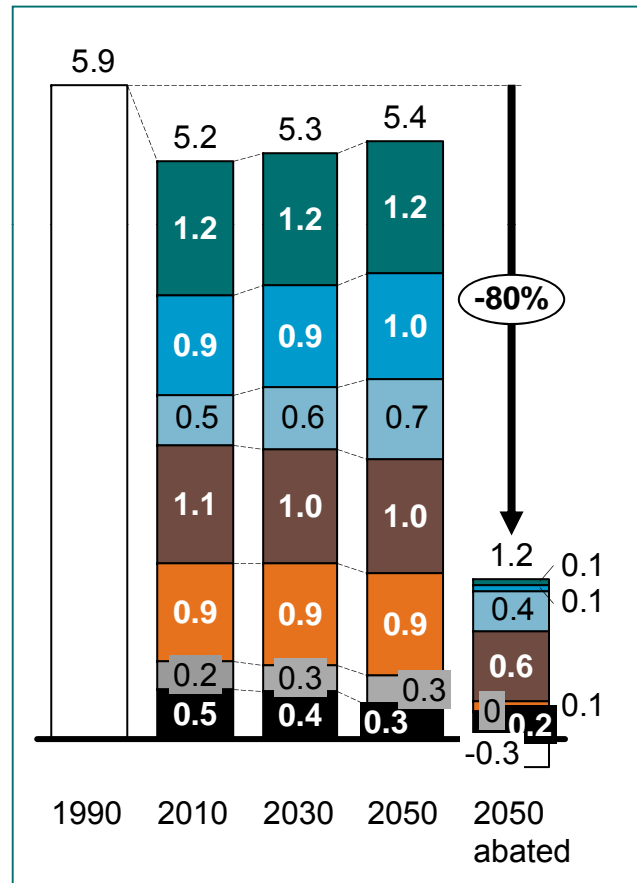
<sup>1</sup> See chapter 3B for assumed lifetime of plants



# 80% decarbonization overall means nearly full decarbonization in power, road transport and buildings

GtCO<sub>2</sub>e per year

EU-27 total GHG emissions



Sector

- Power
- Road transport
- Air & sea transport
- Industry
- Buildings
- Waste
- Agriculture
- Forestry

Total abatement

- 95% to 100%
- 95%
- 50%
- 40%
- 95%
- 100%
- 20%
- 0.25 GtCO<sub>2</sub>e

Abatement within sector<sup>1,2</sup>

- >95%
- 20%
- 30%
- 35% (efficiency, CCS<sup>3</sup>)
- 45% (efficiency)
- 100%
- 20%
- Carbon sinks

Abatement from fuel shift

- 75% (electric vehicles, biofuels and fuel cells)
- 20% (biofuels)
- 5% (heat pumps)
- 50% (heat pumps)

1 Abatement estimates within sector based on the McKinsey Global GHG Cost Curve  
 2 Large efficiency improvements are already included in the baseline based on the IEA WEO 2009, especially for industry  
 3 CCS applied to 50% of large industry (cement, chemistry, iron and steel, petroleum and gas, not applied to other industries)



## Key findings

- For an 80% reduction of GHG emissions by 2050 in Europe a near zero carbon electricity supply and a strong electrification of transport and the built environment is needed
- A zero carbon electricity supply in Europe (with current reliability) by 2050 is technically and economically feasible with existing technologies, but demand reduction is essential
- A very high share of renewable sources (upto 80% in Europe or 100% with use of North African sources) is feasible without storage facilities and with only 10-15% back-up capacity
- Key requirements :
  - a full integration and strong expansion of the European grid, requiring large investements that have to happen early on
  - integration of policy and systems operation
  - avoiding investments in high carbon options
- Average electricity costs for the decarbonisation options are about the same as those for the baseline and cost of energy per unit of GDP declines faster than in baseline
- Energy supply security is greatly enhanced



But ....

## Barriers to implementation:

- Resistance from vested interests (nuclear, gas)
- Conventional wisdom on limits to renewables (back-up, costs); believing the cost estimates
- Fossil fuel subsidies and ignoring fossil fuel risks
- Effective policies to realise strong energy efficiency improvement
- Making decarbonisation happen fast
- Realise European grid expansion and integrated system management
- Ensuring transition can be financed
- Transform transport system
- Electrify built environment
- .....



**Report and various summaries can be downloaded  
from**

**[www.roadmap2050.eu](http://www.roadmap2050.eu)**