Unlocking Underground Hydrogen Storage: Securing Europe's Future Energy System

Insights from the H2eart for Europe Flagship Event 2026

03 November 2026

Context

On 30 September 2026, H2eart for Europe hosted its Flagship Event, *Unlocking Underground Hydrogen Storage: Securing Europe's Future Energy System*, in Brussels. The event brought together representatives of the European Commission (EC), regulators, financial institutions, hydrogen storage operators and organisations across the hydrogen value chain to discuss the strategic role of underground hydrogen storage (UHS) and the conditions needed to accelerate its deployment.

The discussion built on H2eart for Europe's position paper of 22 September 2026[1], which sets out seven priorities for unlocking UHS.

Position 1: Recognise UHS as core element of European energy infrastructure.

Position 2: Put long-duration storage at the heart of energy security and resilience policy.

Position 3: Assess Europe's future storage adequacy needs now.

Position 4: Provide appropriate de-risking to enable anticipatory investment.

Position 5: Reflect the cross-border value of storage.

Position 6: Accelerate permitting, standards and regulatory implementation.

Position 7: Move from recognition to implementation through a coordinated UHS agenda.

This paper draws together four key insights emerging from the discussions at the Flagship Event. It reflects H2eart for Europe's synthesis of the exchanges, rather than an agreed statement by all participants.

[1] "Unlocking Underground Hydrogen Storage: Securing Europe's Future Energy System" (22 September 2026), available here: https://www.h2eart.eu/h2eart-for-europe-position-paper-unlocking-underground-hydrogen-storage-securing-europes-future-energy-system/.

Four insights emerging from the discussion:

1. UHS needs to be planned as part of the wider European energy system.
2. Europe needs a clearer view of future UHS requirements to support timely investment decisions.
3. Making UHS projects bankable requires targeted de-risking and a clear regulatory framework.
4. UHS is an enabler of cross-border hydrogen infrastructure.

Four insights from the discussion

1. UHS needs to be planned as part of the wider European energy system

Position 1: Recognise UHS as core element of European energy infrastructure.

Position 2: Put long-duration storage at the heart of energy security and resilience policy.

The first insight was the importance of planning UHS as an integral part of the wider energy system. The event highlighted the need for coordination across the hydrogen value chain, recognition of the system benefits of UHS, a regulatory framework that accounts for the links between electricity, natural gas and hydrogen, and consideration of the contribution of UHS to Europe's energy security and resilience.

Along the hydrogen value chain, import facilities, transport networks, storage capacity and hydrogen demand depend on one another. If these assets are developed separately or at different speeds, delays in one part of the system can undermine investments elsewhere. Several speakers supported H2eart for Europe's call for closer coordination of infrastructure planning and development. The EC highlighted efforts to strengthen integrated infrastructure planning through the European Grids Package.

An important aspect of the discussion was the role of UHS beyond the hydrogen value chain and its contribution to the wider energy system. Participants emphasised the flexibility that UHS can provide to the energy system by balancing fluctuations in renewable electricity generation and thereby ensuring a stable hydrogen supply to consumers. Where hydrogen-to-power plants form part of the system, UHS can also provide flexibility directly to the electricity system by enabling dispatchable power generation during periods of low renewable production. Speakers pointed to wider system benefits such as avoided electricity network investment and reduced curtailment.

Speakers also highlighted the need for regulation to reflect the links between electricity, natural gas and hydrogen. Separate regulatory frameworks can make it difficult to recognise the benefits that infrastructure delivers across the wider energy system. This, in turn, hinders

benefits being reflected in the revenues available to an individual storage operator. A more integrated approach to regulation is required to make these contributions visible, providing an efficient foundation for UHS business models.

The discussions also emphasised the contribution of UHS to Europe's broader energy security and resilience. Against the backdrop of recent energy crises and Europe's continued exposure to volatile fossil fuel markets, participants highlighted the importance of reducing dependence on imported fossil fuels and strengthening energy independence. UHS can help make better use of domestically produced renewable energy by storing hydrogen for periods when it is needed. This reinforces H2eart for Europe's position to incorporate UHS into the forthcoming EU Energy Security Framework, as well as future adequacy assessments, resilience planning, stress testing and crisis preparedness.

2. Europe needs a clearer view of future UHS requirements to support timely investment decisions

Position 3: Assess Europe's future storage adequacy needs now.

The second insight was the need for a clearer assessment of Europe's future UHS requirements to support timely investment decisions, which could help balance investment risks.

The EC confirmed that hydrogen storage is required across all scenarios under the TEN-E framework. The discussion then focused on how to balance the risks of developing storage capacity too early or too late amid uncertainty about future hydrogen demand and infrastructure development. Participants differed on how to manage the risk of investing too early or too late. A regulatory perspective cautioned against setting capacity targets without realistic assumptions about demand, network connections and project readiness, given the risk of building underused infrastructure. In contrast, a UHS operator argued that the risk of setting a target too low, and thereby leaving the hydrogen system short of storage, is substantially greater than the risk of overbuilding. This reflects a central challenge for infrastructure planning: insufficient capacity could hinder market development, but capacity built too early could impose costs before it is needed.

In this context, participants highlighted the potential advantage of UHS in allowing storage capacity to be developed in more incremental stages than major pipeline networks, which could enable a progressive pathway towards the infrastructure ultimately required. Some speakers called for this potential ramp-up to be reflected in a quantified pathway, which could give developers, customers and financiers a shared reference for investment decisions.

A discussion then emerged on the respective contribution of assessing storage adequacy and setting a policy target. Adequacy assessments can examine how much storage might be needed, where and when, using transparent scenarios, including the costs of delayed

investment and premature deployment. The decision whether to translate those findings into a target is a separate policy choice.

3. Making UHS projects bankable requires targeted de-risking and a clear regulatory framework

Position 4: Provide appropriate de-risking to enable anticipatory investment.

Position 6: Accelerate permitting, standards and regulatory implementation.

The third insight was the need for targeted de-risking and a clear regulatory framework to make UHS projects bankable. This requires measures to address revenue uncertainty and risks that individual developers and customers cannot reasonably bear, alongside clear regulatory requirements.

Several members presented the progress made in developing UHS projects in recent years, while also demonstrating that technical advances and public grants alone are not sufficient to make projects bankable, as they do not necessarily resolve uncertainty over future revenues. RWE reported that construction of its hydrogen storage facility in Gronau-Epe was nearly completed and that operations are expected to begin in 2027. Its first UHS project benefited from close coordination between production, transmission infrastructure, storage and customers, while RWE stressed that such advantageous conditions cannot be assumed for future projects. Gasunie also reported significant progress with its HyStock project, with first contractors in place and exploratory drilling operations underway. However, despite this progress and substantial financing support, it remains difficult to secure customer bookings. Both examples illustrated a timing problem: developers need to commit capital long before customers can confidently enter into long-term storage contracts.

The discussion highlighted the distinction between the commercial value of storage to individual hydrogen users and its wider benefits to society. From an industrial customer's perspective, storage services can justify payment where they provide flexibility or security of supply for the customer's own hydrogen volumes. But an individual offtaker cannot reasonably be expected to pay for broader benefits, such as national security of supply. These system benefits of UHS may therefore call for public funding or other arrangements that go beyond contracts with direct users.

The discussion also reinforced the difference between wider economic benefits and bankable cash flows. Lenders still need a credible route for covering investment and operating costs and servicing debt. In particular, revenue gaps in the first operating years can undermine a project whose benefits will accrue over a much longer period. Support should address risks that individual operators and first users cannot reasonably bear, without removing incentives for efficient project selection and operation.

Speakers discussed several ways to address this gap, including commercial bookings, national and EU funding, public guarantees, revenue support and the possibility of allocating some costs over time. These instruments would address different risks and are not interchangeable. ENNOH noted that lessons from hydrogen pipeline de-risking may be relevant, while emphasising that storage has characteristics that require specific consideration. The UK's proposed hydrogen storage business model provided one concrete example: a cap-and-floor arrangement designed to offer revenue certainty over a 15-year support period.

Beyond financial support, UHS operators also stressed the need for technical standards that are feasible and proportionate, particularly for hydrogen quality and purity. Clear rules on network access and tariffs, connections and permitting also affect whether storage capacity can be offered to customers on workable terms.

4. UHS is an enabler of cross-border hydrogen infrastructure

Position 5: Reflect the cross-border value of storage.

The fourth insight concerned the way UHS benefits are assessed as Europe's hydrogen network develops. Existing methods designed for natural gas infrastructure typically assess how a project changes flows within an assumed network. It was argued that this approach may overlook an important contribution of UHS: Storage can help make hydrogen networks and cross-border corridors viable in the first place. Assessments should therefore consider not only the direct benefits of individual storage projects, but also their role in enabling wider infrastructure development.

ENNOH acknowledged that assessment methods need to reflect the specific characteristics of hydrogen storage and pointed to further work with storage stakeholders. The discussion also raised the question of cost allocation: where the benefits of UHS extend across borders, the Member State hosting a project may bear costs while other countries also benefit. This reinforces the need for assessment methods that can identify wider system benefits and inform how costs should be shared.

Looking ahead: From recognition to implementation

Position 7: Move from recognition to implementation through a coordinated UHS agenda.

The H2eart for Europe Flagship Event reinforced the strategic importance of UHS while bringing out the practical challenges of turning recognition into investment. Its four central insights concern the need for coordinated infrastructure planning, assessments of future storage requirements, suitable financial instruments to address the risks faced by early projects and recognition of UHS's cross-border benefits.

These insights add practical detail to H2eart for Europe's seven policy priorities. The next step is to translate these priorities into coordinated action by European and national policymakers and regulators, so that UHS projects can develop alongside Europe's transitioning energy system.

About the participating speakers

The event included contributions from the following speakers:

Welcome remarks

- Charlotte Roule – CEO, Storengy

Keynote speech

- Kitti Nyitrai – Deputy Director and Head of Unit for Decarbonisation and Sustainability of Energy Sources, DG ENER, European Commission

Panel 1: Hydrogen infrastructure and strategic frameworks

- Jorgo Chatzimarkakis – CEO, Hydrogen Europe
- Georg Dorfleutner – Managing Director, RAG Energy Storage GmbH
- Ralf Wezel – Secretary General, EUTurbines

Project presentations: From system value to project realities

- Johanna Friese – Regulatory Expert Hydrogen and Natural Gas Storage, EWE GASSPEICHER
- Pieter van Aartsen – Director for Storage and Terminals, Gasunie
- Zain Keshavjee – Hydrogen Storage Business Lead, Uniper Storage Technologies

Panel 2: De-risking UHS deployment and enabling bankability

- Sabine Augustin – Commercial Managing Director, RWE Gas Storage West
- Csilla Bartók – Head of Gas, Hydrogen & Retail Department, ACER
- Abel Enríquez – Director, ENNOH
- Wojciech Lach – Manager, Hydrogen Project Coordination Department, ORLEN Group
- Roland Schulze – Managerial Adviser, Low Carbon Energy Technologies, European Investment Bank

Moderation

- Catherine Galano – Executive Director, Frontier Economics
- Matthias Janssen – Executive Director, Frontier Economics

About H2eart for Europe

H2eart for Europe is an EU-wide, CEO-led alliance committed to accelerating the decarbonisation of the European energy system at lowest cost to society by scaling up underground hydrogen storage (UHS). Launched in Brussels on 23 January 2024, the alliance provides fact-based analysis to support policymakers and draws on the expertise of its members, leading companies shaping the future of hydrogen storage across Europe. We are committed to investing in UHS infrastructure to meet the flexibility needs of a decarbonised energy system.

The organisations listed below are the members of H2eart for Europe.

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