

Organics Management

Recommendation

That Utility Committee recommend to City Council:

That the new organic waste management approach based on Alternative 3B, as outlined in the February 1, 2019, City Operations report CR_6669, be approved.

Executive Summary

Waste Services is committed to minimizing the amount of residential waste sent to landfill as it strives to divert 90 percent of residential waste from landfill, a goal established in Waste Management Policy C527. A large component of Edmonton's residential waste stream is organic waste which includes both food and yard waste. As this material accounts for up to 58 percent of total residential waste, having diversion programs responsive to this material is necessary.

A new approach to organics management requires a decision on the configuration of the curbside set out and on the type of investment for new organics processing infrastructure.

To determine the best path forward for the Edmonton Composting Facility, Waste Services and Integrated Infrastructure Services have collaborated to develop a strategic level business case for the renewal of the facility (see Attachment 1). This business case corresponds to the Project Development and Delivery Model (PDDM) Checkpoint #1 - Authorization for Project Initiation per the Capital Project Governance Policy (C591). As such, it has carefully considered the condition of the facility and equipment, current available technologies, and their current and projected market conditions. High-level cost estimates for both repair and replacement of the facility have been prepared and analyzed through a detailed financial model taking into account life cycle capital and operating costs.

The business case provides detailed analysis on four feasible alternatives. Administration recommends that Alternative 3B be approved to advance project initiation and concept planning to PDDM Checkpoint #2 - Authorization for Design Expenditure. This alternative consists of demolishing the existing facility and constructing a new organics processing facility that will digest organic waste and utilize the biogas generated from the process to produce renewable natural gas.

Report

Background

The City of Edmonton provides waste collection for over 370,000 single and multi-unit residential households. Waste Services currently operates a two stream collection service to single unit residents: waste stream and recycling stream. The commingled waste stream is sorted at the Integrated Processing and Transfer Facility and is then further processed at the Edmonton Composting Facility or the Refuse Derived Fuel Facility, or is sent to landfill.

Currently, organic material from the residential waste stream is first mechanically separated at the Integrated Processing and Transfer Facility and later processed at the Edmonton Composting Facility and the Anaerobic Digestion Facility. Due to structural issues identified in the Aeration Hall, the Edmonton Composting Facility cannot operate year round to its intended capacity. While the facility is seasonally shut down, compostable organic waste is sent to landfill, decreasing the single unit residential diversion rate. This will be somewhat offset by the Anaerobic Digestion Facility, which is scheduled to become fully operational in 2019.

The Aeration Hall of the Edmonton Composting Facility was temporarily closed on October 31, 2017, following proactive and escalating investigations into ongoing structural issues (CR_5306 Composter Detailed Plan and Plan of Action - April 23, 2018). Administration initiated the development of a long-term strategy, including the development of a business case, for the renewal of the facility and associated technology. Business case development utilized the following process to determine feasible approaches to renew the Edmonton Composting Facility:

- Current state analysis of the existing facility including building and equipment condition assessment.
- Environmental scan of waste management in other municipalities and associated government initiatives.
- Technology assessment for current options for organic processing through research and communication with qualified vendors.
- Key performance indicators were developed and used in conjunction with financial modeling to narrow down the potential alternatives.
- Financial modeling was used to cost out the feasible alternatives.
- Multiple account evaluation decision framework using a weighted scoring approach to draw together both economic and non-financial aspects of analysis in a quantifiable manner to arrive at a clear conclusion.
- Business case analysis and recommendation was peer reviewed by a panel consisting of key subject matter experts from both private industry and

municipalities that have recently built organic processing facilities of comparable type and design.

The business case attached outlines four feasible alternatives for the renewal of the facility. The following is a summary of those alternatives; additional details can be found in the business case.

Alternative 1 - Rehabilitate aeration hall and maintain all equipment

This alternative involves refurbishing of the existing Aeration Hall to ensure structural integrity and address the lifecycle issues as identified in the Edmonton Composting Facility building condition assessment.

Alternative 2 - Demolish existing aeration hall and install new composting equipment on existing aeration hall site

This alternative involves demolishing the current Aeration Hall and equipment and constructing a new Aeration Hall with new composting equipment.

Alternative 3A - Demolish existing aeration hall, construct new digestion equipment and facility on existing aeration hall site to generate electricity from biogas

This alternative involves demolishing the existing composting facility and equipment and constructing a new Anaerobic Digestion Facility on the current site along with installing new equipment to generate electricity from biogas.

Alternative 3B - Demolish existing aeration hall, construct new digestion equipment and facility on existing aeration hall site to generate renewable natural gas (RNG) from biogas

This alternative involves demolishing the existing composting facility and equipment and constructing a new Anaerobic Digestion Facility on the current site along with installing new equipment to generate renewable natural gas from biogas.

Comparison of Alternatives

The financial cost analysis (2019 to 2048) for the above four alternatives is outlined in the table below. The analysis was completed over the life of the asset which was assumed to be 30 years, starting from 2019 when the planning, design and delivery of the facility will be initiated. Calculations and assumptions are detailed in section 8 of the attached business case.

Edmonton Composting Facility (2019 to 2048)	Alternative 1	Alternative 2	Alternative 3A	Alternative 3B
Total Capital Cost	\$172.9 million	\$215.8 million	\$237.0 million	\$214.6 million

Total Operating Cost	\$356.4 million	\$415.4 million	\$353.1 million	\$397.3 million
Total Revenue	\$93.5 million	\$93.5 million	\$212.1 million	\$379.8 million
Net Present Value*	(\$242.5 million)	(\$314.9 million)	(\$253.0 million)	(\$197.8 million)

*Dollar figures in parenthesis are negative

When evaluating these options from the perspective of capital expenditure, Alternative 1 has the lowest capital impact. However, when comparing total project life cycle cost for all alternatives, Alternative 3B has the lowest negative net present value. This is the result of higher expected revenue under Alternative 3B, including greenhouse gas emission offset credits and the sale of renewable natural gas.

While financial results are important when considering a capital investment of this scale, non-financial metrics must also be considered. To draw together both economic and non-financial aspects of the analyses in a quantifiable manner and arrive at a clear conclusion, the project team developed the Edmonton Composting Facility Decision Framework. This framework captures the project's financial impacts along with environmental considerations, key risks and accommodation.

The following table shows results of this decision analysis. Each alternative received a score out of a possible 100 points. Full summary analysis is shown in the business case (tables 8-2 and 8-3).

Alternatives	Score (out of 100)
Alternative 1	77
Alternative 2	70
Alternative 3B	87

Note: Alternative 3A is not shown in the above table as the differential in score between 3A and 3B is negligible.

Based on the above analysis and process, Administration is recommending Alternative 3B for further consideration based on financial, operational and business impact as outlined in the attached business case.

Organic Waste Management Program

In the 2019 - 2022 Business Plan, Waste Services outlined potential program changes to waste collection and processing in Edmonton. These changes, including the implementation of a Source Separated Organics program, and changes to the collection and processing of grass clippings, leaf and other yard waste, are aimed at increasing the amount of residential waste diverted from landfill each year and providing residential waste services in a more cost effective way. Implementing these changes will improve compost quality, decrease infrastructure and operating costs

and improve the single unit residential diversion rate by up to 11 percent. These changes also have a significant impact on the renewal of the Edmonton Composting Facility.

Waste Services conducted comprehensive public engagement during the fall 2018 to solicit feedback on the proposed waste services program changes. Waste Services received over 17,500 responses across three targeted surveys, and connected in person with more than 2,000 individuals at 13 public drop-in sessions, six 'Engage Edmonton' sessions and a variety of other public events. Additionally, the City hosted several consultation meetings and sessions with targeted stakeholders and groups. Engagement topics included potential waste sorting and set out options at the household level, such as the adoption of a cart system and enhanced disposal options. Engagement also included potential long-term initiatives to increase waste reduction and diversion.

One particular concern from Edmontonians, was the amount of yard waste generated during the year. The material in question is typically yard debris from spring and fall yard clean up, and grass clippings and garden waste during the summer months. Waste Services further investigated methods to provide residents with waste collection services that would meet their expectations, while achieving landfill diversion targets in a cost effective manner. This concern can be alleviated by permitting residents to add yard waste to a proposed 120 litre green organics cart (used for organic waste) as needed and providing additional separate yard waste collections in the spring and fall.

The separate collection will be operated similar to the Christmas tree collection and will be offered in the spring and fall when most yard waste is generated. Material collected in the green cart will be processed through the organics processing facilities, while material collected through the separate yard waste collection will be processed at an outdoor compost cure site which has lower processing cost. This approach provides the ability for residents to top-up their green cart (55 percent of survey respondents stated they were likely, somewhat likely, or very likely to use the green cart to dispose of grass clippings, if permitted), while minimizing costs and promoting waste diversion from landfill.

Financial analysis was conducted to compare the costs of allowing residents to top-up their green cart with seasonal yard waste and of not allowing residents to top-up their green cart with seasonal yard waste. Specific program details and cost per tonne impacts are shown in the table below.

	No Top-Up	Top-Up
Organics Processing	Capital cost: \$215 million	Capital cost increases by \$45

Facility (Alt 3B)		million to accommodate additional material once capacity is reached. New capital cost: \$260 million. Operating costs of the facility increase proportionately to the tonnage of yard waste collected.
Impact for Separate Yard Waste Collection	Provide bi-weekly yard waste collection from April to October. Requires procurement of 22 additional waste collection vehicles, hiring associated waste collectors and additional contract expense.	Provide two seasonal collections of yard waste utilizing existing waste collection vehicles and staff. Increases to overtime and contract costs expected.
Yard Waste Composting Operations	Approximately 40,000 tonnes of yard waste will be processed at an outdoor facility.	Approximately 15,000 tonnes of yard waste will be processed at an outdoor facility.
Total cost per tonne 2024 forecast	\$379 per tonne	\$306 per tonne escalating to \$325 per tonne once facility expansion is constructed.

Implementation of the separate collection of yard waste will require additional outside composting space. Waste Services has a previously approved capital business case to develop additional cure site space (profile 15-33-2025). This additional cure site space is currently targeted to be available in 2021. Until the additional cure site space is available for use, Waste Services will investigate alternatives for processing material on a short-term basis.

Waste Services will engage approximately 8,000 households in spring 2019 to pilot this organic waste management program. Further details on the Pilot Program can be found in CR_5832 Source Separated Organics Pilot - August 23, 2018 and revised scoping of the program, in response to Phase 1 public engagement is included in Attachment 2 of report CR_5827 Citizen Feedback on Additional Residential Waste Diversion Programs.

Project Delivery Considerations

During the project review process, City staff met with municipalities that have recently constructed organic processing facilities of comparable type and design to review the potential alternatives and learn from their experience in the process. Two such municipalities are the City of Calgary and the City of Surrey. Both used public-private partnerships (PPP or P3) for delivering their organic waste processing facility. Administration will continue to investigate the viability of delivering this project as a public-private partnership in 2019 and will return to Utility Committee with a report recommending the appropriate delivery mechanism. Administration has completed

the initial P3 project screening, in accordance with City Policy C555, which supports further evaluation and analysis, and in 2019 will proceed with secondary screening for P3 viability.

During the next phase of the project, the following will be completed:

- Assessment of potential for Public-Private-Partnership per Policy C555. Results of the assessment will be submitted to Utility Committee and City Council for approval.
- Determination of the delivery method and operating model for the facility.
- Continued research and environmental scan to support planning for design, construction, operation and maintenance of the facility.
- Procurement planning.

Once the above steps have been completed, Waste Services will return to Utility Committee with a report summarizing the findings and recommending further steps.

Public Engagement

Comprehensive public engagement was conducted from October 1 to November 30, 2018. Waste Services connected with residents, multi-unit stakeholders (such as property managers, condo boards and related associations), non-residential stakeholders (industrial, commercial and institutional organizations), and internal City of Edmonton stakeholders. Waste Services actively reached out to special target groups to ensure the perspectives of seniors, multicultural groups, post-secondary students, and those with accessibility limitations, were heard.

In addition to the public engagement detailed in this report, a second phase of public engagement will run from mid-February until the end of April 2019. This will enable Waste Services to validate the information gathered thus far, and uncover more comprehensive opportunities to maximize waste reduction and diversion across all sectors in Edmonton as we continue to refine the strategy.

Corporate Outcomes and Performance Management

Corporate Outcome(s): Edmonton is an environmentally sustainable and resilient city			
Outcome(s)	Measure(s)	2017 Result(s)	Target(s)
Edmonton is an environmentally sustainable and resilient city	Single Unit Residential Diversion Rate	39%	2018 - 41% 2019 - 50% 2020 - 64% 2021 - 66% 2022 - 80%

Risk Assessment

Risk Element	Risk Description	Likelihood	Impact	Risk Score (with current mitigations)	Current Mitigations	Potential Future Mitigations
Economic	The market for biogas by-products may change resulting in decreased financial benefits to the City	3 - possible	2 - moderate	6 - low	Sensitivity analysis of these impacts was undertaken and worst-case price scenario was utilized in the business case	As project progresses, discuss with local distribution companies and continue to monitor market conditions
Project Management	If the Business Case is not implemented it could result in lower quality inputs and outputs for the composting facility Budget and scope of project	3 - possible	3 - major	9 - medium	Aligning the program business case approval with project business case approval Monitor fluctuations and include various contingencies	Continue to align with project business case approval Continue to monitor fluctuations and include various contingencies appropriate to the project stage
Technology / Equipment	Future technology and equipment and its ability to impact the City achieving its objectives / service levels	3 - possible	2 - moderate	6 - low	Deemed an acceptable risk as the existing structure is very large and likely will be acceptable for new technology	Ensure technology is able to meet City's objective of an increased single unit residential diversion rate

Attachment

1. Edmonton Composting Facility Renewal Business Case

Others Reviewing this Report

- T. Burge, Chief Financial Officer and Deputy City Manager, Financial and Corporate Services
- C. Owen, Deputy City Manager, Communications and Engagement
- A. Laughlin, Deputy City Manager, Integrated Infrastructure Services