Environment and Climate Change Canada | Environnement et Changement climatique Canada

REDUCING METHANE EMISSIONS FROM THE WASTE SECTOR

Canadian Waste Symposium

April 6, 2022

Environment and Climate Change Canada's 50th anniversary
50e anniversaire d'Environnement et Changement climatique Canada
Meteorological Service of Canada's 150th anniversary
150e anniversaire du Service météorologique du Canada

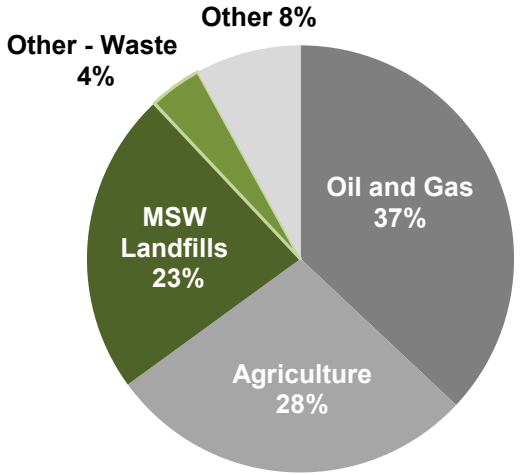
Canada

WASTE SECTOR METHANE EMISSIONS

- Reducing methane emissions has been described as the strongest measure that can be taken to slow down climate change over the next 25 years

- Canada has committed to:
  - Reducing greenhouse gas emissions by 40-45% below 2005 levels by 2030
  - Achieving net-zero GHG emissions by 2050
  - Supporting an international pledge to reduce global methane emissions by 30% below 2020 levels by 2030

- To meet our climate goals, action is required throughout the economy, including in the waste sector

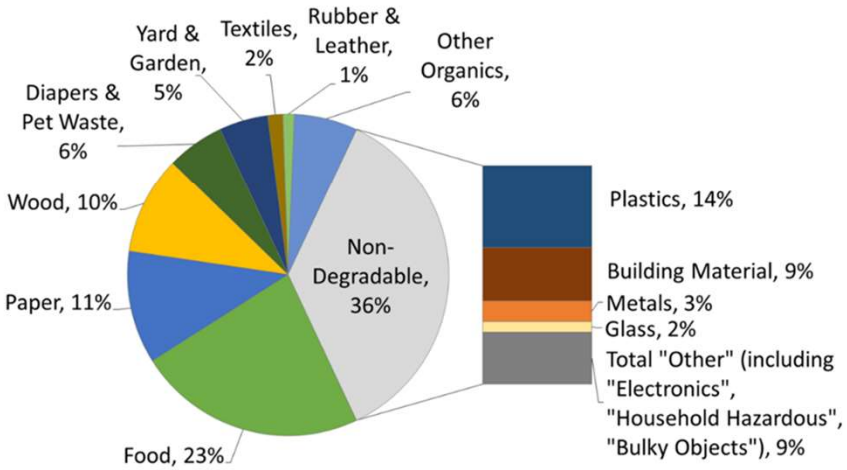


2019 Methane Emissions in Canada, by sector (NIR, 2021)

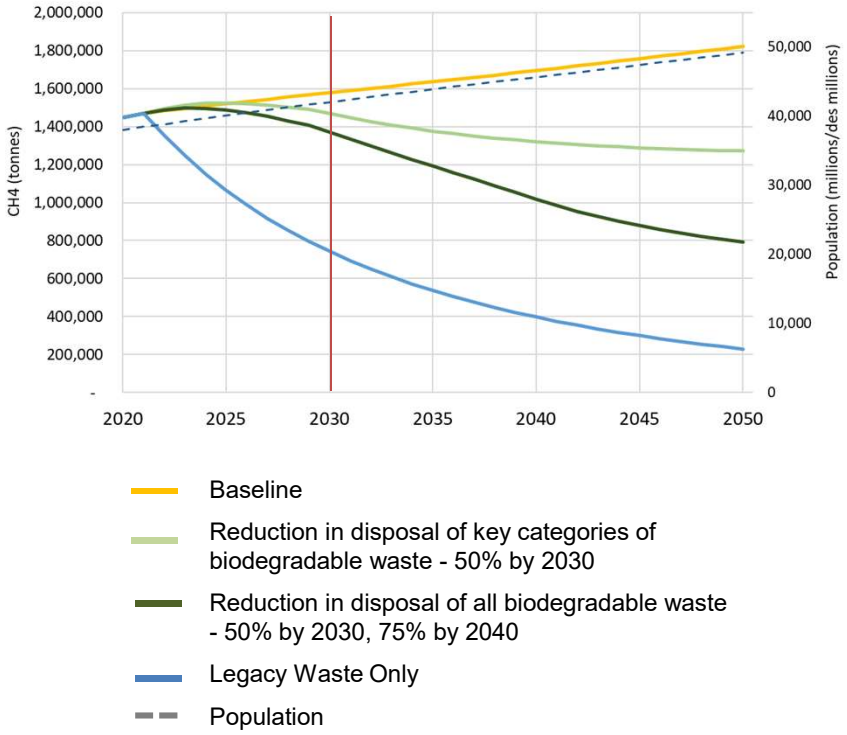
LANDFILL METHANE GENERATION

- Biodegradable waste disposed in landfills is the source of landfill methane emissions
- By 2030, approximately 40% of the methane that will be generated, will be created by biodegradable waste that was disposed before 2020
- At current disposal rate, methane generation will continue to increase due to population growth
- Ambitious diversion is needed to achieve long-term reduction in the quantity of methane that needs to be managed at landfills

National average % composition of residual waste disposed, 2016

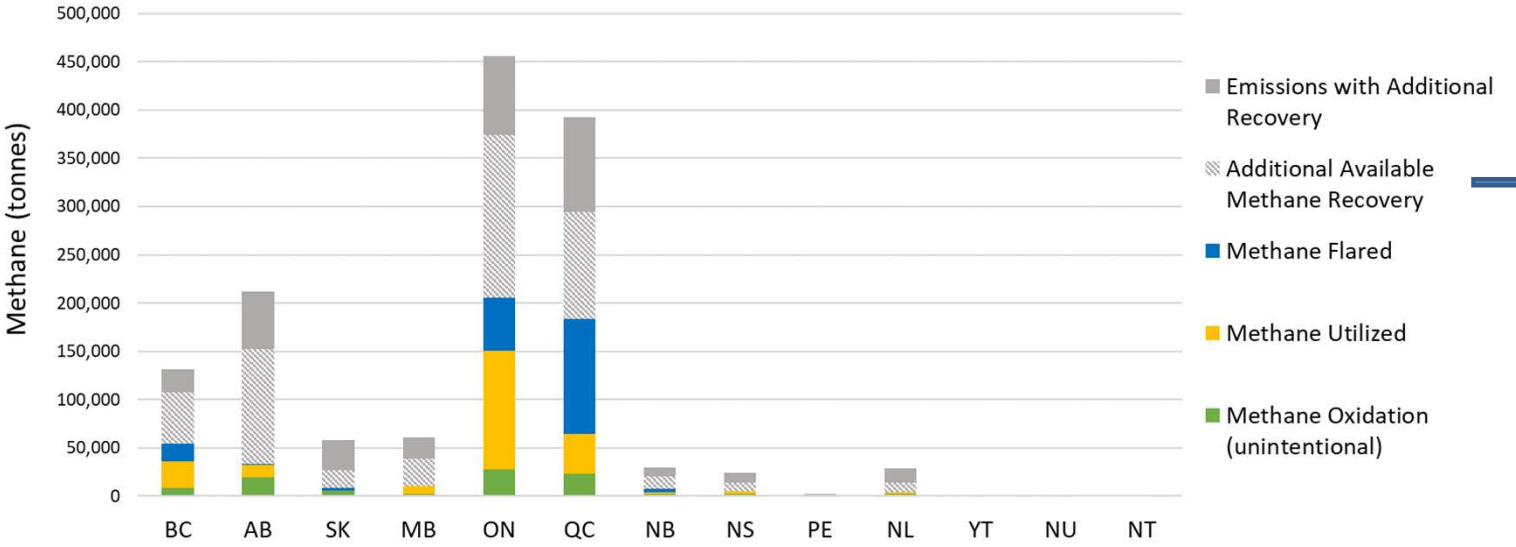


Projected methane generation 2020-2050



REDUCING EMISSIONS - LANDFILL GAS RECOVERY

- Of the 3000+ municipal solid waste (MSW) landfills in Canada, about 270 of the largest landfills are responsible for about 80% (18 Mt of CO_2 eq) of Canada's annual landfill methane emissions
- ECCC has documented 112 landfill gas recovery systems in Canada that recover about one-third of the methane generated
- To date, LFG recovery has been motivated by regulations (in BC, AB, QC, ON), permitting requirements elsewhere, landfill gas utilization incentives/revenue and the sale of offset credits

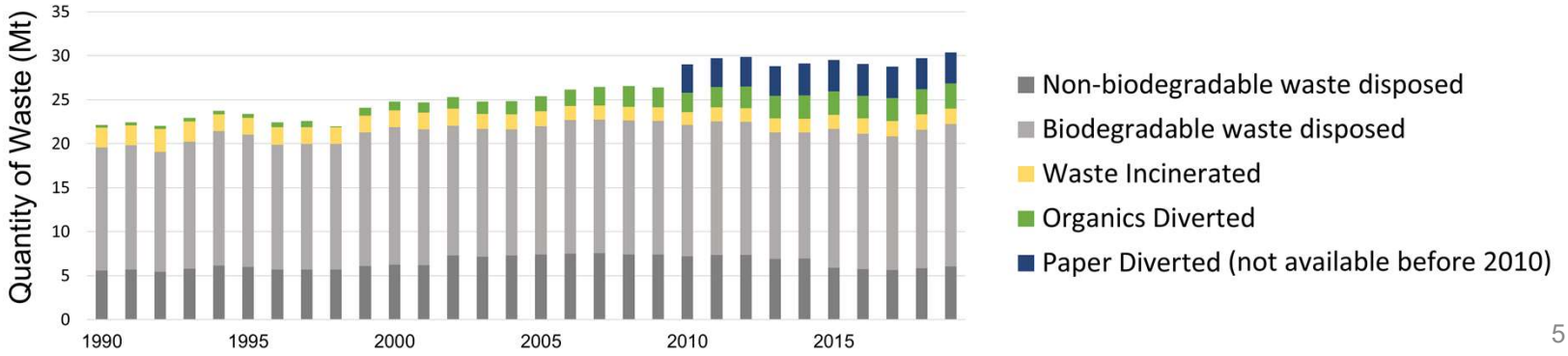


Landfill methane oxidation, recovery and emissions, 2020

"Additional available methane recovery" considers potential for increased recovery in new or expanded LFG systems at open and closed landfills with >100,000 tonnes of capacity .

REDUCING EMISSIONS – WASTE DIVERSION

- Almost 16 million tonnes of biodegradable material was landfilled in Canada in 2018
- Alternative waste management practices that will reduce landfilling of waste include:
  - Anaerobic digestion
  - Composting
  - Recycling (e.g. paper, wood, textiles)
  - Mechanical-biological treatment
  - Thermal treatment
- Additional GHG reductions are achievable when waste is used to generate electricity, heat or to produce renewable natural gas, all of which can displace the use of fossil fuels
- Provinces, territories and municipalities have developed a variety of regulations, strategies, EPR requirements and funding programs to encourage or require the diversion of biodegradable waste from landfills



FURTHER REDUCTIONS ARE ACHIEVABLE

- Reducing methane emissions at landfills is technically feasible and has a relatively low cost per tonne of CO_2 eq reduced (<$50 on average)

  → **< $50 per tonne CO_2 eq**

- Waste sector could significantly reduce emissions by 2030 by:
  - Increasing number of landfills that recover methane
  - Increasing methane recovery at landfills with existing recovery systems

  → **12 Mt CO_2 eq reduction per year by 2030**

- Continued efforts to divert biodegradable waste from landfills are needed to realize longer term methane emission reductions, but will also help in the nearer term (by 2030)

  → **3 Mt CO_2 eq reduction per year by 2030**

FEDERAL GHG OFFSET SYSTEM

- Federal GHG Offset System is under development to encourage cost-effective GHG emission reductions in Canada from voluntary activities not covered by legal requirements or carbon pollution pricing and that go beyond business-as-usual practices.

- The federal system consists of three parts:
  - Regulations to implement operational aspects of the system (enabled under *Greenhouse Gas Pollution Pricing Act*)
    - Draft regulations published in CG1: March 6, 2021
    - Final regulations targeted for spring 2022
  - Protocols to set out the approach for quantifying GHG emission reductions or removals for a given project type; these are being developed in parallel to the Regulations on an ongoing basis
    - Protocols identify eligible activities for generating offset credits; establish baseline and project scenarios; set out monitoring, data management, record and reporting requirements
  - Credit and tracking system to register offset projects, issue and track offset credits

- Federal offsets credits can be used by regulated industrial facilities under the federal Output-Based Pricing System to meet compliance obligations.
  - Other groups, including governments and businesses can use federal offset credits to meet emission reduction objectives or net-zero targets.

LANDFILL METHANE RECOVERY AND DESTRUCTION PROTOCOL

Protocol Overview: Provides incentive to reduce landfill methane from non-regulated landfills within Canada (both open and closed)

- Protocol will enable crediting of GHG emission reductions from recovering landfill methane and converting it to biogenic CO_2 through destruction in eligible destruction device(s)
  - Eligible destruction devices include open and enclosed flares, as well as devices that create energy/heat such as boilers, turbines, etc.
- The protocol only credits for the destruction of landfill methane, not reductions from fuel switching
- Protocol will not apply in provinces with existing offset systems and active protocols
- Projects cannot generate credits for the same reductions in two systems; will need to decide if credited under the Clean Fuel Regulation or Federal GHG Offset System but not both.
- Landfills are not eligible if they are legally required to reduce any portion of landfill methane emissions
- Following publication of the federal landfill methane regulations, the protocol will continue to incentivize activities in non-regulated landfills

Status: Final protocol will be published with final *GHG Offset Credit System Regulations*, targeted for spring 2022

OVERVIEW OF THE CLEAN FUEL REGULATIONS

- The proposed Clean Fuel Regulations were published in December 2020. ECCC is targeting publication of the final Regulations this Spring.
  - Spring 2022: Credit creation may begin as of the date the final regulations are published
  - July 1, 2023: Reduction requirement comes into force
- The Regulations require producers and importers of gasoline or diesel, called primary suppliers, to reduce the lifecycle carbon intensity of the gasoline or diesel they produce or import in Canada for use in Canada
  - The Regulations establish a credit market: each credit represents a lifecycle emission reduction of one tonne of CO_2e.
  - A primary supplier would demonstrate compliance with their requirement by creating credits or acquiring credits, and then using the required number of credits for compliance.
  - Parties that are not primary suppliers are able to participate in the credit market.
- Credits may be created by taking one of the following actions:
  - Compliance Category 1: actions throughout the lifecycle of a liquid fossil fuel that reduce its CI (e.g. carbon capture and storage) through GHG emission reduction projects;
  - Compliance Category 2: supplying low-carbon-intensity fuels (e.g. ethanol, biogas, RNG);
  - Compliance Category 3: end-use fuel switching in transportation (e.g electricity, RNG, hydrogen in transportation).

CLEAN FUEL REGULATIONS: LIFE CYCLE

- Uses a life cycle approach which accounts for emissions from all stages of the fuel lifecycle – extraction, processing, distribution, end use.
- Credits for low-carbon-intensity fuels are calculated based on the MJ of fuel supplied to the Canadian market and the life cycle carbon intensity (CI) of the fuel
  - Recognizes that not all biofuels are equal: the life cycle basis of the Regulations creates incentives for lower-carbon biofuels and fuels produced from waste.
- A Fuel LCA Model is provided by ECCC to support the implementation of the Regulations and determine facility-specific CI values.
  - Since the use of landfill gas, municipal solid waste, waste water treatment sludge and livestock manure for biogas production results in significant and real methane reductions, ECCC is developing the calculation method to account for the avoided emissions in the CI value
- For more information on the CFR, please visit the Clean Fuel Regulations website or send comments or questions to: cfsncp@ec.gc.ca

PROPOSED FEDERAL REGULATIONS

- Regulations would be developed under the *Canadian Environmental Protection Act*, 1999 - Methane is on the list of toxic substances
- Currently in early consultation stage to identify objectives that could be achieved through the regulations – comments currently being welcomed on a discussion paper published in January 2022
- A technical working group will be formed this summer to work through specific approaches that can be considered as regulatory elements; regulatory framework in early 2023
- Publication of draft regulations anticipated in early 2024 and final regulations in 2025

Four objectives are under consideration for a federal regulatory approach that will significantly reduce landfill methane emissions:

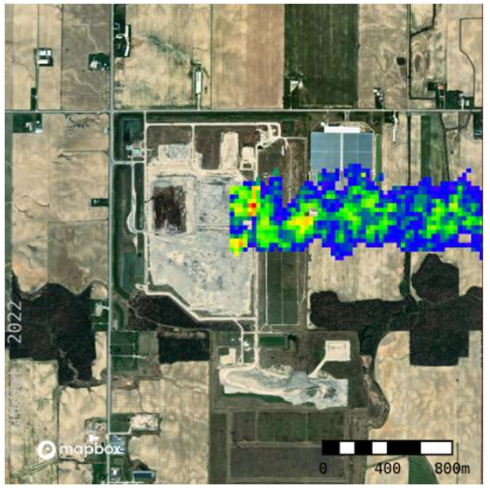
1. Increase the number of landfills that take action to reduce methane emissions
2. Ensure that regulated landfills maximize methane recovery
3. Achieve long-term emissions reductions through increased diversion of biodegradable waste
4. Increase utilization of landfill methane to create low-carbon energy and fuels

MEASURING AND MONITORING LANDFILL METHANE

- Quantification is key to being able to monetize reductions and to modernize regulatory approach – current approaches rely on landfill methane generation model, which has limitations

- Technical guidance document being developed to standardize field methods to measure and monitor emissions

- ECCC is scoping a large field study to measure emissions from landfills; identify new standardized approaches for quantifying methane emissions; identify new approaches for leak detection technologies



GHG CALCULATOR FOR ORGANIC WASTE MANAGEMENT

- GHG calculator initially developed in 2009 to inform waste management decision making
- Update focused on organic waste management, including the following waste materials and management endpoints:

Waste Materials

Residual MSW (containing organics)

Source Separated Organics

Food Waste

Yard Trimmings (Grass, Leaves, Branches)

Wastewater Biosolids

Clean Wood

Management Endpoints

Composting

Anaerobic Digestion (wet and dry)

Incineration

Landfill

- Will provide estimate of GHG emissions associated with different endpoints – based on landfill methane emissions, transportation emissions, process energy, fugitive emissions, offsetting of fossil fuel emissions (where energy is generated or fertilizer use reduced)
- Updated emission factors for energy use (by P/T)

THANK YOU!

For further info, please contact:

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