Project Description

The Regional Municipality of Durham and the Regional Municipality of York (the Regions) are proposing to increase the permitted annual waste throughput rate of the Durham York Energy Centre (DYEC) by 20,000 tonnes per year, from 140,000 tonnes to 160,000 tonnes per year. This additional capacity is needed to accommodate population growth within the two Regions while continuing to maintain and increase diversion rates. The proposed processing rate increase will also allow the DYEC to operate more efficiently and produce more energy with no modifications to existing infrastructure. If approved, the additional capacity will reduce reliance on alternate waste disposal facilities outside the Regions' borders.

Co-owned by the Regions, the DYEC is a waste management facility that produces energy from the combustion of post-diversion residential garbage. Durham Region's portion of DYEC processing capacity is 110,000 tonnes and represents the primary method of post-diversion waste disposal, while York Region's portion is 30,000 tonnes and represents one of multiple disposal facilities used by York Region.

The DYEC is subject to regulatory approvals under the *Environmental Assessment Act* (the EA Notice of Approval) and the *Environmental Protection Act* (the Environmental Compliance Approval, or ECA). The EA notice of Approval was issued in November 2010 followed by the ECA in June 2011. Facility design and construction commenced after the ECA was received, and the facility achieved commercial operation in January 2016.

The DYEC is designed to accept materials with a Higher Heating Value (HHV) of 11.0 MJ/kg to 15.0 MJ/kg and produce a Gross Electrical Output between 712 and 1030 kWh/tonne.The DYEC is capable of processing 160,000 tonnes of waste per year with its existing equipment and is currently being underutilized despite demand for additional waste disposal capacity for residential waste within the Regions.

Problem and Opportunity Statement

The ECA and EA Notice of Approval both limit the annual tonnes processed at the DYEC to 140,000 tonnes per year. As a result of these approval limits on DYEC processing capacity, the Regions were required to by-pass waste to other disposal facilities in 2017 and 2018 that could have otherwise been processed at the DYEC (Table 1). With growth continuing in Durham and York Regions, additional disposal capacity is needed to meet current system demands and to account for long term growth

Table 1: Durham By-pass Waste Tonnes

Year	Tonnes By-passed to Other EFW Facilities	Tonnes By-passed to Landfill	Tonnes By-passed to Waste Composition Study	Total Tonnes By-passed
2017	10,170	3,487	0	13,657
2018	370	6,280	3,657	10,307

If the annual approval limit of 140,000 tonnes were to be increased, some of this additional demand could potentially be satisfied using the existing equipment at the DYEC. The maximum annual waste tonnage that an energy-from-waste facility can process when operating at full design load varies from year to year and is influenced by several factors. This maximum annual tonnage can be calculated using the following equation:

$$T_{max} = \frac{365 \times Q \times A}{HHV}$$

Where:

T_{max} = The maximum waste tonnage that can be processed in one year if the boilers operate at 100% design load whenever they are operating.

Q = The design rate of fuel energy input. For the DYEC, this value is equal to 5,668,000 megajoules per day (MJ/d) with both boilers operating at full design load.

HHV = The average Higher Heating Value of the fuel. This parameter measures the average energy content per unit of fuel mass and varies over time based on waste composition. The DYEC is designed to accept fuel with HHV ranging from 11 to 15 megajoules per kilogram (MJ/kg) which is equivalent to 11,000 to 15,000 megajoules per tonne (MJ/T).

A = The number of hours that the boilers are available to process waste expressed as a percentage of total hours in a year, referred to “boiler availability”

For example, in a year in which the DYEC achieves boiler availability of 94% using fuel with an average HHV of 12,000 MJ/tonne, the maximum number of tonnes that could be processed with the boilers operating at full design load would be:

$$\frac{(365\ days/year) \times (5{,}668{,}000\ MJ/day) \times 94\%}{(12{,}000\ MJ/tonne)} = 162{,}058\ tonnes/year$$

However, if the HHV increases to 14,000 MJ/tonne while boiler availability is reduced to 90%, the maximum number of tonnes that could be processed in one year would be:

$$\frac{(365\ days/year) \times (5{,}668{,}000\ MJ/day) \times 90\%}{(14{,}000\ MJ/tonne)} = 132{,}996\ tonnes/year$$

During the original Environmental Assessment, the DYEC's nominal annual processing capacity was set at 140,000 tonnes per year based on expected normal HHV values and conservative boiler availability estimates to allow for planned and unplanned facility maintenance. However, as illustrated by the examples above, it is possible for the facility to process more than 140,000 tonnes per year in years of higher boiler availability or lower average HHV. The proposed amendment to the maximum annual processing limit would provide the Regions with the flexibility to use this additional processing capacity when available. This in turn would reduce the quantity of waste requiring alternate disposal at facilities outside the Regions' borders.

The proposed processing limit amendment provides an opportunity to achieve significant environmental and social benefits using existing infrastructure, such as:

- Reduced reliance on landfill disposal capacity outside the Regions' borders
- Reduced highway traffic and emissions associated with long-haul transportation to remote disposal sites.
- Reduced methane emissions from landfill disposal.
- Increased energy recovery and displacement of fossil fuel electricity generation
- Reduced cost to Regional taxpayers

Through the EA screening process, the Regions will review studies, and where necessary, update modelling completed during the original EA to demonstrate that these benefits can be realized with no unacceptable environmental impacts. Several of the studies undertaken during the original process included consideration of impacts of a larger facility, with a processing capacity of up to 400,000 tonnes per year, which remain a conservative estimate for the facility operating under the increase throughput capacity.

Other Long Term Solutions

As part of its longer term efforts to manage its waste stream, Durham Region intends to construct an anaerobic digestion facility with a mixed waste transfer and presort component. The proposed facility operation is to remove a portion of the organic fraction of the wastes which are not currently being captured by the Regional Green Bin program for processing in an anaerobic digestor. Additionally, the Region intends to recover portions of the stream as recyclables, as well as remove identified inert

materials from the waste. This is intended to reduce the amount of waste that must be sent for disposal at the DYEC from the Region.

Removing additional materials from the waste stream upstream of the DYEC will delay the need for further DYEC expansion. Funding for development of the Mixed Waste Transfer/Pre-sort with Anaerobic Digestion project was approved by Durham Regional Council in June 2019, and the Region is now undertaking a siting assessment. The Region intends to have the facility in service within 3-5 years, subject to approval, procurement and construction.

Once needed, the Regions would undertake an EA and seek approval for a future expansion of the DYEC to an annual throughput of 250,000 tonnes. Assuming both the 160,000 tonnes per year throughput increase as well as the anaerobic digestion with mixed waste presort projects are successful, Durham Region is projected to exceed its permitted tonnage to the DYEC after 2032. Durham Region Council also approved staff to proceed with the drafting of a Terms of Reference for an EA for the DYEC expansion to 250,000 tonnes per year.