

SUMMARY

Biomethane feasibility study

Italy

Introduction

This document was created in the frame of deliverable 6.4. "Guidance for feasibility analysis covering biomethane investment projects" of the REGATRACE Project, designed to assist developers in the implementation of investment projects in the biomethane sector based on the analysis of political, economic, technical, environmental factors, path to the market (online or offline), optimal scale and financial factors that influence the feasibility of investment projects.

The Italian feasibility study concerns the "Besozzi Luigi and Ernesto Società Agricola", located in Lombardy, about 20 km south of Milan, in the municipality of Salerano sul Lambro (LO).

The Besozzi Luigi and Ernesto farm owns a biogas plant for the production of renewable electricity with an installed power of 0.99 MW_{el}. The plant went into operation in May 2010 and will receive incentives for the production of renewable electricity until April 2025.

The property is evaluating the possible total conversion of the biogas plant to biomethane and the purpose of the document was to make a technical - economic feasibility analysis regarding this choice.

Italian subsidy scheme

During the last 10 years the biogas sector in Italy has gone through radical changes. To better understand them, it is possible to split the decade into three-periods: the first one that goes from 2008 to the end of 2012, the second from 2013 to the end of 2017, the last one from January 2017 until today.

The years 2008-2012 have been characterized by a rapid growth of biogas plants built. The sector grew considerably, exceeding one thousand plants with an installed capacity around 900 MW_{el}, thanks to a feed in tariff ("tariffa onnicomprensiva") that guaranteed really interesting subsidies (0,28 €/KWh) for the production of renewable electric energy. From January 2013 to December 2017, the Italian biogas support scheme substantially changed and was considered less profitable by the investors. Compared to the past the subsidies have decreased and have been extended from 15 to 20 years and related to the size of the plant (the smaller the biogas plant is, the higher is the subsidy) and to the feedstock (the more by-products or organic waste you use, the higher is the subsidy). They also introduced a ranking system for the new biogas plants ("*registri*") and a special bonus for the enhancement of the thermal energy and for the reduction of the nitrogen content in the digestate. At the end of 2017 in Italy there were 1.555 operating plants, with a total installed capacity of 1.345 MW_{el}. According to these numbers, Italy is the second biogas market in Europe after Germany and the fourth in the world after Germany, China and USA.

At the beginning of 2018 the Italian government published a decree (Decree 02 March 2018) that encourages the production of biomethane and that should give a strong boost to this sector.



The Italian biomethane decree ("Decreto 02 marzo 2018"), that will be in operation until 31 December 2022, has a production limit of 1,1 billion m³ of biomethane per year and it gives subsidies only in the case of use of biomethane in the transport sector. During the month of August 2022, this deadline was extended by 12 months. Therefore, there will be time until the end of 2023 to start producing biomethane and benefit from the incentives of the decree 02/03/2018.

The biomethane promotion scheme is based on the allocation of certificates of release for consumption ("*Certificati di Immissione in Consumo di biocarburanti*", better known as "CIC") to be provided to those subjects who release non-renewable fuels for consumption. The number of CIC that these subjects are obliged to hold must be sufficient to cover the share of energy corresponding to the obligation to release for consumption of biofuels, which is determined every year.

Among the main innovations of the decree there is the introduction of specific measures dedicated to advanced biomethane. The biomethane is considered advanced if it derives from particular biomass (organic fraction of municipal solid waste; agricultural by-products). The development of advanced biomethane should be ensured by the presence, within the definition of biofuels mandatory quotas, of a percentage dedicated to advanced biofuels and specifically to advanced biomethane. Therefore, advanced biomethane becomes obligatory in the transportation system.

A special favourable tariff is foreseen for the advanced biomethane: for the first ten years of operation, at the request of the producers of "advanced biomethane", the GSE will withdraw the advanced biomethane which is produced for a maximum share equal to 75 % of the obligation, minus any shares of "obliged subjects" that do not intend to join the arrangement. The withdrawal of the biomethane will take place at a price equal to that of the MP GAS (Spot Market for Gas) reduced by 5 % and the GSE will recognize the value of the corresponding CIC, assigning each certificate a value of € 375. The producers of "advanced biomethane" will also have the possibility to request from the GSE to be excluded from the physical delivery of the biomethane produced, only if they sell their production independently for the consumption in the transport sector; in such a case, the incentive will coincide with the value of the corresponding CIC, valued by the GSE at EUR 375. Following this ten-year period, the producer should have access to the ordinary method of valuing the CIC for the remaining period of the law, namely through the private sale to the obliged parties. In order to help the CIC trade market, the Italian Power Exchange (IPEX) must set up an organized exchange platform that should eliminate the criticisms that characterize the current CIC exchange system.



Figure 1: Italian biomethane incentive scheme

The Decree provides for the introduction of a guarantees of origin (GoG) system which, according to the purpose of the legislator, serves to prove to the consumer the origin of renewable gas used. A relapse of this

mechanism occurs also in the EU ETS (European Union Emissions Trading Scheme): the parties in charge of buying biomethane with GoG under ETS shall fulfil all or part of their obligation to buy quotas for carbon dioxide emissions.

Feasibility study

The study involved an analysis of three different types of feeding of the anaerobic digester of the Besozzi farm.

For each of these the environmental sustainability parameter was evaluated in accordance with the Italian technical standard UNI ISO TR 15377: 2016¹.

In the case of construction of a biomethane production plant, there are multiple variables involved (e.g., construction of a new plant or conversion of the existing one; size of the plant; type of final product: gaseous or liquefied biomethane; etc.). In the case of the Besozzi Luigi and Ernesto Società Agricola, at least 26 different possible configurations have been identified.

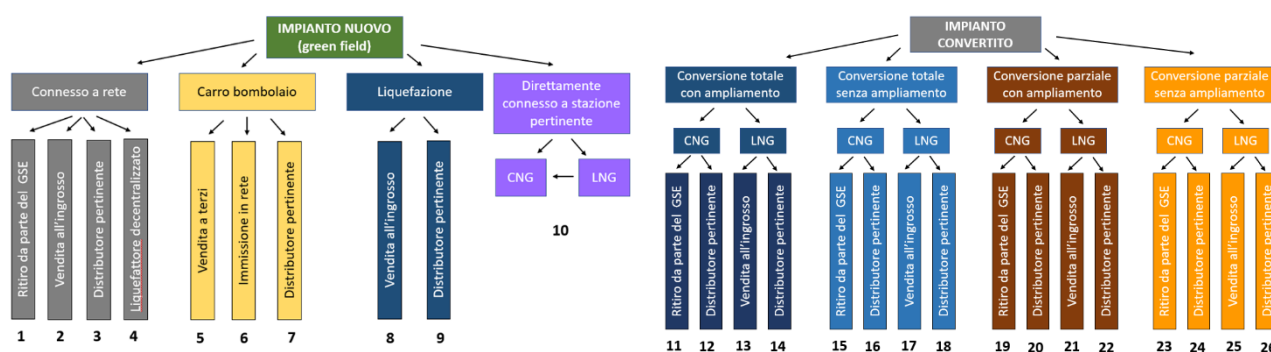


Figure 2: possible configurations of the biomethane plant

The feasibility analysis investigated the configuration that involves the total conversion of the existing anaerobic digestion plant, without expanding production capacity, and the purchase of biomethane by the GSE.

Taking into account the particular context that caused, among other things, a very strong rise in energy prices, two scenarios will be considered:

- 1) "Prezzi bassi" (Low prices) scenario. Average price of natural gas equal to 0,2 €/m³; average price of electricity equal to € 0,18/KWh, inflation rate of 0,5%.
- 2) "Prezzi alti" (High prices) scenario. Average price of natural gas equal to 1,5 €/m³; average price of electricity equal to 0,5 €/KWh, inflation rate of 5%.

The economic feasibility of the transformation of the current biogas plant from 0,99 MWeI to biomethane, without an increase in size and with the withdrawal of production by the GSE, is strongly influenced by the performance of the energy markets.

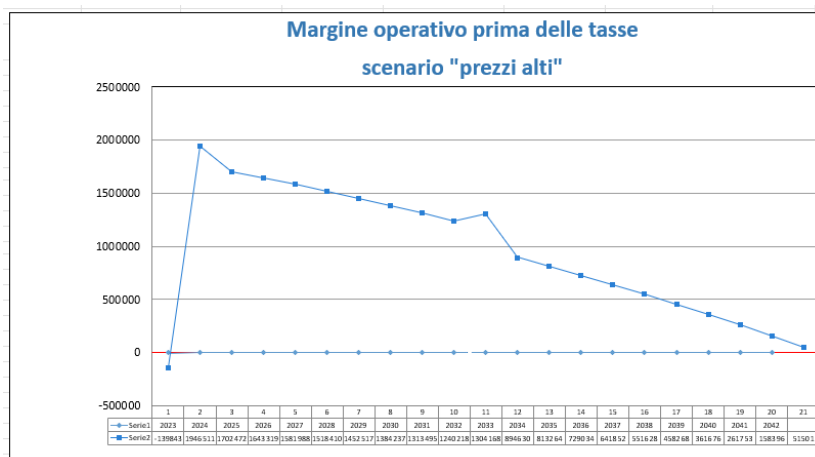
¹ UNI ISO TR15377: 2016 was written in accordance with Article 29. paragraph 10. of RED II the greenhouse gas emission savings from the use of biofuels, bioliquids and biomass fuels shall be at least 65 % for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations starting operation from 1 January 2021.

As is known, the trend in market prices has marked a considerable increase over the last 18 months. The turbulence on the natural gas market, due to the contingent geo-political situation, consequently also led to an increase in prices in the electricity market.

In the "low prices" scenario, the investment is economically sustainable as long as the withdrawal price of the CIC (Certificates of Release for Consumption of Biofuels) remains at a level of 375 euros/certificate. When, after the first decade from the start of production, the dedicated withdrawal period ends with fixed price remuneration of 375 euros/CIC by the GSE and when the purchase price is assumed to be 280 euros/CIC, the cash flow becomes negative.

This is different in the case of the "high prices" scenario, where the cash flow is positive for the entire twenty years of Italian incentives for the production of biomethane (Decree 02/03/2018).

The current high price levels of natural gas make biomethane production particularly sustainable (see "high prices" scenario). To be evaluated, however, with extreme attention for how long the market will remain at such high levels, rewarding the production of this biofuel.



Graph 1: gross operating revenues in "high prices" scenario

In the "low price" scenario, in order to increase turnover and to have a greater profit, the sale of all or part of the biomethane gas production in CNG filling stations could be considered.

In the case of a "high price" scenario, the sale in CNG filling stations could guarantee the stability of revenue even if the wholesale price of natural gas is destined to decrease compared to current values.

If it is intended to evaluate the construction of relevant service stations, however, due consideration must be given to market trends in the short, medium and long term.

- Currently in Italy about 1 billion cubic meters of natural gas are sold per year in the transport sector. The number of operating distributors is approximately 1.550, with an average supply of approximately 650,000 cubic meters per year. This means that 3-4 relevant service stations would be needed to sell all potentially producible biomethane from Besozzi's plant.
- The number of methane-powered cars is growing slowly (a few tens of thousands more units per year). In the event that the market value of natural gas remains at high levels, the forecast is that the sale of new vehicles will almost completely stop (greater convenience to buy vehicles powered by petrol or diesel). After 2035, it is already foreseen that internal combustion vehicles will no longer be sold.

In light of this, it is possible to evaluate “hybrid” solutions such as, for example, that of allocating part of the production for sale in relevant distributors and part of the production for withdrawal by the GSE.

The current decree also allows you to change the configuration of the system during the life of the same. In other words, it could start with the injection into the natural gas grids and then move on to the sale of gaseous biomethane in CNG filling stations or move to the liquefaction of biomethane.