Press Release
Lesquielles-Saint-Germain (02), France, March 20, 2025

Kick-start of DENOBIO, the first French industrial-scale biological methanation unit for injection into the natural gas network

Enosis inaugurates its industrial-scale demonstrator DENOBIO, a pioneering installation located in the Hauts-de-France region in France. This project boosts biomethane production by valorizing CO_2 from an agricultural anaerobic digester unit. The e-methane produced from CO_2 will soon be injected into the natural gas network operated by GRDF.

The kick-start of DENOBIO facility marks another milestone in the industrialization of the biological methanation process designed by Enosis. The French pioneer in CO_2 recycling into gas and renewable fuels has conducted over ten years of research and technological development to build the first installation of this type to enter into service in France. Several commercial projects will follow in France and abroad.

A new technology for producing green gas injected into the French network

Methanation involves producing methane from CO2 or carbon monoxide and hydrogen. The process designed by Enosis is called biological methanation. It is based on an innovative and sustainable biotechnology, developed jointly with French research institutes[1].

Enosis's biological methanation units can be integrated into anaerobic digestion sites that produce green gas from biomass (agricultural residues, livestock effluents, waste, etc.). The Enosis process captures the CO_2 released during the biogas purification process. It boosts methane production by more than 50% without additional biomass consumption. Furthermore, it can also process CO_2 from pyrolysis, gasification, or industrial sites.

In addition to CO_2, the methanation process requires a supply of hydrogen, which can be produced by water electrolysis using renewable electricity. The installations designed by Enosis ensure the conversion of renewable electricity surpluses into renewable gas, which is easier to store and transport. The methane produced by methanation is thus qualified as "renewable" and called “e-methane”. Injected into existing gas infrastructures, it substitutes to fossil gas with identical properties for all use cases.

DENOBIO, an industrial-scale demonstrator and a “first of his kind”

The DENOBIO project aims to be an industrialization tool and a showcase. In this “first of his kind” methanation demonstrator, Enosis plans, initially, to treat the CO2 emitted during the biogas purification of its partner Energia Thiérache's anaerobic digestion unit, to which it is integrated, and then the raw biogas

[1] Le laboratoire TBI (Toulouse Biotechnology Institute), unité mixte de recherche de l’INSA Toulouse, du CNRS et de l’INRAe, et le laboratoire DEEP (Déchets Eaux Environnement Pollutions) de l’INSA Lyon.

produced by this unit. Thus, Enosis intends to demonstrate the various possibilities of coupling with an anaerobic digestion unit : as a complement to the biogas purifier or as a substitute. In any case, the hydrogen required by DENOBIO is supplied by the company Lhyfe, which produces it at a remote site through an electrolysis process using renewable electricity. The e-methane produced by DENOBIO will be injected into the natural gas network, a first in France.

DENOBIO also aims to optimize operating conditions and methods, in cooperation with the operators of the anaerobic digestion unit, and to evaluate the environmental footprint of the process.

DENOBIO, a collaborative project bringing together local, industrial, and scientific stakeholders

DENOBIO is the result of collaboration between Enosis and various partners, primarily the agricultural anaerobic digestion unit of Energia Thiérache. This cooperation demonstrates the potential synergies between local agriculture and industrial innovation.

DENOBIO also includes a close partnership with GRDF for all matters related to metering and injection into the grid of gas produced by methanation.

Finally, DENOBIO has a more scientific component, which brings together Enosis and the TBI laboratory at INSA Toulouse, a long-standing partner of Enosis. This component focuses in particular on advanced modeling of the process with the creation of a digital twin.

DENOBIO is a government-funded project under the "France 2030" initiative, operated by ADEME. It is also supported by the Hauts-de-France Region and GRDF.

DENOBIO project is a winner of the "Hydrogen Technology Building Blocks and Demonstrators" call for projects, operated by ADEME as part of the France 2030 investment plan. The project is also a winner of the call for projects jointly led and funded by GRDF and the Hauts-de-France Region, to support the development of a first biological methanation demonstrator suitable for agricultural anaerobic digestion units. Specifically, DENOBIO is funded by the Hauts-de-France Region's Regional Fund for the Amplification of the Third Industrial Revolution (FRATRI)

The deployment of Enosis biological methanation facilities, coupled with anaerobic digestion units and electrolysis, constitutes a strong base in the decentralized territories for anchoring and accelerating renewable or low-carbon hydrogen production hubs. Several commercial projects are already under development to replicate and adapt this solution to other configurations (territorial anaerobic digestion units, sludge from wastewater treatment plants, etc.).

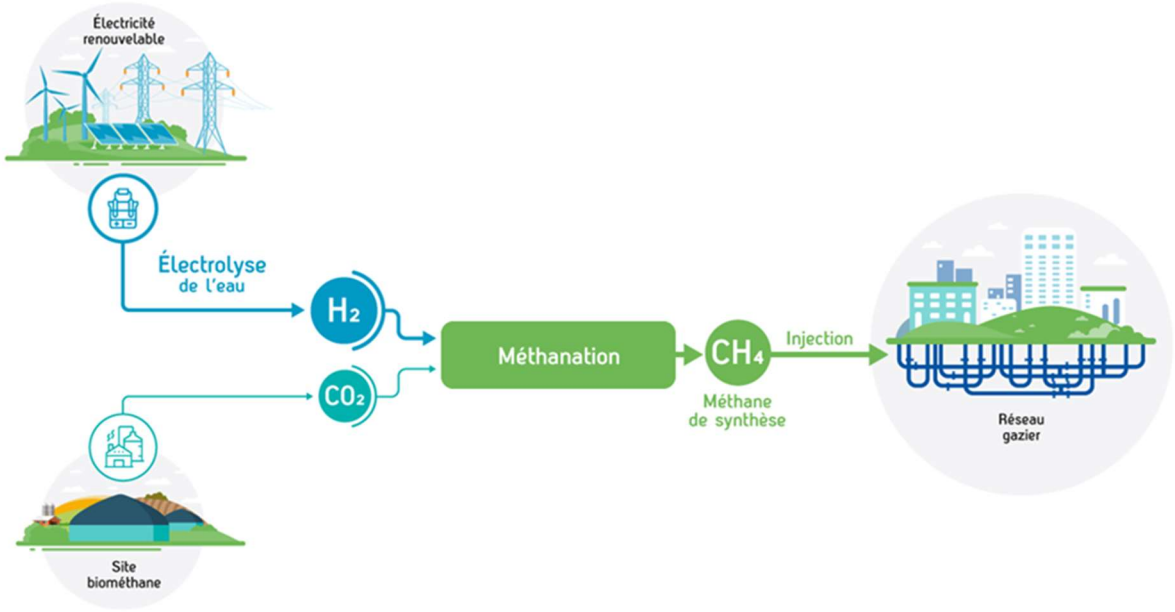
In "Gas Perspectives 2024" report, French gas network operators (GRDF, NaTran, Teréga) estimate French e-methane production to reach 8 TWh in 2035, thus contributing to France's energy independence. This production will come in addition to biomethane production, the capacity of which currently exceeds 14 TWh.

Vincent Guerré, President of Enosis, declared: *"Enosis considers methanation to be a key lever in the energy transition. It increases the production of renewable gas without increasing the input of biomass and allows electricity and hydrogen to be stored in the form of methane. The latter can be transported through natural gas networks. It is with this in mind that we are launching DENOBIO, our first industrial biological methanation unit."*

David Batteux, President of Energia Thiérache, declared: *"At Energia Thiérache, we combine agricultural expertise with industrial innovation. This demonstrator allows us to recover CO_2 from anaerobic digestion unit in a sustainable way. In this way, we are contributing to a respectful and forward-looking agroecology."*

Xavier Passemard, Biomethane Director at GRDF, decalred: *"GRDF seeks to mobilize all green gas capacities to contribute to energy sovereignty and decarbonization. This is why it is crucial for us to contribute to the development of a promising technology like Enosis, which creates synergies with already mature processes such as anaerobic digestion and will enable us to supply our customers in the region with increased volumes of decarbonized gas."*

The methanation process involves combining carbon dioxide (CO2) with hydrogen (H2) produced by water electrolysis. The resulting synthetic methane (CH4), also known as e-methane, can be injected into the network where it replaces fossil gas, with identical properties regardless of its use.



About Enosis:

Enosis is an innovative SME based in Toulouse and a French pioneer in biological methanation technologies. Enosis designs CO2 recycling systems for the production of renewable or low-carbon methane, a substitute for fossil natural gas, which can be injected into existing networks or used as fuel. Integrated into anaerobic digestion units (agricultural, territorial, or for the treatment of sludge from water treatment plants), Enosis biomethanation equipment recycles the CO2 contained in biogas into "e-methane." Coupled with electrolyzers, they provide a bridge between the electricity grid and the gas network (so-called "Power-to-Gas" or "Power-to-Methane" systems).

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About Energia Thiérache:

Energia Thiérache is a company specializing in the production of biomethane. It owns and operates an anaerobic digestion facility located in Lesquielles-Saint-Germain, in the French Aisne department (Hauts-de-France region).

Fueled by organic matter of agricultural origin (silage from intermediate energy crops, energy crops, and compressed beet pulp), the facility produces approximately 570 Nm3/h of biogas, composed of an average of 55% biomethane.

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About GRDF

GRDF manages the largest gas distribution network in Europe. It operates and maintains 207,000 km of networks, ensuring the safety of people and property. GRDF is a key player in an affordable and locally rooted energy transition. Present in more than 9,500 municipalities, the company is a partner to local authorities, supporting them in their decarbonization efforts through their energy and sustainable mobility policy choices.

GRDF distributes gas to nearly 11 million customers for heating, cooking, and transportation, regardless of their supplier. For each use, GRDF offers pragmatic solutions to reduce its customers' carbon footprint: fuel efficiency, green gas, energy efficiency, and high-performance equipment. The company is working to achieve 20% green gas in its networks by 2030, a goal that will enable as many people as possible to benefit from renewable energy produced in France. GRDF is the first gas distributor to be committed to a decarbonization trajectory - across all scopes and at a constant scope - in line with the Paris Agreement.

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