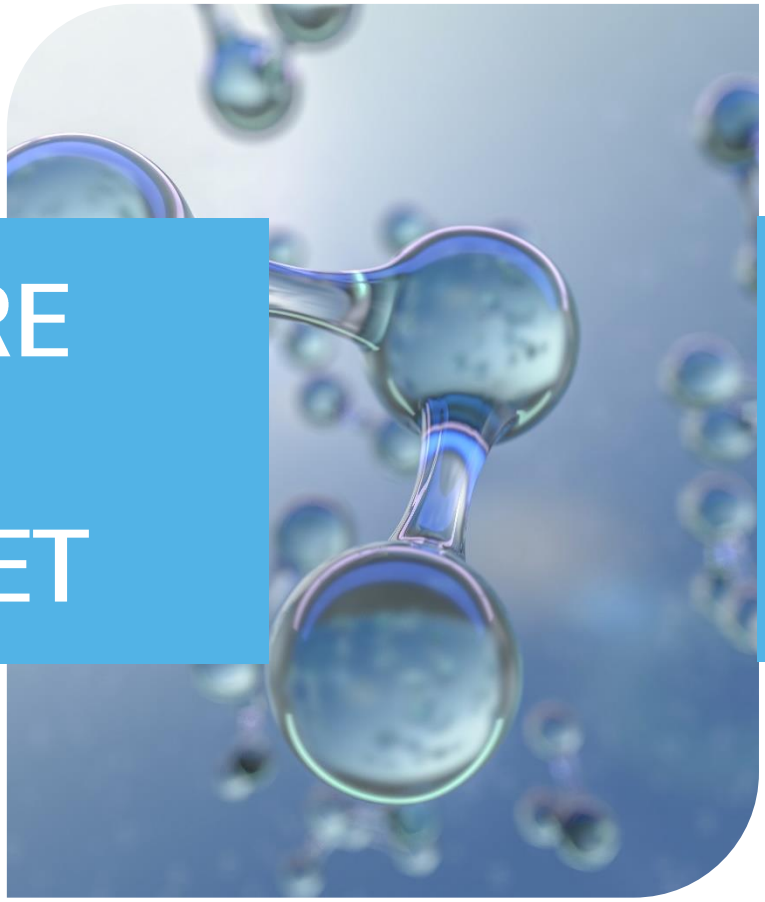
H2RESTORE PROJECT FACT SHEET



KEY POINTS

ENERGY STORAGE

Energy storage is essential for the energy transition as it helps ensure reliable power supply by storing energy for use when demand is high, and renewable generation is low.

COMMERCIALISING UNDERGROUND HYDROGEN STORAGE

H2RESTORE aims to commercialise underground hydrogen storage using existing depleted reservoirs, reducing production costs by utilising low-cost electricity likely generated during times of high renewable generation and low demand.

A DEEP ENERGY RESERVE & HYDROGEN SUPPLY

The hydrogen produced by H2RESTORE could be used as a deep energy reserve to support the National Electricity Market (NEM) and a consistent supply of lower-cost hydrogen to the emerging clean fuels industry.

ENABLING THE HYDROGEN ECONOMY

H2RESTORE could help facilitate the development of the Victorian hydrogen economy.

Storing & shifting energy seasonally via underground hydrogen storage

ABOUT THE PROJECT

Lochard Energy is proposing to develop the H2RESTORE Project, which aims to commercialise the storage of hydrogen in existing depleted gas reservoirs. Large scale underground hydrogen storage may assist in a reduction in the cost of producing hydrogen by utilising low-cost electricity, likely generated during times of high renewable generation and low demand.

The stored hydrogen can be used as a deep energy reserve to support the National Electricity Market (NEM) during times of energy supply shortages. It could also provide a consistent supply of lower-cost hydrogen to the emerging clean fuels industry and other hard to abate sectors.

H2RESTORE is being designed to produce hydrogen by electrolysis using excess energy from the NEM (likely during periods of renewable generation oversupply), and storing it in depleted underground gas storage reservoirs located in Southwest Victoria, an ideal location given its proximity to existing renewable energy generation sources, sustainable water sources, power infrastructure, existing gas pipelines, and underground storage reservoirs.

NEED FOR ENERGY STORAGE

The Australian energy market is transitioning to a lower carbon, renewable energy future. As more variable renewable energy (VRE) such as solar and wind enters the grid and coal-fired power plants retire, balancing supply and demand is becoming more complex.

VRE generation like solar and wind produce electricity based on weather conditions, which can lead to more energy being generated than needed during periods of high sunshine or wind, especially when demand is low. Capturing and storing this excess energy for use during periods when generation might not otherwise meet demand such as in Winter, is key to enabling the continued uptake of renewable energy resources and a smoother transition away from coal.

Energy storage facilities can store energy and help provide reliable power supply during periods where demand might otherwise exceed supply. These circumstances could be caused by demand spikes, low VRE generation or other generator outages.

A combination of energy generation technologies, including storage that can hold energy for hours, days, or even weeks, is needed to support a future energy system that is cleaner, more affordable, and dependable. While grid-scale batteries can 'shift' electricity within a day, underground hydrogen storage has the potential to 'shift' electricity within a year. Shifting energy from periods of high renewable generation and low demand to times of low generation and high demand is crucial for enabling the further expansion of renewable energy whilst helping to maintain supply reliability.

H2RESTORE's large-scale storage allows energy to be shifted from periods of excess renewable supply in Summer to provide power during low renewable generation in Winter.

USING 'SPILLED' ENERGY

As more renewable energy is added to the NEM, it is likely that there will be more times when supply exceeds demand. This is already happening and is expected to become more common in the future. When this occurs, NEM market prices can drop significantly, and generation may need to be curtailed (or spilled) to keep the system balanced.

H2RESTORE aims to utilise spilled VRE electricity to produce hydrogen and store it underground. This stored hydrogen has the potential to be used as a low-cost source of reliable hydrogen and used to generate electricity for the NEM. The hydrogen could then be converted back into electricity to help meet network demand, used as a low-cost source of reliable hydrogen and as an energy reserve to the NEM.

FEASABILITY STUDY UNDERWAY

Lochard Energy has received $2 million in ARENA funding to facilitate an 18-month Feasibility Study, which will involve studies to investigate the commercial and technical viability of storing hydrogen in existing depleted gas reservoirs, conduct engineering and early environmental studies and undertake stakeholder and community engagement. It's estimated that this funding will cover approximately 30% of the total project costs, with Lochard Energy funding the balance.

The Feasibility Study will help progress the Project to the next phase, which could be the development of a small-scale pilot demonstration facility ahead of potentially developing the Project into a commercial scale operation by the early 2030s. The Feasibility Study is expected to be complete in late 2025.

Lochard Energy welcomes the support of ARENA and hopes the Feasibility Study will achieve a viable outcome to progress the Project.

A STAGED APPROACH

The H2RESTORE Project is proposed to be developed in phases with each phase of the project including community and stakeholder consultation and feedback.

Firstly, Lochard Energy is undertaking an 18-month Feasibility Study to investigate the technical and commercial viability of storing hydrogen in underground existing depleted gas reservoirs. This study is underway and is expected to conclude at the end of Q3 2025. Following the Feasibility Study each subsequent phase of the Project will be subject to the necessary regulatory approvals, and approval from Lochard Energy's board of directors as representatives of Lochard Energy's investors.

Following the Feasibility Study, a potential Demonstration Pilot may be developed to test small-scale storage of hydrogen in one suitable depleted gas reservoir. While the Demonstration Pilot is expected to be small in scale it will still be subject to necessary regulatory approvals.

Lochard Energy's current Project timeline is targeting commercial operation of underground hydrogen storage to occur in the early 2030's with the possibility of being used for firming of the NEM via long duration energy storage, and/or to provide a source of lower-cost hydrogen supply to a renewable fuels project or the clean fuels industry.

HOW WOULD H2RESTORE WORK?

Excess energy from the NEM, increasingly from renewable energy sources, is used to power electrolysers that split water, from a sustainable source, into hydrogen and oxygen. This process is known as electrolysis.

The hydrogen would then be captured and stored aproximately 1500m underground in existing depleted gas reservoirs. Similar gas reservoirs in the same formation have been successfully used since 1999 for underground gas storage.

An open cycle turbine would then be used to convert the hydrogen back into electricity, so it can feed into Victoria's electricity grid via existing transmission lines.

PROJECT BENEFITS

Supporting the energy transition
By providing a secure energy supply, H2RESTORE could help equip the electricity grid to handle seasonal shifts in energy generation from renewable energy sources and thereby help enable a smoother transition away from fossil fuels.

Capturing excess renewable energy
By utilising excess renewable energy to produce hydrogen (likely during periods of renewable generation oversupply), H2RESTORE could capture energy that would otherwise be spilled and undelivered to the electricity grid, maximising the use of available resources.

Utilising existing reserviors
Using existing depleted gas reservoirs to store hydrogen at a large-scale would result in less new infrastructure when compared to other alternatives for large-scale hydrogen storage, such as ammonia or refrigeration.

Lowering the cost of hydrogen
Large scale underground hydrogen storage allows for a reduction in the cost of producing hydrogen by capturing low-cost electricity likely generated during times of high renewable production and low demand.

Economic uplift
The development and operation of H2RESTORE could create a multitude of job opportunities, particularly in regional areas. By fostering employment, the Project can help drive economic growth and prosperity, empowering communities and stimulating local economies in Victoria.

Facilitate development of hydrogen economy
H2RESTORE could help facilitate the development of the Victorian hydrogen economy. Lochard Energy will share learnings from the pilot project to help build the Australian hydrogen economy.

MANAGING IMPACTS

Lochard Energy is supportive of sustainable practices and has a strong focus on minimising harm to the environment and adopts an 'avoid and minimise' approach to managing impacts.

Every environmental aspect will be considered and H2RESTORE will be carefully designed to minimise, or avoid where possible, significant impacts. The Feasibility Study will investigate any potential subsurface and environmental impacts associated with storing hydrogen underground.

COMMUNITY CONSUTATION

Lochard Energy is committed to engaging with the local communities where we operate, and community engagement will help inform any development plans for the H2RESTORE Project.

Lochard Energy will consult with landowners, occupiers, stakeholders and the local community throughout all phases of the proposed H2RESTORE Project to provide information on timeframes and activities, potential impacts, and to understand and address any questions or concerns about the Project.

Lochard Energy is committed to actively engaging with Traditional Owners through respectful consultation and collaboration, ensuring their voices are heard early and consistently throughout project development, while recognising the cultural significance of the land and respecting heritage sites, cultural practices, and the history of the land.

ABOUT LOCHARD ENERGY

The proposed H2RESTORE Project is being developed by Lochard Energy.

Lochard Energy are trusted infrastructure specialists that develop, own and operate energy infrastructure, which help facilitate a smoother and more rapid transition toward a lower carbon emitting economy.

We are committed to operational excellence, an outstanding safety culture and being a dependable member of the communities in which we operate.

This Project received funding from the Australian Renewable Energy Agency (ARENA) as part of ARENA's Advancing Renewables Program.

More Information

If you have any questions, please contact the project team or visit our webpage for more information.

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