The European gas infrastructure can help deliver the EU Hydrogen Strategy

Innovative projects under the umbrella of Gas Infrastructure Europe

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This document is based on GIE members' contribution and will be continuously updated.
To find the latest version, we invite you to go to https://www.gie.eu/index.php/gie-publications/gie-brochures

Learn more about:

Who we are

Welcoming all types of gases, we, Gas Infrastructure Europe, represent the interests of 69 members from 26 European countries. Our members operate the underground gas storages, LNG terminals and transmission pipelines.

GIE currently provides citizens with more than fifty thousand jobs, while supplying around 25% of EU's primary energy consumption. GIE shares EU's ambition of reaching climate neutrality by 2050.

To establish a stronger and more innovative European Union, GIE members are already initiating numerous pilot projects to support the deployment of low-carbon and renewable hydrogen.

Within the context of the soon-to-be-released EU Hydrogen Strategy, we invite you to dive into the following pages to learn more about how the gas infrastructure can help deliver the EU Hydrogen Strategy and about the innovative technologies that are currently developed by the European gas infrastructure operators.

Gas Infrastructure Europe

"The existing gas infrastructure represents a valuable asset for the development of the hydrogen value chain within the EU."

Frans Timmermans - Executive Vice-President in charge of the EU Green Deal, European Commission
EU's proposed Recovery Plan Press briefing (28 May 2020)

Our contribution to a sustainable recovery

Energy security is a key enabler for the economic activity and an essential element of the recovery from the current crisis. As included in the G20 Extraordinary Energy Ministers Meeting Statement, issued on the 14th of April 2020, "ensuring affordable and secure energy are key in addressing the health, well-being and resilience of all countries throughout the crisis response and recovery phases".

During the crisis, the European gas infrastructure played a vital role in ensuring that essential services were maintained for the good of European citizens, communities and their economy. The gas infrastructure is a driving force of the energy security of supply as it delivers uninterrupted energy across Europe to continually produce electricity, fuel industry and transport, and it provides affordable energy for cooking, heating and cooling to European citizens.

A fast and cost-efficient transition to a decarbonised society is possible if all available technologies and resources are considered. The European gas infrastructure and hydrogen will play a key role in contributing to the post-pandemic economic recovery and achieving climate-neutrality by 2050.

In this respect, GIE supports the continuation of the European Union's hydrogen initiatives for building a comprehensive and open-minded EU's Hydrogen Strategy.

"Europe's extensive gas infrastructure can be retrofitted and future proofed to one day transport hydrogen across the EU."

Kadri Simson – Commissioner Energy, European Commission
The Financial Times – 10 March 2020

Building tomorrow's H_2 internal market with the European gas infrastructure

Paving the way for a clean, secure, affordable European energy supply is essential for all of us – and the gas infrastructure is ready to enable this. The existing gas infrastructure will be key in the development of a robust hydrogen value chain while contributing to the establishment of a stronger, sustainable and more innovative European Union. Here what the gas infrastructure can do to enhance the upscaling of the hydrogen strategy:

The **gas transmission system** is mostly well interconnected across EU's countries and allows for highly economic and efficient supply, transport and storage of enormous amounts of energy from production sites over long distances. Gas grids are already suited for transporting biomethane and can be fit for hydrogen with additional investments.

Gas storages can store sustainable and fluctuating energy on a large scale and at low cost, thereby ensuring security of supply. They provide and run flexibility tools from intra-hourly up to seasonal operational requirements from customers enabling a robust and resilient system. Gas storages can also play an important role in storing renewable and low-carbon gases, including hydrogen, in the future: salt caverns, with some retrofitting, are suited for hydrogen and the current assessment on the potential of depleted gas fields is showing their great potential. In a future energy system largely dominated by intermittent energy production from wind and sun, the large flexibility and storage capacity provided by the gas system will be necessary to secure a cost-efficient integration of renewable energy sources.

LNG terminals enhance security of supply through source and route diversification and secure access to global and competitive (fossil and renewable) energy sources. They are also an energy flexibility provider. LNG can substitute more polluting fossil fuels, hence reducing CO_2, NO_x, SO_x, noise and particulate matter emissions in maritime and road transport, power and heat generation (i.e. on remote locations not connected to the gas transmission system). LNG terminals can decarbonize by greening the gas upstream, by using low-carbon technologies downstream or can, for example, be the entry door to (imported) hydrogen-based energy carriers.

The **gas and electricity systems** complement each other. The flexibility and resilience provided by the gas system to the electricity system alleviate the stress of the power grid, significantly reduce investments needed and facilitate the integration of large-scale variable renewable energy. As a result, the gas system, which in the future will run on renewable and low-carbon gases, is an enabler of system integration and the economic viability of renewable energy. New business models, support schemes and remuneration are needed to enable this. Renewable and low-carbon molecules will be a structural component of a secure and flexible energy system, in particular for the so-called "hard-to-electrify" sectors.

Based on this combination of gas assets, hydrogen and its derivatives will enhance a **hybrid energy system by benefitting from possible synergies between the gas and electricity infrastructure** (optimising electrical grid expansion through better utilisation of existing gas infrastructure) while providing flexibility services under different temporal and geographical dimensions (smoothing out price fluctuations and avoiding demand curtailment).

GIE believes that it is crucial to support the deployment of **low-carbon and renewable hydrogen technologies**, we are proud to present you the initiatives and key pilot projects developed by our members that contribute to establishing a **climate neutral, stronger and more innovative European Union**.

GIE members innovate today: H_2 projects in the EU

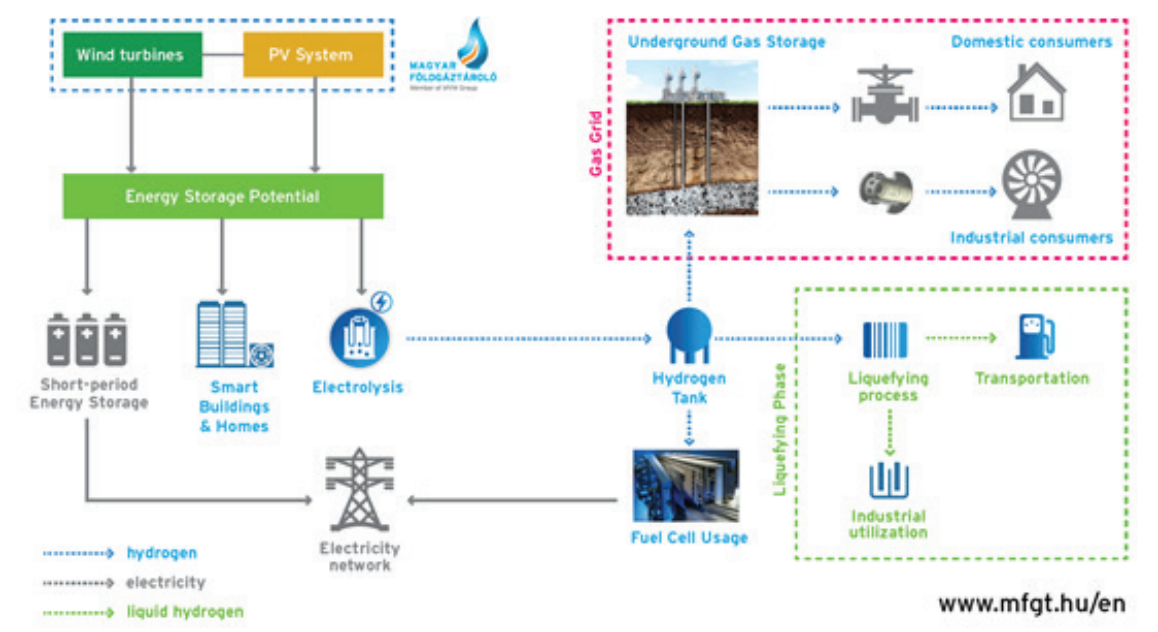
1. Hydrogen storage in depleted fields

By Hungarian Gas Storage (Hungary)

Description of the project

Hungarian Gas Storage plans to develop a new project of hydrogen storage in depleted fields.

After the production of hydrogen from renewable energies by PEM-electrolysis, hydrogen-enriched natural gas would replace part of the own gas consumption of the storage sites of the country, and then be injected into the grid using the existing gas infrastructure for domestic and industrial uses. For the moment, the project is still waiting for financial support from the Hungarian government. This project could be part of the EU Strategy for the Danube Region endorsed by European Council in 2011.



Technical aspects

- The project uses PEM-electrolysis. The main advantages of this technology compared to AEC-electrolysis are that a lower operating temperature is needed (80°), efficiency is higher (65-77%) since more hydrogen is produced per kWh, no chemicals are generated, devices need low maintenance, and the footprint is smaller (more kg of hydrogen per m^3 cell)
- The total working gas capacity of Hungarian Gas Storage is 4.4 bcm

Contribution to energy transition

In Hungary, energy from photovoltaic and wind turbines is expected to strongly increase, but the most critical point in the spread of renewable energy is how to store it when needed. This project is offering a solution to store the surplus, helping the country achieve its carbon emission targets in the long-term.

2. HyGreen Provence

By DLVA, Air Liquide, ENGIE and its subsidiary STORENGY (France)

Description of the project

The **HyGreen Provence project**, created through a cooperation agreement between ENGIE and Air Liquide in 2017, aims to generate green hydrogen from solar energy and store it in underground salt caverns in the French region Provence Alpes Côte d'Azur.

PV electricity production facilities will be erected, as well as electrolyser plants to convert part of the renewable electricity into hydrogen.

The hydrogen will either be used for mobility, supplying a network of filling stations across the region, for heat and cooling for an urban eco-district, and for local industrial users.

The project will be developed into several phases: first, electricity will be produced at a small scale to fuel about 50 public buses by 2023, and then hydrogen storage will be developed in salt caverns by 2024. Eventually, the photovoltaic power and hydrogen storage are expected to be extended in 2027.

Technical aspects

- The project aims at producing 1300 GWh of solar electricity annually, which represents the local annual consumption of around 450 000 people, and 10 440 tons of green hydrogen at an industrial scale, making it the first large-scale project in France based on hydrogen production and storage.
- The total budget estimated by HyGreen comes to 300 M€.

Contribution to energy transition

- Hydrogen produced from fully renewable sources represents a zero-emission fuel (no greenhouse gases and no particles) for green mobility, for industry (replacing fossil fuels for heat production in various processes) and for electricity production with fuel cells. Therefore, it provides a concrete response to the challenges posed by sustainable mobility and local pollution in urban areas.
- The storage of hydrogen helps manage the intermittence of solar energy.
- This new project, with a scale and nature unprecedented in France, will contribute to the development of massive renewable hydrogen production projects in France.

It will self-finance the Climate-Air-Energy Territorial Plan of an agglomeration, without any subsidies.

3. Underground Sun Storage

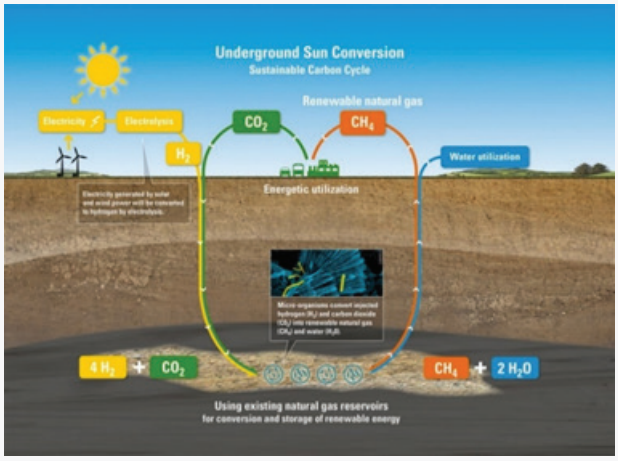
By RAG Austria (Germany)

Video: **http://mediathek.rag-austria.at/#en/episode/UndergroundSunStorage**

Description of the project

Underground Sun Storage is a project run by RAG Austria to store wind and solar energy in naturally formed gas reservoirs. Energy generated from renewables would be converted into hydrogen by electrolysis before it is stored 1 000 underground. By adding liquid CO_2 to this hydrogen in the reservoir, methane is created and can be injected back into the grid.

The project is financed by Austrian Research Promotion Agency and the Climate and Energy Fund.



Technical aspects

- The quantity of energy stored in RAG's gas storage facilities alone is more than 400 times higher than the quantity stored by pumped storage, which is today the main technology for storing large quantities of energy.
- From 2012 research has been conducted to evaluate how the natural gas infrastructure tolerates hydrogen. For the moment, it has shown that it is possible to fill the natural reservoirs with 10% hydrogen, and a test site has already been inaugurated in 2015. A final report published in 2018 showed the overall feasibility of the project, pushing a step further to test the storability of up to 100% hydrogen.

Contribution to energy transition

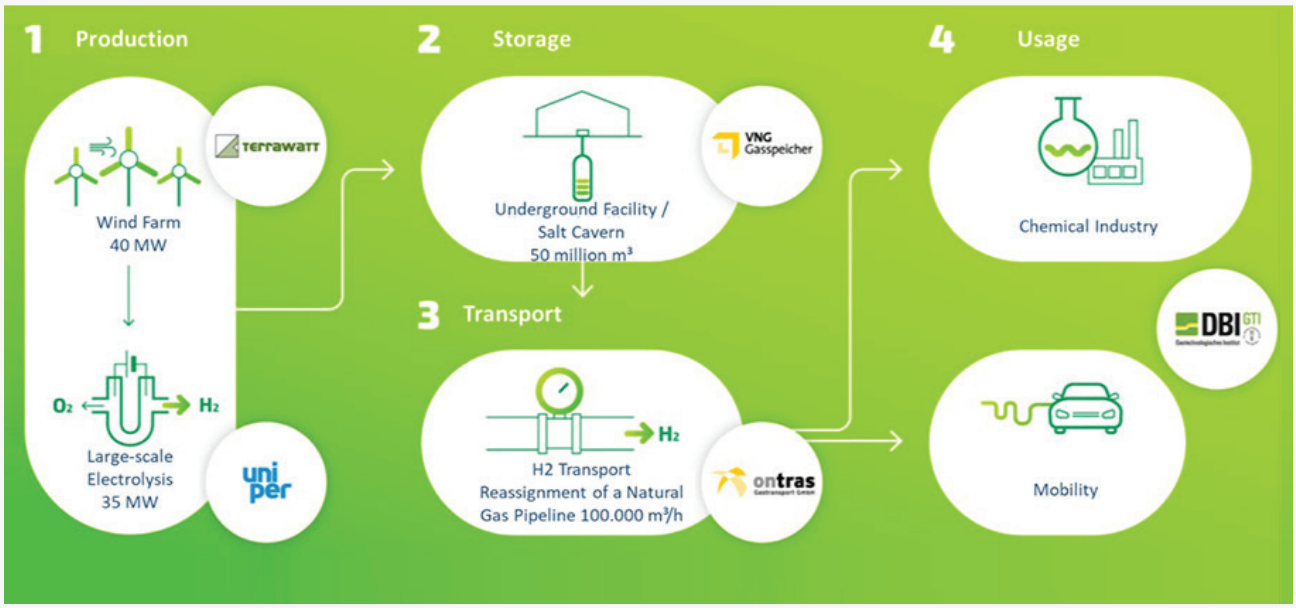
- This project would allow the storage of solar energy during the summer when sunshine is abundant in Austria, in order to be injected back into the grid during winter when demand for heating increases. Therefore, it offers a solution to the challenge of storing renewable energy, so that it can be integrated to the country's energy mix to reduce its carbon emissions.
- Furthermore, the CO_2 injected in the reservoirs is part of a closed cycle, and does not add to greenhouse gas emissions, compared to traditional production of natural gas.
- The goal is also to enable similar investigations for many other storage facilities, all over the world.

4. Bad Lauchstädt Energy Park

By ONTRAS (Germany)

Description of the project

Bad Lauchstädt Energy Park is a large-scale power-to-gas project. Using a large-scale electrolysis plant of up to 35 MW, green hydrogen will be converted from a nearby wind farm using renewable electricity produced. Stored temporarily in a salt cavern specially equipped for this purpose, the green hydrogen can be fed into the hydrogen network of the chemical industry based in central Germany via a dedicated gas pipeline and used in the future for urban mobility solutions It would be the first H_2 cavern in continental Europe and the first such facility in the world for storing green H_2.



Technical aspects

- Windpark: 40MW - Electrolyser: 35 MW - Gas pipeline: 100,000 m^3/h
- Storage capacity: 50 million m^3 ≈ 150 million KWh ≈ households heating annual demand for in a city of 20,000 residents[1]. The energy park is expected to produce 24 million m^3/a H_2[2].
- Objectives: By 2025, substitution of 1.3 billion m^3 with H_2 (CO_2 savings: 1.3 million tonnes). By 2050, substitution of 9 billion m^3 with H_2 (CO_2 savings: 9 million tonnes). It will be used for the Chemical industry and urban usage: local heating, mobility (development of a H_2 filling station directly connected to the H_2 network).

Contribution to energy transition

Green H_2 produced from renewable electricity using electrolysis is non-polluting and easy to store. It enables to compensate for weather-related fluctuations in solar/wind power generation and provides for efficient sector coupling. It will contribute to decarbonise mobility and industry sectors and will help promote large-scale hydrogen projects. The project will boost research and accelerate market maturity of innovative H_2 technologies: it will serve to test under real-world conditions and at an industrial scale. On the long-term, it will contribute to expend at large-scale the integration of green H_2 in central Germany, and sector coupling technologies throughout the country and via EU.

[1] https://www.uniper.energy/news/uniper-and-its-partners-plan-a-large-facility-to-produce-and-store-green-hydrogen-in-saxony-anhalt/
[2] https://static1.squarespace.com/static/5d3f0387728026000121b2a2/t/5e2063e74301a9378dc8b111/1579181032322/06_200113_VNG_CoverAndSlides+VNG+Pitch+%28ID+7818800%29.pdf

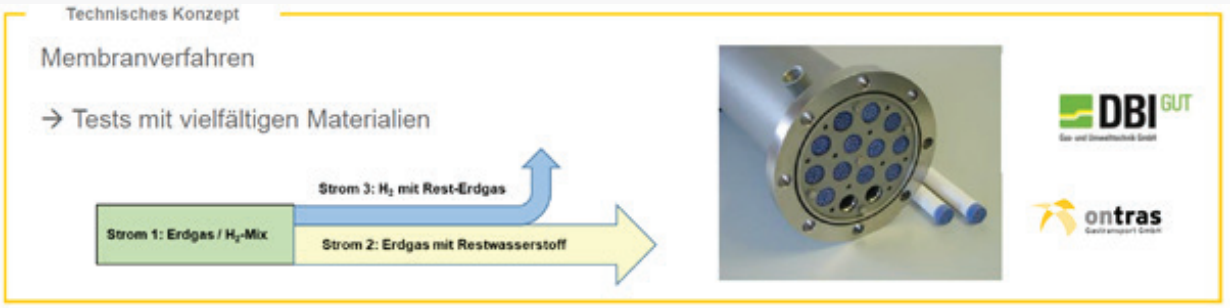
5. Membrane filter technology

By ONTRAS, GRTgaz ONTRAS, GRTgaz, DBI, Mitnetz Gas, DVGW (Germany)

Description of the project

ONTRAS is leading a consortium (DBI, ONTRAS, Mitnetz Gas, GRTGaz, DVGW) aimed at developing a gas filter separating methane and hydrogen compounds from a mixed gas stream. The objective is to build a pilot set of membranes for the separation of hydrogen in hydrogen-natural gas mixtures with high purity. The tests will start in 2020.

Research are ongoing to economically evaluate such a membrane and to test it with different materials.



Contribution to energy transition

- Various applications: making pure natural gas or H_2 available for natural gas filling stations or fuel cells
- Opens up new opportunities

6. North Sea Wind Power Hub

By TenneT, Energinet, Gasunie & Port of Rotterdam (North Sea)

Video: https://www.youtube.com/watch?v=gTuYlybeiXA

Description of the project

North Sea Wind Power Hub is an international consortium, run by TenneT (Germany), Energinet (Danemark), Gasunie (Netherlands) and Port of Rotterdam (Netherlands), which goal is to build wind power hubs in the North Sea from 2030-2050.

The idea is to build one or more hubs in the central North Sea, with interconnections to the bordering countries. Such artificial islands will be situated at a location where there are frequent high wind speeds and will be connected to a large number of offshore wind farms. The electricity will then be distributed to The Netherlands, Belgium, the UK, Norway, Germany and Denmark via current connections.

Furthermore, the surplus can be converted to hydrogen for large scale transport or storage, thanks to Gasunie expertise in power-to-gas technology based on electrolysis.

Today, the project is in the research phase, and recent results have shown its feasibility.

Technical aspects

- The idea is to gradually develop 10 to 15 GW hubs before a large offshore wind build-out.
- A first hub will likely be electrically connected to the coast and with additional power-to-gas to provide energy system flexibility and could be operational in the 2030s.
- The implementation of 180 GW offshore wind can be achieved by 2045.
- After 2030, once large, far-offshore wind regions have been defined for development, it will be possible to develop several hubs that will act as central platforms for supporting the infrastructure required to transport the energy, e.g. for converting electricity into gas (in particular green hydrogen) instead of using the offshore converter platforms commonly used at the moment.
- The relevant wind power capacities range from 70 to 150 GW by 2040 and up to 180 GW by 2045.

Contribution to energy transition

- The project could lay the foundation for supplying hundreds of millions of Europeans with green energy.
- The project aims to meet Paris Agreement climate goals and those of the countries around the North Sea. Close collaboration between countries is essential since such a system cannot be realized by individual EU members states on their own.
- Overall, it will help pave the way for hydrogen economy.

7. Blended Hydrogen for Decarbonisation

By Snam (Italy)

Video: https://www.youtube.com/watch?v=20ceRTByGRU

Description of the project

Snam was the first company in Europe to **introduce** a **mix** of **hydrogen** and **natural gas** in its high-pressure **transmission network**, an initiative aimed at advancing the energy transition through the promotion of hydrogen as a clean energy source.

The pilot project, which successfully took place in Contursi Terme, in the province of Salerno, in December 2019, involved supplying a 10% H2NG (hydrogen-natural gas mixture) for a month to two industrial companies in the area, a pasta factory and a mineral water bottling company. The experiment built on the successful results of Snam's previous successful trial in the area, undertaken in April 2019, which involved a 5% Hydrogen blend.

The project generated wide international interest, defined by Bloomberg News as "a shift toward greener energy sources" and by the Financial Times as "historic".

At present, Snam is committed to verifying the full compatibility of its infrastructure with increasing amounts of hydrogen mixed with natural gas, as well as studying hydrogen production from renewable electricity.

Technical aspects

- By applying a **percentage of 10%** of hydrogen to the total gas transported annually by Snam, 7 billion cubic meters could be added to the network each year, a quantity equivalent to the annual consumption of 3 million households.
- According to Snam's experiments, this would allow **carbon dioxide emissions to be reduced by 5 million tons**, corresponding to the total emissions of all cars in the cities of Rome, Turin, Milan and Palermo.
- Growing the percentage of hydrogen to natural gas transport pipelines in Europe and Japan to 7% by 2030 would more than deliver the required electrolyser capacity. The fully ramped up system would cost 0.02% of GDP per annum.

Contribution to energy transition

As also outlined in Snam's CEO, Marco Alverà's book on the topic, "Generation H", the results of this experimentation could have a positive impact in kick-starting the green hydrogen economy and reach Europe's decarbonisation targets:

- Once proven a feasible option, inserting a blend of Hydrogen within the existing gas network could help to generate demand and build scale, boosting the hydrogen value chain and bringing down its costs to reach $2 per kg and making it competitive with fossil fuels in the long run.
- It also offers a way to leverage the significant gas infrastructure asset in Europe (2.2 million kilometres of gas pipelines and 1,200 TWh of underground storage capacity), and therefore does not require significant investments in infrastructure to advance the energy transition.
- It would also allow Europe to position itself as leader of the energy transition, and generate a Hydrogen economy that would create jobs, safeguard menaced ones and help citizens reap the benefits.

8. MéthyCentre

By Storengy (France)

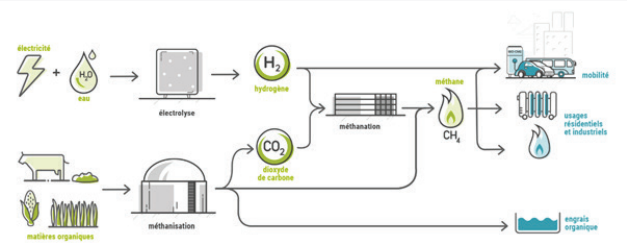
Video: **https://www.youtube.com/watch?v=Ej5Hp3IaOjM&feature=emb_logo** (in French)

Description of the project

MéthyCentre is a project that aims at demonstrating the technical and economic feasibility the first Power-to-Gas process in France that combines methanisation (biomethane production), electrolysis (hydrogen production) and methanation (synthetic methane production). The site is located in the Centre-Val de Loire region of central France.

The renewable methane produced will be injected to the local grid for domestic (heat, cooking…) and industrial needs (heat, chemical industry), but also used as a fuel for transports.

The hydrogen will be used for transports.
The organic matter used for the methanisation process will come from local farms.



Timeline of the project:

- 2020: building and start of use of the electrolysis
- 2021: building and start of use of the methanisation
- 2022: putting the MéthyCentre into service: start of the P2G experimental phase
- 2023: end of the experimental phase of the demonstrator
- 2036: 15 years of methanisation operating

The project will come into service in 2021.

Technical aspects

- MéthyCentre will consume 1 GWh of electricity each year, that will come from renewable sources thanks to certificates of origin.
- The hydrogen production consumes water whereas methanation generates it. In total, MéthyCentre will consume around 400m^3 of water a year, which corresponds to the annual domestic consumption of 8 inhabitants.
- Key data:
  - 50m^3/h of green gases production
  - gas consumption of 800 inhabitants
  - 5kg/day of hydrogen production
  - electrolyser power: 250 KW

Contribution to energy transition

MéthyCentre provides a solution for a crucial challenge : transforming renewable electricity (and the CO_2 contained in the biogas) into large quantities of hydrogen and synthetic methane in order to meet customers' needs, whether for green mobility powered by hydrogen and biogas (bio-CNG) or for injection into the natural gas network.

9. Centurion

By Storengy (France)

Description of the project

Centurion is an innovation project aimed at setting up to 100 MW electrolyser combining the transport and storage of hydrogen. The goal is to produce low-carbon hydrogen for industrial uses, mobility and heating in the UK.
The first phase includes a feasibility study to demonstrate the attraction of Power-to-Gas in decarbonising the energy system by significantly reducing costs.

For this project, Storengy is associated with Innovate UK, ITM Power, Inovyn, Cadent and Element Energy.

Technical aspects

- A 100 MW P2G energy storage system.
- Storage capacity of 40 000 MWh in the salt cavern
- Capital costs at about 1/100th of the cost of a battery storage

Contribution to energy transition

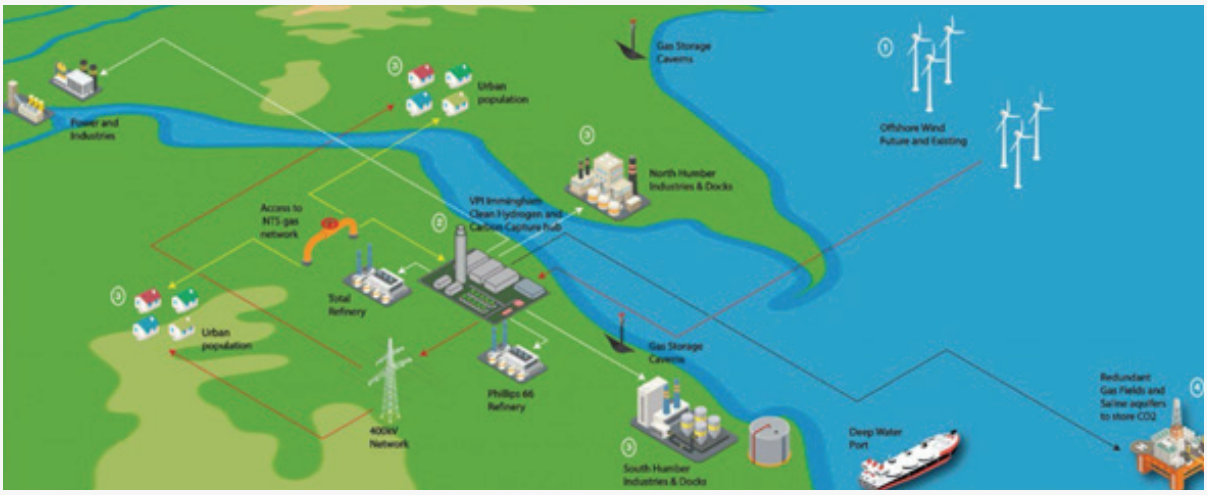
Once the demonstration is proven successful, those systems will be able to significantly contribute the decarbonisation of the electricity and gas grids and, with the coupling of both network, they will enable energy storage, that will help the UK energy network to receive high quantities of renewable energy.

10. Humber Zero

By Uniper, Phillips 66 and VPI Immingham (UK)

Description of the project

Humber Zero is a large-scale decarbonisation and hydrogen project that aims to create zero-carbon industrial cluster in Humberside by reducing carbon emissions from power and petrochemical facilities, as well as creating a sustainable platform for industrial growth and economic development.



Technical aspects

- The project will decarbonise up to 5MT/CO2 per annum of the UK's industrial activity in the Humber region, with the potential for further decarbonisation in the future.
- 1 500 MWth of clean hydrogen will be produced, which is enough to power1 million homes
- The UK's largest offshore wind development is planned with the capacity to produce 2.6WG of power initially, growing to 6WG by 2028. National Grid estimates that up to 50% of this will not be needed off-peak, so Humber Zero will use the excess capacity to pilot green hydrogen gas production.
- The empty gas fields and saline aquifers located at 20 miles offshore from the Humber estuary will enable the storage of CO2 indefinitely and with a capacity of 720 Mt CO2. Over 40 years' worth of emissions from British industry could therefore be stored.

Contribution to energy transition

Humber Zero will support the Humber region move towards zero industrial emissions, by providing clean hydrogen for over a million homes. A fully functioning low-carbon industrial hub is expected from 2025.

11. Baltic Pipe

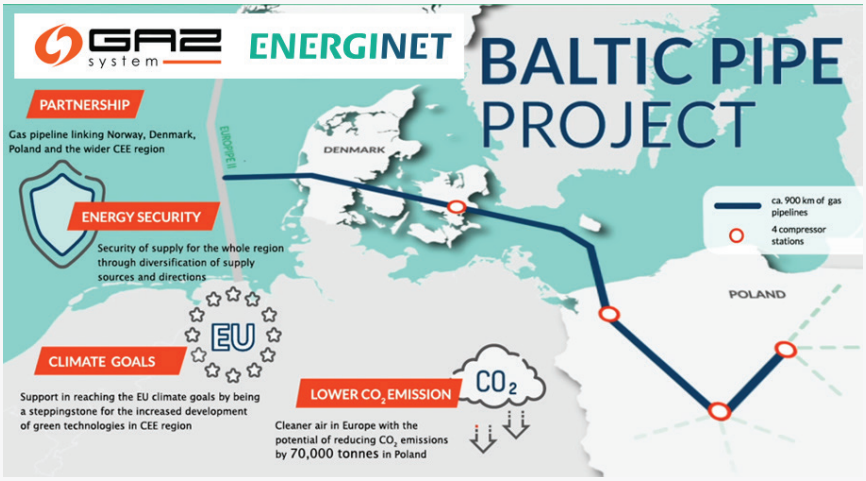
By GAZ-SYSTEM, Energinet (Poland, Denmark)

Videos: **https://www.baltic-pipe.eu/news/materials-to-download/#acc-tb_lpv5706-0**

Description of the project

The Baltic Pipe project, that will be effective by October 2022, aims at creating a new gas supply corridor in the European market, from Norway to Denmark and Poland, as well as to end-users in neighbour countries. At the same time, it will enable the supply of gas from Poland to the Danish market

The project is being developed in collaboration between the Danish gas and electricity transmission system operator Energinet and the Polish gas transmission system operator GAZ-SYSTEM, and is co-financed by the Connecting Europe Facility of the European Union.



Technical aspects

- The pipeline will have a capacity of 10 billion m^3 /year of gas from Denmark to Poland and 3 billion m^3 from Poland to Denmark. This equals around 120 TWh of energy if used for methane.

Contribution to energy transition

According to the *Climate report*[3] published by Baltic Pipe Project, this project could bring climate benefits by 2022, among which:

- 70 million tonnes of carbon emissions would be reduced annually by utilizing gas combined with wind (Poland has high potential for wind energy). Such a reduction would contribute with 58% to Poland's 2030 target.
- In the future, the pipeline could be used not only for natural gas, but also for greener gases such as biomethane or green hydrogen as well as for CO_2 used in CCS. This would require some modifications and a new license.

Baltic Pipe project can be used to produce about 60 TWh of electricity. This can then be combined with another 40 TWh wind (and/or solar) for a total of 100 TWh. This corresponds to an increase of 60% in electricity generation compared to today. This clean electricity can be used to replace coal in electricity generation, oil and wood in buildings using electrically powered heat-pumps.

[3] https://www.baltic-pipe.eu/wp-content/uploads/2019/11/baltic-pipe-climate-reports-en.pdf

12. HyOffWind

By Fluxys (Belgium)

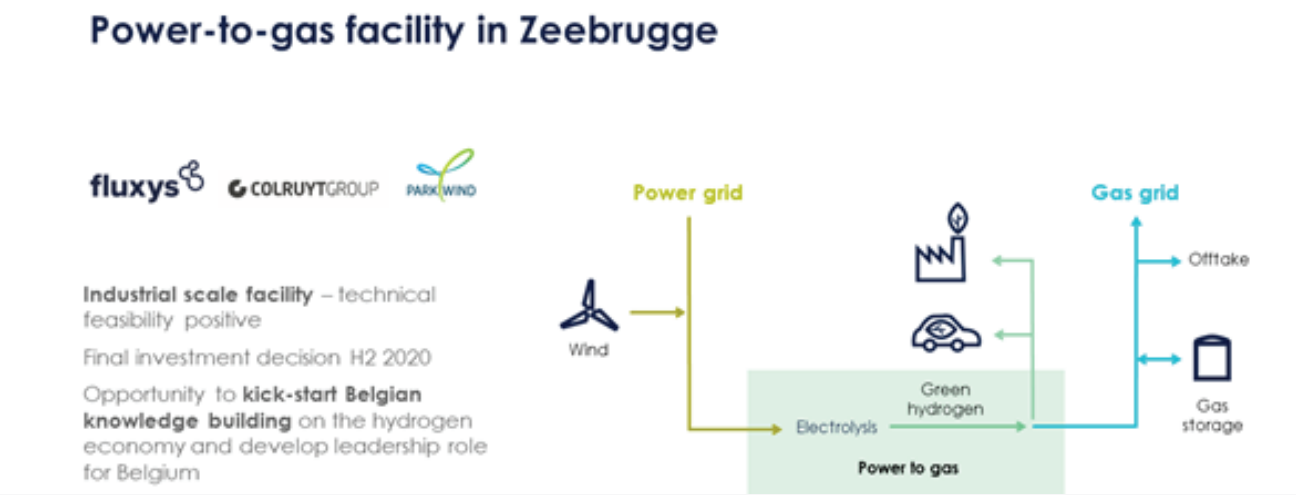
Description of the project

HyOffWind, supported by Eoly, Parkwind and Fluxys, aims at building the first industrial power-to-gas installation in Belgium (Zeebrugge), to convert renewable electricity into green hydrogen at an industrial scale. The feasibility study for the project turned out positive and end of February, the consortium is issuing a call for tenders for its construction. The partners aim to take a final investment decision after the summer 2020.

In a first phase, with the support of the Federal Energy Transition Fund, the feasibility of the installation was further investigated - and the outcome was positive.

The technology is mature enough to realise an industrialised production of green hydrogen, and the legislative framework and permits provide a sufficient basis to further build on the realisation of the project.

End February 2020, the consortium tendered with various external parties to develop the project into a concrete reality. Current timing is to be able to take a final investment decision after summer 2020 in order to be able to start the construction of the installation by mid 2021. Based on the current planning, the first production is planned for early 2023.



Technical aspects

- 25 MW electrolysis

Contribution to energy transition

HyOffWind project aims at launching green hydrogen production, and becoming one of the first opportunities in Belgium to deliver green hydrogen to the market via tube trailers or through injection into the gas grid. Therefore, this project aims at a scale-up for Belgium, and consequently making sure that Belgium is not missing out on the current evolutions. Zeebrugge would act as an energy hub, also having the potential as a logistics hub for hydrogen applications. It would be the first installation of such scale in Belgium.

As a result, the price of renewable hydrogen could drop, which in turn could boost the applications that make use of this green hydrogen.

13. M/R HELLE - Hydrogen injection

By Energinet (Denmark)

Description of the project

The project aims at testing a blend of hydrogen and natural gas in the Danish network. Hydrogen will be injected up to 80 bar corresponding to transmission networks. It will be partly funded by external innovation fund.

Phase 1 was finalised in February 2020: long-term test of 12% hydrogen blend, and short-term test of 14% hydrogen blend were completed. Furthermore, no leakage of hydrogen was detected throughout the testing period. It has been decided to continue in a phase 2 where the aim is to test up to 25% blend of hydrogen in the closed loop system. The project partners for phase 1 are Energinet, EVIDA and the Danish Gas Technology Centre.

Technical aspects

- Blending up to 25% in a closed loop system between two M/R-stations (80/40 and 40/4 bar stations).
- A new connection has been built to return the gas to the high-pressure side.
- A compressor raises the pressure from 4 bar to 80 bar.
- The two M/R stations and connecting pipework are standard and have been in operation for about 30 years on natural gas.

Contribution to energy transition

This project will play a role in enabling Denmark to reach its objective of 100% renewable energy in 2050. To reach that target, it is indeed necessary to increase the focus on conversion between various energy sources and on storage of large quantities of renewable energy. M/R HELLE testing project will pave the way to the large-scale development of hydrogen in Denmark, allowing to store and transport surplus renewable electricity.

How to scale up H_2 - Policy asks

The EU Hydrogen Strategy should encourage gas infrastructure operators to continue developing decarbonisation activities aimed at increasing the potential and actual quantities of hydrogen, in a way that does not distort market competition, complies with the applicable regulatory framework and secures third party access to maximise societal benefits.

To enhance the hydrogen market while increase the resilience and competitiveness of European companies, European gas infrastructure operators need:

1. A common terminology via clear, accurate and science-based definition of renewable and low-carbon gases, including clean hydrogen.
2. A set of national binding consumption targets for renewable and low-carbon gases, including hydrogen, by considering technological developments and decarbonization pathways of individual Member States.
3. An EU-wide credible documentation of the green value of renewable and low-carbon gases, including hydrogen, such as Guarantees of origin (GOs), with a technology-neutral approach and compatible with the EU ETS.
4. The adjustment of levies, grid charges and taxes to reflect societal benefits provided by the gas infrastructure and the avoidance of double charging.
5. The amendments of relevant EU legislation (e.g. TEN-E regulation) to enable network owners to operate several categories of gases (including hydrogen), and providing them with incentives to adapt their infrastructures to cope with the coexistence of different gases.
6. The alignment of the EU Hydrogen Strategy with upcoming policy measures, particularly the Strategy for Energy System Integration and the Sustainable Finance and Taxonomy, to ensure a fully integrated market in view of the development of renewable and low-carbon gases, including hydrogen.
7. The upcoming Offshore Wind Strategy as an opportunity to rework how overall system efficiency gains can be achieved by looking at the optimal way to bring hydrogen from supply source to demand area (i.e. offshore conversion). Those are issues we need to address to allow the whole infrastructure to play its role.
8. A Roadmap for hydrogen gas assets readiness developed by/in close cooperation with the gas infrastructure and electricity sector.
9. A robust regulatory framework that will allow research, development and pilot projects by infrastructure operators on renewable and low-carbon gases, including the injection of pure, blended H_2, synthetic methane and other renewable and low-carbon gases into gas infrastructures and end-use applications.
10. Transparent and uniform criteria for better comparability of objective life cycle assessments (GHG total carbon footprint) to assess policy measure and technologies.

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