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The Regional Municipality of Durham Information Report

From: Commissioner of Works
Report: #2020-INFO-80
Date: August 28, 2020

Subject:

Anaerobic Digestion Facilities

Recommendation:

Receive for information

Report:

1. Purpose

1.1 This report provides information on Anaerobic Digestion (AD) and the processing of Green Bin and other organic materials into a renewable natural gas and fertilizer material. This report also provides links to websites that offer more information about existing AD facilities.

2. Background

2.1 The June 19, 2020 Council Information Package included a memorandum (Attachment #1 attached by link) from the Commissioner of Works on the Mixed Waste Pre-sort system. The memorandum provides an overview of the components of the Mixed Waste Pre-sort system proposed for Durham Region and links to websites that provide information on operating mixed waste pre-sort facilities.

2.2 The Mixed Waste Pre-sort system will be complemented by an AD facility. Source separated organics collected curbside through the Green Bin program from single-family homes in the Region will be delivered directly to the AD facility. Organic material removed from the garbage bags (e.g. organics the Green Bin did not

capture and organics in multi-residential garbage) by the Mixed Waste pre-sort system will also go to the AD facility for processing.

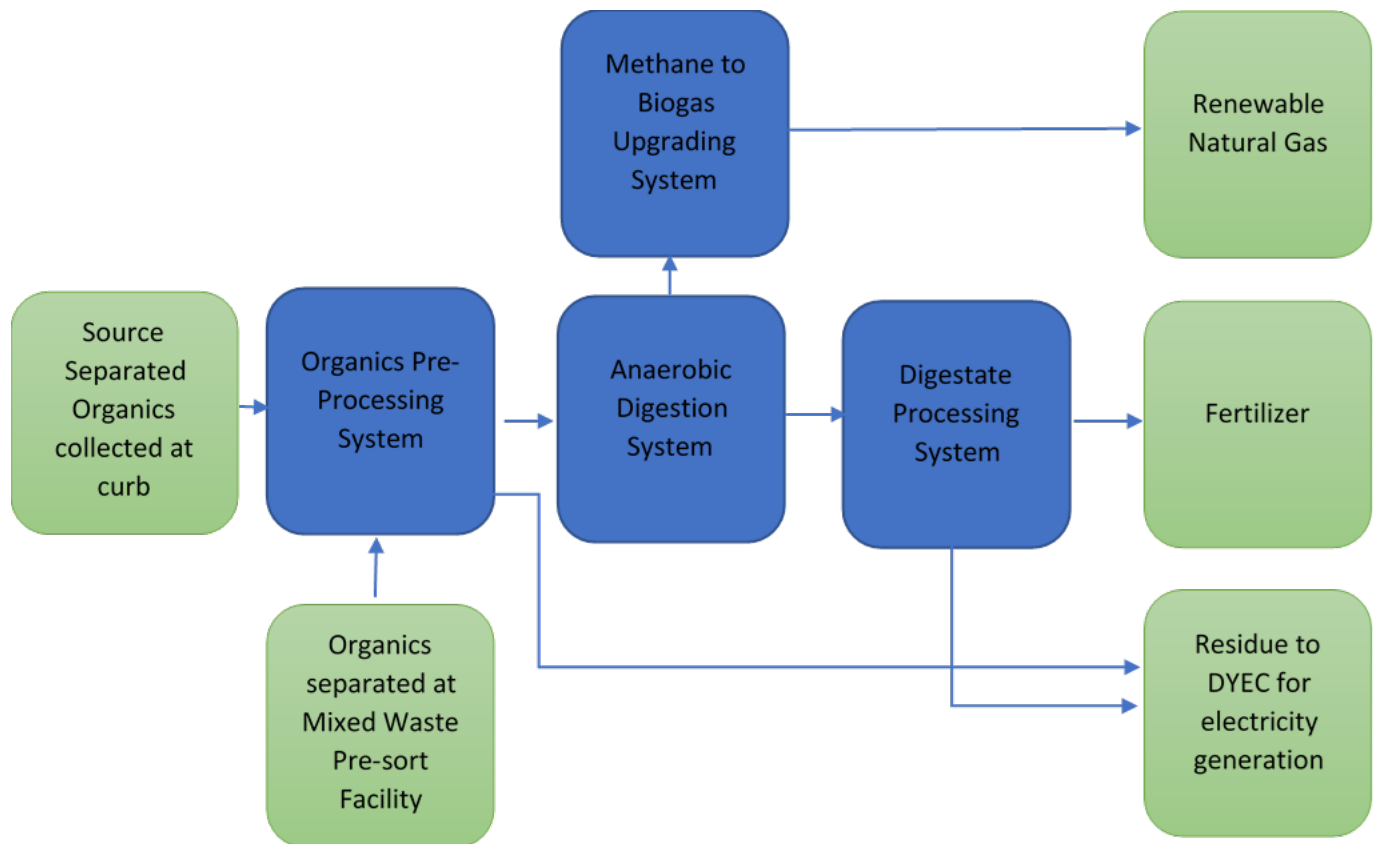
- 2.3 In the resident survey conducted in fall 2019, 73 per cent of respondents from Clarington and Durham agreed that energy should be generated from the Region's waste. Over 90 per cent of Durham residents agreed that waste should be managed as a resource, while 86 per cent thought AD was an appropriate method to manage waste as a resource. Survey respondents from Clarington had similar opinions as Region-wide responses.
- 2.4 As reported to Council in 2020-INFO-70, provided in the Council Information Package of July 17, 2020, the Mixed Waste Pre-sort and AD facility will generate less than 1,000 tonnes per day of residual waste and, therefore, does not require an Environmental Assessment. The Ministry of Environment, Conservation and Parks confirmed this determination in correspondence in March 2020.

3. Anaerobic Digestion Facilities

- 3.1 Anaerobic digestion is the treatment of organic material in the absence of oxygen. It is a naturally occurring biological process that occurs over decades in landfills and produces methane gas. Anaerobic digestion can be accelerated in a controlled environment and the methane gas (renewable natural gas) can be captured for beneficial use to reduce greenhouse gas emissions by injecting it into the existing natural gas distribution system or used directly to refuel natural gas-powered vehicles and equipment.
- 3.2 In an engineered AD facility, specially designed reactor buildings maintain critical elements such as temperature, moisture, nutrients and pH levels to maximize methane production and organic decomposition rates.
- 3.3 Since the AD process occurs within a facility under negative pressure, there is no odour released to the atmosphere. All the air taken into the building will pass through a biofilter prior to being released to the atmosphere. No combustion occurs during anaerobic digestion and therefore, there are no associated emissions.
- 3.4 Source separated organics and organic material from the Mixed Waste pre-sort will be pre-processed to create a well-mixed emulsion using water pressure (aqua-pulpers). Any remaining plastic material will also be removed from the organics stream, as it will float to the top of the tanks. Heavier material such as grit and dirt will drop to the bottom of the tanks and be removed. This pre-processing will allow

the Region to accept a wider range of organic material in the Green Bin program, including bagged pet waste and diapers.

- 3.5 Source separated organics and other organic materials are moved to a large, air-tight tank where bacteria break down the material at temperatures exceeding 50 degrees Celsius (kills pathogens). The products of the bacterial action are digestate that can be processed for a beneficial use (fertilizer) and a methane-based biogas that can be cleaned and used as a natural gas replacement. Figure 1 below illustrates the key steps in a typical AD process and the end products. A brief video overview of the AD process is found at the following link:
<https://www.youtube.com/watch?v=WdZViehrUks>
- 3.6 Residual waste from the mixed waste pre-sort and plastics separated from the organics in the AD pre-processing step will be transferred to the adjacent Durham York Energy Centre (DYEC). It is anticipated that an additional two trucks per day will be required to deliver the waste and organics to the mixed waste pre-sort and AD facilities as compared to the current truck traffic to the DYEC.
- 3.7 The mixed waste pre-sort and anaerobic digestion facilities are being constructed to meet the projected population growth within the Region and to help the Region meet the provincial organics diversion target of 70 per cent. The facilities will only accept waste generated within Durham Region.

Figure 1: Typical AD Operation

4. Anaerobic Digestion Facilities and Operators

4.1 Dufferin and Disco Road Anaerobic Digestion Facilities, City of Toronto, Ontario

- a. Toronto operates two AD facilities processing residential organic waste
- b. Website: <https://www.toronto.ca/services-payments/recycling-organics-garbage/solid-waste-facilities/>

4.2 Biffa, Horsham Mechanical Biological Treatment Facility

- a. Provides mechanical waste sorting and anaerobic digestion of organics for West Sussex County in England.
- b. Website: <https://www.biffa.co.uk/about-us/waste-journeys/mechanical-and-biological-treatment>

4.3 Bio-En Power Inc, Elmira, Ontario

- a. Provides Anaerobic Digestion equipment and operating expertise.
- b. Website: <http://www.bio-enpower.com/>
- c. Operates the AD facility located in Elmira, Ontario

4.4 Allerton Waste Recovery Plant, North Yorkshire, England

- a. A waste management campus that includes a pre-sort facility, anaerobic digestion and energy-from-waste.
- b. Website: <https://wasteservices.amey.co.uk/where-we-work/north-yorkshire/>
- c. Video of Recovery Plant operations start to finish:
<https://www.youtube.com/watch?v=qWI0OFbYz9s&feature=youtu.be>

5. Conclusion

5.1 Anaerobic digestion is a proven and widely used process that is compatible with a diverse organic waste stream that will allow the Region to expand its organics diversion program and processing capability while reducing waste for disposal at the Durham York Energy Centre, thereby, delaying the need for additional disposal capacity.

5.2 For additional information, please contact Gioseph Anello, Director, Waste Management Services at 905-668-7711, extension 3445.

6. Attachments

Attachment #1: [June 15, 2020 Memorandum: Mixed Waste Pre-sort Facilities](#)

Respectfully submitted,

Original signed by:

Susan Siopis, P.Eng.
Commissioner of Works