

## Biomethane: An appropriate solution for reducing greenhouse gas (GHG) emissions

As part of the Paris Conference in the fall of 2015, Québec set ambitious targets for the reduction of GHG emissions. By 2030, it intends to reduce GHG emissions by 37.5% below 1990 levels. In 2013, Québec's emissions represented 81.2 Mt CO<sub>2</sub> equivalent, broken down as follows:<sup>1</sup>

- Transportation: 43%
- Industry: 30.8%
- Residential, commercial and institutional: 9.5%
- Agriculture: 9.2%
- Waste: 7.2%
- Electricity production: 0.3%

Waste: who would have thought that it could be so harmful? We put it out in the street and it disappears. Yet, all this waste sent to landfill sites releases methane into the atmosphere as the organic matter decomposes. Over a 100-year period, methane (CH<sub>4</sub>) has a global warming potential (GWP) that is 21 times higher than that of carbon dioxide (CO<sub>2</sub>). In Québec, we produce 13 million tonnes of residual materials annually. There is interesting potential here and it's time to take action.

Also, we need to eliminate organic waste from landfills to meet Québec's extremely ambitious targets.<sup>2</sup> This waste produces greenhouse gases, which can be recovered as biogas or compost. In addition to organic waste from the residential sector, municipal sludge and grass residue can also be used to produce biogas. The capacity of biogas production from this organic waste varies from around 50 to 120 m<sup>3</sup> of biomethane per tonne of products.<sup>2</sup>

### Some definitions

Anaerobic digestion is a break down of organic material in the absence of oxygen, producing a mixture of gas containing methane and a liquid called leachate. This process occurs naturally in bogs or during ruminant digestion. In an industrial facility, this digestion in the production of biogas can take 15 to 40 days in a bioreactor. This biogas is mainly a mixture of 50 to 75% methane (CH<sub>4</sub>) and 25 to 50% carbon dioxide (CO<sub>2</sub>). The next step in the process is biomethane. Biogas becomes biomethane once the contaminants have been removed and it has the same properties as the natural gas that is fed into Gaz Métro's system. The biogas from landfills or waste water treatment plants, which is collected and cleaned, significantly reduces their GHG emissions. Renewable natural gas (RNG) does not generate any GHG emissions.

This RNG can be used or sold in a variety of ways, as illustrated in Figure 1.

- Self-consumption: biomethane producers use this fuel for their own heating, hot water production or transportation needs. Sometimes, production exceeds actual needs.
- Direct sale: producers can use the gas system to sell their renewable natural gas directly to a specific customer.

- Sale to Gaz Métro: producers sell some or all of their RNG to Gaz Métro at the conventional natural gas spot price (current day's value). Additional costs relate to the transportation and compression of gas between the production facility and Québec, and to the cap-and-trade system (CATS).

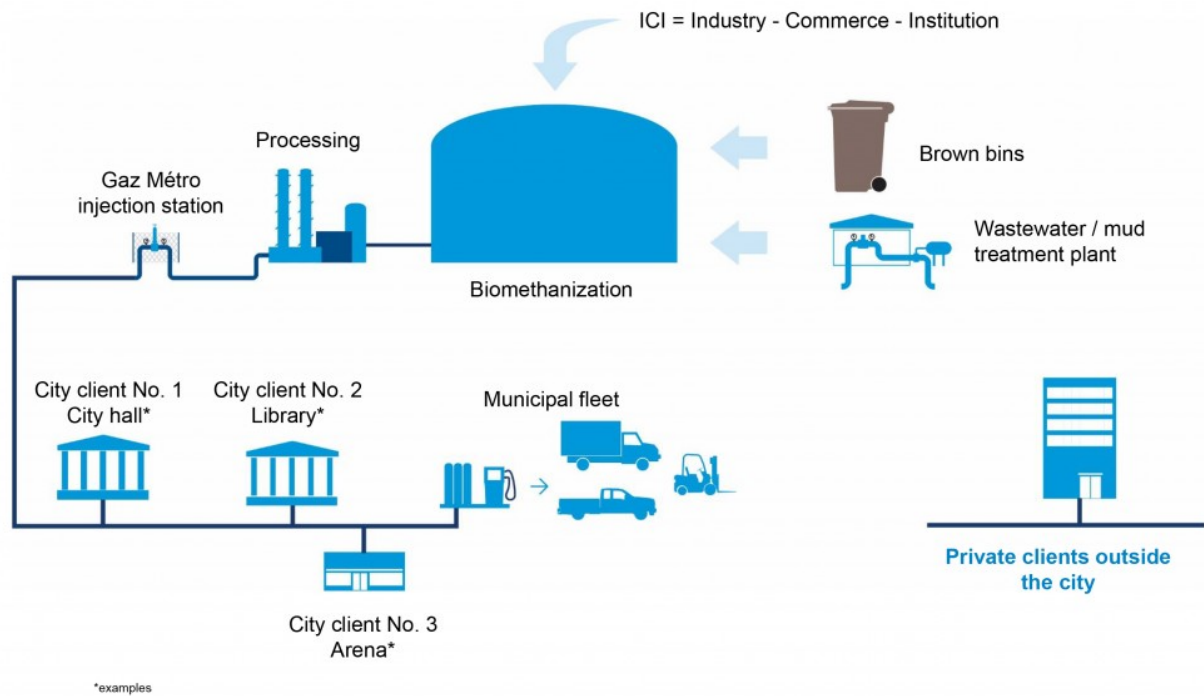


FIGURE 1

Various business models were analyzed and presented to the Régie de l'énergie for projects involving the injection of biomethane into Gaz Métro's distribution system. The following model is preferred by Gaz Métro:

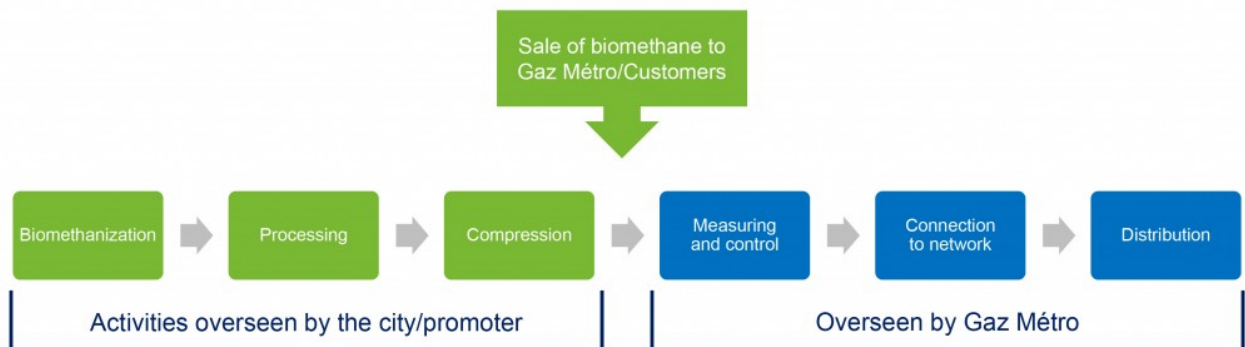


FIGURE 2

The promoter of a project involving the injection of biomethane into the distribution system is responsible for such activities as the production of biogas (biomethanization), processing to obtain biomethane (same quality as the natural gas in the system) and compression to be able to inject it into the distribution system. Gaz Métro will be responsible for measuring and quality control, connection to the distribution system, and RNG distribution. RNG composition must be very similar to that of conventional natural gas so that there is no difference upon use. Gaz Métro will purchase the RNG and the promoter will pay a rate for the injection of RNG into Gaz Métro's system. The injection rate will depend

on the volume of RNG and the infrastructure that needs to be put in place to receive the RNG. Throughout the project process, various Gaz Métro stakeholders will be involved to ensure the success of the production and injection of biomethane into Gaz Métro's system.

### Inspiring projects<sup>3</sup>

Private initiatives on the production and injection of biomethane have been in place for a number of years. Within the context of the Québec Policy on Residual Materials, many cities and municipalities have taken action. As a result, in the Bas-Saint-Laurent region, more than 70 municipalities will process more than 25,000 tonnes of waste annually to produce approximately 1.5 million m<sup>3</sup> of methane. The agglomeration of Québec City will process more than 180,000 tonnes of organic matter to produce more than 7 million m<sup>3</sup> of methane annually. In the Montérégie region, there are at least four projects in the process of being analyzed to produce approximately 5.4 million m<sup>3</sup> of methane.

The City of St-Hyacinthe is due to complete its RNG injection project in 2017. Part of the production will be used for self-consumption (municipal buildings and transportation) and the remainder will be injected into the system (90%). Every year for the next 20 years, close to 13 million m<sup>3</sup> of RNG will be produced, injected into the system and used in Québec. Organic waste from the City of St-Hyacinthe will directly contribute towards meeting Québec's GHG reduction targets.

The above-mentioned projects are not necessarily on Gaz Métro's distribution system, and the final decision to inject into the network is not systematic. Nonetheless, the potential to reduce GHG emissions through the recovery of residual materials is real and, without doubt, Québec has the necessary expertise.

Marie-Joëlle Lainé, Eng., CEM, CMVP  
Technical Advisor, Industrial sector, Groupe DATECH, Gaz Métro

1 Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques, Direction des politiques de la qualité de l'atmosphère. 2016. *Inventaire québécois des émissions de gaz à effet de serre en 2013 et leur évolution depuis 1990*. [Inventory of greenhouse gas emissions in Québec in 2013, and emission trends since 1990]. Available on line in French only: <http://www.mddelcc.gouv.qc.ca/changements/ges/2013/Inventaire1990-2013.pdf>

2 RECYC-QUÉBEC. *Les matières organiques – Fiches techniques à l'intention des élus municipaux* [Organic matter – technical data sheets for elected municipal officials]. Available on line in French only: <https://www.recyc-quebec.gouv.qc.ca/sites/default/files/documents/fiches-techniques-mo.pdf>

3 Ministère du Développement durable, Environnement et Lutte contre les changements climatiques. Programme de traitement des matières organiques par biométhanisation et compostage [Program for processing organic matter by biomethanization and composting]. Available on line in French only: <http://www.mddelcc.gouv.qc.ca/programmes/biomethanisation/liste-projets.htm>

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