

# Hydrogen economy's success lies in underground storage



**Hydrogen storage is important for a secure renewable energy supply as it can help to balance fluctuations in electricity produced by wind and sun. The Clean Hydrogen Partnership is funding R&I projects that are studying how best to store large volumes of 'green' hydrogen underground, understand the challenges, map potential sites and prepare demonstrators.**

## Greater renewable energy demand

Hydrogen storage in salt caverns has been done since the 1970s in Europe, but not in porous reservoirs like depleted gas fields or aquifers. HYSTORIES and HyUSPRé projects have identified suitable porous reservoir sites for hydrogen storage and studied the economic, environmental and technical requirements needed to exploit them.

HYSTORIES has produced a [database](#) of hydrogen storage sites in the EU's 27 Member States countries and four neighbouring countries. Meanwhile, HyUSPRé developed an interactive map of potential storage sites in depleted gas fields and aquifers and a [roadmap](#) for the deployment of underground storage up to 2050. EUH2STARS has started work on the first demonstration site located in Austria.

## Preparing demonstration sites

Laboratory experiments and computer modelling have allowed for better understanding of the technical feasibility and risks of underground hydrogen storage. Costs estimates were done, taking into account the sites' proximity to renewable energy infrastructure. HyUSPRé's roadmap to 2050 shows how underground storage can contribute to a zero-emission energy system in the EU.

EUH2STARS, which began in January this year, will aim to demonstrate competitive hydrogen storage in depleted natural gas reservoirs at technical readiness level 8 – a complete and qualified system – by the end of the decade.

## REGULATIONS, MICROBES AND PUBLIC ACCEPTANCE

In addition to developing regulations and ensuring public acceptance, more work is needed to understand the geochemical, microbiological, flow and transport behaviour of hydrogen in porous reservoirs.

## INSIGHTS FOR DECISION-MAKERS

HYSTORIES and HyUSPRE have laid the foundation for commercial-scale underground storage. EUH2STARS' demonstrator sites in the European regions will show how the technology can be replicated.

**The goal?** Pilot projects will help build storage capacity in line with the development of a trans-European hydrogen transport infrastructure. Use of underground storage will reduce the need for transport infrastructure between countries and enable stronger integration of renewables into the European energy system.

**Key results?** Technical and socio-economic studies and mapping have provided insights about cost, storage capacity and suitability to help government and industry decide which sites to exploit and how.



## KEY ACHIEVEMENTS

**GEOLOGICAL DATA** was gathered from **23** European countries.

**A CAPACITY ESTIMATION** for over 800 porous reservoirs in 27 EU countries and 4 neighbouring countries was developed.

For instance, 26 on- and offshore storage sites were identified in Italy.

**6 OF 17 EU COUNTRIES** studied by HYSTORIES have regulations or regulations under development for underground hydrogen storage.

**140 EXISTING AND PLANNED** underground gas storage sites in porous reservoirs, suitable for hydrogen storage, are contained in HyUSPRE's database.

**415 TERRAWATT HOURS** of storage capacity was identified by HyUSPRE in Europe.

## IMPACTS

**A ROADMAP** for underground hydrogen storage until 2050 was developed by HyUSPRE.

**A STORY MAP** about the potential for underground hydrogen storage in European depleted gas fields and aquifers was developed by HyUSPRE.

A better understanding of the **GEOCHEMICAL, GEO-MECHANICAL AND MICROBIAL** effects of underground hydrogen storage is due to HYSTORIES and HyUSPRE.

EUH2STARS will **DEMONSTRATE UNDERGROUND STORAGE** in Austria and prepare three replicator sites in Hungary, Spain and the Netherlands.

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[https://www.clean-hydrogen.europa.eu/index\\_en](https://www.clean-hydrogen.europa.eu/index_en)

<https://www.euh2stars.eu/en/project/project-description.html>

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