

Presentation to the Standing Committee on Natural
Resources on the low-carbon and renewable fuels
industry in Canada

By



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Friday, April 30, 1 p.m. to 3 p.m. (ET)

Enerkem is pleased to contribute to the work of the committee, which is currently studying the **low-carbon and renewable fuels industry in Canada**.

On December 8, Enerkem, with a group of strategic partners, including Shell as lead investor, as well as Suncor, Proman and Hydro-Quebec as the renewable hydrogen and oxygen supplier, and with the support of the governments of Quebec and Canada, announced plans to build a biofuels plant in Varennes, on Montreal's south shore, at a cost of C\$875 million.

Once operational in 2023, Recyclage Carbone Varennes (RCV) will produce biofuels and renewable chemicals from non-recyclable waste materials and residual forest biomass. The plant will harness renewable hydrogen and oxygen produced through electrolysis, turning Quebec's excess hydroelectric capacity into value-added biofuels and renewable chemicals. RCV will be a major creator of decent direct and indirect local jobs during its construction and operation. RCV will generate an annual economic impact of \$85 million in Canada.

Canadian and global context

According to the World Research Institute, in 2018, Canada was the 10th-largest greenhouse gas (GHG) emitting country/region.

Canada's total GHG emissions in 2019 were 730 megatonnes of carbon dioxide equivalent (MtCO₂e), a slight increase from 728 MtCO₂e in 2018.

In December 2015, Canada adopted the Paris Agreement declaration, an ambitious and balanced agreement to fight climate change. Last week, Prime Minister Trudeau committed to reducing GHG emissions by 40–45% from 2005 levels by 2030—a much more ambitious target than the one in the Paris Agreement.

Canada has also committed to a carbon-neutral economy by 2050.

In Canada, by 2030, GHG emissions:

- are projected to be 588 MtCO₂e in Canada's climate plan or 227 MtCO₂e less than the 815 MtCO₂e projected prior to the adoption of the Pan-Canadian Framework
- are projected to be 503 MtCO₂e in Canada's strengthened climate plan or about 8 MtCO₂e below the 2030 target of 511 MtCO₂e

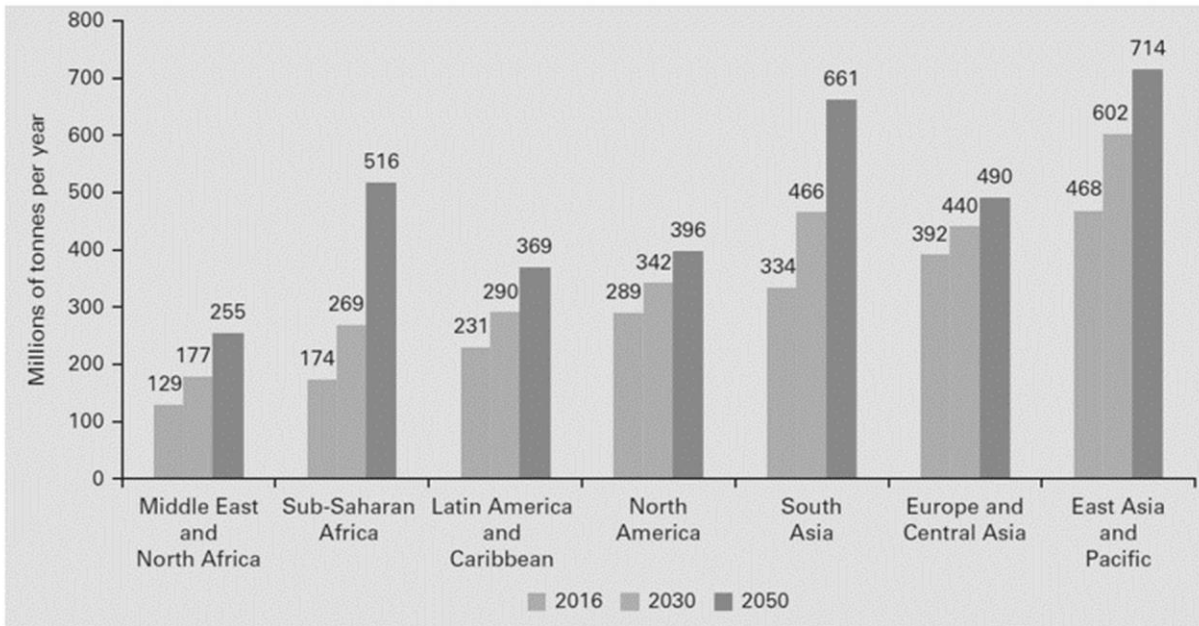
Canada has made commitments in terms of GHG reductions, and achieving these targets first requires taking stock of the situation.

Canada's final waste management is a concern

- The total amount of solid waste disposed of decreased from 768 to 688 kilograms per person from 2002 to 2016.
- The amount of diverted waste increased over the same period, from 212 to 255 kilograms per person, an increase of about 20%.

According to the World Bank, final waste generation will increase by 2050, despite current efforts and initiatives to reduce at source, reuse and recycle.

Projected waste generation, by region (millions of tonnes/year)



Transportation

While electrification initiatives and support are commendable, important and necessary, they will not be enough to significantly reduce our GHG emissions. Currently, the 5% rule allows biofuels to be added to gasoline. We now need to raise the bar. The following are some statistics to illustrate the urgent need to bring in rules requiring a higher percentage of biofuel at the pump.

- Canadian gross sales of gasoline totalled 44.8 billion litres in 2019
- Vehicle registrations in Canada in 2019 totalled 35.7 million
- Between January and June 2020, Canadian auto dealerships sold about 21,400 electric vehicles, according to data from EV-Volumes. Mid-year sales declined by about 20% between 2020 and 2019. That year, annual sales reached nearly 51,000 units. Cumulative sales were about 162,700 units between 2009 and the second quarter of 2020
- In 2021, electric vehicles account for just 0.004% of the total vehicle fleet in Canada

Now that the targets are set and the state of play is known, it is time to take action. We need solutions that will allow Canada to reduce its GHGs and promote the development of a forward-looking circular economy.

Enerkem's technology replaces petroleum-based chemistry with green chemistry in the manufacture of everyday items (paint, windshield washer fluid, plastics, chemicals of all kinds) and alternative renewable fuels.



Biofuels



Renewable chemicals

RECOMMENDATIONS

A predictable regulatory and financial environment and tax incentives are needed to implement solutions like Enerkem's. In short, favourable market conditions must be created to support the application of innovative solutions like ours.

Canada already has the tools to achieve this:

1. Ensure consistent support for the technology innovation life cycle through existing programs

- For example, SDTC helps bring ideas closer to commercial readiness. Some will fail and some will succeed. Leaving disruptive technology at the commercial readiness stage is a waste of taxpayer dollars if no further action is taken because the work is not done.
- At this stage, the Strategic Innovation Fund (SIF) should take over and be used as an incentive to support the early adopters of a new technology.

2. Take a carrot and stick approach

It is vitally important to create market conditions that incentivize the local production and use of bioenergy and hydrogen.

- **The carrot:** There's no need to reinvent the wheel. Many tools and programs have been used successfully in other industries such as green electricity, oil and gas and mining.
 - For example, governments have reduced the risks of early wind farm development by offering long-term power purchase agreements, which guarantee a stable return to early producers. This has helped the technology develop rapidly so that it is now more competitive than any other and no longer requires support.
 - Create a competitive Canadian market to attract private investment and implement bioenergy and hydrogen projects. As was the case for mining, oil and renewable energy projects, the government should provide investment tax credits to facilitate financing for green technology companies.

- Enhance economic competitiveness and preserve the environment by exempting second-generation ethanol from the federal fuel excise tax. Natural gas is currently exempted when used as an alternative transportation fuel, and grain-based ethanol has been exempted in the past.
- **The stick:** Regulations that mandate GHG reduction measures, establish a clear pricing system and highlight the penalty for non-compliance.
 - Many governments have done this and created an influx of green products. In the area of clean fuels and chemicals, the cost of adopting new technology is now less than the cost of non-compliance and the negative public image associated with it.

As well, in the ongoing process of developing the Clean Fuels Standard (CFS)

The CFS must support Canadian innovation

- **Ensure that ALL waste diverted from landfill is recognized with credits.**
The CFS has a narrow focus on GHG reduction. As a result, fuels with broader environmental impacts, such as improving the ecosystem and natural resources, are not recognized. A full life cycle assessment (LCA) under ISO 14044 would recognize the broader environmental implications of a fuel pathway, as these important contributions are part of the overall efforts to address climate change.
- **Recognize renewable hydrogen and renewable electricity as zero-carbon intensive to support increased production in Canada.**
As an example, the California market applies a zero emission factor to all renewable energy production. It would be interesting to support Canadian renewable generation by recognizing it as zero emission to make it as competitive as possible.
- **Allow low-carbon fuel producers to purchase renewable electricity off-site to reduce their carbon footprint (book and claim).**
The book and claim approach can accelerate a country's energy transition by giving additional market value to renewable energy production. Book and claim is a proven approach used in many countries and by many jurisdictions facing similar circumstances.

For example, the Government of Canada is already using this approach to meet its targets under its Greening Government Strategy (the commitment of all key government departments and agencies to use 100% clean electricity by 2025). This strategy includes the purchase of renewable energy certificates (RECs) from new clean energy generation across the country.
- **Recognize and provide credits for diverting residual forest biomass (i.e., bark, slash) from more GHG-generating end uses such as mass burning.**
Both the British Columbia and California Low Carbon Fuel Standard (LCFS) recognize the value of diverting forest and agricultural biomass from mass burning. This outdated practice is unfortunately still being used as a last resort in many areas and should be discouraged when more sustainable options are available. By providing credits for avoided emissions, the CFS will encourage this low-carbon fuel production in lieu of mass burning.

About Enerkem

Enerkem has developed and commercialized a disruptive technology to produce advanced biofuels and renewable chemicals from non-recyclable waste materials. Based in Montreal, Quebec, Canada, Enerkem operates a full-scale commercial facility in Edmonton, Alberta, and an innovation centre in Westbury, Quebec. Enerkem's technology is a prime example of how a true circular economy can be achieved. It contributes to the diversification of the energy portfolio and the production of greener mainstream products while providing a smart and sustainable alternative to landfill and incineration. For more information, visit enerkem.com.

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Enerkem's technology will recover carbon from final waste materials diverted from landfills: residual forest biomass, non-recyclable plastics and municipal solid waste.

All of it will contain carbon value that will be used in Enerkem's thermochemical process to produce biofuels and renewable chemicals.

These products will help reduce our consumption of traditional hydrocarbons, both in road and air transportation and in everyday products (paint, windshield washer fluid, plastics, chemicals of all kinds).

- ✓ **The only proven and validated process for converting final waste into syngas, bio-methanol and ethanol at commercial scale (Edmonton)**
- ✓ Feedstock flexibility: municipal, industrial and commercial solid waste, residual biomass and plastics
- ✓ Waste to value
- ✓ Achieved ISCC certification in 2015 for processing low-CI methanol into chemicals

Reduced GHG emissions

Unlike incineration, which burns waste and uses its energy, Enerkem's gasification platform recycles carbon from forest biomass and waste into biofuels and renewable chemicals. Quebec-based production of biofuels, renewable chemicals and green hydrogen.

- ✓ Green alternative to landfill with feedstock from final waste, thereby contributing to reduced GHG emissions
- ✓ In partnership with the Canadian oil and gas industry and in support of their energy transformation to reduce our dependence on fossil products

Valorization of residual forest biomass and final waste materials

- ✓ Perfect illustration of the circular economy
- ✓ Targets raw materials rejected by recycling and composting programs or by industrial production
- ✓ Solves a waste problem and avoids methane emissions or combustion
- ✓ Supports the emergence of new high-potential products from the forest such as bioplastics, biochemicals and biofuels
- ✓ Develops a value chain in Canada to further transform forest resources into bioproducts at the secondary and tertiary processing levels

Economic benefits and non-offshorable job creation with the Enerkem plant in Varennes

- ✓ Total investment estimated at over C\$875 million
- ✓ Creation of more than 500 construction jobs and about 100 direct, permanent, decent jobs during operation
- ✓ Annual recurring economic benefits of C\$85 million for Canada

Production characteristics of Recyclage Carbone Varennes, powered by Enerkem technology

- ✓ Converting more than 200,000 tonnes of non-recyclable waste and residual forest biomass into an annual production of nearly 125 million litres of biofuel
- ✓ Construction of one of the world's largest green hydrogen production facilities with an 87-megawatt electrolyzer using Quebec's green electricity