



Committee of the Whole Report

Report Number: WM2021-001
Meeting Date: February 9, 2021
Title: 2020 Lindsay Ops Landfill Gas Generator Summary
Description: A review of the operations of the Lindsay Ops Landfill Gas Generator for 2020
Author and Title: David Kerr, Manager of Environmental Services

Recommendation(s):

That Report WM2021-001, **2020 Lindsay Ops Landfill Gas Generator Summary**, be received;

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Department Head: _____

Financial/Legal/HR/Other: _____

Chief Administrative Officer: _____

Background:

At the Council Meeting of October 20, 2020, Council adopted the following resolution:

CR2020-333

That Report ENG2020-018, Lindsay-Ops Landfill Electricity Generation System Optimization Study, be received;

That staff proceed with continued operation of the generator and implement recommendations in the study to optimize the operation where feasible; and

That staff present an annual report to Council on the Lindsay-Ops Landfill Electricity Generation System.

This report follows that direction.

To put this report into context we have provided a summary overview of the generator, the recommendations from the recent optimization study and its operational performance over the last year.

Overview

It is a provincial requirement to have a methane collection system on a landfill the size of Lindsay Ops to manage the gas. To dispense of the gas collected, historically, the City of Kawartha Lakes flared the gas.

Since 2015, the City also owns and operates a landfill generator, which uses methane gas from the Lindsay Ops landfill as fuel to create electrical power. The power is in turn used to supply electricity to the Lindsay Ops landfill and adjacent Lindsay Water Pollution Control Plant (WPCP).

In order for the gas collection system to work effectively, a vacuum blower system draws methane from a network of pipes within the landfill. If for any reason the generator is down for maintenance or other, the blower routes the methane to flare where it is burned.

The gas facility (including collection system, blower, generator, and flare) are located on the landfill property adjacent to and west of the waste fill. The operation of this facility, including maintenance and monitoring, is currently contracted to Comcor Environmental Limited (Comcor) and is administered by Waste Management

Operations. Comcor is in the sixth year of their contract, with the option to renew for one additional term, up to December 31st of 2022.

As per Council's direction, the User Rate (Water and Wastewater) covers 96% of the costs associated with the operation of the landfill gas generator, while the Solid Waste Division assumes the remainder of the costs, and those of the flare and collection system.

Recent System Optimization Study

The Engineering and Corporate Assets department led and presented an optimization study conducted by Greer Galloway to Council on October 20th, 2020.

The optimization study covered multiple possibilities for optimizing the operation and value of the generation facility. Aspects reviewed included the Hydro One contract, the service call strategy, downtime events, energy use and efficiency, and the landfill gas collection wellfield.

Staff have reviewed the recommendations and the following updates are being provided:

1. Hydro One Contract

Investigate the possibility of converting the 'billing and generation contracts' with Hydro One to a Distributed Generation (DGEN) classification, as this could potentially produce cost savings.

Staff have reviewed this option with Hydro One and unfortunately this facility does not qualify for the DGEN classification as it is a behind-the-meter generator and a load facility.

2. Service Call Strategy

Train landfill staff to perform restarts on weekends, to reduce downtimes. There are times the generator stops running and the current policy prohibits service calls outside of regular operating hours to limit costs. In some cases, the generator requires a straightforward restart that could be accomplished by appropriately trained staff with limited teleconference support from the contractor. This has an immediate effect of returning the generator to activity and increasing the amount of generated electricity.

This has been completed and has resulted in a decrease of downtimes and an increase in electricity generated.

3. Downtime Events

Implement recommendations made by Wintek Engineering to reduce the amount of times the generator is shut down, as a result of recent changes Hydro One implemented.

Comcor reviewed the recommendations, and in the fall of 2020 made corrections to the system that minimized the amount of time the system is down particularly due to low gas pressures. The alterations made have reduced the amount of times the generator had been out of service, which will ultimately increase electricity generated.

4. Landfill Gas Collection Wellfield

Consider expansion of the wellfield (gas collection) system. Greer Galloway's updated modelling of methane generation suggested that the current methane generation rates on the old landfill area may be higher than originally modelled and that the methane collection efficiency in the old landfill area is lower than previously assumed. The construction of additional vertical collector wells within the old landfill area is predicted to improve the overall quantity and quality of the landfill gas delivered to the generator.

At this time, there is no scheduled expansion to the current wellfield. However, it is under consideration for future capital project and budget planning as the landfill continues to be built-out.

It is important to note that new wells were installed in 2019 and additional cover placed around the wells in 2020 to reduce air intrusion. It is expected that the gas levels from these wells will enrich in the next several years providing better quality methane to the system. This will continue to be monitored by Comcor.

Performance in 2020

In 2020, the generator was out of service for approximately 170 days. Most of those days were for scheduled maintenance, including the required 30,000-hour minor overhaul that occurred this past December, as per the contract. The remaining out of service days were sourced from grid power interruptions, high temperature alarms and other issues that arose from regular operation of the equipment.

One major source of trips and generator downtimes, as per Comcor, is the low pressure and landfill gas quality. Positive efforts were made in the later part of 2020 as a result of the Greer Galloway recommendations to improve the generator downtime. In previous years, the generator has operated effectively but unable to operate at optimal rates due to unexpected lower volumes of methane. As the landfill continues to be built-up, more methane will be generated and this will have a positive impact on generator operation.

Rationale:

When waste is first deposited in a landfill, it undergoes aerobic (oxygen) decomposition and during this stage little methane is produced. Typically, within one-year anaerobic (lack of oxygen) conditions are met and methane-producing bacteria begin to decompose the waste and generate methane. The expectation is that with time, as the Lindsay Ops landfill increases in age and size, there will be many future years of optimal methane production. Any future expansion of the wellfield will also work in bettering the operation of the generation facility.

The landfill gas generator provides a sustainable green alternative energy source that is greatly utilized onsite, due to the considerable energy demands of the WPCP and landfill buildings. The generator also provides redundancy onsite, so if either the flare or generator are unable to run, the other can be utilized. This is very important in ensuring the site remains in compliance with the landfill site's Environmental Compliance Approval (ECA), which requires methane to either be flared or converted to energy through the generator. In 2020, approximately 1.2 million kWh of electricity was produced from the methane gas to service the on-site needs of City operations.

As further discussed in the financial operation impact section of this report, there is a strong business case to continue operating the generator based on regulatory needs, reduction of greenhouse gases, operational redundancy and offsetting electrical costs. It is expected that through additional operation in 2021 and beyond, that the cost savings will be able to be more accurately predicted. For these reasons, we continue to recommend operation of the generator over the course of 2021 to better evaluate its long-term performance and benefit to the City.

Other Alternatives Considered:

There are no other alternatives being considered at this time.

Alignment to Strategic Priorities

The Lindsay Ops landfill gas generator is a component of the Healthy Environment Plan and overall Strategic Priority of a Healthy Environment. This is because it produces renewable energy and reduces the corporate carbon footprint and the City’s greenhouse gases. It also contributes to environmentally efficient municipal infrastructure as it offsets a large portion of the electricity required by Lindsay’s Water Pollution Control Plant (WPCP), therefore reducing the energy consumption required for municipal operations.

Financial/Operation Impacts:

The City budgeted \$250,000 in 2020 for the operation and maintenance of the landfill gas generator, flare and wellfield. The entirety of this budget was utilized in 2020.

Electricity demands for the Lindsay WPCP and Lindsay Ops landfill are significant and for the period of December 5th, 2019 to December 7th, 2020, Hydro One costs came to a total of \$349,000. The total amount of kilowatt hours (kWh) consumed during this time was approximately 2.9 million kWh. Of this 2.9 million kWh, 1.2 million kWh were delivered from the generator, while the remainder was sourced from the Hydro One grid.

The kWhs contributed by the generator, has an approximate cost savings to the City of \$240,000. This is an estimation using the approximate \$/kWh for each billing period. Supporting information for this statement is outlined in the chart below:

Billing Period	Hydro One Bill Total (A)	Hydro One Bill Total kWh (B)	Total kWh Generator Produced (C)	Total Amount of kWh Consumed (B+C)	Estimated \$/kWh (D)	Estimated Cost Savings* (C x D)
Dec 5 - Jan 9	\$27,285.92	164962	123628	288590	\$0.17	\$20,449
Jan 9 - Feb 7	\$25,790.85	135171	108102	243273	\$0.19	\$20,626
Feb 7 - Mar 10	\$31,625.74	155185	93129	248314	\$0.20	\$18,979
Mar 11 – Apr 7	\$19,362.84	79733	123907	203640	\$0.24	\$30,090
Apr 7 – May 7	\$23,391.91	95632	147257	242889	\$0.24	\$36,020
May 8 – Jun 9	\$21,093.96	103879	152072	255951	\$0.20	\$30,880
Jun 10 – Jul 9	\$25,979.07	120999	114180	235179	\$0.21	\$24,515
Jul 10 – Aug 10	\$34,018.92	188623	72352	260975	\$0.18	\$13,049
Aug 10 – Sept 10	\$34,867.46	186413	63422	249835	\$0.19	\$11,863
Sept 10 – Oct 7	\$35,865.65	186612	16713	203325	\$0.19	\$3,212

Oct 8 – Nov 9	\$40,197.82	192515	54209	246724	\$0.21	\$11,319
Nov 10 – Dec 7	\$29,583.67	146278	84722	231000	\$0.20	\$17,134

*It is important to note that these costs are estimated based on variable billing costs.

Based on this data, there would be a significant increase in annual Hydro One billing costs of approximately \$240,000 without the generator.

The annual budgeted costs for operation and maintenance of the generator is approximately \$200,000. Operation of the generator currently delivers a net benefit to the City of \$40,000 per year. If the generator performance can be improved as we expect it can be, the benefit to the City will be even greater.

Consultations:

Manager, Water and Wastewater
 Waste Technician 2
 Executive Assistant, Engineering and Corporate Assets

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Department Head: Bryan Robinson, Director of Public Works