

RENEWABLE HYDROGEN

THE HIGH POTENTIAL OF A LOW-CARBON ENERGY MIX

RENEWABLE HYDROGEN MEANS CLEAN ENERGY

Driven by the ambitious goals of the energy transition, the use of hydrogen as an energy source has tremendous potential! The energy, industrial and transport sectors all have a vested interest in producing this versatile gas to help deliver tomorrow's energy and climate-related challenges.

Today, more than 90% of hydrogen production in the world stems from fossil fuels, mainly in the chemical and petrochemical industry. The process used (steam methane reforming - SMR), though undeniably economical, emits significant quantities of CO₂.

In line with the aim of steadily decarbonising the global economy, the emerging technology of producing hydrogen by water electrolysis has the potential to be a credible alternative to SMR in the long term. Excess production of renewable energy from wind / solar can be used to power the electrolysis. This concept is called 'Power to Gas' (PtG). The hydrogen produced can then be stored to be redistributed as and when required to enable it to be converted back into power when there are peaks in demand.

3 PRINCIPAL USES OF RENEWABLE HYDROGEN

- 1 | As a raw material in industrial production.**
 Sectors as varied as glass-making, the petrochemical, metallurgy, iron and steel industries, food processing and power generation are increasingly interested in this alternative solution to burning fossil fuels, as it would significantly lower the carbon emissions resulting from their activities.
- 2 | As a fuel for green mobility.**
 Converted into motive force or electricity, it is used in green mobility (buses, trains, boats, vehicles, forklifts, bikes...) into which major automotive manufacturers are investing more and more money, in both Europe and the rest of the world.
- 3 | In gas infrastructure or for mobility based on CNG.**
 Combined with CO₂ (and then enhanced), it allows the production of synthetic methane that can be injected into the existing natural gas infrastructure (systems, storage facilities, etc.) and used as fuel in vehicles bio-CNG vehicles (NGVs).

STORENGY IS COMMITTED TO 'RENEWABLE H2'

Storengy has all the necessary expertise needed to deliver projects involving the production and storage of renewable hydrogen. Our expertise extends to feasibility studies, engineering design, construction, operation and maintenance, industrial safety and includes specialist knowledge of geosciences.

BOTH PRODUCER AND STORER

With 21 natural gas storage facilities in Europe (France, Germany and the United Kingdom), **Storengy offers decentralised hydrogen production solutions close to where it is consumed.**

Whenever there is excess electricity derived from renewable sources (RES), an electrolyser can use this surplus energy to produce hydrogen that can then be stored in above-ground or underground facilities, as applicable.

BOTH INVESTOR AND PROJECT INTEGRATOR

Existing infrastructure, **partners** (start-ups, component manufacturers) **and customers** (local authorities, companies and industries) **can rely on Storengy's commitment to and capacity to invest in large-scale hydrogen production and storage projects.**

Storengy's experts and project managers will provide tailor-made solutions that optimise the needs expressed by their customers by applying their extensive understanding of the hydrogen chain and their technical know-how.

«Today, hydrogen (most of which is derived from hydrocarbons) is often produced far away from where it is actually consumed. This generates high transportation costs and causes sizeable CO₂ emissions. Our mode of production (electricity derived from renewable energy sources + electrolysis), combined with the location of our storage facilities in Europe, gives us a distinct advantage, offering our customers a supply of renewable hydrogen that is both flexible and competitive. Furthermore, our expertise permits us to deliver projects outside of our sites.»

Yannick BONIN
 Hydrogen Programme Manager - Storengy

By **2050**

- Hydrogen will account for **18% of final energy demand**
- Hydrogen will reduce **CO₂ emissions by 6 Gt a year**

Source: Hydrogen Council; IEA ETP Hydrogen and Fuel Cells CBS; National Energy Outlook 2016

A PIONEERING TECHNOLOGY DEVELOPED BY STORENGY

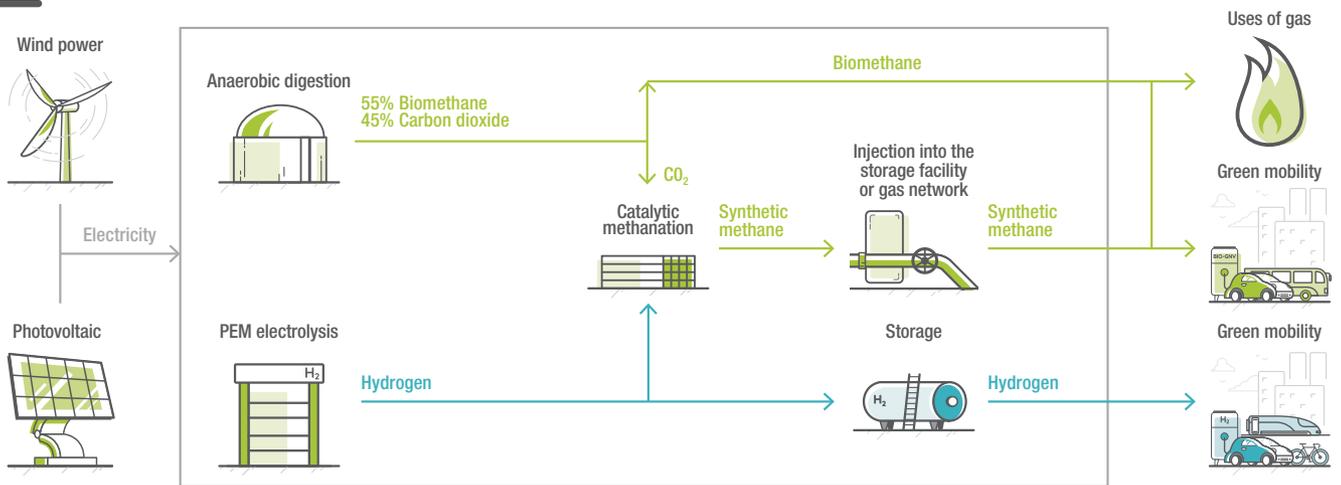
In France, MÉTHYCENTRE is the first Power to Gas demonstration project coupled to a methanisation plant. It also features a number of major innovations that contribute to improve the overall energy efficiency of the Power to Gas chain and lower costs.

This Storengy project constitutes a decisive step in the process of building a Power to Gas chain in France and in its industrial deployment in Europe. It provides a solution for a crucial challenge: storing surplus renewable energy in the form of synthetic methane and renewable hydrogen, in large quantities, to make them available when needed by our customers, in this case the Centre-Val de Loire region.

- Renewable hydrogen (from wind and solar power electrolysis) produced and stored in this way will supply several nearby vehicle filling stations.
- Synthetic methane produced from CO₂ and H₂ will be injected into the gas network and/or supplied for household use or to provide mobility services.

The major innovations of the MÉTHYCENTRE project are its flexibility and the optimal linkage of its system, enabling the long-term storage of surplus renewable electricity at a competitive cost. The start of operations is scheduled for 2020.

MÉTHYCENTRE



ARE YOU...



AN INDUSTRIAL PLAYER?

Storengy can develop hydrogen production and storage solutions for you, tailored to your needs and manufacturing processes. Storengy will help you set up these solutions at your site (providing assistance in obtaining regulatory permits, integrating them into your operations, running and maintaining them) and will guarantee their efficient performance and reliability.



A LOCAL AUTHORITY?

Storengy will help you develop a local renewable energy economy by implementing effective, innovative hydrogen production and storage solutions.

- Identify locations for production and storage facilities
- Optimise of local renewable energy assets
- Guarantee system integrity
- Promote consumption of low carbon gas (CNG or H₂ green mobility)



A KEY PLAYER IN THE H₂ SUPPLY CHAIN?

Storengy is committed to helping all component manufacturers, developers and investors.

As your partner, we will ensure that our teams, expertise and storage capabilities help to make your project successful.

Contact us!

hydrogen@storengy.com

IN EUROPE

IN FRANCE

The Provence-Alpes-Côte d'Azur region could be relying on 100% renewable energy by 2030. HyGreen Provence, the first commercial project on this scale in France, entails the construction of a system for generating renewable electricity locally, recovered as hydrogen gas, which can potentially be stored in salt caverns on an existing Storengy site with a view to ultimately supplying a network of green mobility filling stations spread across the region.

Storengy's know-how, infrastructure and R&D capability, covering the production and storage of hydrogen, both in surface and underground, are key factors in determining the successful outcome of such a project.

IN THE UNITED KINGDOM

Storengy supplied detailed geoscience information for a study funded by the Energy Technology Institute (ETI). The output from the study confirmed that storage of hydrogen in salt caverns was a credible technology with the salt strata used for Storengy's existing natural gas storage facility in Cheshire offering the most economic solution. Storengy is also working with an electrolyser manufacturer to understand the feasibility of constructing a 100 MW electrolyser. Our role is to provide the expertise on the storage of hydrogen.

IN GERMANY

Storengy Germany is currently investigating the potential of a hydrogen production project on one of its sites. The end uses considered for the hydrogen produced include its injection into the gas system and mobility-related or local industrial applications.