



Press release
25 January 2021

“HypSTER”: realising the First EU-supported large scale Green Hydrogen Underground Storage Demonstrator

HypSTER is the first EU supported project aiming for large scale green hydrogen underground storage in salt caverns. The demonstration facility will be realised in France. The project with a total budget of 13MEuro has been granted a 5-million-euro grant by the Fuel Cells and Hydrogen Joint Undertaking (FCH 2 JU).

At the beginning of the year 2021, the project is launched with a subsurface and surface engineering study, which precedes the field-testing phase. This project will make it possible to better identify the position of storage in the hydrogen value chain. In the long term, this demonstrator aims to support the development of the hydrogen economy in Europe.

HypSTER stands for *Hydrogen Pilot Storage for large Ecosystem Replication*

Storage: A critical facility in the green hydrogen sector

This demonstrator, **the flagship of the development of green hydrogen underground storage in Europe**, is fully in line with the objective of **lowering the economy’s carbon intensity**, as well as the EU recovery plan, and integrates a link in the Hydrogen value chain which hasn’t been tested yet: underground storage. Its aim is to test **industrial-scale green hydrogen production and storage in salt caverns** and the technical and economic reproducibility of the process to other sites throughout Europe.

HypSTER marks another stage in energy transition for phasing out of fossil energy, in favour of renewable, carbon-free energy sources.

For the production of green hydrogen, the Etrez storage site will rely on **local renewable energy sources** (photovoltaic, hydroelectric) and a **1-MW electrolyser**. In the long run, this facility will **produce 400 kg of hydrogen per day** (the equivalent of the consumption of 16 hydrogen buses*). This production will enable to test the storage of 2 to 3 tons of green hydrogen during the first stage, before using the **total capacity of the chosen salt cavern, amounting to 44 tons** (the equivalent of the daily consumption of 1,760 hydrogen buses*).

Etrez: A site located ideally at the crossroads of production, storage and consumption

Located north-west of Bourg-en-Bresse, on the north-south European corridor, the Etrez storage site is the **largest French natural gas storage site in salt caverns** in terms of capacity.

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 101006751. This Joint Undertaking receives support from the European Union’s Horizon 2020 research and innovation programme and Hydrogen Europe and Hydrogen Europe Research.



The site area is particularly **dynamic regarding the development of the use of green hydrogen** with large-scale projects such as Zero Emission Valley (Project ZEV) in the region of Auvergne-Rhône-Alpes, the construction of hydrogen production units and filling stations in the region of Bourgogne-Franche-Comté, and the Chemical Valley with the presence of many industrial players.

**One bus tank containing 25 kg of hydrogen*

A closer look at hydrogen:

Hydrogen from renewable production has a prime position in energy transition.

It can be utilised for a variety of purposes:

- in the industry (chemical, electronic, glass, metal...), hydrogen can be used to produce different materials, but also for energy purposes (steam, for instance), and to lower the carbon intensity of the production chain;
- in transports and mobility, it replaces traditional fuels with the advantage of not generating any emissions while offering significant autonomy and very short refuelling time.

Thanks to green hydrogen, renewable energy sources can access hard to decarbonise sectors

The project stakeholders and their roles

- **Storengy (FR):** Project coordinator for all partners, manages and operates the storage site and the salt cavern used for testing.
- **Armines-Ecole Polytechnique (FR):** Different academic studies which are part of the HyPSTER project.
- **INOVYN (UK):** Definition of the ideal salt cavern utilisation cycle (hydrogen input/output for consumption).
- **ESK (DE):** Validation of engineering design and transfer of existing cycling models (from natural gas storage) for hydrogen storage.
- **Element Energy (UK):** Validation of the techno-economic approach of the demonstrator and assessment of potential for replicability to other sites/countries.
- **Ineris (FR):** Expertise in the demonstrator's environmental risks. Analysis and the regulatory framework for a safe development of this industry in Europe.
- **Axelera (FR):** Operational result monitoring and sharing with all partners and the scientific community. Communication, dissemination, strategic intelligence and networking with stakeholders, in order to facilitate the use and replication of HyPSTER's solutions beyond the project.

The project timeline

- **2020:** Definition of the regulatory framework for the project. Reception of financing by the European Union (FCH-JU), signature of the consortium agreement by all partners
- **2021:** Start of the engineering studies.
- **2022:** Construction of the electrolysis unit for on-site green hydrogen production.
- **2023:** Experimentation of hydrogen storage in a salt cavern and hydrogen production.

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About Storengy:

Storengy, an ENGIE subsidiary, is one of the world leaders in underground natural gas storage. Drawing on 60 years of experience, Storengy designs, develops and operates storage facilities and offers its customers innovative products. The company owns 21 natural gas storage sites with a total capacity of 136 TWh in France, Germany and the United Kingdom. Storengy is positioned today as a key player in the development of geothermal energy (heat/cold production and power generation), as well as innovative production and storage solutions for renewable gas (biomethane, hydrogen, synthetic methane). In the hydrogen sector, Storengy is a member of France Hydrogène (formerly AFHYPAC), as well as the association Hydrogen Europe. www.storengy.com

About Armines-Ecole Polytechnique:

Armines is the largest French research structure oriented towards businesses, with 48 joint training centres (Ecoles-Armines), including Ecole Polytechnique. Ecole Polytechnique is the leading French institution combining top-level research, academics, and innovation at the cutting-edge of science and technology. With its 23 laboratories, the Ecole Polytechnique Research Center explores the frontiers of interdisciplinary knowledge to provide major contributions to science, technology, and society. www.armines.net www.polytechnique.edu

About INOVYN:

Formed on 1 July 2015 and part of INEOS, INOVYN is a vinyls producer that ranks among the top three worldwide. With a turnover above €3.5 billion, INOVYN has more than 4,300 employees and manufacturing, sales and marketing operations in ten countries across Europe. INOVYN's portfolio consists of an extensive range of class-leading products arranged across Organic Chlorine Derivatives; Chlor Alkali; General Purpose Vinyls; Specialty Vinyls; Sulphur Chemicals; Salt; and Electrochemical and Vinyls Technologies. Annual production volumes are more than 40 million tonnes. www.inovyn.com

About ESK:

As a renowned engineering company for energy storage and energy system services, ESK GmbH has been successfully managing both national and international projects for many years. Our highly qualified team, mainly consisting of engineers and geoscientists, has many years of experience and extensive know-how, especially in the fields of porous rock and cavern storage technology. ESK employs a total of 80 people at the Holzwickede and Freiberg locations and in offices in Leipzig and Staßfurt, Germany. www.esk-projects.com

About Element Energy:

Element Energy is a low carbon, sustainability and consumer behaviour consultancy and engineering practice providing strategic advice, computational modelling, software development and engineering consultancy across the buildings, transport and power sectors for a broad range of clients. Element Energy has a decade-long experience with hydrogen technologies as a consulting SME and brings to the project its knowledge of the supply and demand for stored hydrogen strategic analysis for the eventual replication of the salt cave storage technologies as well as experience in the delivery of hydrogen projects and management of R&D consortium. www.element-energy.co.uk

About Ineris:

Ineris (National Institute for the Industrial Environment and Risks) is an industrial and commercial public Institute under the aegis of the Ministry of the Environment managing industrial and environmental risks. The institute carries out research activities requested by industrial operators and / or public authorities in the field of risk assessment, prevention and protection in connection with industrial activities, in particular in underground environments. INERIS has developed over the years a solid expertise in the field of environmental risk assessment related to underground storage activities. Ineris has also large scale laboratories for H2 experiments and testing. This expertise is based on both experimental skills (particularly in situ), numerical modelling and risk assessment methods for health and the environment. <https://www.ineris.fr/fr>

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About AXELERA Auvergne-Rhône-Alpes:

Axelera Auvergne-Rhône-Alpes is a French cluster at the crossroads of the chemical and environmental sectors. Axelera aims to help mature green hydrogen projects with its members from ideas to marketable products and processes as part of its more global commitment to developing sustainable, efficient, circular and clean solutions for industry. Axelera's public-private network of 367 members gathers expertise in: • Materials, chemicals, equipment and system manufacturing and integration • Process engineering, industrial energy and resource efficiency, and regulatory compliance • Circular economy • Water, air, and soil depollution • Renewable raw materials • Digitalization of the process industries. www.axelera.org.

About FCHU-JU:

The Fuel Cells and Hydrogen Joint Undertaking (FCH JU) is a unique public private partnership supporting research, technological development and demonstration (RTD) activities in fuel cell and hydrogen energy technologies in Europe. Its aim is to accelerate the market introduction of these technologies, realizing their potential as an instrument in achieving a carbon-clean energy system.

Fuel cells, as an efficient conversion technology, and hydrogen, as a clean energy carrier, have a great potential to help fight carbon dioxide emissions, to reduce dependence on hydrocarbons and to contribute to economic growth. The objective of the FCH JU is to bring these benefits to Europeans through a concentrated effort from all sectors. The three [members](#) of the FCH JU are the European Commission, fuel cell and hydrogen industries represented by Hydrogen Europe and the research community represented by Hydrogen Europe Research. <https://www.fch.europa.eu/>

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