

BIOGAS IN CANADA

International Panel – Global Opportunities for Advancing Biogas
Biocycle REFOR19
Madison, Wisconsin
October 28-31, 2019



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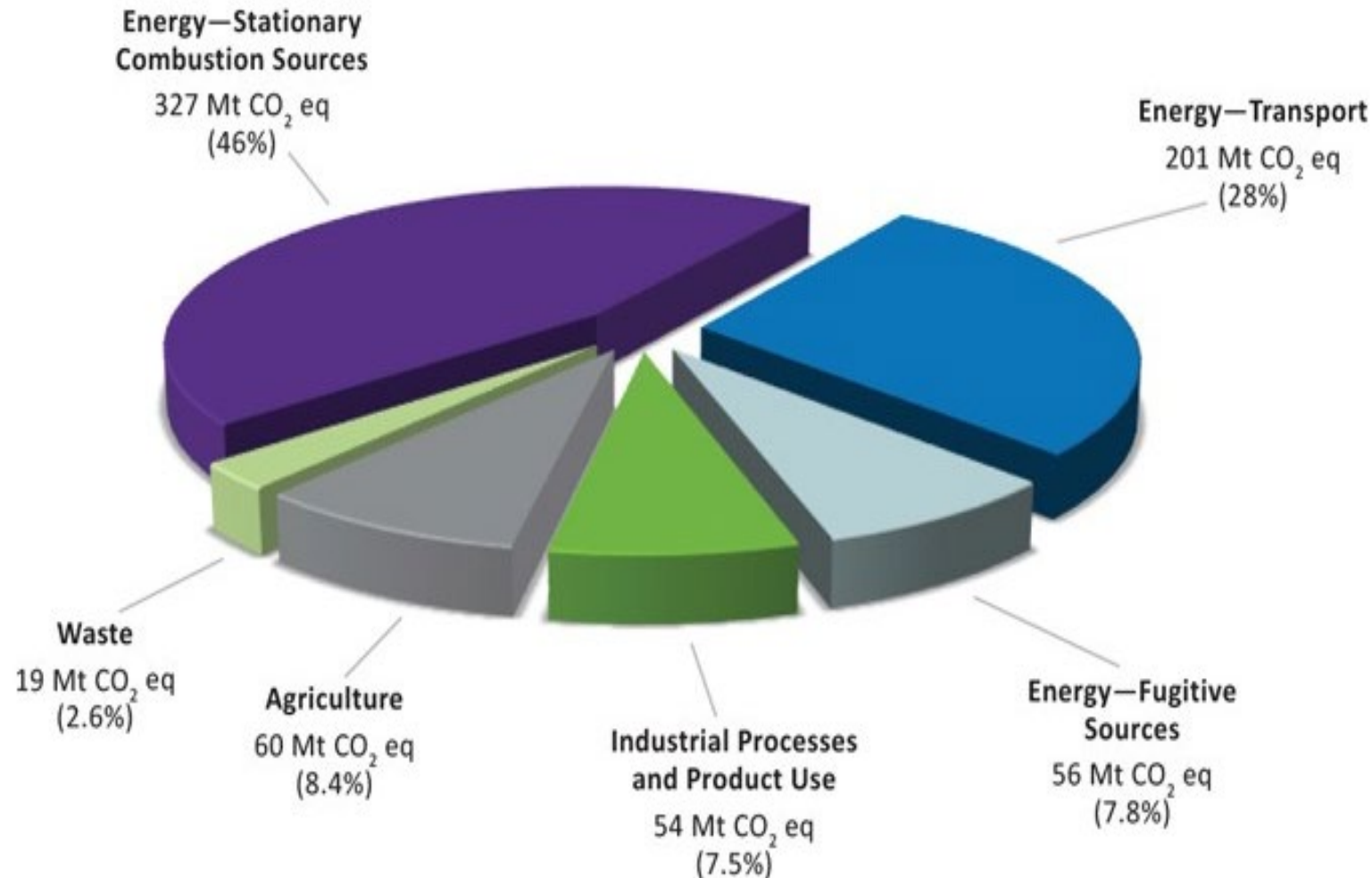
Canada's Transition to a Low Carbon Future

- Tackling climate change is a priority and an opportunity to shift towards a low carbon economy
- **Pan-Canadian Framework on Clean Growth and Climate Change**
 - Pricing carbon pollution
 - Complementary measures to further reduce emissions across the economy
 - Measures to adapt to the impacts of climate change and build resilience
 - Actions to accelerate innovation, support clean technology, and create jobs

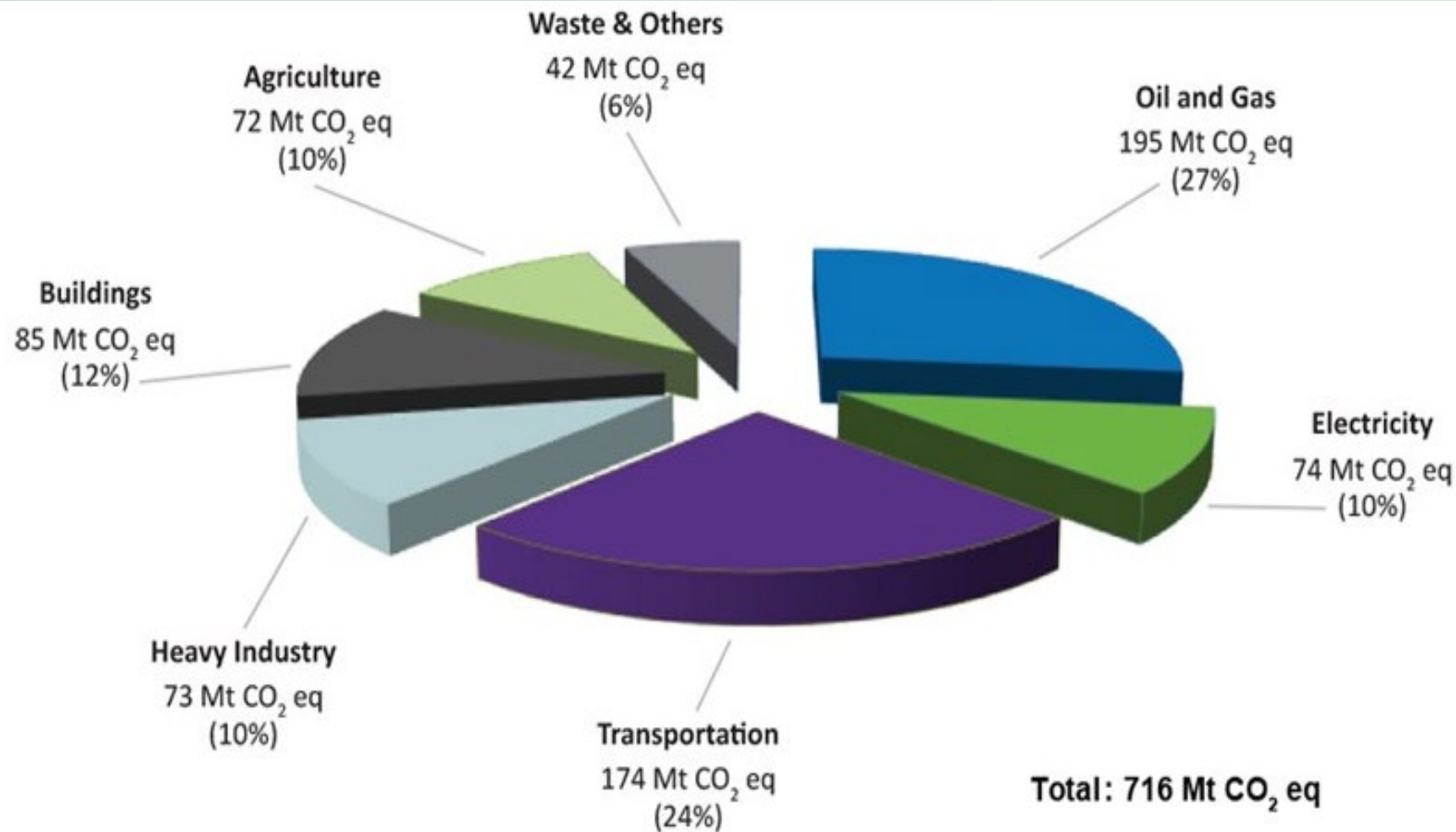
<https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html>



Canada's GHG Emissions by IPPC Sector (2017)

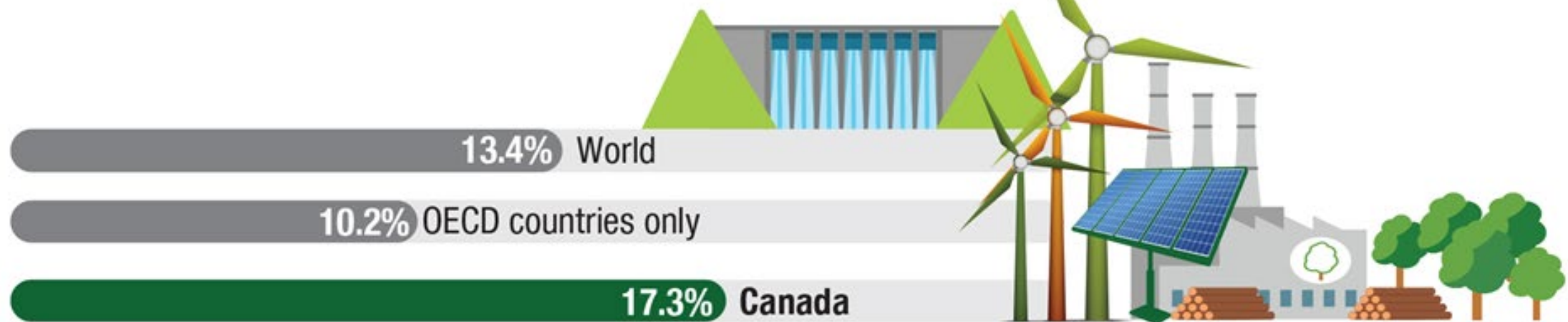


Canada's GHG Emissions by Economic Sector (2017)



Canada is a Leader in Renewable Energy

Share of energy supply from renewable sources (2017)



Source: Natural Resources Canada

<https://www.nrcan.gc.ca/science-data/data-analysis/energy-data-analysis/energy-facts/renewable-energy-facts/20069>

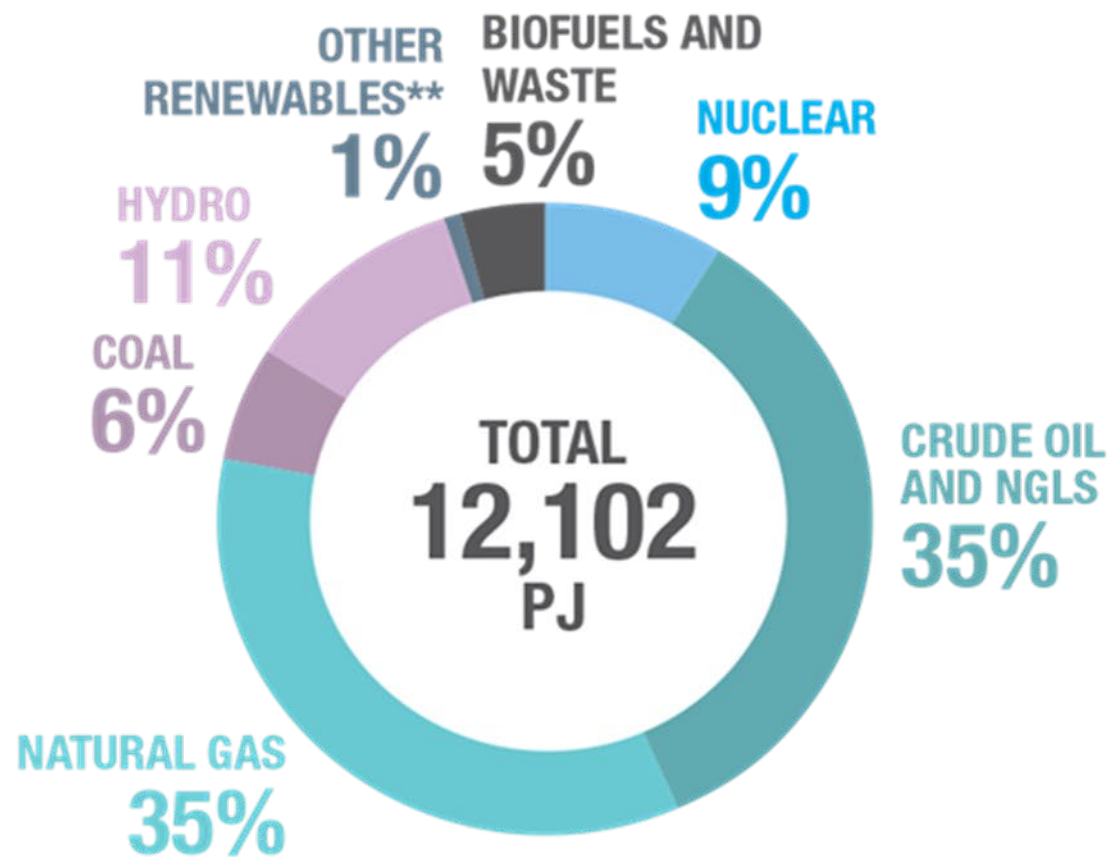


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Canada's Total Primary Energy Supply* (2017)



* Not including electricity trade
** "Other renewables" includes wind, solar, wood/wood waste, biofuels and geothermal

Source: Natural Resources Canada

<https://www.nrcan.gc.ca/science-data/data-analysis/energy-data-analysis/energy-facts/energy-and-greenhouse-gas-emissions-ghgs/20063>

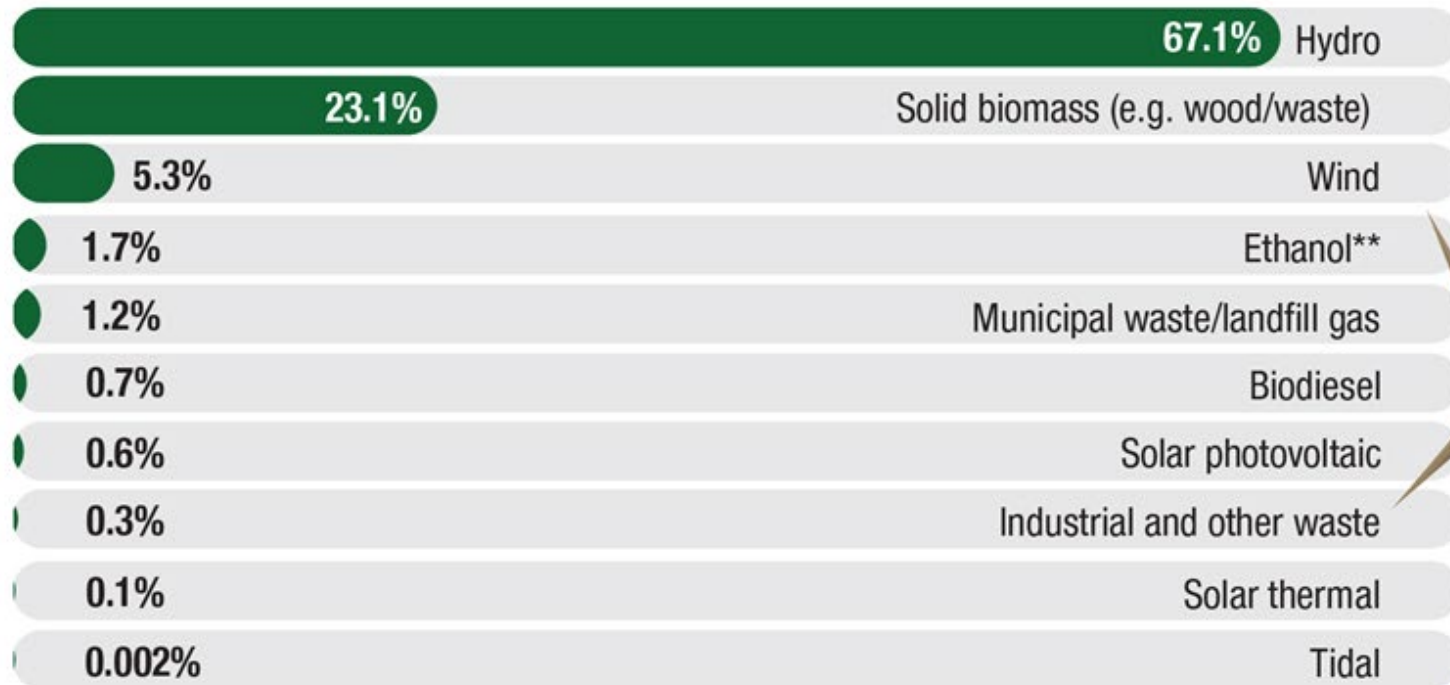


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Canada's Renewable Energy Sources



**Total Renewable Energy
2,119 PJ or 50.6 MTOE**

**(Includes energy consumed
for electricity and heat
production, and biofuels for
transportation)**

Source: Natural Resources Canada

<https://www.nrcan.gc.ca/science-data/data-analysis/energy-data-analysis/energy-facts/renewable-energy-facts/20069>

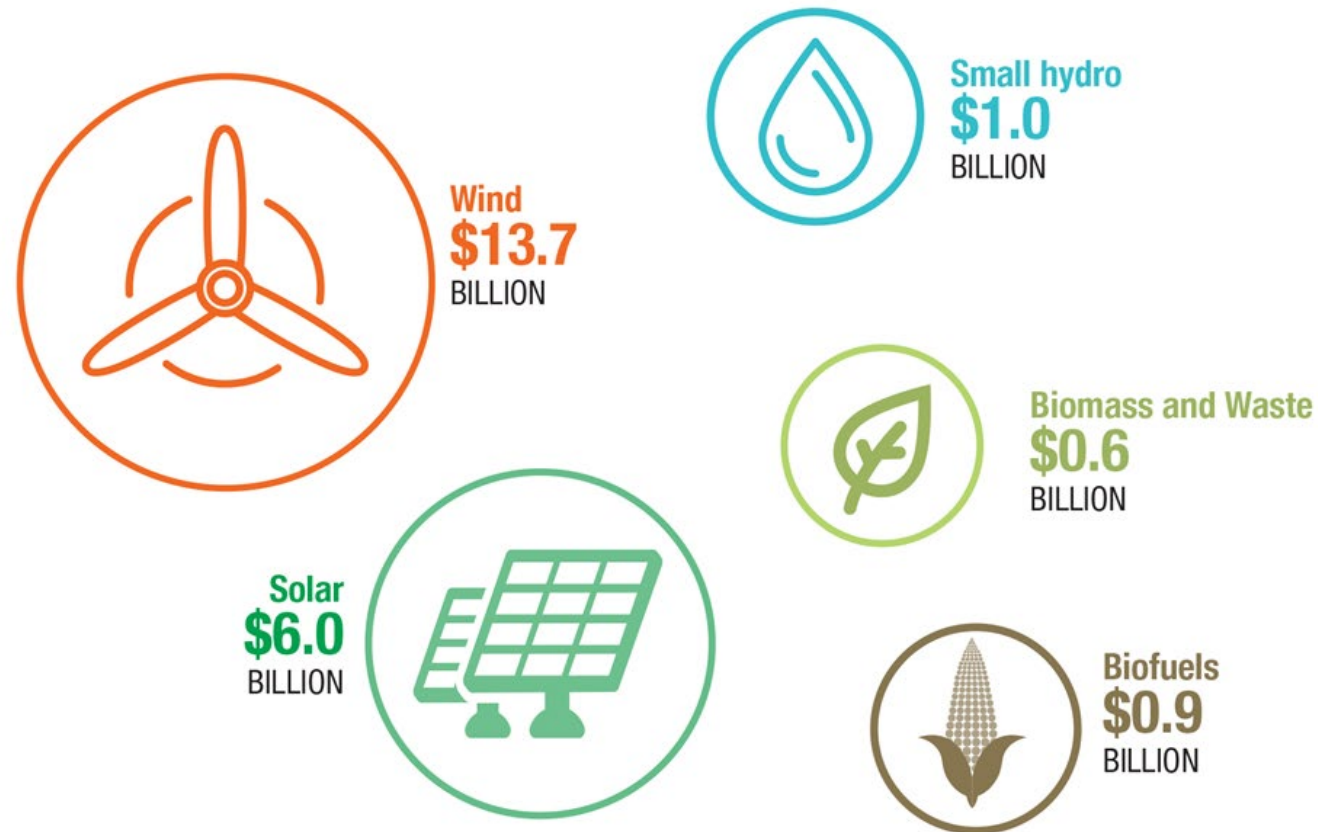


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Canada's Investment in Renewable Energy (2013-2017)



Source: Natural Resources Canada

<https://www.nrcan.gc.ca/science-data/data-analysis/energy-data-analysis/energy-facts/energy-and-economy/20062>



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Biogas and RNG in Canada

Biogas and RNG Energy Capacity

Operational and initiated projects generate:

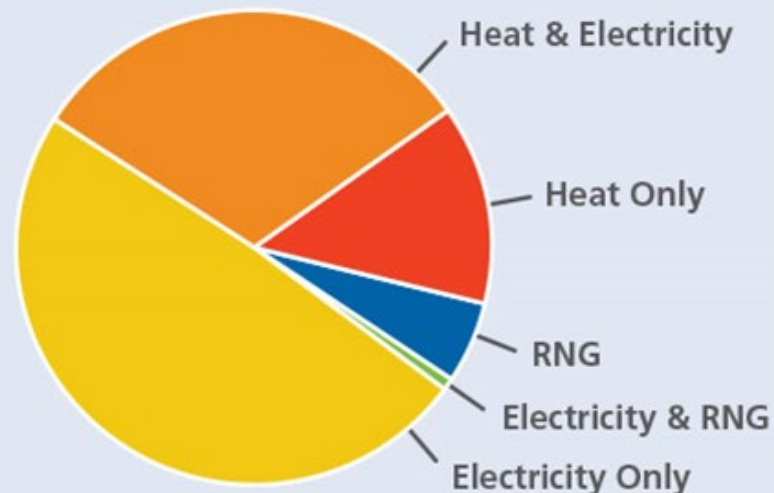
Greater than

196 MW

Greater than

& 400,000 GJ
from RNG

Biogas Energy Utilization



Provincial energy and waste management policies have been the main drivers for biogas production and use (i.e. power or renewable gas)

Operating Biogas and RNG Projects in Canada

61



Agricultural & Food Waste Digesters

86



Wastewater Treatment Facilities

53



Landfill Gas Projects

Source: Canadian Biogas Association

https://biogasassociation.ca/about_biogas/projects_canada



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Agriculture and Agri-food Sectors

- 61 operational biogas facilities, and at least 5 more planned or under construction
 - Livestock operations (52%)
 - Food processing facilities (33%)
 - Greenhouse operations (5%)
 - “Other” (10%)
- Ontario, Quebec and Alberta have the most, with Ontario accounting for 64%
- Several end-uses for biogas
 - 64% generate electricity for sale to the grid
 - Remaining facilities generate heat and electricity for on-site use
 - Only two upgrade biogas into renewable natural gas (RNG)

Source: 2018 study by Canadian Biogas Association and Government of Canada, https://biogasassociation.ca/resources/Canadian_agricultural_biogas_study



Opportunities for Biogas and RNG in Canada

Realizing the full potential of biogas development from all major sources* could lead to:

- Biogas production equivalent to about 3% of Canada's natural gas demand, or about 1.3% of Canada's electricity demand
- Capital investment of \$7 billion (CDN)
- Economic spin-offs of \$21 billion (CDN) to the Canadian Economy
- 17,000 construction jobs for a period of one year
- 2,650 ongoing long term operational jobs
- 100 new and expanded Canadian companies, including biogas system designers and developers, equipment suppliers, and laboratories

* agricultural organics (excluding energy crops), landfill gas, residential and commercial source separated organics, municipal wastewater

Source: Canadian Biogas Association https://biogasassociation.ca/about_biogas/biogas_potential



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Opportunities for Biogas and RNG in Canada

- Federal “Clean Fuel Standard” under development
- Natural gas suppliers/utilities are increasing renewable content
 - Canadian Gas Association aiming for 5% renewable content by 2025, and 10% by 2030
 - E.g. Fortis BC (British Columbia), Enbridge/Union Gas (Ontario), and Energir (Quebec) are entering into long-term supply agreements with biogas producers
- Municipal organics diversion is increasing
 - Federal, provincial and territorial governments committed to reduce total waste disposal by 30% by 2030, and 50% by 2040
 - 80% of households will have curbside organics diversion (under existing and proposed provincial and municipal plans)

Source: Canadian Biogas Association https://biogasassociation.ca/about_biogas/biogas_potential



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Opportunities for Biogas and RNG in Canada

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Source: Canadian Biogas Association https://biogasassociation.ca/about_biogas/biogas_potential



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Challenges for Biogas and RNG in Canada

- Cost / raising investment
- Economics of small scale operations
- Feedstock supply
- Connections to the grid and gas network
- Operator training and technical support
- Community resistance
- Land application of digestate

Source: 2018 study by Canadian Biogas Association and Government of Canada, https://biogasassociation.ca/resources/Canadian_agricultural_biogas_study



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The Global Methane Challenge

- The Global Methane Challenge is an opportunity to showcase methane initiatives to a world-wide audience
- Purpose is to raise awareness about methane emissions, showcase policies and technologies, and encourage reduction around the world
- Participation is voluntary, and provides international exposure to projects, policies, and emerging technologies

Landfill Gas Capture and Utilization Feasibility



- Environment and Climate Change Canada is working to encourage greater LFG collection and utilization across provinces and municipalities through feasibility studies of LFG capture in small, medium and large landfills
- This work includes developing a comprehensive landfill database, LFG modelling, assessment of existing technologies, and cost-per-tonne assessments
- Capture and utilization information will be made available to regional governments in order for them to make informed decisions about managing GHGs from landfills in their jurisdiction

Initiatives to Prevent GHG Emissions through Diversion and Prevention of Organic Waste



- Environment and Climate Change Canada is doing extensive work to provide information to provincial, municipal and private sector organizations on the waste reduction and diversion options available for organics
 - GHG calculator for waste diversion scenario planning
 - Canadian Forum on Food Waste and Loss
 - "Taking Stock Report" that will identify current actions and opportunities
 - National Framework to measure and report food waste and loss
- Expected outcomes are greater awareness of food loss, and informed decision making by jurisdiction when planning waste diversion infrastructure

International Collaboration to Address Methane Emissions



- Environment and Climate Change Canada is working collaboratively with several international partners to address methane emissions in 6 countries
- Work includes helping countries account for methane in their National Determined contributions, and achieving methane reductions in major methane-emitting sectors, including waste



Vietnam



Senegal



Côte d'Ivoire



Chile



China



Mexico

Canadian Agricultural Partnership

- The *Canadian Agricultural Partnership* is a five-year, \$3 billion investment by federal, provincial and territorial governments to strengthen the agriculture and agri-food sector
- It includes cost-shared programs by federal, provincial and territorial governments
- It supports initiatives that have the potential to lead the way to broader adoption or application of BMPs on farms and by the sector more generally
- The program also aims to support efforts to understand the potential impacts of GHGs as well as approaches to mitigate agricultural GHG emissions