

The project



Case Study



Construction of a plant for Biogas Upgrading and Injection of Biomethane into the Network within the SMAT purification site in Castiglione Torinese

The SMAT project

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THE PROJECT

In July 2020, with the completion of the stages involving testing and plant implementation, **SMAT officially concluded the work on one of the most important projects in Europe** for the production of biomethane from sewage sludge, strengthening the commitment to developing a sustainable energy system.

In June 2019, Smat launched a tender, resulting in **Tonello Energie** (EPC contractor company in the sector of renewable energy) being awarded the contract for the design and construction of a complete biogas upgrading and network injection system.

In turn, **Tonello Energie** took advantage of the collaboration with **Pietro Fiorentini** (leading company in the supply of oil&gas system components) as Main Technological Partner.

The project in numbers



1.800 Nm³/h

Total biogas flow rate



2.700 Nm³/h

Potential biogas flow rate



99,5%

Biomethane recovery

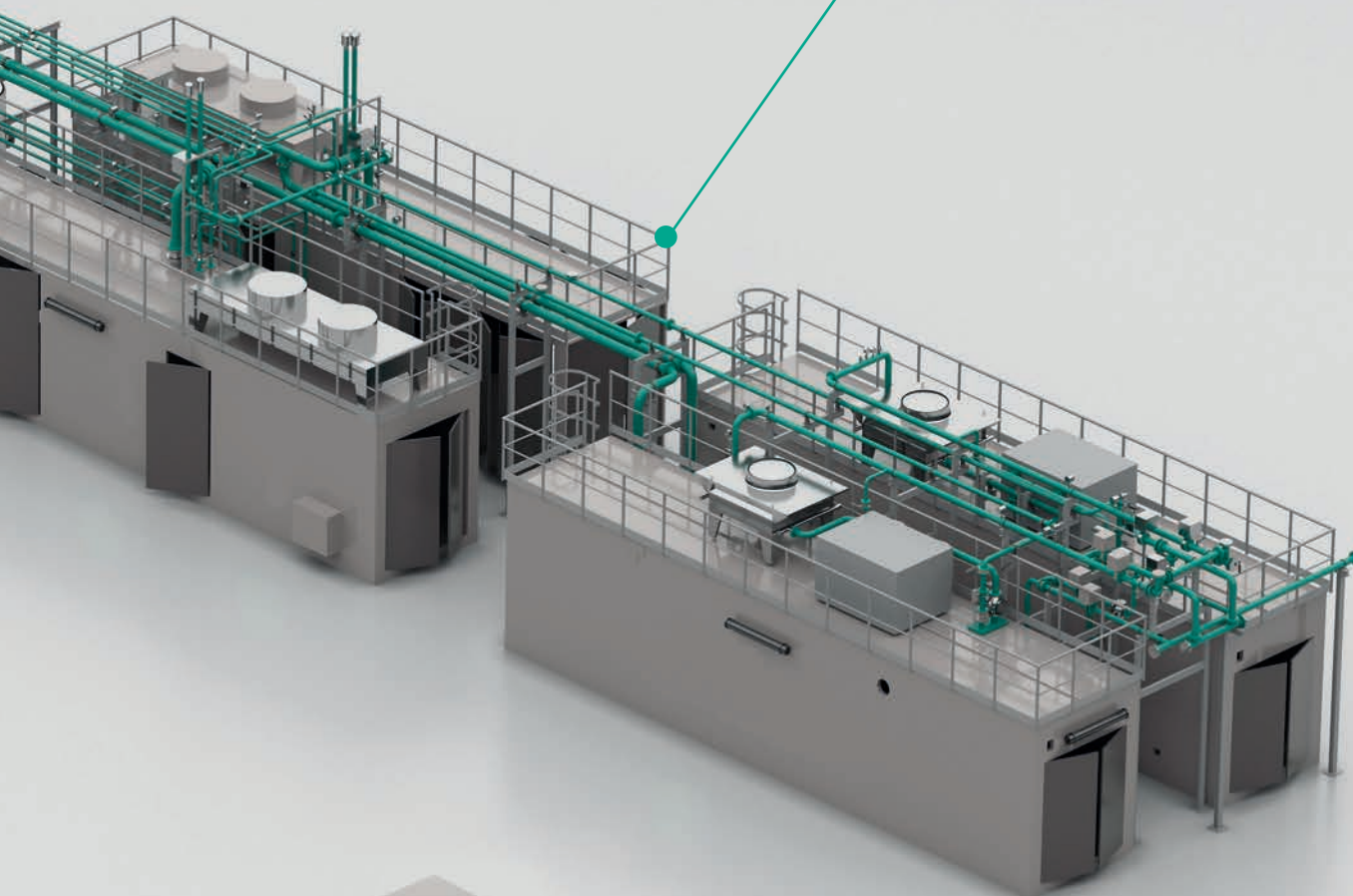


12 barg

Injection pressure

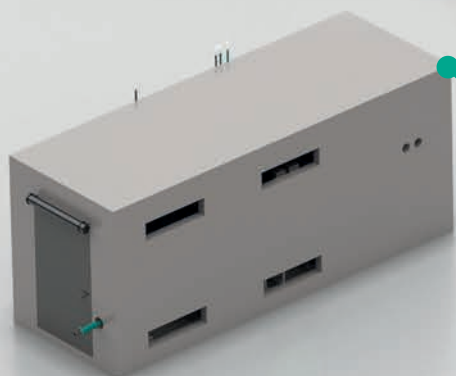
Fiograde⁺

Biogas Upgrading System



Fiogrid⁺

Analysis, measurement and injection system



CASE STUDY / THE SMAT PROJECT

THE SMAT SEWAGE WATER PURIFICATION CENTRE

SMAT, Società Metropolitana Acque Torino, manages the largest and most technologically advanced European water networks, waste water production, purification and treatment systems.

SMAT operates respecting environmental sustainability principles in the whole productive cycle, using low environmental impact systems, the recovery and reuse of the raw materials and the production and use of renewable sources.

Through advanced processing processes, SMAT increases the reuse of purified waste waters limiting the exploitation of underground water resources, using self-produced energy from renewable sources in its systems: hydroelectrical, photovoltaic and cogeneration using biogas produced from the digestion of sludge deriving from sewage water purification.

The water Purification Centre for the Turin metropolitan area, located in Castiglione Torinese is the largest chemical, physical and biological processing plant in Italy, with a maximum potential of **3.800.000** equivalent inhabitants (a.e.) and a daily processed flow rate of approximately **600.000 m³**.

The industrial complex processes more than **200 million** cubic meters of waste coming from a 450 km² area equal to more than **2 million equivalent inhabitants** between citizens and productive activities.



The centre in numbers



1°
In Italy



3°
In Europe



3.800.000
Equivalent inhabitants



600.000

Average daily flow rate





BIOGAS

The Castiglione Torinese plant was previously configured for cogeneration and the production of electrical and thermal energy for self-consumption.



Thanks to the incentives introduced in recent years by Italian legislation, SMAT has decided to make the most of biogas by transforming it into biomethane, i.e. the process by which CO₂ and other unwanted compounds (H₂O, H₂S, siloxanes, halogenated compounds, etc.) are removed from the biogas in order to produce a gaseous mixture comparable to natural gas, which can therefore be injected into the



gas infrastructure, in this case into the SNAM distribution network.

This process allows green molecules to be produced for certain industries with a high dependence on fossil fuels, such as transport, a sector which strongly needs renewable fuel with low environmental impact.

A virtuous example of eco-sustainable business, which involves the transformation of waste (sewage sludge biogas) into a renewable energy resource (**biomethane**).



DESIGN AND PRODUCTION

At the beginning of September 2019, the **Tonello Energie - Pietro Fiorentini team**, working in total synergy and cooperation on the development of the project, has effectively carried out the project development, with the construction and delivery of the first plant components (injection, post-burners and parts of the pre-processing) in December 2019.

Despite the obstacles in the installation related to the Covid-19 emergency, the two companies were able to proceed with no interruptions or delays, delivering a complete and tested plant within the 6 months envisaged by the contract, allowing access to the connected incentive mechanisms.

A very short time scale for a project of this size, which Tonello Energie and Pietro Fiorentini were able to meet thanks to the extraordinary flexibility, collaboration and effectiveness of the work team has established with the SMAT commission.

The plant involves the recovery and treatment of the biogas generated by the anaerobic

digestion of sewage sludge, and consists of two 900 Nm³/h complete biogas purification lines, with the set-up of a third line for a total potential of 2,700 Nm³/h.

In detail, each line includes:

- a pre-treatment section with biogas dehumidification/filtration;
- a biogas compression unit;
- a **FIOGRADE** upgrading system with **PRISM®** membrane permeation, with a recovery of methane from the process of over **99,5%**;
- a network section for the transport of biomethane, from the upgrading station to the injection station;
- a circuit for off-gas treatment;
- a network section for the reuse of non-compliant gas, from the biomethane injection station to the point of connection with the existing biogas network;
- a complete **FIOGRID** system for quality analysis, measurement and injection of biomethane into the SNAM distribution network, at a pressure of **12 barg**, sized for the entire scope of the project;
- the commissioning of the safety, supervision and control software for the entire plant and its integration with existing systems.



KNOW-HOW

With this important project, Tonello Energie and Pietro Fiorentini are among the first Italian companies able to design and build integrated upgrading and injection systems, offering customers the process and cost synergies that derive from the collaboration with a single partner in the design, implementation, installation and maintenance of complete systems for the use of renewable gases.



Case Study



The Customer
www.smatorino.it



General Contractor
www.tonello-energie.com



Main Technological Partner
www.fiorentini.com

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