

SURFING THE RENEWABLE ENERGY WAVES WITH HYDROGEN



The SURFER project kicked off at SINTEF in Trondheim, January 21-22, 2026. Photo: SINTEF

A new EU-funded project will support Europe’s energy transition by creating more resilient, decarbonised energy systems by advancing hydrogen electrolysers.

Variable renewable energy sources (VRES), such as solar and wind, have become the cheapest energy sources available. However, the intermittent nature of VRES presents significant energy storage issues, and this has limited their deployment. At the same time, the production of green hydrogen from electrolysers is projected to represent a significant fraction of the energy usage in Europe’s future, decarbonised energy system. As electrolysers are very quick to start and stop, hydrogen can function as an energy buffer for renewable energy.

Flexible electrolysers for resilient grids

The Clean Hydrogen Joint Undertaking’s project SURFER — Supporting Uptake of Renewables with Flexible Electrolysers for Resilient energy systems — aims to facilitate the widespread deployment of variable renewable energy sources by demonstrating the use of flexible electrolysers as dynamic energy buffers. It also aims to stabilise multiple types of energy networks, focusing primarily on power grids, but also considering heat valorisation and isolated or weak grids.

“SURFER addresses two of Europe’s key energy challenges at once: reducing the cost of green hydrogen and enabling higher adoption of renewables”, says project coordinator at SINTEF, Dr. Federico Zenith.

“SURFER gives us the opportunity to bring real-world operational expertise to the forefront of Europe’s hydrogen transition. By coordinating the first demonstration site with our partner Lhyfe and enabling hydrogen assets to interact dynamically with electricity markets, we are turning Hydrogen flexibility from a

concept into an operational reality. Our role is to ensure that these technologies perform reliably under real grid conditions while revealing new economic pathways for operators. This project is a chance to show how practical deployment and market integration can accelerate the emergence of a resilient, low-carbon hydrogen ecosystem.”; highlights Bouchra Chevalier, Project Manager at Energy Pool.

SURFER's multi-disciplinary consortium consists of leading research institutions, hydrogen producers, grid operators, equipment manufacturers, and safety and certification experts. Together they will address the complexities of electrolyser dynamics and energy system integration, significantly advancing beyond the state-of-the-art.

The main goal of the project is to enable electrolysis plants to make additional revenues from power grid stabilisation, also making the latter more resilient and decarbonised with increased VRES adoption and maximisation of their use. The project will improve energy security and drive down costs, thanks to additional sources of revenues and heat integration, thus supporting Europe's energy transition goals.

Multiple demonstration sites across Europe

Through multiple demonstrations across diverse European sites, including operational environments in France, Germany, and Norway, the project will improve the integration of these electrolyser technologies into the energy system. The partners will be the first in the world to provide grid services with electrolysis plants on a commercial basis.

The project will demonstrate the capabilities of Proton-Exchange Membrane Electrolyser (PEMEL), Alkaline Electrolyser (AEL) and Solid Oxide Electrolyser (SOEL) to rapidly modulate their operation to accommodate variations in renewable energy supply, grid demand and waste heat when available. The partners have made available their already existing, large-scale sites, rated up to 10 MW for PEMEL, 1.5 MW for AEL and 300 kW for SOEL.

Partners:

- SINTEF, Norway
- Lhyfe, France
- CEA, France
- TecNALIA, Spain
- Varanger Kraft, Norway
- Atmen, Germany
- RTE, France
- Energy Pool, France
- Genvia, France
- DNV, Norway and Netherlands
- Fraunhofer IWES, Germany
- Nidec, France



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