Niagara Region

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MEMORANDUM

WMPSC-C 34-2019

Subject: Alternative Waste Management Technologies Update

Date: Monday, October 28, 2019

To: Waste Management Planning Steering Committee

From: Brad Whitelaw, Program Manager, Policy and Planning

As per PW 41-2015 and the May 30, 2016 Waste Management Planning Steering Committee (WMPSC) meeting, this memorandum is intended to provide Committee members with an update on alternative waste management technology projects and related initiatives (i.e. Energy From Waste, Mixed Waste Processing, Anaerobic Digestion, etc.). Staff have been monitoring new and emerging alternative disposal technologies along with existing projects for future consideration over the past several years. Staff provide updates on these alternative waste management technologies, at least annually, or when there are significant updates.

This memorandum also responds to the August 6, 2019 Public Works Committee Councillor Information Request, which asked for information respecting the use of incineration as an option for future waste management.

Background

- Originally, as part of the Long Term Waste Management Strategic Plan and then subsequently as a stand-alone project, Council approved completion of a review and issuance of a RFP for a scientific review of alternative diversion and disposal technologies, including analysis on viability and sustainability and recommendations for next steps.
- In 2013, an RFP was awarded to HDR Inc. to perform a comparative assessment of alternative waste and biosolid management technologies. The aim of this assessment was to determine which technology or combination of technologies would be viable for implementation in Niagara Region.
- In mid-2014, this project was subsequently deferred for one year due to a number of considerations (see PW 41-2015) and subsequently was terminated by Council and instead will be included as part of a future long-term waste management strategic plan with a comprehensive stakeholder engagement process.
- Niagara Region continues to engage other neighbouring municipalities in discussions related to available capacity at their current/future alternative waste management technology facilities and/or future needs that could be addressed by partnering on alternative technologies.
- Niagara Region continues to participate in the Municipal Mixed Waste Processing (MWP) Working Group, which has the objective to “identify collaboration opportunities

and specific information needs, actions and timelines, in order to determine the feasibility of jointly implementing waste management policies, programs and/or facilities, which includes alternative technology facilities".

Overview

Provided below is an update on municipal and private alternative waste management technology facilities across Canada, and related Provincial waste reduction legislation, subsequent to what was previously reported in WMPSC-C 29-2018 - Alternative Waste Management Technologies Update, September 17, 2018.

1) Summary of Municipal and Privately-Owned Alternative Waste Technology Facilities across Canada

Provided below is an update on municipal and privately-owned alternative waste technology facilities implemented across Canada, subsequent to what was previously reported.

Table 1 - Municipally-Owned Facilities (owned by a municipality and operated by a third party)

Municipally-Owned Facilities		
Municipality/ Facility	**Type of Technology**	**Update**
Durham-York Energy Centre (DYEC) and Covanta	Energy from Waste (EFW)	• DYEC's maximum waste thermal treatment rate is currently set at 140,000 tonnes per year (tpy). • The nominal electricity generation rate is 17.5 Megawatts and the nominal steam generation rate is approximately 67,200 kilograms per hour. • In June 2019, the Regions of Durham and York began the Environmental Screening Process to increase the amount of waste processed at the DYEC by 20,000 tpy, for a total of 160,000 tpy. • Total cost to construct the DYEC was $295 million. • In 2018, DYEC received 140,780 tonnes of waste. • Covanta's 2018 estimated operating fee was $16.2 million. There were additional non-operating costs of $2.2 million. • In 2018, the estimated electricity revenue generation was $8.7 million, and revenue from ferrous and non-ferrous metals was approximately $0.5 million. • In 2018, the net annual operating cost was approximately $9.2 million.

Municipally-Owned Facilities		
Municipality/ Facility	**Type of Technology**	**Update**
		• In 2018, the DYEC operated in full compliance with its Environmental Compliance Approval, except for one event.
Metro Vancouver Waste-to-Energy Facility (WTEF) and Covanta	Energy from Waste	• Metro Vancouver owns the WTEF and Covanta operates it on their behalf, under a long term operations and maintenance contract. • The tonnage of Mixed Solid Waste (MSW) processed at the WTEF has decreased following the success of Metro Vancouver's organics diversion program. • Since the organics ban was introduced on January 1, 2015, the MSW tonnage processed at the WTEF has decreased from approximately 280,000 tpy to approximately 253,000 tpy in 2018. • With this decrease of approximately 27,000 tpy of organic food waste, there was a resulting 6-7% increase in the waste heating value of the MSW. • In September 2018, Metro Vancouver commissioned a non-ferrous recovery project. This project will also provide secondary ferrous metal recovery. • In 2018, the WTEF recovered and sold approximately 5,700 tonnes of ferrous and non-ferrous metals. • In 2018, the total operating cost, including debt charges, for the WTEF was approximately $20.5 million. 2018 disposal costs were $1.6 million. • In 2018, Metro Vancouver earned approximately $5.6 million from the sale of electricity and $0.2 million from the sale of recycled metal to a company that produces reinforcing steel. • In 2018, the net cost to operate the WTEF was $58.16/tonne.
City of Halifax Otter Lake Waste Management Facility	Mechanical Biological Treatment (MBT)	• From April 2018 to March 2019, the Otter Lake facility received a total of 45,832 tonnes of residential waste, of which 40,744 tonnes were landfilled. • Total operating costs for the Otter Lake MBT facility during this period were approximately $6.0 million.

Municipally-Owned Facilities		
Municipality/ Facility	**Type of Technology**	**Update**
City of Toronto Dufferin Biogas Utilization Project	Anaerobic Digestion (AD)	• Toronto, in partnership with Enbridge Gas Distribution Inc., began installation of new equipment at Dufferin Solid Waste Management Facility in late 2018. • This new equipment, known as a Bio-methane Upgrading System, will allow the City and Enbridge to turn the raw biogas produced from processing Green Bin organics into Renewable Natural Gas (RNG). • The Dufferin Facility will process 55,000 tonnes of organics per year. • The total project cost for the Dufferin Biogas Utilization Project is estimated to be $16.3 million. • The City has also identified other potential RNG production opportunities for development consideration at two of its landfill sites (Green Lane and Keele Valley) and its other AD facility (Disco). • The City estimates that development of all four sites offers the potential to produce 65 million cubic metres of RNG per year. • These kinds of projects are targeted to assist the City in moving forward on its initiatives to encourage a circular economy, however specific timelines for completion of these developments have not yet been defined.

Table 2 – Summary of Current and Proposed P3 Facilities (owned and operated by private company but agreements with municipalities to supply waste)

Current P3 Facilities		
Municipality/ Facility	**Type of Technology**	**Update**
City of Edmonton and Enerkem Alberta's Waste-to-Biofuel and Chemical Facility	Gasification, Cleaning and Conditioning of Syngas, Catalytic Synthesis and Product Purification	• Enerkem began construction of its ethanol plant in 2016, and initiated ethanol production in 2017. • Enerkem has been producing and selling bio-methanol since 2016, and expanded production to include cellulosic ethanol with the installation of its methanol-to-ethanol conversion unit. • Enerkem entered into a 25-year supply agreement with the City of Edmonton to receive 100,000 tonnes of Refuse Derived Fuel (RDF) annually. • The annual cost to operate the Enerkem facility is proprietary information.
Proposed P3 Facilities		
Municipality	**Type of Technology**	**Update**
Durham Region	Mixed Waste Processing and Anaerobic Digestion (AD)	• In June 2019, Durham Region obtained Council approval to proceed with construction of a mixed-waste transfer and pre-sort facility and an AD organics management processing facility (utilizing a wet technology), under a design, build, operate and maintain (DBOM) public-private partnership contract. • The pre-sort facility would accept all residential residual garbage and separate out any organics and recyclables from the residual garbage. • The recyclables would be sent to market, while the organics would be processed at the AD facility, along with Green Bin organics, and converted into energy and fertilizer. • The AD facility is anticipated to divert approximately 30,000 tonnes of organics from the DYEC, annually. • The remaining residue garbage would be processed at the DYEC. • The upfront capital costs to build both facilities are estimated to be approximately $164 million, including land ($42.3M – Pre-sort facility; $116.3M – AD facility; $4.8M – Land).

		• The estimated operating and maintenance costs for both facilities during the first year of operations would be $19.3 million. • Costs could increase by an additional $15 million to $26 million per year for debenture financing costs to finance the initial capital investment. The estimated debt financing costs would be $20.5 million. • Durham Region anticipates issuing an RFP for the DBOM of both facilities in the next year.

Table 3 – Summary of Privately-Owned or Proposed Private Facilities

Privately-Owned Facilities		
Facility	**Type of Technology**	**Update**
Grimsby Energy Inc. (GEI) Bio Digester	Biogas	• The GEI biodigester was designed to receive approximately 24,000 tonnes annually of organics (i.e. pork and chicken renderings, grape pumice, oils and grease, dog food, vegetables and fruits, etc.) from local farmers and businesses. • During its first year of operation (August 2017 to August 2018), the GEI facility processed approximately 17,000 tonnes of organics. • The $12.3 million facility operated at approximately 50% capacity, and was hampered by weather-related issues, and an inability to dispose of the digestate by-product, due to Provincial regulatory changes. • In February 2019, Grimsby Town Council voted in favour of providing an additional $400,000 in funding, split into two amounts. The first amount was in the form of a $100,000 demand loan from the Town, followed by a $300,000 addition to the Corporation's existing $4.5 million bank loan guaranteed by the Town. The former of these two amounts was to cover GEI's current overdraft balance, freeing up those funds for use at the biodigester site. • In February 2019, GEI retained Deloitte Canada to oversee the sale of this facility. The facility would continue to operate until it was sold. • In September 2019, the facility was sold to White Owl Limited. The sale will result in proceeds

		sufficient to retire all bank debt obligations associated with previous losses, all property taxes owing, as well as the balance of a Promissory Note and interest due to the Town of Grimsby, accounts payable owed to suppliers, and other indebtedness of the company.
Canada Fibers Ltd. (CFL) Dongara Facility, Woodbridge, ON	Mixed Waste Processing (MWP)	• Over the past few years, CFL and select municipal partners conducted multiple pilot projects at its Dongara Facility to explore the recovery and diversion of highly contaminated single stream materials from multi-residential dwellings and Grey Box materials (i.e. cardboard and newsprint). • CFL staff reported that through these pilots, it was determined that MWP was an effective method for the recovery of valuable recyclable and digestor-ready organic materials originating from multi-residential dwellings, but can also supplement the recovery of organics originating from single family homes. • CFL is currently exploring the feasibility of recovering and converting non-recyclable plastics into an engineered alternative fuel, at its Dongara Facility.
Proposed Privately-Owned Facilities		
Facility	**Type of Technology**	**Update**
AmaLaTerra Inc. and City of Hamilton	Steam Reformation	• In February 2019, AmaLaTerra approached City of Hamilton Council about utilizing its proposed steam reformation technology to vaporize any sort of waste, including plastic and tires. • According to AmaLaTerra's proposal to the City, Blue Box materials would be placed inside sealed containers and heated from the outside until they are vaporized, producing very little emissions in the process. • According to AmaLaTerra, any emissions produced from the process would be well below the Provincial emissions levels. They would be half of green hydrogen, as well as methane and carbons that could be used to produce electricity. • City of Hamilton Council voted down AmaLaTerra's proposal in February 2019.

Southern Alberta Energy from Waste Association (SAEWA)	TBD – Commercially demonstrated technology	• Established in 2009, the non-profit SAEWA is a coalition of 66 municipal entities and waste management jurisdictions in southern Alberta with the mission to research and implement energy recovery from non-recyclable waste materials in order to reduce long-term reliance on landfills. • In February 2019, SAEWA announced they will be conducting in-depth assessments to identify a list of potential sites suitable for an Energy-for-Waste facility after being awarded $400,000 funding from Alberta's Community Partnership program grant.

2) Municipal Mixed Waste Processing (MWP) Working Group:

The Municipal MWP Working Group, which Niagara Region is currently a member of, meets annually to discuss and share information on various MWP initiatives. Provided below is an update on the municipal members' current MWP initiatives beyond that included in the tables above:

i) **London:**

- London's Waste to Resources Innovation Centre (WRIC) currently operates using four existing locations:
  1. Materials Recovery Facility (including an approved area for recovery/ waste management demonstration projects)
  2. City Hall
  3. Institute for Chemicals and Fuels from Alternative Resources (research institute within Faculty of Engineering at Western University)
  4. Western University
- The WRIC currently has activities in five main areas:
  1. Research & Development
  2. Training, Testing & Auditing
  3. Resource & Waste Management Knowledge Exchange
  4. Technology Demonstrations
  5. Outreach & Engagement
- In 2019, the WRIC, which includes MWP as part of its discussion and research, was awarded a five-year, $3 million Natural Sciences and Engineering Research Council of Canada grant with Western University and its nine other industry partners. The focus of this grant will be on projects related to the thermochemical conversion of biomass and waste to bioindustrial resources.

ii) **Oxford County:**

- In June 2018, Oxford County Council endorsed Enhanced Material Recovery and Biological Treatment as the recommended Waste Recovery and Reduction Technology (WRRT) approach.
- This is the next phase for advancing Oxford County towards Zero Waste, with the ultimate goal of diverting 90% of waste currently landfilled by 2025 and extending the lifespan of the County's landfill site to 2100.
- Staff reported to Council on June 12, 2019, seeking their endorsement of the preferred site selection, which was required in order to proceed with next steps – Value for Money analysis to validate preferred procurement option for Council's subsequent endorsement. However, the motion at June 12, 2019 meeting was defeated and the project was put on hold until staff received further direction from Council.
- Subsequent to the June 12, 2019 Council meeting, the WRRT project was cancelled altogether by Council.
- Council endorsement of the preferred WRRT sites and procurement option was necessary to inform the planned procurement phase of the WRRT project, including vendor prequalification and RFP to short-list of vendors.

iii) **Peel Region:**

- Peel Region plans on issuing an RFP in September 2019 for an AD facility to process its Green Bin organics.
- Peel Region was approached by 3Wayste at the end of March 2019, who proposed to build a MWP facility, which they claimed could replace the AD facility and source-separated organics (SSO) program, and achieve equivalent levels of diversion, at a lower cost.
- Peel Region staff completed an assessment of 3Wayste's technology and compared the diversion potential to the Region's approach, which includes both SSO to be processed at their AD Facility, supplemented by MWP of garbage, as well as other implications (i.e. quality and markets for outputs such as compost and the requirement to comply with the province's Food and Organic Waste Policy Statement).
- The results of this assessment were presented to senior management, who were in agreement that Peel Region should maintain its current waste diversion plans.

iv) **Simcoe County**:

- Simcoe County has no plans, at this point, to pursue MWP technology. Instead, the County will be keeping abreast of developments in the MWP field.
- The County is pursuing the development of its waste management facility (ERRC Environmental Resource Recovery Centre), which has two major

components: an Organics Processing Facility, and a Materials Management Facility or waste transfer facility for garbage and recycling.
- The County has selected a site and are currently pursuing the necessary Official Plan and zoning designations.

v) **Toronto:**
- In September 2018, HDR Corporation was selected to undertake a comprehensive Mixed Waste Processing with Organics Recovery (MWPwOR) Study for the City of Toronto, at a cost of approximately $1 million.
- The MWPwOR Study is expected to be completed by December 31, 2020.

vi) **Waterloo Region**:
- Waterloo Region continues to monitor the activities of larger municipalities with respect to alternative technology initiatives, at this time.

vii) **York Region**:
- Through a 2017 technology study, York Region identified anaerobic digestion as the preferred technology for managing its organic waste.
- In 2019, staff are developing an implementation plan to secure the capacity needed to meet long term processing needs and emission reduction goals.

3) Provincial Waste Reduction Legislation:

Provincial waste reduction legislation may impact the amount of tonnage to be directed to alternative technology facilities, and will require additional consideration by Regional Committees/Council in terms of services and facilities that Niagara will continue to operate under a producer responsibility framework.

i) **Provincial "Made-in-Ontario Environment Plan" (Plan) Update:**
- On August 15, 2019, Minister Yurek issued a direction letter requiring Stewardship Ontario (SO) to begin transition of the Blue Box Program to full producer responsibility, and submit a plan to Resource Productivity Recovery Authority (RPRA) by June 30, 2020.
- RPRA will oversee SO's development and implementation of the plan, along with providing approval of the plan by no later than December 31, 2020. It is expected that the first group of municipalities or First Nations will transfer responsibility of programs to producers starting in January 2023, with producers fully responsible for Blue Box service, province-wide, by 2025.
- Regulations have yet to be developed, which will provide the details needed by all stakeholders. It is anticipated that final regulations will be complete by early 2021.
- Additional details on the Blue Box transition to full producer responsibility are available in WMPSC-C 32-2019 - Modernizing Blue Box Program.

- The Plan also contained several references, which support alternative waste technologies, including:
  - Investigating options to recover resources from waste, such as chemical recycling or thermal treatment, which have an important role – along with reduction, reuse and recycling – in ensuring that the valuable resources in waste do not end up in landfills. The Plan indicates that incineration will not be counted as diversion.
  - Encouraging increased recycling and new projects or technologies that recover the value of waste, such as hard to recycle materials.

ii) **Provincial Food and Organic Waste Framework Update:**

- The Ministry of the Environment, Conservation and Parks (MECP), formerly the Ministry of the Environment and Climate Change (MOECC), released the Food and Organic Waste Framework on April 30, 2018. The Food and Organic Waste Framework consisted of two complementary components:
  1. ***Food and Organic Waste Action Plan***, which outlines strategic commitments to be taken by the province to address food and organic waste.
  2. ***Food and Organic Waste Policy Statement****,* under the Resource Recovery and Circular Economy Act, 2016 (RRCEA), which provides direction to the province, municipalities, producers, Industrial, Commercial and Institutional sector (e.g. retailers, manufacturers, hospitals, schools), the waste management sector and others to further the provincial interest in waste reduction and resource recovery as it relates to food and organic waste.
- A Policy Statement was issued by the MOECC, pursuant to Section 11 of the RRCEA, on April 30, 2018 and came into effect, at that time.
- In June 2019, the MECP formed an Organics Stakeholder Committee to delve more deeply into the technical issues on the management of food and organic waste and to develop recommendations that can be implemented.
- The Organics Stakeholder Committee was organized into three technical working groups, which met between June and August, to obtain input on the following:
  1. **Compostable Products and Packaging** - Recommendations on a path forward for compostable products and packaging in Ontario
  2. **Food and Organic Waste** - Recommendations on priority areas for guidance to support implementation of the Food and Organic Waste Policy Statement
  3. **Modernization of Organic Waste Permissions** – Identification of regulatory barriers preventing innovative solutions to the management of food and organic waste.
- Niagara Region staff participated in the Compostable Products and Packaging technical working group.

- The Organics Stakeholder Committee will be reporting their findings to the MECP in the fall of 2019, for further consideration.

Summary/Conclusion

Based on a review of the Municipal MWP Working Group members, none are considering EFW for various reasons, including:

- A decision was made to monitor EFW, but not implement at this time i.e. Waterloo;
- The EFW technology was not included as part of their long-term waste strategy i.e. London is undertaking research project in thermochemical conversion and Toronto is undertaking a MWPwOR study;
- The decision was made to focus on organics (AD) diversion, which in the case of Durham, Oxford, Simcoe and Peel, is being supplemented by MWP or biological treatment and in the case of York Region, no further plans to expand the existing capacity at their DYEC is being considered.

Niagara Region will be assessing EFW, as part of its strategic plan. It is anticipated that the development of the RFP for completion of this plan will be initiated later in 2019.

Respectfully submitted and signed by

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