



## Hamilton RNG Generation

Project Complete

More than a decade ago, the City of Hamilton, Ont. took a new approach to upgrading and refurbishing an aging wastewater treatment plant by constructing a renewable natural gas (RNG) facility that allowed the city to reduce greenhouse gas (GHG) emissions while providing a new revenue stream.

The Woodward Avenue Wastewater Treatment Plant had already been using anaerobic digesters to process sludge for half a century. The digesters produced heat and power through a 1.6 megawatt cogeneration engine.

The upgraded biogas purification unit, when operating at maximum capacity can utilize excess raw biogas and produce over 200 gigajoules daily of pipeline quality RNG.

Since the development of the City of Hamilton's RNG production facility in 2012, municipalities from across Canada have made similar investments and upgrades to their own waste management operations. Many have used this plant as an example to help understand the planning, processes and equipment required to produce RNG within their own regions.



**The first of its kind in the public sector, the Hamilton wastewater facility was improved in 2011 to process and condition surplus raw biogas in a biogas purification unit upgrader to produce RNG for injection into the local pipeline.**

## Biogas enhancement and digester upgrade



The wastewater treatment plant's biogas purification project was part of a larger \$42M biogas enhancement and digester upgrade plan that started in 2010 and was completed within two years. The team assessed the benefits of upgrading to a larger cogeneration unit or producing RNG. In addition, a total of five different purification processes were evaluated before the final water scrubbing technology was decided on. The decision to install an upgrader to produce RNG was based on excess availability of digester gas, maximum usage of the cogeneration engine and anticipated future biogas production.

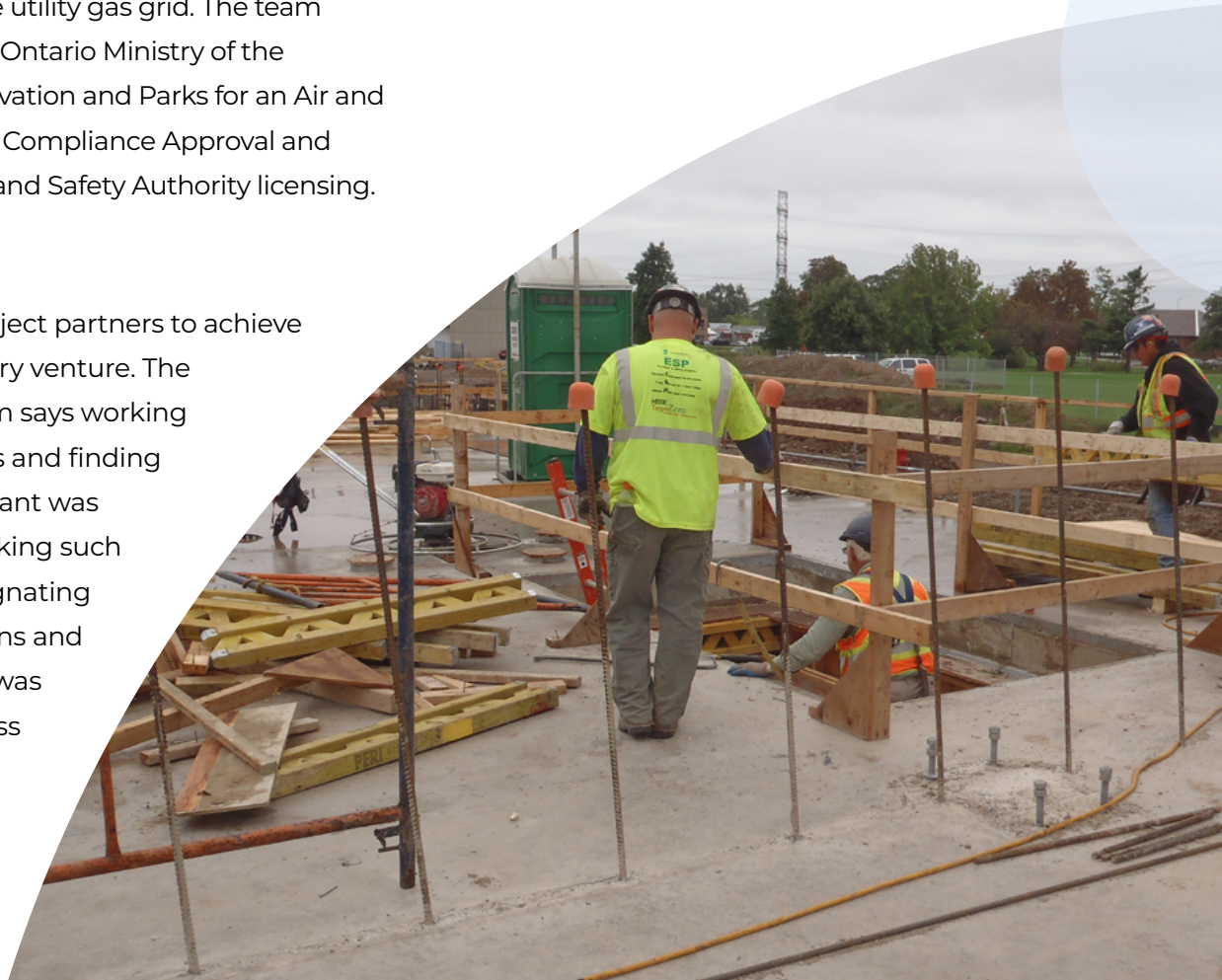
To navigate the regulatory process, the City of Hamilton's project team coordinated with Enbridge Gas throughout the plant design stage. It's essential the RNG is analyzed to ensure its quality meets Enbridge Gas specifications, and is then injected into the utility gas grid. The team also worked with the Ontario Ministry of the Environment, Conservation and Parks for an Air and Noise Environmental Compliance Approval and Technical Standards and Safety Authority licensing.

## Partners

Finding the right project partners to achieve success is key for every venture. The City of Hamilton team says working with reliable partners and finding a competent consultant was essential for undertaking such a novel project. Designating a dedicated operations and management team was also key to the success of the enhancement project.

**At the time of the decision to upgrade, the market for RNG was promising. The ability to capture the existing biogas already being produced and diversify the digester gas utilization made the decision for the City of Hamilton to install an upgrader an easy one.**

The city was fortunate to work with an experienced consultant to guide the plant development process, along with the wastewater treatment plant operations and maintenance staff, City of Hamilton Energy group and Enbridge Gas.





The city established an M13 agreement with Enbridge Gas. This allowed the option to take the gas to market or to use the gas as a portion of requirements at facilities or transit. Under this arrangement, Enbridge Gas does not pay for the RNG, it charges a small fee to transport the gas. Through their agreements, the city paid for the purification and injection facility and pays all ongoing operating and maintenance costs, but it is built to Enbridge Gas quality specifications. The project team noted that, since RNG isn't always steady (factors like weather can impact production), negotiating flexible contracts was important.



## Lessons learned

The City of Hamilton's biogas purification unit was the first of its kind to take additional methane from the digesters at the Woodward Avenue Wastewater Treatment Plant and create RNG. Throughout the process the city staff learned some valuable lessons.

### 1. Stakeholder involvement



Looking back at the development process, the municipal project team noted the importance of involving stakeholders at the beginning of the project, and keeping everyone informed throughout the project duration.

### 2. Experienced advisors



When it came to installing the new equipment required to produce RNG, the City of Hamilton staff relied on and valued the experience their consultant and contractors had working with the equipment. In fact, because the project was so novel, the equipment and technology had to be sourced from Europe. This created additional challenges when the local pipeline connections weren't compatible with the equipment itself, something the partners had to work together on to overcome.

### 3. The importance of methane quality



The importance of monitoring the makeup of the input gas going into the biogas upgrader was a valuable lesson in the early days of plant operation. The quality of the input gas is very important, and the team quickly learned to monitor its makeup by implementing testing processes to produce the cleanest methane possible. City staff note that, such challenges like maintaining gas quality may not be an issue with newer projects, but because the system was so innovative at the time, they had to learn to overcome the challenge. More recent biogas projects may have in fact, already learned from the City of Hamilton's experience maintaining methane quality.

## Endless solutions

Another key factor in the decision to generate RNG as part of the upgrade to the Woodward Avenue Wastewater Treatment Plant was the flexibility of generating revenue from the sale of RNG to fund city initiatives, or utilize the gas themselves. Having these use options means the plant can support municipal goals as they evolve.

As the city enhances its focus on environmental stewardship and puts a greater emphasis on reducing carbon emissions, municipal operations can leverage the RNG produced for fuel. These green initiatives could include fueling municipal

transportation vehicles like city busses or heating and cooling buildings. Hamilton city staff note the overarching goal throughout the entire project has always been to lower the city's carbon emissions by utilizing waste resources and moving to low carbon fuels.

The investment made at the wastewater treatment plant to leverage the cogeneration engine with the biogas upgrader offers the City of Hamilton the greatest opportunities to reduce their carbon footprint.



**Canadian  
Biogas  
Association**

The Canadian Biogas Association is a member-driven industry organization that supports the diverse needs of the biogas and renewable natural gas (RNG) sector with the goal of building a strong, robust biogas & RNG industry in Canada. We represent companies that span the interests of biogas & RNG production. By working with the agricultural sector we can strengthen both industries by maximizing the utilization of organics, such as manure and food waste to produce renewable energy and fertilizer.

Want to learn more?  
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