



Greenhouse Gas Emissions

The information in this document offers insight into Greenhouse Gas (GHG) emissions associated with the waste management industry, including various technologies and innovations developed to reduce the impact of waste management on the environment. It is important to have an awareness of how the waste management sector influences GHG and climate change in order to recommend how the City best moves forward the vision and guiding principles of the Solid Waste Master Plan.

Background

Landfills are considered a significant source of greenhouse gas emissions. Food and organic material breaking down in the landfill in the absence of oxygen produces a landfill gas that is a combination of methane, carbon dioxide and some trace chemicals. Both methane and carbon dioxide are GHGs, with methane having an impact on global warming that is 25 times greater than carbon dioxide. The Government of Canada indicates that emissions from Canadian landfills account for 20% of national methane emissions.

As the impact of climate change continues to grow, governments across the world have taken action and made commitments to reducing GHG emissions. Under the Paris Agreement, Canada committed to reducing its GHG emissions by 30% below 2005 levels by 2030. Many municipalities have set targets for GHG emission reductions in an effort to fight climate change. As of September 2019, almost 450 communities in Canada declared a state of climate emergency, including the City of Ottawa.

Waste Management and GHGs: Canadian Context

Recognizing the impact of GHG emissions on climate change, municipalities across Canada have explored innovative technologies, systems, and policies to reduce GHG emissions associated with managing waste.

Efforts to separate organic waste from the garbage stream, thereby preventing it from being sent to landfill and producing methane, include:



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Green Bin Programs. Green Bin programs, where residents set out food waste and organics at the curbside for separate collection, play an integral role in driving organic diversion and reducing the generation of methane gas. In Ontario, more than 37 municipalities, representing over 70 percent of households have access to a food waste (Green Bin) diversion program. Over 1 million tonnes of organic matter was diverted through provincial Green Bin and leaf and yard waste programs in 2017. It is estimated that each tonne of food waste diverted from landfill results in a savings of 0.80 tonnes of GHG emissions (compared to it being placed in a landfill). The Province of Ontario announced food and organic waste diversion targets of 70% for curbside households by 2023 and 50% for multi-residential properties by 2025.

Mixed Waste Processing (MWP). MWP is a system that involves recovering recyclables and organic materials from the garbage stream, after it has been collected, leaving the residual waste for landfilling or another appropriate waste processing application. MWP facilities reduce GHG emissions by removing food and organic waste from the garbage stream so that it does not enter the landfill. Municipal MWP facilities are being constructed in Peel Region and Durham Region in an effort to increase diversion.

A process used by many municipalities to convert separated organics into reusable products is *anaerobic digestion*. In many municipalities food waste is diverted from the landfill and taken to anaerobic digester facilities. Anaerobic digestion is a type of composting process that creates biogas as the food and organic material decomposes and is turned into compost. Biogas is a by-product that consists mostly of methane. This biogas is captured, cleaned, and used to create energy. This includes electricity and heat, as well as renewable natural gas that can be used to fuel vehicles. Anaerobic digestion is widely used throughout Europe as a means of processing municipal organic waste. There are seven anaerobic digestion facilities operating in Canada that process source separated organics from municipal programs, including the City of Toronto and Surrey, British Columbia.

In order to encourage the separation of organics from the garbage many municipalities, particularly in British Columbia, have implemented *food waste disposal bans* that prohibit food waste from being disposed of in the garbage. The Province of Ontario announced its intention



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to implement a Provincial landfill ban on food and organic waste as early as 2022. Other Canadian municipalities, including Halifax Regional Municipality and the City of Calgary, have updated their by-laws to make recycling and green bin programs mandatory for residents and businesses.

Despite the use of organics separation programs, a significant amount of organics are still sent to landfill. One method to reduce the environmental impact of greenhouse gas emissions at landfills is *landfill gas capture*. Landfill gas is created by the decomposition of food and organic material in the landfill. Left unattended, landfill gas is released into the environment. Technology exists to capture landfill gas, and either flare it (a process that treats landfill gas to dispose of methane and other flammable constituents safely) or convert it to electricity. In Ontario, there are 45 landfills with landfill gas capture systems, and over 53 landfill gas systems operating across Canada.

Waste Management and GHGs: Ottawa context

The City of Ottawa has taken a number of steps to reduce GHG emissions associated with waste management, including a landfill gas capture system and a successful Green Bin program.

Trail Waste Facility (owned by the City of Ottawa) is the 2nd largest municipal landfill in Ontario. Landfill gas is collected at the TWF through a highly engineered gas collection system with more than 100 landfill gas collection wells. The landfill gas is either flared (to safely dispose of the gas and reduce air pollution) or converted to electricity. Each year, landfill gas from the Trail Waste Facility creates enough electricity to power 6,000 homes in Ottawa. The City continues to work on reducing GHG emissions associated with the landfill: in 2018, the Trail Road Waste Facility constructed a Landfill Gas Perimeter Collection System to further capture additional landfill gas. This resulted in the most significant emission reductions within the corporation of the City of Ottawa, as can be seen in the City's 2018 corporate GHG inventory results.

The City continues to work with residents and property owners to encourage green bin participation in an effort to divert waste from landfill and reduce GHG emissions associated with food waste.



What's Next?

In January 2020, Ottawa City Council approved the City's Climate Change Master Plan, including targets to reduce GHG emissions from municipal operations by 100 per cent by 2040. All options proposed through the City's new Solid Waste Master Plan will be evaluated to understand the environmental impact (including GHG emissions) in an effort to support the Council-approved direction to reduce GHG emissions.

The City will be sharing the GHG impact of all options proposed through the City's new Solid Waste Master Plan, and will be seeking feedback from residents and stakeholders on various policies, programs, technologies and initiatives that the City is considering for managing waste.

We look forward to hearing from you!