

Landfill Gas to Renewable Natural Gas Project and Future Potential Renewable Energy Opportunities at the Green Lane Landfill

Date: May 19, 2023

To: Infrastructure and Environment Committee

From: General Manager, Solid Waste Management Services

Wards: All

SUMMARY

Since 2015, Solid Waste Management Services has been working to explore opportunities to create renewable energy from the landfill gas and biogas produced at its organics processing facilities and existing and closed landfills. The purpose of this report is to provide an update on the renewable natural gas (RNG) project being implemented by Solid Waste Management Services (SWMS) at the City's Green Lane Landfill (GLL).

In 2016, City Council granted the General Manager, Solid Waste Management Services, delegated authority to enter into RNG Projects and agreements. Further to this authority, in 2019, City Council also granted the General Manager, Solid Waste Management Services delegated authority to negotiate and enter into any new agreements necessary in connection with the efforts to produce, manage, market, distribute, use and sell RNG and other environmental attributes associated with RNG production.

This report is seeking authorities to also explore and develop potential hydrogen and other renewable energies that can be derived from landfill gas/biogas, and to apply for and accept funding for Solid Waste Management activities including but not limited to renewable energy projects and advancement of landfill gas management.

In 2020, SWMS initiated a study to investigate the most beneficial use of the landfill gas collected at GLL. Various technology solutions were evaluated against criteria that was co-developed with the three First Nations Communities in close proximity to the landfill and other key stakeholders.

The study recommended a phased approach with RNG as the cornerstone of the project, which will enable future add-ons such as hydrogen, and other renewable energies. Since concluding the study, SWMS has been negotiating the necessary agreements to implement an RNG Facility at GLL. This project has the potential to generate enough RNG to meet 50 per cent of the City's (Agencies & Boards excluded) annual natural gas needs and realize significant greenhouse gas emission reductions towards TransformTO Net Zero Goals.

RECOMMENDATIONS

1. City Council authorize the General Manager, Solid Waste Management Services and/or designate, to negotiate and enter into any agreements, amendments of existing agreements, or acknowledgements — including on the basis of a non-competitive procurement under Municipal Code Chapter 195, Purchasing — necessary to investigate, evaluate, produce, manage, distribute, use and sell hydrogen and other renewable energies and associated environmental attributes on terms and conditions satisfactory to the General Manager, Solid Waste Management Services and to the Chief Financial Officer and Treasurer and in a form satisfactory to the City Solicitor.
2. City Council authorize the General Manager, Solid Waste Management Services and/or designate, to investigate and accept external funding from all levels of government and organizations, for Solid Waste Management activities including but not limited to renewable energies and landfill management and on terms and conditions satisfactory to the Chief Financial Officer and Treasurer and in a form satisfactory to the City Solicitor.
3. City Council endorse Solid Waste Management Services to explore the feasibility and market value of hydrogen and other renewable energies that may be derived from the City's waste processing facilities.

FINANCIAL IMPACT

There are no immediate financial impacts resulting from the recommendations within this report.

Current Renewable Natural Gas (RNG) project at Green Lane: The capital project for Landfill Gas Utilization is categorized as a Service Improvement & Enhancement project with planned cash flows totalling \$52.601 million over the period 2024 to 2027. Instead of proceeding with this capital project, Solid Waste Management Services has opted to contract out the RNG equipment installation and operations to Enbridge Gas Inc. (EGI) and Solid Waste Management Services will be billed a monthly service fee. Currently, it is estimated that monthly service fees payable to EGI will begin in 2026. The Operating Budget will be updated for 2026 to reflect the beginning of payments which will be commencing post-commissioning of the facility.

The current capital plan for Landfill Gas Utilization for 2024 to 2027 will likely be removed as all expenditures will be changing to Operating beginning in 2026. The agreement with EGI is currently under negotiation.

Other Renewable Energy Opportunities: Future financial impact considerations resulting from the implementation of other renewable energies, such as hydrogen, will depend on the outcome of investigations for the opportunity and feasibility of available add-on projects that are anticipated to take place throughout 2023, and will likely be estimated and presented for approval in the 2024 budget. Other sources of funding, if available, will be considered.

The Chief Financial Officer and Treasurer has reviewed this report and agrees with the financial impact information.

DECISION HISTORY

At its meeting on July 28, 2020, City Council adopted Item IE14.7 entitled "Citywide Greenhouse Gas Reduction Strategy through Blending Renewable Natural Gas and Natural Gas, a Low-Carbon Fuel Option", and directed Renewable Natural Gas produced at the Dufferin and Disco Road Organic Processing Facilities be delivered by Solid Waste Management Services via the local gas utility distribution company for distribution to all enrolled City gas accounts under the City Natural Gas Purchasing Program managed by the Environment and Energy Division and to those enrolled accounts for City's agencies, boards and corporations that elect to purchase Renewable Natural Gas, at a cost per cubic metre not to exceed the amounts required to fully recover all Renewable Natural Gas capital and operating costs.

The City Council Decision document can be viewed at:

<https://www.toronto.ca/legdocs/mmis/2020/ie/bgrd/backgroundfile-148034.pdf>

At its meeting on December 17, 2019, City Council adopted Item EX11.3 entitled "2020 Rate Supported Budgets - Solid Waste Management Services and Recommended 2020 Solid Waste Rates and Fees", and authorized the Chief Financial Officer and Treasurer and the General Manager, Solid Waste Management Services and/or designate, to negotiate and enter into any new agreements, amendments of existing agreements, or acknowledgements, including on the basis of a non-competitive procurement under Municipal Code Chapter 195 (Purchasing), necessary in connection with the efforts to produce, manage, market, distribute, use and sell Renewable Natural Gas and other environmental attributes associated with Renewable Natural Gas production on terms and conditions satisfactory to the General Manager, Solid Waste Management Services and each in a form satisfactory to the City Solicitor and the Executive Director, Corporate Real Estate Management.

The City Council Decision document can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.EX11.3>

At its meeting on October 2, and 3, 2019, City Council adopted Item MM10.3 entitled "Declaring a Climate Emergency and Accelerating Toronto's Climate Action Plan". City Council endorsed a net zero greenhouse gas emissions target that is in line with keeping global average temperature rise below 1.5 degrees Celsius, immediately strengthening Toronto's goal of becoming net zero before 2050, and City Council requested the Director, Environment and Energy to report back by the fourth quarter of 2020 on the feasibility of actions that could achieve net zero by 2040.

The City Council Decision document can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.MM10.3>

At its meeting on June 7, 8 and 9, 2016, City Council adopted Item PW13.8 entitled "Authority to Enter into Renewable Natural Gas Projects". City Council authorized the General Manager, Solid Waste Management Services, to enter into Renewable Natural Gas Projects and agreements on such terms that are satisfactory to the General Manager, Solid Waste Management Services, based on the environmental/business case presented in Attachment 1 to the report (April 29, 2016) from the General Manager, Solid Waste Management Services and in a form satisfactory to the City Solicitor, and that the General Manager, Solid Waste Management Services be authorized to execute these projects up until December 31, 2021.

The City Council Decision document can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.PW13.8>

At its meeting on April 28 and 29, 2008, City Council adopted Item GM13.11 entitled "Natural Gas Supply Arrangements". City Council authorized the Chief Corporate Officer to execute new or amending gas transportation agreements, new or amending master agreements with gas suppliers, new or amending master services and gas delivery agreement(s) with Enbridge Gas Distribution Inc. and new or amending agency agreements with the Toronto Community Housing Corporation and the City's participating agencies, boards and corporations, all as required, on terms and conditions satisfactory to the Chief Corporate Officer and the City Solicitor.

The City Council Decision document can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2008.GM13.11>

COMMENTS

Background

The City's existing and closed landfill sites and organics processing facilities are some of the largest producers of biogas and landfill gas in Ontario. Biogas and landfill gas are made up primarily of methane and can be upgraded into renewable natural gas (RNG)

that can be injected into the natural gas grid and used to fuel vehicles and heat buildings.

RNG production has been a strategic priority for Solid Waste Management Services as an opportunity to advance the City's TransformTO Climate Action goals and the goal of moving towards a circular economy. The City, working with Enbridge Gas Inc. (EGI), has installed infrastructure at the Dufferin Solid Waste Management Facility that allows it to create RNG from Green Bin organics and inject it into the natural gas pipeline. The City began using this gas in November 2022, and the project is expected to produce 2.2 million cubic metres of RNG annually. A second RNG facility is currently under construction at the Disco Road Organics Processing Facility, which is expected to produce 4.6 million cubic metres of RNG and be operational in 2024.

As per the strategy, unanimously adopted by City Council in 2020, the RNG produced at both of the Dufferin and Disco Organics Processing Facilities will be blended with the natural gas the City buys to create a lower-carbon fuel blend that will be used to power City vehicles and heat City-owned facilities, allowing for a reduction in greenhouse gas emissions across the organization. The two projects are estimated to result in a fuel blend that is more than 13 per cent renewable.

Green Lane Landfill Opportunity

The City has also identified landfill gas upgrading opportunities at its Green Lane Landfill (GLL), located in Southwold, Ontario, southwest of London. Toronto collects around 900,000 tonnes of waste per year, approximately half of which is garbage that goes to GLL. Currently, in accordance with Ontario Regulations for large landfills, the landfill gas at GLL is flared, which does not realize its renewable energy potential.

In 2020, SWMS retained a consultant, GHD, to develop an approach for beneficial utilization of the GLL gas through exploration of available technologies and solutions. In addition, the City formed a steering committee including representation from each of the three local First Nations Communities immediately surrounding the landfill. The committee developed evaluation criteria centred around environmental, social and economic impacts to help inform the study and identify the final recommendation to the City.

While the study outlined possible solutions for beneficial landfill gas utilization, the primary recommendation was to proceed with cleaning and conditioning the landfill gas to produce pipeline quality RNG. The project has the potential to create significant social, environmental and economic value, due to the amount of renewable natural gas at the site and the ability to adapt technologies to other future renewable energy generation options. At present, technology is readily available for upgrading LFG to RNG and this project enables various opportunities to further collaborate with the local First Nations Communities. The GLL project has the potential to produce 25 million cubic metres of RNG, with an estimated greenhouse gas emission reduction of 49,470 tonnes CO₂e per year.

This would be one of the largest RNG projects in Ontario. It's estimated that the project alone could produce enough RNG to meet half of the City's (Agencies & Boards excluded) annual natural gas needs.

Since concluding the study, SWMS staff have been working toward implementing the recommended cornerstone solution of landfill gas to RNG. Staff are currently negotiating a Biogas Services Agreement (BSA) with EGI for the design-construct-commissioning of a turn-key RNG production Facility at GLL. EGI is the only provider for pipeline and injection services and infrastructure as they are considered regulated services under the Ontario Energy Board (OEB). Staff have determined that the same project delivery model used for both the Dufferin and Disco Organics Processing Facilities would be the best path forward. With this project requiring integration of various pieces of infrastructure and technology, the approach of having it delivered through one entity will reduce project risk, costs and timelines. EGI will be responsible for all aspects of project delivery, maintenance, operations and ultimately gas transportation, distribution or storage, and facilitating any end-use option. Further, the chosen project delivery allows for cost certainty and savings to the City as the project overhead is capped at a regulated rate of return set by the OEB.

A subsequent agreement to the BSA will be required and once executed will trigger an application to the Ontario Energy Board (OEB) for approval to construct the regulated services of an injection station and corresponding 18 km pipeline. The approval process is anticipated to take 12-18 months. In the spirit of continued collaboration on the project, SWMS is requiring that EGI offer an option for the three First Nations Communities surrounding GLL to invest in a portion of the equity stake in the project to generate community benefits.

Next Steps

SWMS intends to execute the agreement with EGI before the end of June 2023, which would allow for an estimated commissioning in 2026. The end-use of the estimated 25 million cubic metres of RNG per year is yet to be determined. SWMS will evaluate the following options from an economic, environmental and social lens: self-consumption, which aligns with the current strategy for RNG produced at Dufferin and Disco, sale to a third-party consumer to create a revenue stream which could be reinvested in green infrastructure projects, or a hybrid of the two. SWMS will also continue to collaborate with the City's Environment and Climate and Corporate Real Estate Management Divisions, to establish the best recommended end-use option based on the City's progress towards its TransformTO goals, economic feasibility and the priorities of the City leading up to the completion and commissioning of the facility.

The gross capital and operating costs for the project at GLL are estimated to be between \$260 and \$330 million (estimated inflationary range), paid to EGI through a monthly service fee over a 20-year term commencing post-commissioning. This cost will be offset through RNG sales or consuming RNG and reducing natural gas purchases. Depending on the sell verse consume ratio this project can be cost neutral or generate a profit.

With landfill gas to RNG implementation underway, staff have begun exploring other renewable energy solutions as identified within the initial beneficial use study, primarily the generation of hydrogen from RNG. With Natural Resource Canada developing a Hydrogen Strategy for Canada, SWMS staff are exploring the opportunity that exists for hydrogen at the GLL as a potential add-on to the RNG project. This will allow the project to be adaptable to future energy demands, more resilient to market conditions and in alignment with focuses of the recent Federal government's budget.

SWMS staff intend to engage hydrogen experts in the industry as well as issue calls for RNG and hydrogen pricing to determine the applicability and consider its future implementation based on market conditions, accessibility and cost.

Additionally, SWMS Staff require the ability to investigate, apply and receive all eligible funding from all levels of Government and other external funding sources to help offset the costs of the existing projects as well as any future renewable energy projects as well as projects that seek to advance solid waste management activities including but not limited to landfill management.

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SIGNATURE

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