Renewable Natural Gas Developments in Ontario: An Evolving Outlook

Canadian Biogas Association

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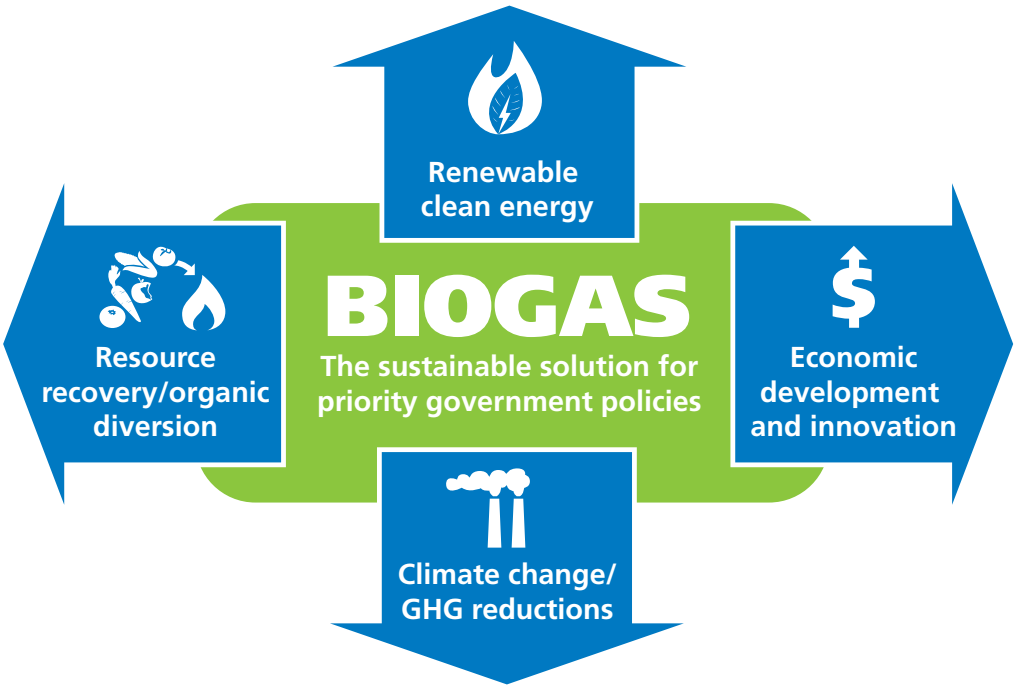
Introduction

The Canadian Biogas Association (CBA) convened a *RNG Working Group* comprised of industry and government representatives that met several times in 2016 and 2017. The objective of the *RNG Working Group* is to connect stakeholders to improve their understanding and awareness of RNG and create market conditions to develop more RNG projects. The purpose of the group was to share information about RNG and identify supportive policies and associated costs needed to bring RNG to Ontario.

This document summarizes the findings learned from the working group discussions and outlines the priorities identified by the Working Group for government policy makers towards establishing a RNG market and achieving Ontario's RNG vision.

Ontario's RNG Vision

Ontario is balancing a number of environmental policy priorities for which biogas and RNG can offer solutions to: climate change, waste management and renewable energy. Specific policies of relevance to RNG include the *Climate Change Action Plan*, *Cap and Trade Program*, *Waste Free Ontario Act*, *Food and Organic Waste Strategy* and the *Renewable Fuel Standard for Gasoline in Ontario*.



As part of the *2016 Climate Change Action Plan*, the Government of Ontario outlined an intention to introduce a renewable content requirement for natural gas, however, specific details, including content targets and program details on funding for RNG, have not yet been announced. In 2011-2012, Union Gas and Enbridge Gas Distribution made applications to the Ontario Energy Board proposing a maximum of 2% RNG content in the utilities' system gas supply portfolio by 2020, and 10% by 2030. The Canadian Biogas Association and Canadian Gas Association have similarly endorsed national RNG content targets natural gas of 5% by 2025 and 10% by 2030 in Canada.

RNG in Ontario can benefit from the extensive pipeline infrastructure, storage capacity, and resilient energy systems that exist today.

The introduction of renewable content such as RNG for natural gas will require investment in Ontario infrastructure through multiple RNG upgrading facilities to be constructed as well as capturing RNG from new anaerobic digestion facilities.The timeline for these developments will be years factoring in necessary approvals, financing, connections, and regulatory processes.

Background

RNG, also known as biomethane, is a renewable source of non-fossil based methane gas derived from biogas generated from the decomposition of organic materials and waste streams that has been captured and cleaned of impurities to meet natural gas pipeline specifications set out by gas utility companies, or that meets natural gas vehicle fuel specifications set out by engine manufacturers.

Anaerobic Digestion (AD) facilities perform the biological decomposition of organic materials in the absence of oxygen. Materials suitable for use in AD facilities that produce biogas and in turn RNG include: agricultural organics such as crop residues, animal manure and food processing waste, residential and commercial source separated organics and municipal solid waste and biosolids from wastewater. Landfill gas is another source of RNG.

More than 100 municipal, commercial and agricultural AD facilities are located across Canada with over 35 of these projects based in Ontario. The continued interest and capacity to build anaerobic digesters in Ontario is demonstrated by the 73 on-farm biogas applications representing 16.4 MW received and reviewed by the IESO during the FIT 5 application period. Currently, there is only one RNG generating facility in Ontario, located at the City of Hamilton's Woodward Avenue Wastewater Treatment Plant. Clearly this demonstrates the voluntary market and the economic gap that exists to make RNG projects viable in the absence of a target or price incentive. Without a clear government legislation or utility regulated requirement in Ontario, the industry for developing further biomethane projects has been in a state of flux, pending certainty on what the market opportunity might look like.

British Columbia and Quebec have set the stage for RNG adoption. In March 2017, the Government of British Columbia took action under the *Climate Leadership Plan* to support investments by natural gas utilities that will include RNG. Referred to as a *Renewable Portfolio Allowance for RNG*, FortisBC, a public utility in BC, can procure RNG up to 5% by volume per year and may pay up to $30 per GJ for that supply.

In June 2017, the Government of Quebec announced a regulation establishing 5% as the minimum proportion of RNG that Quebec natural gas distributors must inject in their distribution network for customers in Quebec. The *2030 Energy Policy Action Plan* set a target date of 2020 to achieve the 5% renewable natural gas content. The *Action Plan* also intends to provide financial support for RNG projects to reach a target of 50 Mm^3 increase in RNG, equivalent to 1.9 million GJ, by 2020 in comparison to 2016.[1] This is an ambitious goal that will encourage Quebec natural gas distributors to actively seek out RNG suppliers in earnest over the next several years. In July 2017, Gaz Metro proposed to the regulator, Régie de l'énergie, a price of $22/GJ for AD projects that produce up to 1.5Mm^3/year of RNG.

The Canadian precedents are being set, and Ontario is taking action to chart a similar course.

[1] *Quebec, 2030 Energy Policy Action Plan, 2017*

Achieving Ontario's RNG Vision

Canada's potential RNG production is equivalent to 34 billion cubic metres per year or 1.3 billion GJ – equal to a little more than 50 per cent of Canada's 2014 natural gas consumption.[2] Within Ontario in 2017, the amount of RNG needed to fulfill a 2% target of utility supplied gas is approximately 3.6 million GJ or 95 Mm^3 of RNG for Union Gas Limited and 5.9 million GJ or 156 Mm^3 of RNG for Enbridge Gas Distribution annually.[3,4] This amounts to a combined annual energy value of 9.5 million GJ of RNG or 251 Mm^3.

Putting this RNG goal into context, to meet the 2% renewable content requirement would require roughly:

- 100 1MW farm biogas systems (where currently there are less than 30), or
- 50 source separated organic facilities processing 75,000 tonnes/year (where currently there are four), or
- 23 landfills with 3,360 m^3/hour of landfill gas (where currently there are less than 10)

In addition to implementing a renewable content requirement, for Ontario to realize continued RNG development and benefit from this multi-faceted solution that directly reduces methane emissions, the economics need to make sense and the financial viability of projects needs to be certain.

A long-term price in the order of $21/GJ for RNG, which ensures sufficient and reliable revenue to justify investment, is required to accelerate RNG project development.

This value is in line with prices being offered in other jurisdictions and compares favourably with the cost per MWh of other low-carbon energy sources in Ontario (See *Appendix*). The CBA believes this level of revenue will likely be required to stimulate the industry and attract the capital necessary to finance new private sector plants. The level of revenue is based on an operating AD plant producing 15,000 cubic metres of methane daily and will vary depending on the type of project, with smaller projects requiring a higher price. This value does not include the pipeline interconnect costs, these costs vary by project size, type, complexity and distance from common carrier pipeline.

Other complementary measures are important to support the RNG vision for the province as outlined below. A sustainable, long-term, RNG price offers a level of certainty that will accelerate access to investors and financing required to build RNG projects. In turn, Ontario can realize the economic and environmental benefits awaiting this RNG opportunity.

[2]Canadian Gas Association, Renewable Natural Gas: Affordable Renewable Fuel for Canada, 2016

[3]2017 Rate application, EB-2016-0254, Exhibit A, Tab 3, Appendix B

[4]2017 Rate application, EB-2016-0215, Exhibit D1, Tab 2, Schedule 5

How to Meet Ontario's Market Potential

A suite of policy tools that have the potential to support RNG growth are currently under development in Ontario. A summary of these proposed initiatives as they are understood to date, and how they relate to building an RNG market in Ontario are described below.

CLIMATE CHANGE ACTION PLAN

Ontario aims to reduce GHG emissions from 1990 levels by 15% in 2020, 37% in 2030, and 80% by 2050. Strong action, leadership and investment by government and industry are needed to achieve these targets. RNG is identified as a low carbon fuel of interest within the *Climate Change Action Plan*, and arguably is ready to demonstrate real and meaningful contributions. An ICF report on natural gas abatement activities determined that RNG from landfill gas, wastewater, animal manure, and residential and commercial SSO had the potential to reduce the emissions intensity of natural gas by a total of 915,000 tCO_2/year by 2028.[5] This is equivalent to removing nearly 200,000 passenger cars from the road each year, and does not include the further GHG reductions from methane capture and diesel displacement.

RENEWABLE CONTENT REQUIREMENT

A renewable content requirement is fundamental to spurring market development. This will enable natural gas utilities to offer project developers offtake agreements and be willing partners in the development of RNG projects.

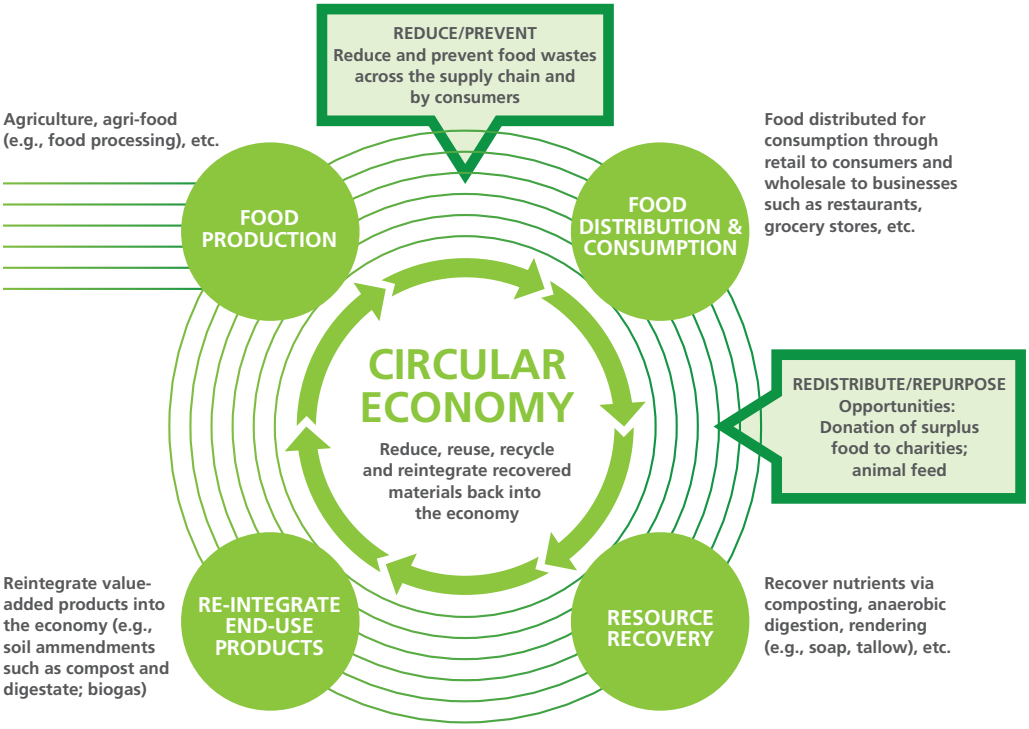
The renewable content requirement is the one policy supported by all industry stakeholders within the *RNG Working Group* who agreed it has the ability to send the strongest signal to industry for development of an RNG market in Ontario. *RNG Working Group* participants indicated a target was essential and that it be ambitious enough to kick-start and mobilize the relatively new RNG industry in Ontario. Consideration should be given to the 2% target originally proposed by the natural gas utilities, the precedents set in British Columbia and Quebec, and the ambitious targets voiced by industry associations.

One important factor needed for the development of an RNG industry in Ontario, identified during the *RNG Working Group* sessions, was an open market and competition from existing RNG markets which are already established in the United States; as a result of the US EPA *Renewable Fuel Standard*, as well as the *Low Carbon Fuel Standard* (LCFS) in California. In 2017, credits under the *Renewable Fuel Standard* are valued at between Can$17/GJ and Can$43/GJ CAD for D5 and D3 RINs depending on contract term with LCFS credits adding Can$5/GJ.[6] This currently provides the best economic return to any potential RNG project. In order to keep the domestically produced RNG in Ontario, a program with similar attractive project returns and incentives will need to be developed.

[5] *ICF, Marginal Abatement Cost Curve for Assessment of Natural Gas Utilities' Cap and Trade Activities, July 2017*
[6] *PFL Weekly Recap, Jul 17-Jul 21, 2017*

WASTE-FREE ONTARIO STRATEGY

The Strategy for *A Waste-Free Ontario: Building the Circular Economy* sets a course for resource recovery and waste reduction in Ontario to achieve a zero waste Ontario and zero greenhouse gas emissions from the waste sector with goals of 30% diversion by 2020, 50% by 2030, and 80% by 2050. The Strategy will address food waste and organic materials, which are essential feedstocks needed to produce RNG. One option being contemplated is implementation of a disposal ban for organic materials to landfill, which has the potential to increase diversion of organic materials, extend the longevity of existing landfills, and increase the feedstock supply for organic waste processing such as anaerobic digestion.



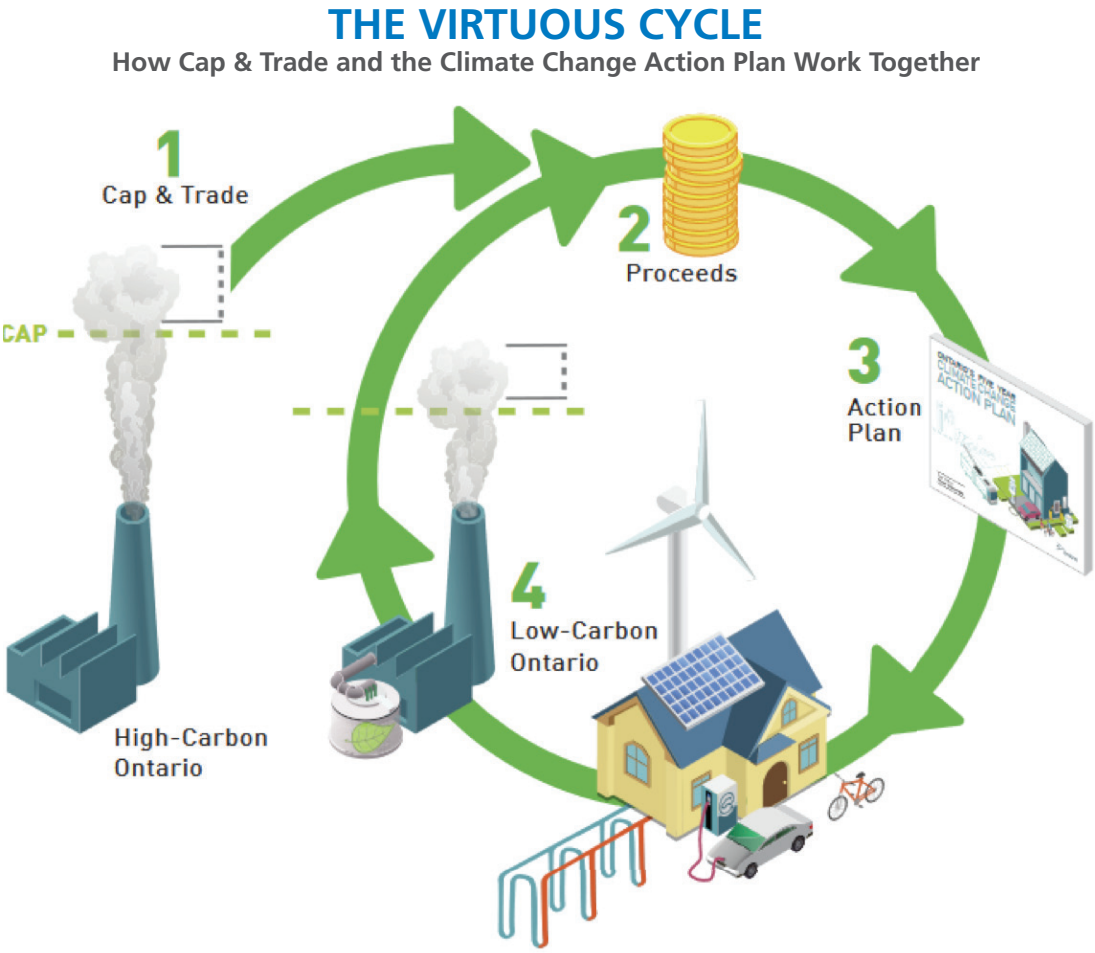
Source: Ontario Ministry of the Environment and Climate Change, Discussion Paper: Addressing Food and Organic Waste in Ontario, June 2017

The *RNG Working Group* did not discuss at length how an organics diversion strategy could be implemented; however, many members are also part of the Ministry's *Food and Organic Waste Working Group* and there was general support that further organics diversion policies would be supportive of RNG development whether they took the form of a disposal ban, landfill tax, or other mechanism.

The *RNG Working Group* flagged that the potentially mutually exclusive nature of a landfill ban and offset markets needs to be addressed to achieve the desired outcomes of diverted material and recognizable compliance offset credits. The concern is that if an organics ban is mandated, then diversion from a landfill would not be voluntary negating any future opportunity to generate compliance offset credits or significantly reducing the additionality of anaerobic digestion and the potential number of compliance offset credits available to monetize.

CAP AND TRADE PROGRAM

Ontario introduced a *Cap and Trade Program* on January 1, 2017 that limits GHG emissions from regulated emitters. Regulated emitters can achieve compliance through reducing GHG emissions, purchasing allowances at auction, purchasing offset credits, or trading allowances with other regulated entities. Ontario has held two auctions for GHG allowances in March and June 2017 generating over $975 million dollars in proceeds and a settlement price on average of $18.50.



Source: Ontario Ministry of the Environment and Climate Change, Ontario's Climate Change Action Plan, 2016

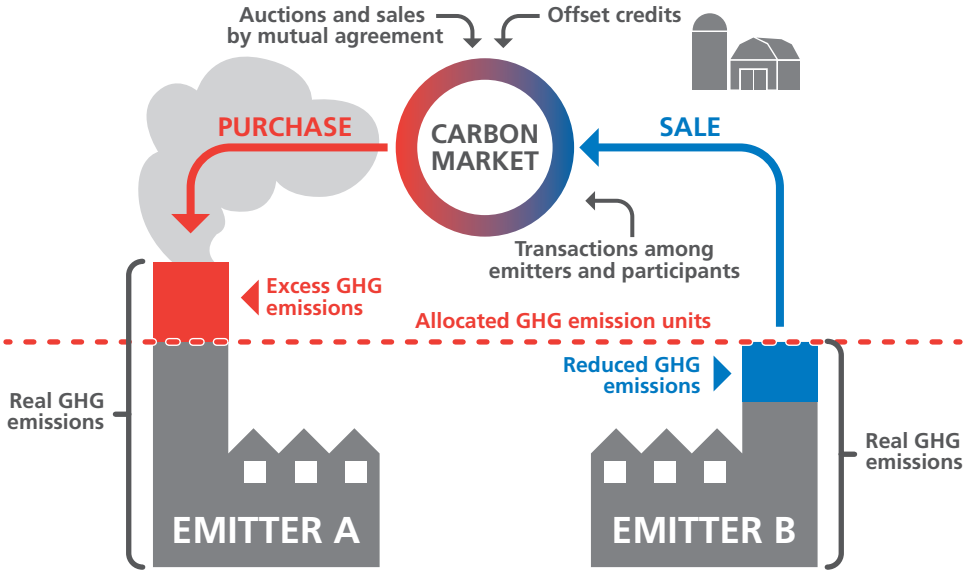
As part of Ontario's *Climate Change Action Plan*, the Province has committed $100 million to support the introduction of RNG.[7] While the program details have yet to be released, time is of the essence to incent RNG development and achieve deep GHG reductions.

The *RNG Working Group* noted that funding for RNG projects and implementation of a renewable content requirement are critical to stimulate project development and that a balanced approach should be considered in how the funds are to be allocated.

[7]*MOECC, Ontario Investing up to $100M in Renewable Natural Gas, May 2016*

OFFSET CREDITS/PROTOCOL ADAPTATION

Complementary to the *Cap and Trade Program*, Ontario is developing a *Compliance Offset Credit Regulatory* regime under which eligible projects that reduce or remove GHGs and comply with offset protocols can receive compliance offset credits fungible in the Ontario carbon market. Thirteen protocols are being developed with consideration given to adapting existing protocols from Quebec and California. Two protocols of relevance to RNG include: Landfill Gas Destruction, and Anaerobic Digestion (Organic Waste and Manure).



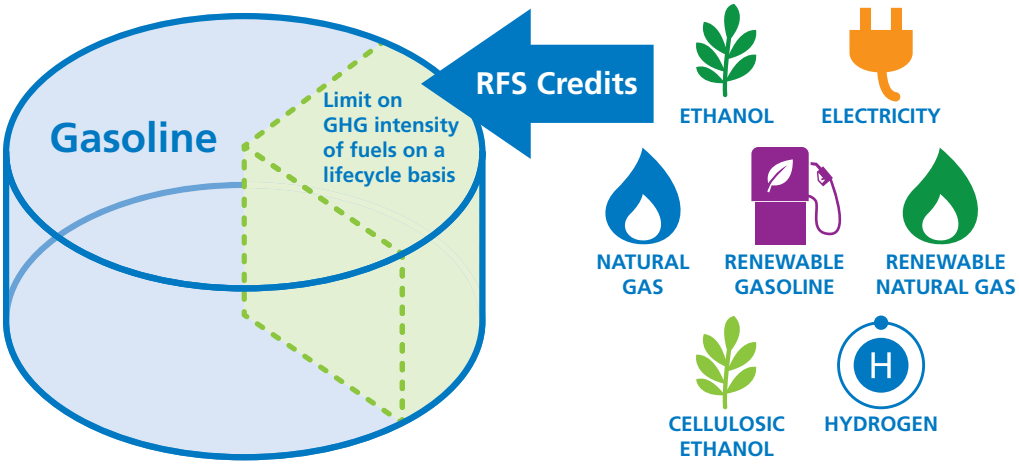
Source: Government of Quebec, The carbon market, a green economy growth tool!

It is important that protocols be developed that will take into account regional differences in Ontario while also respecting the rigor of the Western Climate Initiative partners. Establishing protocols before projects are developed is critical to ensure that projects can be developed in compliance with the protocol. Consideration should be given to recognize GHG emission reductions with respect to both fossil fuel displacement and upstream methane abatement and value the full environmental benefit that can be realized through RNG projects. As protocols are established, simplicity, reasonableness, and probability for a project to be developed using the protocol should be a guiding principle in developing methodologies and verification processes for effective uptake and participation.

RENEWABLE FUEL STANDARD FOR GASOLINE

Ontario has proposed a *Renewable Fuel Standard* (RFS) for Gasoline setting a goal to reduce GHG emissions from gasoline by 5% by 2020. A RFS is a regulatory mandate to reduce GHG emissions from gasoline and increase production of fuels from low-carbon alternative sources. The RFS requires fossil fuel suppliers to reduce the carbon intensity of transportation fuels by increasing the proportion of sustainable biofuels sold or purchasing RFS credits generated by other suppliers.

RNG has a much lower carbon intensity than other transportation fuels given it is derived from organic residues. A 2011 waste-to-wheel lifecycle analysis of RNG by Argonne National Laboratory found an 81-91% GHG emissions reductions relative to gasoline vehicles for anaerobic digestion based RNG.[8] The *RNG Working Group* requests that the RFS be flexible to include generation of credits from the use of RNG and that credits are stackable and complementary to other policy measures.



Source: Ontario Ministry of the Environment and Climate Change, Developing a modern renewable fuel standard for gasoline in Ontario, January 2017

[8]*Argonne National Laboratory, Waste-to-Wheel Analysis of AD Based RNG Pathways with the GREET Model, 2011*

AGRIFOOD RNG FOR TRANSPORTATION DEMONSTRATION PROGRAM

Ontario is proposing to pilot a program that uses methane obtained from agricultural materials or food wastes for transportation purposes. The goal of the program is to demonstrate competitive systems and business models for the production of RNG from agrifood sources and the use of RNG as a transportation fuel in order to reduce GHG emission and initiate broader deployment of RNG transportation fuelling.

A number of other demonstration type programs would be beneficial for the province to demonstrate viable, sustainable RNG utilization options.

CLEAN FUEL STANDARD

Similar to Ontario, the federal government is investigating a means to transition Canada to a low carbon economy. A *Clean Fuels Standard* (CFS) is in development to target a 30 Mt GHG reduction nationally by 2030. The goals of the CFS are: to reduce the carbon footprint of fuels supplied in Canada; to promote the use of clean technology, lower carbon fuels, and promote alternatives such as biogas; and, to apply a performance-based approach using life-cycle analysis. The CFS is expected to take into account a broad coverage of fuels including liquid, gaseous and solid fuels used within industry, transportation and buildings.

As the CFS develops, consideration is needed with how federal and provincial policies will work together to create strong, supportive mechanisms that respect the regional variation in economic profiles, energy sectors, emission profiles, and trade activities.

Closing

At the provincial and national level there are a variety of policies in place or in development that could help to support the development of RNG projects and establish an RNG market in Ontario. The *RNG Working Group* participants identified a renewable content requirement as the priority policy initiative that will spur additional development and market growth for RNG in Ontario.

Immediate action taken by the Province to announce a renewable content requirement for natural gas is essential to mobilize RNG development and to demonstrate a real and meaningful commitment for the role that RNG can play in Ontario. In addition to a renewable content target, a sustainable, long-term price for RNG is required to support financial viability of projects and accelerate RNG market development.

Other complementary policies are important to support an RNG vision for the Province and will require timely implementation and consideration for how they can complement each other and ultimately support RNG market growth.

Appendix – RNG Pricing

TABLE 1. RNG PRICING IN NORTH AMERICA

Region	RNG Price
British Columbia[1]	<$30/GJ
Quebec[2]	$22/GJ; proposed price for AD up to approx. 1.5Mm^3 RNG/year
U.S.[3]	$25-50/GJ; $17-43GJ for 2017 D5 and D3 RINs, LCFS could add approx. $5 +/GJ

[1]*BC Clean Energy Act, Greenhouse Gas Reduction Regulation, 2017*

[2]*Gaz Metro, Mesures relative à l'achat et la vente de gas naturel renouvelable, 2017*

[3]*PFL Weekly Recap, Jul 17-Jul 21, 2017*

TABLE 2. COST COMPARISON OF EQUIVALENT ENERGY UNIT FOR CONTRACTED SUPPLIES OF LOW-CARBON ENERGY

	$/GJ	$/MWh
Proposed RNG Price	21	76
Solar (PV Non-Rooftop) Price[1]	58	210
On-shore Wind Price[1]	36	128
Biogas < 500kW[1]	47	168

[1]*IESO, Fit/microFIT Price Schedule, June 21, 2016*

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