

What does the study say?

Hydrogen4EU explores **2 pathways** for a mix of hydrogen technologies to be deployed across sectors in Europe. **Both pathways** meet the EU's 2030 55% GHG emission reduction and 2050 climate neutrality targets. The difference lies the mix of technologies deployed.

TECHNOLOGY DIVERSIFICATION PATHWAY

Based on approved national targets
Assumes no obstacles to the deployment of different technologies & accurate market foresight.
Looks at decarbonisation technologies that enable a more competitive and cost-efficient energy system

RENEWABLE PUSH PATHWAY

Prioritises the use of renewable energy beyond current policy goals.
Hydrogen considered key to help absorb, store, and transport the additional energy resulting from higher renewables generation.

Total energy system costs are €40 billion per year lower in the Technology Diversification pathway

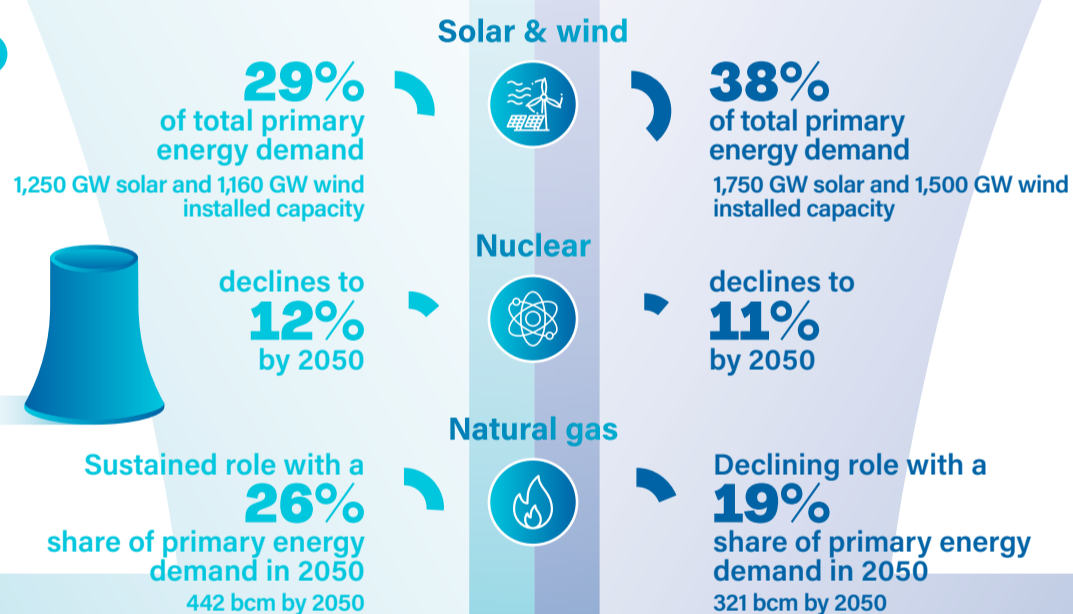
Total share of renewable energy in the final energy consumption in 2050



Cumulative hydrogen production capacity roll-out from now to 2050



Energy mix by 2050



Hydrogen import potential



Key sectors impacted by hydrogen



TRANSPORT

In 2050 hydrogen-based solutions in transport require more than 50 Mt of hydrogen and represent more than 40% of the sector's energy demand.



INDUSTRY

Industrial hydrogen demand reaches some 43 Mt by 2050 (nearly 40% of the sector energy demand).



BUILDINGS

The amount of hydrogen in final consumption is between 2 and 4 Mt (up to 3% of market penetration).



POWER

Electrolysis from solar and wind power helps integrate renewable electricity and mitigate curtailment and grid congestion. Peak hydrogen-fuelled units show potential to generate more than 50 TWh by 2050 (2 to 3 Mt).

Methodology

MIRET-EU. A model that encompasses the entire lifecycle of an energy system from primary resource to utilisation.
Integrate Europe. A model that analyses the impacts of technology learning on the cost effective transition to an emission-free European Energy system.
Hydrogen Pathway Exploration. This provides the MIRET-EU and Integrate Europe model with low-carbon renewable hydrogen imports from neighboring EU countries.
Methane emissions module calculates the upstream, midstream and downstream methane footprint of natural gas and all of its products, providing MIRET-EU and HyPE with CO_{2eq} methane emissions of natural gas, LNG and low-carbon hydrogen.