

New study:
**Picturing the value of underground gas storage
to the European hydrogen system**

Brussels, 15 June 2021

The study presents the essential role of underground gas storages in establishing an integrated energy system and hydrogen economy in Europe by 2050. The vision paper and map provide a detailed overview, with concrete facts and figures, of the potential of these facilities. They build on the updated proposal for the European Hydrogen Backbone (EHB), a vision for a pan-European dedicated hydrogen network. This analysis was performed by Guidehouse in collaboration with GIE.

"It was positive to see the European Commission recognising the needs for underground hydrogen storages in its Hydrogen Strategy in July 2020. Within GIE, we are deeply convinced they will play a vital part in balancing the future energy system that relies significantly on renewable energy sources." **Boyana Achovski, GIE Secretary General**

"The task of storing energy on a large scale is not new. However, the role of gas storage is expected to be even more pronounced due to the higher penetration of intermittent energy sources into our energy system. With this study, we wanted to look in more detail and raise awareness on the way underground hydrogen storages will ensure energy resilience and contribute to securing Europe's leadership on the hydrogen market, at the lowest cost to society." **Dr Axel Wietfeld, GSE President**

Here is a foretaste of what you will learn from this study: on the supply side, the need for large-scale storage could be explained by higher hydrogen supply variability driven by intermittent renewable electricity production. On the demand side, this is because of the increase in electrification and the subsequent need to meet higher electricity demand peaks created by residual load.

“When it comes to reaching the European Union’s carbon neutrality objective, the assets of GIE members – Storage, Transmission and LNG Terminals System Operators – will all be part of the solution. That’s why we extend the EHB’s vision by providing an initial outlook into the hydrogen storage needs across Europe, in terms of capacities and services, as well as a broader discussion on repurposing and retrofitting possibilities, geographical availability, and the type of flexibility required in the future markets.”

Torben Brabo, GIE President

“To prepare the ground for investment and political decisions, transparency is key and we have all the right tools to deliver that to the EU stakeholders and citizens. The data we collect and make available for further analyses and studies is the latest and most accurate from the industry. We will continue to deliver the right and most reliable figures in support for the best decisions.”

Francisco de la Flor, GIE System Operations & Development Area Sponsor

For an effective decarbonisation of the European economy, here is what we need:

1. Large-scale, underground hydrogen storage is indispensable to the development of the European hydrogen market and will become an important part of the future decarbonised energy system.
2. If hydrogen is to be deployed at scale, a substantial deployment of storage will be needed as well, requiring a better understanding of the specific storage needs.
3. In the early stages of hydrogen market development (up to 2030), demand will likely be concentrated around cluster areas (hydrogen valleys) that will initially mostly manage their supply locally. Underground hydrogen storage will be an integral part of these valleys, helping to significantly improve the economics of the emerging hydrogen infrastructure.
4. As the transition continues and hydrogen supply and demand grow, the hydrogen valleys will evolve into an interconnected hydrogen network.
5. Our first-order estimation of hydrogen storage capacity requirements shows the need for around 70 TWh of hydrogen storage in 2030, growing to around 450 TWh of hydrogen storage in 2050.
6. Hydrogen storage in salt caverns is a low-hanging fruit and current research shows that porous structures (depleted gas fields, aquifers) are showing fair potential to cover further storage needs for pure and blended hydrogen.
7. To be ready for substantial hydrogen demand and regional pipeline networks by 2030, we need to start on the storage now.
8. Storage system operators have a key role—their experience will be needed.

9. A clear business case and an enabling regulatory environment need to be present to enable decisions to repurpose or develop large-scale, underground hydrogen storage.

Who is GIE?

GIE is the association of the European gas infrastructure operators. GIE members are active in transmission, storage and regasification via LNG terminals. They work and innovate with the infrastructures for renewable and low-carbon molecules. That includes natural gas, hydrogen and biogases. Gathering around 70 industry entities from 27 European countries, GIE perfectly embodies the multiple decarbonisation pathways of the EU regions. Gas infrastructure can become the backbone of the new innovative energy system, allowing European citizens and industries to benefit from a secure, affordable and sustainable energy supply by 2050.

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