

POWERING CARBON NEUTRALITY IN EUROPE BY 2050

EDF'S NET ZERO SCENARIO



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EDF contributes to the European debate by presenting an optimized scenario for achieving carbon neutrality in 2050, based on a technical-economic analysis.

01

SHARP REDUCTION IN ENERGY DEMAND THANKS TO MASSIVE ELECTRIFICATION OF USES AND ENERGY EFFICIENCY

The Net Zero 2050 objective requires a very significant acceleration in the reduction of greenhouse gas emissions. To do so, a dramatic transformation in energy demand is required. Two guiding principles stand out: minimizing the use of fossil fuels and reducing final energy demand. It can be achieved by maximizing three main levers:

- The first two: **the electrification of uses** and **energy efficiency beyond electrification** are essential levers for reducing final energy demand.
- **Behavioural changes** are also a lever for reducing energy consumption, it is nevertheless socially and politically sensitive.

The necessary transformation will require efforts from all players and will have a cost, hence the importance of making appropriate choices to minimize the cost of the transition.

Then, to meet the remaining energy needs, 3 energy vectors will have to be mobilized :

- **Electrons** will play a growing role in the energy mix, with two priorities for action: mass electrification of uses in light transport and buildings, and support for electrification of industrial processes.
- **Bioenergies'** supply is limited, so they should be reserved for uses for which there are no decarbonized alternatives.
- **Decarbonized molecules** will have a role to play in the decarbonized energy mix in the long term, but their use must be targeted because of their high costs and high energy requirements.

02

ENERGY PRODUCTION: A KEY ROLE FOR DECARBONIZED ELECTRICITY, COMPLEMENTED BY BIOENERGIES AND DECARBONIZED MOLECULES

03

ELECTRICITY GENERATION: AN ELECTRICITY MIX BASED ON ALL DECARBONIZED GENERATION TECHNOLOGIES

The electricity generation mix in 2050 should be a **diversified mix of renewable energies including hydropower, nuclear and decarbonized thermal generation**. This mix takes advantage of the complementarity between intermittent renewable energies and controllable sources such as nuclear, hydropower and decarbonized thermal plants.

This transformation will imply **major changes to the electricity transmission and distribution networks**, requiring significant investments. Investing in infrastructures is a priority, and efficient electrical networks will be essential to make this energy system work.

Tomorrow's electricity system will also need **greater flexibility and storage**, with a range of solutions on the generation side, such as nuclear and hydropower (incl. pumped storage), batteries, as well as on the demand side such as electric vehicles smart charging and demand-side response.

The scenario prioritizes the electrification of uses, an efficient lever to reach the climate objectives. **Analysis shows that failing to deliver on electrification of uses would seriously jeopardize the trajectory to Net Zero, and delay decarbonization by 10 years, while being at the same time costlier.** It is therefore imperative to promote efficient electrification and maintain robust CO₂ prices, to avoid endangering Europe's climate objectives as well as economic competitiveness and European sovereignty.

This optimized scenario enables reaching Net Zero by 2050, with an intermediate step of a 55% reduction in emissions by 2030 compared to 1990 levels. Priority actions and levers to reach -80% CO₂ emissions in 2040 would need to be significantly strengthened and complemented to reach -90% with a regulatory framework must clear and robust, relying on :

- ➔ An ambitious **EU electrification strategy**,
- ➔ **Robust CO₂ prices**, giving long-term visibility to investors,
- ➔ A **technology-neutral legislation** and a fair access to EU funds for all zero- and low-carbon techs,
- ➔ The acceleration in innovation in disruptive technologies (including carbon capture and storage technologies),
- ➔ A support for European industrial value chains preserving the competitiveness of the European industry and, more broadly, the economy,
- ➔ A special attention to the burden sharing of the aggregate cost of the transition, remaining mindful of its impact on the standards of living and way of life of European citizens.

04

ACHIEVING CARBON NEUTRALITY IN A COST-EFFECTIVE WAY, CONTRIBUTING TO EUROPEAN SOVEREIGNTY