

Low carbon scenarios for Europe: summary of key points

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Scope: EU25 total energy flows and emissions from national energy consumption.

Objectives. Reduction of CO₂ and other emissions and improved energy security: 'Non-End-Of-Pipe' (NEOP) options in the following categories reduce fossil fuel use and simultaneously achieve objectives:

		Category	Examples
1	NEOP	Behavioural change	Smaller cars, lower speeds, less aviation demand growth
2	NEOP	Demand management	Building insulation, low energy appliances
3	NEOP	Improved energy conversion	Condensing boilers, CHP, Combined Cycle Gas Turbines
4	NEOP	Fuel switching	From coal and oil to gas and renewables
5	EOP	End-of-pipe	Flue gas desulphurisation, catalytic converters

Six scenarios for each EU25 country were constructed to reach these objectives using different combinations of NEOP options:

Label	Target: % CO ₂ reduction	Target: Reduction date	Nuclear	EOPs
EU30pc20N	30	2020	New	Mix
EU40pc20N	40	2020	New	Mix
EU30pc20NN	30	2020	No new	Mix
TecNN			No new	Maximum technology
BehNN			No new	Maximum behavioural
TecBehNN			No new	Maximum technology and behaviour

The main findings

- Large CO₂ reductions possible
- Date and rate of introduction of NEOP measures critical
- Large energy demand reduction feasible with technologies in all sectors except aviation and shipping.
- Behavioural change very important, especially in car choice and use, and air travel.
- A shift from fossil fuel heating to solar and electric heat pumps
- A shift from fossil electricity generation to a mix of renewables
- Main problem is replacing fossil liquid transport fuels, especially for aircraft and ships.

- Large renewable electricity potential and Europe might become a net exporter of electricity, but remain a large importer of gas

Issues arising

- International aviation and shipping should be included in inventories because their emissions will become very large fraction of total
- Better detailing of technology needs and priorities (e.g. solar PV)
- Further exploration of how to replace fossil liquid fuels with synthetic fuels of electricity
- System dynamics of European electricity need to be explored.

Policy

- Energy security is a large driver of energy policy.
- Rate of introduction of measures is important.
- How to implement NEOP options in each sector, especially behavioural?
 - Fuel efficient design and use of cars
 - Freight transport demand
 - Air transport demand
 - Retrofit of demand management and energy efficiency to buildings

Analysis – data and tools

The critical need is for accessible, comprehensive and consistent data across the EU25 so that energy demand, demand management and renewable supply can be analysed and modelled.

For example;

- Behavioural information – temperatures in buildings, driving speeds.
- Details of building stocks and energy efficiency levels
- Details of the demand structure of passenger and freight transport
- Breakdown of industrial demand by end use
- Current efficiency of end-use appliances, boilers, etc
- Information about the potential supply and costs from all renewables

A comprehensive database of technologies for demand management and supply, with projections of technological development, would also be useful.