

What is Hydrogen4EU?

A cross-sectoral research project aiming to inform the potential contribution of low-carbon and renewable hydrogen in reaching the EU's goal to reach net zero emissions.

What does the study say?

Hydrogen4EU **explores 2 pathways** for a mix of hydrogen technologies to be deployed across sectors in Europe. Both pathways depart from current EU decarbonisation targets of 55% by 2030 and climate neutrality by 2050, with the share of renewable energy in primary energy demand increasing significantly in both pathways.

Both pathways enable the EU to reach net zero by 2050. The difference lies in which mix of technologies are 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 carbon efficient energy system.

RENEWABLE PUSH PATHWAY

Prioritises 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 share of renewable energy in the primary energy demand in 2050

49%
(stabilising at 717 Mtoe by 2050)



61%
(stabilising at 868 Mtoe by 2050)

Cumulative investments in the hydrogen value chain from now to 2050

€3.1 Trillion



€5.5 Trillion

To note, investments in hydrogen infrastructure amount to €900 billion of cumulative investments in the two pathways.

Energy mixes

27%
of total primary energy demand



39%
of total primary energy demand

declines to
12%
by 2050



declines to
8%
by 2050

increases to
32%
by 2050



does not increase beyond current level by 2050

Hydrogen import potential

15%
of total hydrogen supply in 2050 (in RP)



9%
of total hydrogen supply in 2050 (in RP)

Key sectors impacted by hydrogen

TRANSPORT

In 2050 the share of hydrogen-based solutions in transport is more than 40% of the sector's energy demand.

INDUSTRY

Industrial hydrogen demand reaches some 45 Mt by 2050.

BUILDINGS

In the buildings sector, the amount of hydrogen in final consumption is between 4 and 12 Mtoe (up to 3%).

POWER

Hydrogen produced by electrolysis from solar and wind power helps to mitigate curtailment and grid congestion.

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