



The Regional Municipality of Durham
To: The Works Committee
From: Commissioner of Works
Report: 2008-WR-3
Date: January 9, 2008

SUBJECT:

Greenhouse Gas Implications of the Solid Waste Management Alternatives, Thermal Treatment and Remote Landfill

RECOMMENDATION:

THAT this report be received for information.

REPORT:

1. BACKGROUND

As climate change continues to become a pressing concern, there is a greater need to examine the greenhouse gas implications of all activities under the control of the Regional Municipality of Durham (Region). Solid Waste Management Disposal is one of these activities, and its greenhouse gas emissions should be considered.

The Region is currently undergoing an Environmental Assessment (EA) Study with the Regional Municipality of York (York) to find an alternative to the current approach to the disposing of residual waste in remote landfills in southwestern Ontario and Michigan, United States of America. After a detailed analysis of various options, thermal treatment was selected as the preferred method of managing the remaining waste after the Regions' extensive diversion program.

This report will compare the greenhouse gas emissions from thermal treatment to Durham/York's current waste management practice of remote landfill disposal from a lifecycle perspective.

2. DISCUSSION

The lifecycle analysis performed, using the Region's estimated residual waste composition, compared the net environmental effects of the two (2) strategies over the long term. This analysis was made using a model developed in co-operation with the US Environmental Protection Agency which has undergone extensive peer review and stakeholder input.

The major assumptions used in the comparison are as follows:

1. The quantity of residual waste is 250,000 tonnes per year, which is the initial quantity of waste approved for consideration in the EA Terms of Reference
2. A full waste diversion program is in place, achieving sixty percent (60%) diversion initially and increasing to seventy-five percent (75%) over the life of the facility
3. The average haul distance from Durham and York to the remote landfill is 300 kilometres (one way) and the average haul distance to the thermal treatment facility is 75 kilometres (one way)
4. The landfill and the thermal treatment facility are both modern, state of the art facilities
5. Electricity is generated by utilizing the landfill gases that are collected from the landfill and the combustion of waste in the thermal treatment facility produces steam that also generates electricity
6. The model considers all residues produced by the combustion and gas cleaning processes
7. The energy recovered is a credit in the model, since it displaces electricity production in Ontario. As a conservative assumption it was estimated that forty-five percent (45%) of Ontario's energy would be generated by nuclear power, thirty-one percent (31%) by natural gas, and twenty-four percent (24%) by hydropower based on future generation projections

The greenhouse gas implications of the two (2) systems were analyzed. It should be noted that some of the emissions are presented as a negative value, which represents a net reduction in the emission. Net emission reductions are emissions that are avoided by the production of energy at the facilities, offsetting energy from the grid and from the recycling of metals recovered by the thermal treatment facility (virgin material displacement credit).

Remote Landfill

The net greenhouse gas emissions from the remote landfill scenario are the sum of the emissions (or emission reductions) from the following sources:

- The transportation required to transfer the waste to the landfill
- Direct methane emissions from the landfill
- Energy offset from the grid resulting from the energy produced by the landfill

The emissions from each of these individual sources are presented in Table 1 for the remote landfill scenario.

Table 1: Remote Landfill Greenhouse Gas Emissions

	Net Carbon Dioxide Equivalent (eCO₂, tonnes/yr)
Transfer of Waste to Landfill	5,000
Landfill Emissions	56,900
Energy Offset	-3,300
TOTAL GHG Emissions	58,600

Thermal Treatment

The net greenhouse gas emissions from the thermal treatment scenario are the sum of the emissions (or emission reductions) from the following sources:

- The transportation required to transfer the waste to the thermal treatment facility
- Direct emissions from the thermal treatment facility
- Energy offset from the grid resulting from the energy produced by the thermal treatment facility
- The transportation and disposal (landfill) of the residue and ash from the thermal treatment facility
- Emission reductions from recycling metals recovered by the thermal treatment facility to displace virgin materials

The emissions from each of these individual sources are presented in Table 2 for the thermal treatment scenario.

Table 2: Thermal Treatment Greenhouse Gas Emissions

	Net Carbon Dioxide Equivalent (eCO₂, tonnes/yr)
Transfer of Waste to Thermal Treatment Facility	1,200
Thermal Treatment Facility Emissions	85,700
Energy Offset	-35,600
Transfer and Landfill of Ash and Residues	2,600
Virgin Material Displacement Credit	-21,000
TOTAL GHG Emissions	32,900

3. **FINANCING**

There are no direct financial implications related to this report.

4. **CONCLUSION**

The above results show that in the case of the Regional Municipalities of Durham and York, residual waste, managed by thermal treatment, is better than the remote landfill scenario with respect to greenhouse gas emissions. Thermal treatment also provides a local source of energy, and generates a greater quantity of energy than remote landfill.

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