



Next Steps for Developing a Third Green Bin Organics Processing Facility

Date: November 9, 2017

To: Public Works and Infrastructure Committee

From: General Manager, Solid Waste Management Services

Wards: All

SUMMARY

This report responds to City Council's direction to investigate next steps for building a third Green Bin Organics Processing Facility and to review the viability of the proposed Zoo Share biogas facility at the Toronto Zoo. Impacts from the Long Term Waste Management Strategy, provincial initiatives regarding food and organic waste and the Zoo Share biogas facility, among other factors, are detailed in this report for consideration when developing the business case for a third facility.

RECOMMENDATIONS

The General Manager, Solid Waste Management Services, recommends that:

1. Public Works and Infrastructure Committee receive this report for information.

FINANCIAL IMPACT

There are no financial implications from this report.

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

DECISION HISTORY

At its meeting on July 4, 5, 6, and 7, 2017, City Council adopted item PE19.4 titled "TransformTO: Climate Action for a Healthy, Equitable and Prosperous Toronto - Report 2 - The Pathway to a Low Carbon Future" and directed the General Manager, Solid Waste Management Services in consultation with the Director, Environment and Energy

to review the viability of the proposed Zoo Share biogas organic waste to electricity project at the Toronto Zoo, assess opportunities for organic energy projects at the former Beare Road Landfill, and to report back to the Public Works and Infrastructure Committee in the fourth quarter of 2017, as part of the "Next Steps for Developing a Third Anaerobic Digester" report.

The City Council Decision document can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.PE19.4>

At its meeting on December 13, and 14, 2016, City Council considered item EX20.23 titled "2017 Rate Supported Budgets - Solid Waste Management Services and Recommended 2017 Solid Waste Rates" and directed the General Manager, Solid Waste Management Services to report back to the Budget Committee in the second quarter of 2017, on the next steps for developing a third anaerobic digester to process organic waste, given the business case for planning and securing additional capacity with an earlier timeline due to potential Provincial/Federal funding programs, maturation of multi-residential Green Bin Program, and long-term contract opportunities to accept organic waste from private entities and other municipalities.

The City Council Decision document can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX20.23>

At its meeting on July 12, 13, 14, and 16, 2016, City Council considered item PW14.2 "Final Long Term Waste Management Strategy" and approved the Long Term Waste Management Strategy, including recommended options and implementation plan, as presented in Attachment 1 to the report (June 2, 2016) from the General Manager, Solid Waste Management Services.

The City Council Decision document can be viewed at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.PW14.2>

COMMENTS

In 2016, Solid Waste Management Services collected 144,381 tonnes of Green Bin organic waste from all City of Toronto customers. Once collected, the material is transferred to an organics processing facility to process the organics into a reusable compost product and where possible, extract energy. The City currently owns two organics processing facilities, namely the Disco Road and Dufferin Organics Processing Facilities which have a total capacity of 75,000 and 55,000 tonnes respectively (Dufferin Organics Processing Facility will begin operation in late 2018). Both of these facilities use a process known as anaerobic digestion to break down the organic waste.

An anaerobic digester is a system in which natural bacteria break down organic waste in the absence of air. This process creates two by-products known as digestate and biogas. Digestate is an organic solid material that the City delivers to a secondary facility, where it is mixed with yard waste material and further processed resulting in the creation of high quality compost. Biogas, which is mainly comprised of carbon dioxide and methane, can be cleaned and transformed into a high-value commodity known as

renewable natural gas. This Renewable Natural Gas can then be injected into the existing natural gas grid and used to offset traditional fossil natural gas, resulting in significant emissions reductions.

In general, anaerobic digestion of organic waste provides an environmentally conscious manner of recovering resources and diverting organic waste away from landfill.

Current Organic Waste Processing Capacity

City-Owned Facilities

Currently, the City owns two anaerobic digesters, the Disco Road Organics Processing Facility and the Dufferin Organics Processing Facility.

- The Disco Road Organics Processing Facility currently processes approximately 75,000 tonnes of organic waste per year. The facility is operating at full capacity with final construction on the waste water treatment plant being completed and commissioned.
- The Dufferin Organics Processing Facility opened in 2002, and was initially designed to process 25,000 tonnes of organic waste. The facility is currently closed and construction is underway to expand the processing capacity to 55,000 tonnes per year. It is expected that this facility will be ready to process organic waste by the end of 2018.

Private Organic Processing Contracts

In addition to the City-owned organic processing facilities, Solid Waste Management Services has processing contracts with private sector operators to manage excess organic waste and provide contingency capacity. Currently, the City has contracts with three private sector facilities, totalling approximately 67,000 tonnes of processing capacity annually. All three private facilities are located outside of city limits, at a distance of approximately 120 km to 460 km away. Within the next three years, these contracts will expire and new capacity will need to be procured.

Currently, two of the three private facilities are experiencing processing challenges leading to odours in the vicinity of the sites. One processor has recently informed Solid Waste Management Services that the City will have to reduce the amount of material sent to their facility until they have their processing/odour issues back into compliance with Ministry of the Environment and Climate Change requirements. Should the City's third private processor begin to experience challenges, the Division may be required to find alternative means, such as landfilling, to manage organic waste until the issues are resolved. These issues demonstrate a significant risk associated with a current lack of processing capacity within the Province of Ontario.

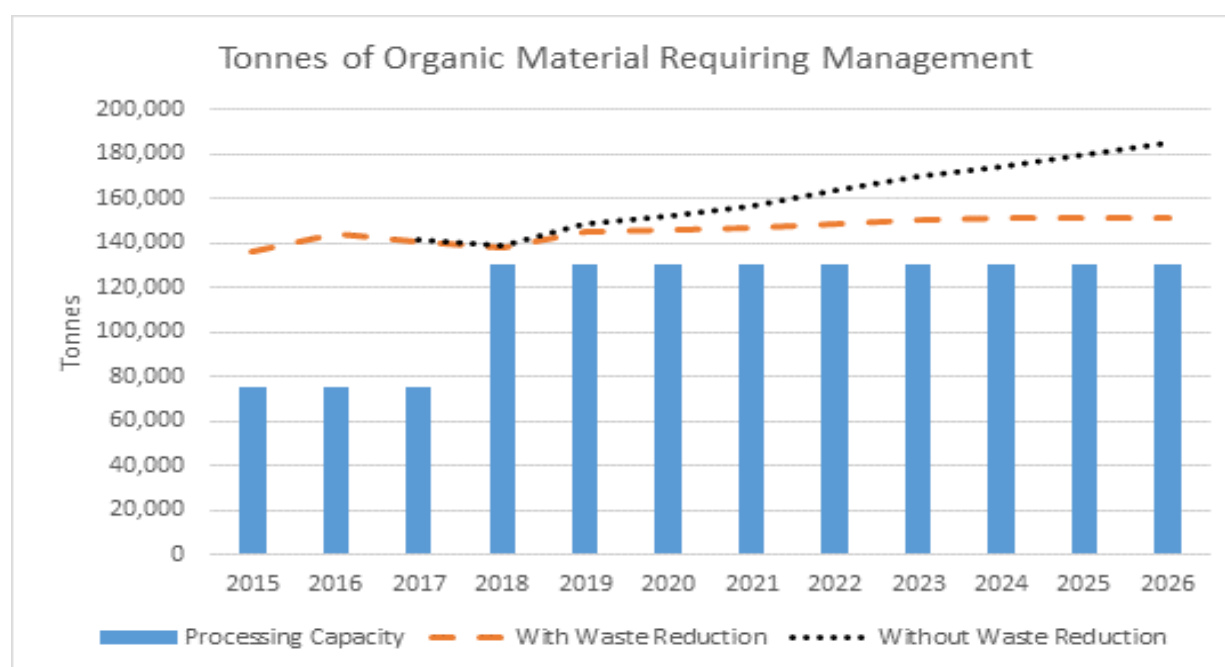
Future Organic Waste Processing Capacity

By the end of 2018, the total processing capacity of the two City owned facilities will be 130,000 tonnes per year (75,000 tonnes from the Disco Road Organics Processing

Facility and 55,000 tonnes from the Dufferin Organics Processing Facility). This will significantly reduce the need to outsource organic waste processing capacity, however, approximately 14,400 tonnes of organic waste will still require processing.

The Long Term Waste Management Strategy is currently being implemented and includes a food waste reduction strategy, enhanced education and comprehensive enforcement initiatives to increase participation in the Green Bin Program. These are all factors that will impact the amount of organic waste tonnes captured. Figure 1 compares the City-owned processing capacity with the total estimated tonnage that will require processing in the future, based on two different waste reduction scenarios.

Figure 1 - City Controlled Processing Capacity and Required Total Capacity



Factors that Impact Green Bin Organic Waste Tonnes

The following section outlines factors that could impact the amount of Green Bin material that the City manages from its existing customers.

Long Term Waste Management Strategy

The Long Term Waste Management Strategy includes measures and initiatives that focus on reduction and recovery in all of the City's waste streams. The Long Term Waste Management Strategy anticipates that additional City-owned organic waste processing capacity will not be needed until 2026, due to the Long Term Waste Management Strategy's impact on the amount of food and organic waste captured. However, this projection assumes that there is a sufficient amount of private organic

processing facilities with suitable physical and operational capacity to manage these additional tonnes.

The Long Term Waste Management Strategy includes recommendations to study options for managing future organic waste streams. In the five year implementation plan, funding in the amount of \$50,000 has been allocated to investigate methods for managing contaminant-free organic feedstock generated at restaurants, grocery stores, or other businesses.

Mixed Waste Processing Facility with Organics Recovery

As part of the Long Term Waste Management Strategy, Solid Waste Management Services is investigating mixed waste processing with organics recovery technologies to recover additional divertible materials from the waste stream (i.e. recyclable and organic waste).

A full-scale mixed waste processing facility for the City is expected to process approximately 150,000 tonnes per year of mixed waste from primarily the multi-residential sector and is expected to increase the amount of organic waste captured. Assuming that 50 percent of the material can be diverted, 75,000 tonnes of additional recyclable and organic waste will be captured, of which up to 48 percent or 36,000 tonnes, is estimated to be organic waste. This additional 36,000 tonnes of recovered organic waste will require processing and further necessitates the need for additional organic waste processing capacity. Solid Waste Management Services is currently completing a feasibility study that will further refine these tonnage estimates as well as material quality and end-use opportunities.

Contamination of the Blue Bin Recycling Stream

Educating residents on proper participation in the City's waste diversion programs has been a primary focus for Solid Waste Management Services for a number of years. Despite ongoing efforts to provide education on proper sorting, the Division has noted a significant increase in the amount of non-recyclable materials, including organic waste, in the City's Blue Bin recycling stream. The current contamination rate of 26 percent represents approximately 52,000 tonnes of contaminated Blue Bin material sent to landfill each year. To address the high contamination rate, the Division is monitoring bins set out at the curb and continuing their efforts to educate residents on the costs incurred by the City, as a result from managing contaminated recycling.

It is too early to estimate how the Division's ongoing efforts to raise awareness on the implications of contaminating recycling with the wrong materials, like organic waste, will impact the total tonnage of Green Bin material that the City collects. However, it is expected that ongoing monitoring and education will discourage residents from contaminating their Blue Bins with organic waste and may result in higher amounts of organic waste captured and processed via the Green Bin Program. Currently, Solid Waste Management Services estimates that approximately 17,000 tonnes of organic waste is wrongly being placed in the residential Blue Bin recycling stream.

Waste-Free Ontario Act

In 2016, Ontario's provincial government enacted the *Waste-Free Ontario Act* and introduced the Strategy for a Waste-Free Ontario: Building the Circular Economy ("The Strategy") that lays out the vision for Ontario's circular economy and aspirational goals of a zero-waste Ontario with zero greenhouse gas emissions from the waste sector. One of the priority items included in the Strategy is to develop a Provincial organics strategy, including a comprehensive approach to reduce food waste.

Recently, the Ministry of Environment and Climate Change consulted on a discussion paper to engage Ontarians to participate in the development of a Food and Organic Waste Framework. The consultation responses have been considered and it is expected that the Province will release an Organics Action Plan that will consider a ban of all food and organic waste from landfill in the near future. The impact of this action could increase the amount of organic waste managed by the City. A landfill ban on food and organic waste could result in the need to manage additional tonnes of organic waste, which is still found incorrectly in the residential garbage and recycling stream based on recent waste audits. The intensity of the impact from the ban on food and organic waste from landfill is difficult to measure due to the uncertainty regarding how the commercial sector will react to the ban. A provincial initiative aimed at reducing food and organic waste is expected to be received by Cabinet in February 2018, for approval.

The current environment of limited private sector organic processing capacity in the province, coupled with the provincial goal to work towards zero greenhouse gas emissions from the waste sector and a potential ban on food and organic waste from landfill may necessitate the private sector and municipalities to seek and develop additional organic waste processing capacity in the near future.

Municipal Partnership Opportunities

Neighbouring municipalities have expressed interest in collaboratively exploring organic waste processing technologies. Currently, municipalities bordering Toronto are engaged in various aspects of the technology selection and business case development for new organic waste facility processing capacity. Collaborative opportunities may be available to support these initial studies and cost share the work being completed.

Solid Waste Management Services recommends establishing an inter-municipal working group to be kept apprised of plans to pursue organic waste processing capacity and explore opportunities for collaboration.

Considerations for Building a Third Green Bin Organics Facility Processing

The following section outlines factors that the City will have to consider when building a third Green Bin Organics Processing Facility.

Siting

To build a third Green Bin Organics Processing Facility, the City will first need to identify a site that has adequate space, access to roads, pipelines and electricity. This requires undertaking a siting exercise to locate and acquire suitable land.

As a size comparison, the Disco Road Organics Processing Facility was built on a 5.4 hectare City-owned property, but the facility itself occupies approximately one hectare.

Permitting

Permitting requirements and timelines vary depending on the nature of the project. Generally, a Waste and Air Emission Environmental Compliance Approval is required to build and operate a third Green Bin Organics Processing Facility. Other permits and authorizations are required from the Ministry of Labour, the Electrical Safety Authority, the Technical Safety and Standards Association, and the City itself as part of the construction and operation of a facility.

Timelines

Estimating the time to design, tender and construct a third facility is dependent on a number of factors including finding an appropriate site, procurement of engineering and construction services, and meeting permitting requirements. Table 1 outlines the activities required to build a third facility along with their estimated timelines. It is important to note that the timeline represents the length of time after a City Council decision has been made to pursue development of a third facility.

Table 1 - Activities and Time Required to Build a Third Green Bin Organics Processing Facility

Activity	Time
Siting and planning approvals	3 – 4 years
Procurement of professional services and completion of preliminary design	2 years
Construction	2 – 3 years
Initiation of processing operations	1 year
Total (from siting to full-scale operation)	8 – 10 years

* Some activities could be completed in parallel.

Cost

The cost of a third Green Bin Organics Processing Facility is proportionate to the capacity of the facility. It is generally understood that a third Green Bin Organics Processing Facility cost is approximately \$1,000.00 per tonne of capacity. Land costs,

development, contract management and permitting are among other costs when building this type of facility. These costs vary according to where the facility will be built, the total capacity, and contractor pricing to build the facility.

The City benefits from increased in-house Green Bin organics processing capacity as the gas by-product can be captured and purified into renewable natural gas. The gas by-product can then be used or sold, offsetting the cost of fuel or generating revenue. This potential revenue opportunity could offset capital and operational expenditures that should be considered in the financial analysis of building a third Green Bin Organics Processing Facility.

Zoo Share

In response to City Council's direction, Solid Waste Management Services with the Environment and Energy Division, reviewed the viability of the proposed Zoo Share biogas facility project. Zoo Share, in conjunction with the Toronto Zoo, is proposing to develop North America's first biogas facility that will use manure and food waste as feedstock to generate electricity. The Zoo Share biogas facility is to be located near the Toronto Zoo, in eastern Scarborough, on land that is owned by the Toronto and Region Conservation Authority.

In Phase 1 of the project, Zoo Share has plans to build one 17,000 tonne per year digester that will accept approximately 15,000 tonnes of food waste and 2,000 tonnes of manure. However, there is uncertainty regarding the amount of manure that can be secured on a long-term basis. The proposed feedstock for the Zoo Share digester consists of manure generated by zoo animals coupled with food waste from commercial locations (e.g. grocery stores, retailers, restaurants, etc.). This first phase is expected to produce approximately 500 kW of electricity. Under Phase 2, Zoo Share has a lease agreement with the Toronto Zoo that allows for an expansion to 1,000 kW of electricity with a processing capacity of 34,000 tonnes. Zoo Share is working with Miller Waste Systems Inc., to complete the design, build, finance and operation of the facility. Under this arrangement, Miller Waste Systems Inc. will finance and construct the facility, contingent on Zoo Share securing an agreement for third party financing. The third party financing would be used to pay for Miller's construction financing.

At this time, Zoo Share does not have the necessary Waste or Air Emission Environmental Compliance Approvals, both of which are necessary if they were to receive and process City-collected organic waste materials. Zoo Share has received an Approval for a Renewable Energy Project from the Ministry of Environment and Climate Change, however, there are restrictions on this approval that may prevent the facility from accepting municipal Green Bin organics once operational, or will require significant pre-processing of material. This approval expires in 2018, but may be extended at the request of the proponent and approval by the Province. The project also had a Feed-In Tariff agreement with the Province to generate electricity from the Zoo Share plant once operational. This Feed-In Tariff agreement is in default for failure to achieve Commercial Operation by the Milestone Date of January 18, 2017, and is at risk of being terminated by the Independent Electricity System Operator on July 18, 2018. The Feed-In Tariff Program is now closed and the Independent Electricity System Operator will not be accepting any additional applications. Furthermore, Toronto Hydro has not completed a

Connection Impact Assessment required for this project to determine the acceptability of the electrical network to receive this additional power.

Commencement of construction of Phase 1 has not begun and will not proceed until funding has been secured and the appropriate approvals are in place. Given that Zoo Share is not ready for development, factors such as legislation preventing the organization from accepting the City's waste without pre-processing, the uncertainty around the amount of manure that can be secured on a long-term basis, and the lack of necessary Environmental Compliance Approvals; it is currently not a viable option for managing the City's organic waste.

Next Steps

Although contracts are in place to manage excess organic waste until 2018 and 2019, the City will need to begin planning for a third Green Bin Organics Processing Facility.

Solid Waste Management Services will continue to work with its neighbouring municipal colleagues to identify and review opportunities for collaboration in 2018. In addition, the Division will continue the ongoing Mixed Waste Processing Facility and Organics Recovery study, as well as initiate the development of a work plan to address siting, permitting, consultation, timeline considerations, capital and operating costs, and potential rate impacts.

Once complete, Solid Waste Management Services will report back to the Public Works and Infrastructure Committee in 2019, with a set of comprehensive plans, analysis and recommendations for consideration.

CONTACT

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SIGNATURE

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