Landfill gas used to be just a smelly byproduct of decomposing garbage. Not any more: landfill gas released by the Trail Road Landfill has become a valuable resource that is captured and used to generate electricity that powers homes and businesses in Ottawa.

“Why not do something productive with the gas, like generating electricity?”
- asks Greg Clarke, the Chief Electricity Generation Officer at Energy Ottawa.

Landfill gas-to-energy facility generates enough power for 6,000 homes

Reducing landfill’s greenhouse gas emissions by up to 180,000 tonnes each year
INTRODUCTION

Operating commercially since January 2007, the Trail Road landfill gas-to-energy plant takes landfill gas from the City of Ottawa’s Trail Road Landfill and converts it to renewable energy. This landfill gas is made up mostly of methane - 20 times more potent as a greenhouse gas than carbon dioxide, and in the past, it was simply flared-off without generating any power[3].

PROJECT DETAILS

Now, a vacuum pump cools and pressurizes the landfill gas before feeding it to several generators where it is combusted, producing renewable electricity, with carbon dioxide and water vapour as by-products. The generating facility is connected to the Fallowfield Distribution Station meaning that the electricity produced can be fed directly into the existing distribution grid. The generating facilities were developed by PowerTrail, a partnership between Energy Ottawa and Integrated Gas Recovery Services. Through a competitive bidding process, PowerTrail was also awarded a twenty year contract to operate the facility, coinciding with the plant’s estimated twenty year operating life[1]. The capital costs of the project were around $10 million, with both partners sourcing the necessary financing internally[3].

The landfill gas-fuelled facility originally had five engines, for a total generating capacity of 5-megawatts[1]. In June 2012, after five years of operation, Energy Ottawa added a sixth engine to the plant to make better use of the abundantly available landfill gas.

At present, the site’s generating capacity is 6 megawatts, producing more than 40,000 megawatt-hours of renewable energy each year, or enough electricity for 6,000 homes[4]. The generating facility operates 24 hours a day, 365 days per year, with interruptions only for routine maintenance.

RESULTS

In addition to the renewable energy generated, the drop in landfill gas flare-offs reduces annual greenhouse gas emissions from the landfill by up to 180,000 tonnes relative to the situation in 1990[1]. (Even though carbon dioxide is still produced as a by-product of the combustion process, because it is a much less potent greenhouse gas than methane, the result is still a substantial net reduction in emissions).

Furthermore, the renewable electricity generated at the landfill eliminates the need for an equivalent quantity of electricity generated from other, likely non-renewable sources, which in turn results in a further emissions reduction of 40,000 tonnes[1].

Additionally, this project is also reaping financial rewards. The City of Ottawa is the owner of the Trail Road landfill and receives an estimated royalty of $150,000 per year from PowerTrail as payment for the rights to the landfill gas[1]. (The exact royalty depends on the quantity of electricity generated in any given year).

Prior to 2007, the City needed to invest heavily in upgrades and repairs to the existing landfill gas collection and venting system. By implementing the landfill gas-to-energy system, the City saved approximately $2 million in one-time capital costs, and is accruing recurring savings of between $200,000-$250,000 per year due to Energy Ottawa taking over responsibility for the operation and maintenance of the new system.
2017 marked the 10-year anniversary of the Trail Road landfill gas-to-energy project. In these 10-years, the facility has had the same cumulative emissions reduction impact as taking 330,000 passenger vehicles off the road[5] (or around 1.6 million tonnes of eliminated carbon dioxide emissions). Reflecting on this first decade of operation, Greg Clarke, Chief Electricity Generation Officer at Energy Ottawa recalls some early growing pains, such as the snow-melt following a particularly snowy winter flooding the landfill gas collection wells (they subsequently invested in pumps for the wells) and the discovery that the garbage by-product siloxane has a detrimental impact on power generation equipment (they soon installed a siloxane filtration system)[3].

2017 saw Energy Ottawa submit a proposal to the Independent Electricity System Operator (IESO) in Ontario to add a seventh engine to the facility, to further increase the plant’s ability to convert landfill gas to electricity[5]. IESO however rejected this proposal, citing reasons of overcapacity in the province’s energy generating infrastructure[3].

While the Trail Road Landfill landfill gas-to-energy project was the first of its kind in Ottawa, its success is already being replicated in other locations: in 2013, Energy Ottawa opened a new 4.2-megawatt landfill gas-to-energy facility at the Lafleche Eastern Ontario Waste Handling Facility in Moose Creek, about an hour southeast of Ottawa. This facility produces enough electricity for 4,000 homes and reduces greenhouse emissions by around 100,000 tonnes[4].

**REFERENCES**