

Biomethane recovery unit for wastewater from the Métropole de Lyon

by Laëtitia AUBEUT / 2019-05-24 14:06:46 / France / 7972 / FR



Year of commitment : 2018

CO2 Impact : The implementation of the recovery of 100% of the biogas produced in biomethane produced from sewage sludge from the Feysine wastewater treatment plant enables the metropolis of Lyon to avoid the emission of approximately CO2 / year

Green energies : Biogas, Biofuel, Gas

Water cycle : Purification, Other

Circular economy and waste management : Industrial Ecology, Optimization of ressources, Save of ressources, Organic recycling, Methanation unit



2 500 000 €

Builder

PRODEVAL / SUEZ for purification and GRDF for injection

Manager / Dealer

METROPOLIS OF LYON / Suez

GENERAL INFORMATION

The Aqualyon La Feysine wastewater treatment plant treats the wastewater of 300,000 equivalents / inhabitants of around 20 municipalities in the Lyon Metropolitan area. It is the third largest wastewater treatment unit in its territory. As part of its treatment process, the sludge produced by wastewater treatment is methanised by producing a biogas that until 2018 was partly flared and used for the need for reheating of the methanizer and a treatment of these sludge by drying. At the end of 2018, the Feysine wastewater treatment plant became the eighth French urban wastewater treatment plant to upgrade the production of

biogas biomethane by purification and injection into the community's gas network, operated by GRDF.

From its wastewater, Métropole de Lyon is able to produce on average 70 Nm³ / h of biomethane or the equivalent of 6.2 GWhPCS / year. This production corresponds to the annual gas consumption of about 1000 new homes complying with the RT 2012 standards for hot water and heating needs or 28 buses fueled by green gas and simply from wastewater from the metropolitan area. Lyon and its citizens.

In addition, the production and injection of biomethane into Lyon Métropole's gas network significantly avoids the emission of more than 1000 tonnes of CO₂ to the atmosphere for 100% recovery of the biogas produced in biomethane.

Finally, the biomethane produced and injected is purchased by a gas supplier that can green its commercial offer, allow the city to quickly make the investment in the upgrading system and help develop the greening of gas in its various uses. throughout the country by the subscription of guarantees of origin arrows preferably in favor of fuel and local use for the needs of the Metropolis of Lyon.

Progress Status

Delivered

Data Reliability

Self-declared

Funding Type

Public

Website Enterprise / Infrastructure

<https://www.actu-environnement.com/ae/news/Biomethane-station-epuration-Feyssine-injecte-premier-m3-32932.php4>

Sustainable Development

Attractiveness :

In France, biogas upgrading to biomethane and its injection from sewage treatment plant sludge has only been permitted since 2014. Despite a recent regulatory context, the development of biomethane from our wastewater in the gas distribution network operated by GRDF continues to grow. In fact, GRDF's 2023 forecast will reach more than 70 wastewater treatment plants in France that will inject biomethane for a production capacity of at least 1 TWh. This represents the hot water supply and heating capacity of a city of 170,000 new homes or the equivalent of feeding nearly 4,000 buses running at BioGNV. As of June 2019, 12 community wastewater treatment plants are already using biogas for biomethane in their gas network.

Communities see this as an opportunity from their infrastructure to meet their goals and commitments to sustainable development. It is precisely in the context of its sanitation competence that Métropole de Lyon has made the choice of energy recovery from sludge wastewater treatment plant of the third largest treatment plant in its territory. In addition, it has also used its master plan for energy and waste management more broadly for the development of anaerobic digestion on its territory with a global organic deposit which could enable it to double its production of renewable energy and by 2030. As such, the Feyssin biogas upgrading and injection project is indeed the first brick of a coherent ensemble that plans to expand with the biomethane production of both. the largest wastewater treatment plants in the metropolitan area, namely Saint-Fons and Pierre-Bénite. Thus, with these three treatment plants, a total of 127 GWh / year of biomethane could be produced locally. This represents the equivalent of the Natural Gas for Vehicles (NGV) consumption of 630 garbage trucks or the same number of urban buses.

The end consumers of this biomethane, thus produced and injected (individuals, private or public companies, industrialists) are active players and citizens of the ecological and energy transition by subscribing to green gas supply offers for their everyday uses but also in favor of commercial offers whose environmental value becomes a source of diversification and competitiveness for the local economy.

Companies specialized in the design of industrial gas and wastewater treatment processes, as well as in the preservation of the environment, see an opportunity to develop a new market, new know-how and strengthen their competitiveness in France as internationally.

For operators of gas networks, such as GRDF, support for the development of biomethane production through anaerobic digestion and biogas purification as well as their technical expertise in the injection and operation of networks, is an essential strategic and vital strategy, which, as French energy companies, must enable the energy transition to be overcome and to sustain the development of new renewable and sustainable energy models based on existing infrastructures and at the earliest opportunity. ecological and climatic issues.

Well Being :

Social Cohesion :

Preservation / Environmental Improvement :

By choosing to invest in a biogas valorization unit for biomethane produced from its third largest wastewater treatment plant, the Métropole de Lyon avoids flaring of 2 GWhPCS / year, the equivalent of 95 T of CO₂ avoided / year. The purification and injection of 100% of biomethane produced in the gas network more generally allows it to save around 1000 tonnes of CO₂ avoided / year.

Indeed, the biomethane once injected into the network can be used to supply homes for their need for hot water and heating production, but also for natural gas vehicle (NGV / bioGNV) stations to run its buses or skips. garbage. Biomethane in its current-use or fuel-use form (BioGNV) is thus substituted for fossil natural gas and can reduce GHG emissions by more than 14 times compared to the use of fossil natural gas "heating" or near 10 times in its bioGNV fuel usage compared to a diesel transport.

The Métropole de Lyon is committed to developing sustainable mobility, transport representing 24% of energy consumption in its territory and the vast majority of which is dependent on petroleum products. Its goal is to reduce this dependence by 16%. To achieve this, it chose among other things to develop the GNV / BoGNV with the objective of having 15 GNV / BioGNV public stations by 2030, all designed to be powered by biomethane fuel from, among other things, the production of its treatment plants.

Resilience :

Responsible use of resources :

Testimony / Feedback

- o Testimony of Jean Paul COLIN, vice-president of the Métropole de Lyon in charge of water and sanitation

"To make the treatment plant even more virtuous, the Métropole de Lyon has decided that the biogas will be redirected to the city gas network. The biogas is injected into the grid operated by GRDF and sold to ENDESA on the basis of a tariff guaranteed by the State over 15 years. This is a profitable project for the metropolis. It contributes to controlling the price of water. In addition, the biogas sector contributes to the reduction of gas emissions, that causes the greenhouse effect. "

- o Testimony of Laurent Roy, General Manager of the Rhône Méditerranée Corse Water Agency:

"Major development projects, the reconstruction of the city on the city, the renovation of housing are all opportunities to adapt urban spaces to climate change. It is urgent to act. Water management in this new context where water tensions are increasing is a priority of the water agency. With its innovative actions in the field of rainwater management and on its treatment plants, the Metropolis is exemplary in this and is a showcase for the water agency. "

Governance

Lyon metropolis

Holder Type : Regional Authority

PRODEVAL / SUEZ for purification and GRDF for injection

Builder Type : Other

METROPOLIS OF LYON / Suez

Manager / Dealer Type : Public

The biomethane injection project in the metropolitan gas network was launched in June 2014 as soon as national regulations allowed it. A first feasibility study was conducted by the SUEZ group as part of its operating contract before being followed by in-depth studies conducted by the Métropole de Lyon. A deliberation authorizing the operational launch of the project was voted by the metropolitan elected representatives in May 2016. All of the work required to complete this project was completed by the end of 2018. The GRDF teams allowed the connection and the supply of the injection station, which was commissioned in December 2018 after a quality verification campaign for the biomethane produced.

The biomethane thus injected was bought by the supplier ENDESA in the form of "Guarantee of origin", in other words the certificates of traceability of the biogas proving that it is indeed of "green" gas. As part of this contract, ENDESA is committed to distribute the biogas locally, in particular to one of the companies responsible for the collection of household waste on the territory (Pizzorno) so that it uses it in 40 of its garbage trucks. This allows the Métropole de Lyon to be part of a CNG / BioGNV development master plan for the sustainable mobility of its territory.

Finally, this project was funded by ADEME and the Rhône Méditerranée Corse Water Agency. For the latter, its contribution is part of the urban agglomeration contract 2016-2019 signed with the Métropole de Lyon for "sustainable management of water and aquatic environments". This innovative project is part of the solutions recommended by the water agency to respond to the challenges of adaptation to climate change. Its new "Save the Water" 2019-2024 program has made it a priority. The water agency thus supports innovation and projects to build the "STEP of the future" such as the reuse of treated wastewater, the recovery of the material, energy recovery with a priority to the injection of biogas when possible.

Other actions of the contract with the Metropolis are also part of the objective of adaptation to climate change: 40 hectares were de-waterproofed in the metropolis with the help of the water agency to let the water infiltrate the soil and disconnect it from the unitary networks. The goal is to convert 113 hectares into permeable. This project represents a very concrete illustration of a virtuous circular economy: urban wastewater treatment is transformed into "green" gas after purification and this biomethane feeds part of the metropolitan fleet responsible for collecting other urban waste. The circle is complete, on a beautiful example of a circular economy in the making.

Business Model :

The sale of this biogas and guarantees of origin to the ENDESA group plans to generate gross revenues of 650,000 € / year. It will only take 7 years for Lyon Métropole - which financed the works with the help of the Water Agency and ADEME - to have a return on investment. Over a period of 15 years, expected revenue amounts to € 2.6 million.

The total investment is € 2.3 million, including € 1.85 million for the works. In this context, the Rhône Méditerranée Corse Water Agency contributes € 1.3 million and the ADEME provides an additional financing of 40 000 euros.

For its part, GRDF brings to the project the rental of the injection tool (injection station) and provides quality control services for biomethane and odorization. PRODEVAL and SUEZ formed a duo for the design, supply and construction of the purification unit. SUEZ is also the operator of the wastewater treatment plant on behalf of the Métropole de Lyon.

Sustainable Solutions

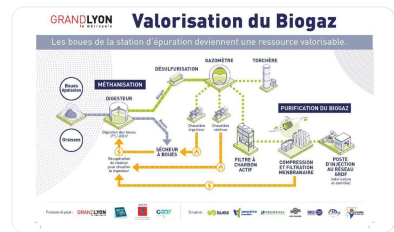
Biogas upgrading unit for biomethane produced from a wastewater treatment plant

Description :

The recovery and biomethane injection solution produced from a wastewater treatment plant is described in three stages:

1 / At the outlet of the sewage sludge methanizer, the biogas produced is captured and then stored in a 900 m3 gasometer. This biogas is then composed of 34% of carbon dioxide (CO2), 65% of methane (CH4) and 1% of various products (nitrogen, oxygen, sulfur, etc.). This gas quality does not allow

direct injection into the gas network operated by GRDF. It is therefore necessary to purify it to allow to retain mainly in this gas that methane (CH₄). This purification step is, in the context of the Lyon metropolis project, carried out by a purification membrane developed by PRODEVAL, which is also a local regional company. At the exit of the gasometer the biogas is first dried and then filtered on activated charcoal in order to first eliminate the sulfur compounds. Then, it is compressed and then conveyed to a membrane purification unit. This unit is designed in a sea container and it is equipped with several membrane modules to adapt the processing capacity over time with regard to the prospects for development and optimization of biomethane production on the treatment plant. The installed purification capacity is thus 250 Nm³ / h for a purified flow rate of 70 Nm³ / h in a first phase of operation. The quality of the biomethane at the end of this purification stage reaches a content of over 97% in methane and then becomes compatible with an injection into the gas network of the Lyon Métropole. The purifying efficiency of the PRODEVAL technology is over 99.3% with only 1% losses. The study and the design of this stage of valorization was carried out by the company SUEZ alongside the metropolis of Lyon and PRODEVAL. SUEZ is also the operator of the Feysine wastewater treatment plant.



2 / The second is the last stage of the recovery process described here is the injection stage of biomethane produced in the gas network of the community. This step is carried out by the French operator of gas distribution networks, GRDF, via a biomethane injection station specially developed to allow

a quality control of the biomethane produced,

an odorization if necessary of this biomethane in compliance with the French safety regulations in force and

the injection of this biomethane into the gas network of the community. This injection is provided by an injection station designed in a maritime container capable of injecting between 10 and 250 Nm³ / h of biomethane.

3 / Once injected and under the operating conditions of the gas network controlled by GRDF, the biomethane produced is then purchased from the producer of the Lyon Metropolis by the gas supplier ENDESA.

- o Mobility :
- o Energy/climate :
- o Urban project governance
- o Air quality
- o Circular economy
- o Infrastructure
- o Water management
- o Waste management
- o Climate adaptation
- o Renewable energies

Company (es) Website :

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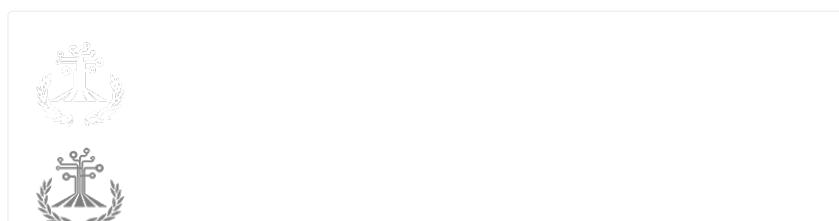


Contest

Reasons for participating in the competition(s)

- Assure la production d'une énergie renouvelable de type gaz à partir des eaux usées d'un territoire.
- Réduction de l'empreinte carbone de la Métropole de Lyon par adaptation des bennes à ordures ménagères roulant. ainsi au biométhane
- Usage local de la production.

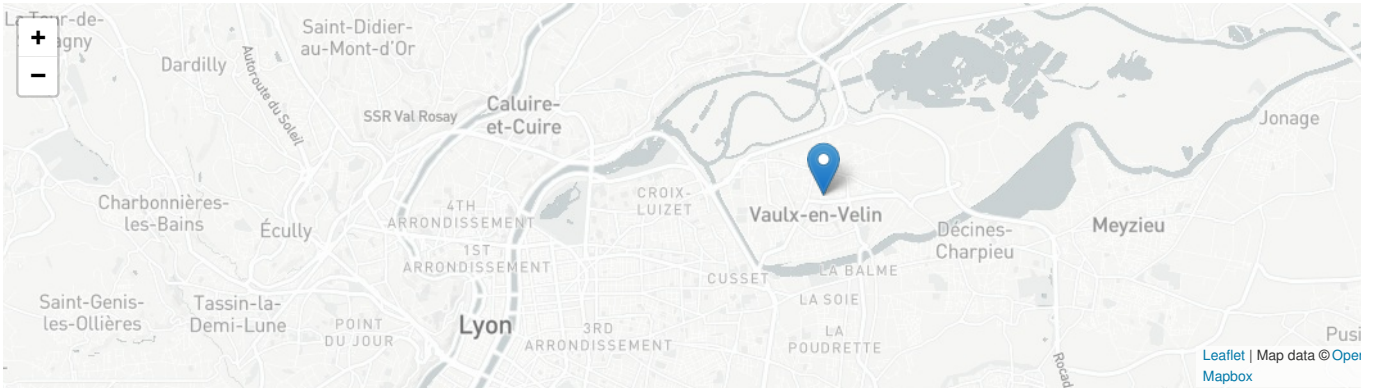
Building candidate in the category



Grand Prix Infrastructure Durable



Prix du public



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