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June 19, 2017

Ministry of the Environment and Climate Change
Climate Change and Environmental Policy Division
Air Policy Instruments and Programs Design Branch
77 Wellesley Street West, Floor 10, Ferguson Block
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Attention: Gerrit Ledderhof
Project Manager

Re: Renewable Content Requirements for Natural Gas

On behalf of Ontario's more than 3,000 environment and cleantech firms, the Ontario Environment Industry Association (ONEIA) is pleased to provide our thoughts on the Ministry of Environment and Climate Change's (MOECC) efforts to date in regard to "Renewable Content Requirements for Natural Gas".

By way of background, Ontario is home to Canada's largest group of environment and cleantech companies. The most recent statistics from the Federal Government show that Ontario's environment sector employs more than 65,000 people across a range of sub-sectors. This includes firms working in such diverse areas as materials collection and transfer, resource recovery, organics processing, composting, recycling solutions, alternative energy systems, environmental consulting, brownfield remediation and water treatment – to name just a few. These companies contribute more than \$8-billion to the provincial economy, with approximately \$1-billion of this amount coming from export earnings.

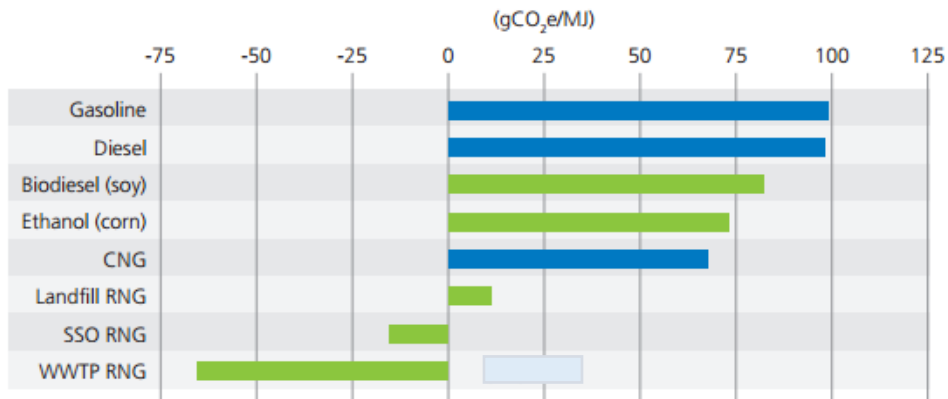
Members of ONEIA are committed to engaging the Federal Government and the Province of Ontario as they develop policies and regulations that are consistent with the principles of sound science, environmental responsibility and economic growth. To that end, we convened a working group of members drawn from across the resource recovery services and climate change sectors to review the MOECC's discussion paper on a Renewable Fuel Standard (RFS) as well as the advisory work that is being undertaken on the renewable content requirements for the natural gas supply and distribution system.

ONEIA applauds MOECC for the program that it is looking to undertake in this area and would request that MOECC engage with ONEIA's members who both generate and process renewable natural gas (RNG) supply as well as appropriate federal government agencies on the Clean Fuel Standard (CFS). The following are our thoughts on RNG and its highest and best use.

Renewable Natural Gas

The conversion of methane from landfills, biogas and wastewater treatment facilities to electricity or natural gas is a decades old technology. Compared to other fuels, the carbon intensity of these energy sources is considerably less than traditional sources of transportation fuels. As an example, in the use of RNG as a transportation fuel, the chart below shows the carbon intensities of various fuels:

CARBON INTENSITY OF VARIOUS FUELS



Data Source: Carbon Intensity Lookup Table for Diesel and Fuels that Substitute for Diesel, California Air Resources Board, 2012

This biogenic source of energy is used extensively in the United States. In Ontario, only a handful of companies and municipalities are converting methane to electricity but there is significant potential is great to expand the use of this technology for the development of alternative low carbon fuels.

In the last decade, landfill companies, primarily in the United States, have been increasingly switching from generating electricity to developing pipeline quality gas, specifically as a direct substitute, or offsetting the use of natural gas or electricity at industrial facilities (e.g. automotive, pulp and paper and cement manufacturers). Today, landfill operators are moving towards supplying competitive markets with RNG via pipelines as large GHG emitters and other obligated parties are seeking to receive as much RNG as possible. ONEIA supports the development of an RNG system that is market driven and allows private entities generating RNG to sell the associated attributes for the highest return available in the marketplace.

As an example, Waste Connections (WC) built and operates a large-scale biogas facility at its Lachenaie Landfill in Quebec. This facility converts landfill gas to pipeline quality gas, which is supplemental to its landfill gas to electricity facility. The company recently closed its landfill gas to electricity operation and redirected all the landfill gas generation to its RNG facility. WC intends to develop a similar facility at its Ridge Landfill near Chatham, ON. Walker Industries is taking a similar approach at its Niagara Landfill.

Renewable Natural Gas as a Transportation Fuel

As example of the advantages of migrating to RNG as a transportation fuel, in 2014, Ontario used approximately 5 billion litres of diesel for road motor vehicles. Based on organics, biosolids and landfill gas production, Ontario could transition 33% of its entire diesel fuel use to compressed RNG and therefore, provide a low carbon fuel source, supporting the mitigation of short-lived climate pollutants. MOECC has discussed a program that would look to achieve 2% usage of RNG by 2020 and 10% by 2030. However, to achieve these objectives, regulatory approvals and the development of the required infrastructure will need to be hastened significantly. These proposed timelines do not align with the federal and provincial climate change goals. Sources and their RNG generation potential are detailed in the table below based on a Canadian Biogas Association study from 2013:

Source	Generation Potential of Millions m3 RNG	Generation Potential of Millions of Litres of Diesel Fuel Equiv.
Wastewater WWTP	119	123
IC&I Food Waste	122	126
Animal Manure	637	657
Residential SSO	72	74
Landfill Gas	654	675
Subtotal	1,604	1,655

The use of natural gas as a transportation fuel has been growing exponentially. It is predominantly used with return to base fleets such as waste collection and municipal transit. The waste services industry began using liquid natural gas (LNG), predominantly in California, over two decades ago. The switch to compressed natural gas (CNG) began in the mid to late 2000s. Today, Waste Management (WM), Republic and WC have the largest CNG powered waste and recycling collection fleets in North America, respectively. In Ontario, WM, PWS and Emterra Environmental have CNG powered collection vehicles operating in Ottawa, Waterloo and the Regions of Peel and Simcoe County. It should be noted that municipal governments are increasingly adding the use of CNG as a prerequisite to outsourcing their residential connection contracts. This has resulted in an effective means to driving the use of CNG.

There are numerous environmental benefits to converting from diesel to CNG. For every vehicle that is converted to natural gas, use of diesel fuel is reduced by an average of 36,400 litres (8,000 gallons) per year. This reduces greenhouse gas emissions by over 22 metric tons per year, per truck. Vehicles powered by CNG result in: nearly zero particulate emissions; a 50% reduction in smog-producing nitrogen oxide emissions compared to the cleanest diesel trucks; cut greenhouse gas emissions by over 20 percent; and are far quieter than diesel trucks.

While the conversion of CNG to compressed C-RNG is not a new phenomenon, its uptake is starting to take root. WM in partnership with Linde, is converting landfill gas into LNG at WM's Livermore Landfill in northern California and transporting the LNG to southern California to fuel its LNG powered fleet. In St. Landry's Parish, LA, WC is fueling its CNG powered vehicles with landfill gas directly from the St. Landry Landfill. In Surrey, BC, the City is completing the development of a bio-digester that will process the organics collected in the city, and generate pipeline quality gas. The generation of RNG from waste-based sources will continue to originate primarily from landfills, due to their large and consistent flow volumes. However, biogas and wastewater treatment plant (WWTP) facilities also show significant potential for RNG generation.

Response to Questions Raised in Previous Technical Advisory Discussions

As outlined earlier, ONEIA is providing responses to the various questions that were asked during the technical advisory discussions that occurred on October 12, 2016 and February 27, 2017, as well as our meeting on March 23, 2017.

October 12, 2016

- a. Will the renewable content requirement for natural gas drive GHG emission reduction in natural gas supply to complement Cap and Trade?

ONEIA agrees that renewable content requirements for natural gas would drive GHG reductions in the natural gas supply due to the low carbon nature of RNG. However, we recommend that the Province consider a more holistic approach, and focus on displacing the highest carbon intensity fuels first, given the Province's 2020 mandate for GHG reductions. We believe that RNG should be treated like other low carbon fuels in terms of their carbon intensity, and support the Province in meeting its goals for lower GHG emissions as well as the Federal Government's vision and objectives for a CFS.

b. Would the RNG mandate enable regulated utilities to source renewable content?

ONEIA believes that a RNG mandate would enable the regulated utilities to source renewable content for its natural gas supply. However, there are no incentives for these utilities to support the growth of the RNG industry in Ontario. As presented, the mandate would allow them to source the lowest price RNG (i.e., nothing prevents these utilities from sourcing the RNG from jurisdictions outside of the Province of Ontario). The economics for RNG in the United States as the RFS and low carbon fuel standard (LCFS) programs at the federal and state levels have an impact on the economics of RNG in Ontario due to the common carrier provisions of this type of fuel.

ONEIA has concerns about an RNG mandate for the gas utilities, because they represent an oligopoly, and are regulated by the Ontario Energy Board (OEB). The regulated utilities need to be fair and accountable to the ratepayers/shareholders in Ontario, and base their rates on reasonable costs for prudently sourced RNG. Therefore, it is possible that if the utilities are mandated to provide RNG, then they will push down pricing on the various sources of RNG and potentially impede the development of a robust and competitive market as has been seen in California. It has been stated by the Ontario gas utilities that they would provide producers with the option to sell into utility RPS or sell RNG directly to Ontario consumers such as industrials, transportation, and others. Given the earlier comment on the common carrier, ONEIA believes the limited option of either selling to Ontario utilities or Ontario industrial facilities is not supportive of competition rules, and the Province should not limit the market outlets for RNG to just these options. We note here that while the OEB does have the power to fix just and reasonable rates for the sale of gas, it does not have the authority to fix prices for the sale and purchase of RNG between the utilities and the RNG gas producers, or obligate producers to sell their unprocessed gas to the LDCs. ONEIA is also concerned that RNG developers that do not follow the preferred course of the gas utilities can be lead to gamesmanship (i.e. excessive interconnection costs/timelines) unless the gas utilities are given clear guidance on the interconnection provisions or gas quality specifications. We also believe that out of province sources need to be addressed.

c. Would an RNG mandate encourage a market-based response by having natural gas distributors choose the most cost-effective and/or appropriate sources of renewable content?

As outlined above, ONEIA has concerns about an approach that is led by the natural gas distributors, given their control over the industry in the Province. As previously discussed, many sources of RNG are available or will likely be available in Ontario including WWTPs, commercial source separated organics (SSO) anaerobic digestion facilities, municipal SSO facilities, landfill gas (LFG), farm AD facilities, power to gas facilities, etc. Each of these fuels, as outlined earlier, has its own carbon intensity and associated economics. Thus, if utilities competitively

procure biogas then small farms and existing sources of biogas will not convert, and the Province will potentially lose out on bringing a domestic source of RNG into the market. It is ONEIA's view that the optionality of the outlets for RNG needs to be protected for the RNG developers, so that they have the opportunity to bring the low-carbon RNG to market and reduce GHG emissions even if this market is outside of the Province. The utilities have been clear that they want price transparency and competition amongst producers. However, the producers want the flexibility to move their RNG to the highest and best use from an economic a GHG reduction perspective.

d. Would an RNG mandate provide certainty regarding minimum levels of GHG reductions achieved?

It is ONEIA's view that an RNG mandate could provide a base level of GHG reductions. However, the use of this fuel to displace fossil fuels for non-transportation uses could lead to the use of RNG where it has a lower impact on GHG reductions. As discussed earlier, ONEIA believes that the displacement of diesel as a transportation fuel would have the most significant impact. Considering the StormFisher facility in London as an example, Ontario has worked with third party consultants to validate a carbon intensity of a RNG used in heavy duty vehicles that has a carbon intensity of negative 150 g CO₂ e/MJ, which would make it one of the lowest carbon-intense fuels available in North America.

e. Would an RNG mandate make use of committed natural gas infrastructure funding (e.g. Ministry of Infrastructure's Expanding Access Program)?

ONEIA understands that the Ministry of Infrastructure's Expanded Access Program could be used to expand access to RNG for communities that do not currently have service including those in rural and Northern Ontario, as well as First Nations communities. It is our understanding that this program allows municipalities and other communities to work with utilities and natural gas distributors to bring forward proposals under a competitive intake process. Based on this understanding, it is ONEIA's view that the RNG mandate may be able to access this funding to implement interconnections for farm AD sources of RNG and other remote RNG sources such as LFG. However, this would still need to be a competitive process, to prevent the utilities from using these funds to support their own efforts for a regulated biogas upgrading and injection service in the Province. The utilities have stated that they believe that they can provide the lowest cost service through rate basing, while maintaining the highest gas quality compliance. ONEIA does not agree with this view and in fact, opposes this idea as it would force the gas suppliers to sell their resource to a gas utilities.

f. Target Setting - How much renewable content is required? Compliance Dates?

ONEIA has observed several "mixed" messages regarding the amount of renewable content that is being pursued by the Province. On a few occasions, the Province has stated that they wanted to focus on buildings and transportation, and to replace NG with RNG and hydrogen. Yet, we have also seen presentations by the Canadian Biogas Association (CBA) that requested up to 2% RNG in system gas by 2020 and the technical (not economic) potential of 10% of all NG consumed in Ontario by 2030. ONEIA believes that the request for 2% of system gas by 2020 was subsequently revised to 2% of all gas by 2020. ONEIA feels that this is an extremely ambitious initial target, given the current uses of biogas and the long timelines for amendments/approvals from MOECC to allow the implementation of the infrastructure to produce RNG. We feel that further study of

the barriers/constraints that exist for the existing sources of RNG is required. As an example, below we have noted the major types of RNG sources and provided commentary on some of these barriers/constraints for each:

1. Farm Based AD

- a. Dairies – This is the most feasible source of RNG due to the manure management techniques and the likelihood of having the land base to handle off-farm organics that could be co-digested. They have heavy-duty vehicles entering their site on a regular basis and most likely will have a natural gas connection on the property. Other sources of manure are, at present, less feasible to produce RNG.
- b. Interconnection – As outlined above, most dairies will have a natural gas connection. However, the NG infrastructure may not be large enough to handle gas flowing in the other direction, as with biogas to electricity projects that were developed on farms.
- c. Price – The price that would be required for existing dairy farms to switch over would be significant and the price for new sources of RNG would have to be tiered depending on farm size. The farm feasibility should be done on a manure only basis or with energy crops as the overreliance on off-farm organics has been a challenge over the past number of years.
- d. Approvals – Clarity on the farm based AD systems and the oversight by OMAFRA and MOECC would require further assessment.
- e. Existing vs planned – The 2020 target would only apply to the existing biogas sources from farms in Ontario and possibly the farms that have recently been approved for electricity (FIT) contracts. New sources would not likely be feasible in this timeframe but could be investigated for longer-term projects. However, MOECC needs to consider TPP/NAFTA negotiations and their impact on the dairy sector.
- f. FIT obligations – Existing dairies engaged in FIT contracts will have contract provisions for supply that will need to be understood further. Subsequent discussions would need to occur with IESO/Ministry of Energy on their obligations and conversion over while stranding the assets.

2. Commercially Generated Organics

- a. Feedstock – The feedstock market has been challenging over the past 5 years as new capacity came on line for processing organics. The MOECC is working on an organics diversion program that would divert more organics from landfills in the form of source separated organics (SSO). However, the required infrastructure and end markets are not prepared for this today.
- b. Approvals – The timelines for new approvals or amendments to existing environmental approvals to facilitate the conversion of facilities to produce RNG is currently over 1.5 years and thus, would need to be revised to allow for the 2020 target to be achieved in any capacity. The lead-time on the equipment is also a challenge as the procurement cycle is approximately 8 to 12 months from order due to compressor lead times.
- c. Resource Recovery – As outlined above, the feedstocks are required to produce the biogas. The Waste Free Ontario Act (WFOA) and the provincial organics diversion policies do not line up with the RNG mandate that is being considered. Additional work also needs to be completed to understand the organic fraction of municipal solid waste (MSW) that is still available even after SSO efforts have occurred in the municipalities.
- d. Existing – A few facilities are currently in operation in the Province and would have the same challenges as the farms from the perspective of FIT and the cost of conversion.

3. WWTP

- a. Existing – We are aware of an existing RNG system at the Woodward Wastewater Treatment Plant in Hamilton demonstrating that other WWTPs could make this conversion. However, most have been focused on putting in CHPs to manage their biogas as the price of electricity has risen (i.e. Region of Waterloo). Thus, the amount of gas that is possible within the next few years would be minimal.
- b. New/Capital, Planning – The municipalities that own these treatment plants provide a public service, and have clear planning and budgeting cycles. Any changes/improvements to these facilities would take several years and would have to go through a public procurement program prior to commencing the construction of the project, thereby delaying its execution.
- c. Co-digestion – Little to no co-digestion of organic waste is occurring in the Province today. In other jurisdictions, the WWTP sector is actively seeking organics that need to be diverted from landfills to enhance the production of biogas at their WWTPs. This approach could occur in Ontario. However, the ramp up would likely be protracted as the municipalities adopt the technology that allows co-digestion and biomethane capture, and implement contracts to secure SSO and the construct infrastructure to move the resultant RNG to market. The upside of co-digestion is that it may allow WWTPs that are currently producing very low volumes of biogas to become viable as an RNG production facility.

4. Landfill Gas

- a. Connection and off-taking capacity – Many of the landfills in the Province have significant volumes of Landfill Gas that could be converted to RNG. One challenge is the ability of the local utilities to take on such large quantities of gas in relatively small geographical areas, particularly on zero degree days (heat of the summer when only hot water tanks are using gas), where curtailment issues can hamper some large-scale projects. One solution is to ensure access to mainline systems (e.g. Trans Canada) is not restricted by the local distribution companies (LDCs).
- b. Permitting – Large, regional landfills have the potential to be a significant source of RNG in the province. One of the biggest hurdles to the development of any new landfill facility is the onerous and lengthy permitting process. Although there are technical standards in place (O. Reg. 232/98) and widely understood EA requirements, the protracted nature of the Province's current review and approval process means years of delays and missed opportunities to have stable, reliable and long-term sources of RNG come on line.
- c. Remote locations – The location of several of the landfills in the Province may not be conducive to providing RNG. Further assessment work will be required to determine the feasibility of interconnection and the prices that would facilitate it.

g. Regulated Entities - Which entities will have to comply? Phasing?

ONEIA is concerned about focusing on the gas utilities for an RNG mandate. ONEIA recommends utilizing the RNG in the RFS program as stated earlier. However, if the MOECC does decide to mandate the gas utilities to have a renewable stream of fuel in their portfolios, then we recommend also considering voluntary purchases and helping various market participants that may require different lead times to comply.

As previously mentioned, a few factors would impact the volumes and phasing of an RNG mandate including commercial, technical and regulatory barriers. The

feedstock, technology and pricing, as well as access to out-of-province sources will affect the phasing in of RNG use. It should be noted, that extraction of RNG from biogas sources does not have many technical barriers, while gasification requires further technical development. ONEIA has also reviewed industry research reports that contemplated agricultural residues and biomass as sources of RNG by 2030. These approaches also require further study as the barriers to market rollout for these feedstocks is considerable.

h. Compliant fuel options - What qualifies as renewable content?

ONEIA believes that all non-fossil sources of RNG should qualify.

February 27, 2017

Target Setting

1. Target metric: Should the target be a percentage of the annual delivered energy content (e.g. 2%)? Or a fixed annual number (e.g. 3PJ)?

ONEIA believes that setting a fixed annual number (e.g. 3PJ) is a metric that can be more transparently supported year over year. Using a percentage based target comes with inherent subjectivity as it is relative to a number that fluctuates due to variable and unpredictable factors such as extreme weather patterns and conservation efforts. ONEIA suggests that the Province select an initial near-term target, while investigating a longer-term target over the next 12-24 months.

ONEIA also understands that the Ministry of Energy stated in their Fuels Technical Report that 155 PJs of RNG could be achieved by 2035. ONEIA has no issue with the Province setting the target on either a PJ or a percent basis. However, there should be consistency in how this is presented. It has been widely published that the RNG targets are 2% by 2020 and 10% by 2030. ONEIA suggests that one unit of measure for the goal be adopted and used uniformly in all documents. We also wish to note that however this goal is stated (PJs or %), it needs to be aligned with the available quantity of RNG from producer facilities. The phases to bring these sources to market need to be determined and aligned with the target timelines.

2. Lead Time: If following a phased approach, how much lead time would be required between setting a new target and meeting it?

The proposed timelines, especially with respect to an organics diversion strategy, do not align with climate change objectives. To achieve the Ontario Governments stated goal of 2% RNG by 2020 and 10% by 2030, approvals for the development of infrastructure will need to be hastened significantly from their current levels. ONEIA recommends that the Province work closely on the resource recovery efforts and the staging of any RNG mandate as well as the other steps/activities that we have outlined in this letter.

3. Long Term target: What should the long-term target be (e.g. 2030)? How this might change with technological advancements or if imported content is available?

ONEIA recommends harmonizing the various regulations in this area including the ethanol and biodiesel mandates. The coordination of the renewable content requirements for natural gas, the RFS and the Federal CFS should allow for a level playing field that supports the Province's efforts to achieve its GHG reduction

targets. ONEIA believes that the Province should set short, medium and long-term targets for the renewable content of transportation fuels, and assess the scalability of the various low carbon fuels that support these targets along with technology developments to support its efforts. The Province should also work with other jurisdictions to complement the policies that are being undertaken.

Market Coverage and Regulated entities

1. Barriers – are there regulatory or non-market impediments preventing marketers or large users from buying renewable content or the associated compliance units from Enbridge and Union Gas? Or using the same to procure renewable content on their behalf?

As previously stated, ONEIA recommends harmonizing the various regulations in this area including the ethanol and biodiesel mandates. In terms of engagement with gas utilities, ONEIA supports an open and transparent market for the procurement and sale of RNG. As with any other products generated in the Province, the manufacturers of RNG have the right to market and sell their product to the customers they choose. It is not the role of either Enbridge or Union Gas (the distribution system) to sell renewable content or the associated compliance units, as they do not own them and cannot be mandated to do so.

Where the distribution system does add value, is by providing a conduit between the producer facilities and the end customer, who are participating in a competitive market to purchase either renewable content or the associated compliance units. This does not preclude distributors, such as Enbridge or Union Gas, from also purchasing from the manufacturers. They would be participants in an open and free market for these products.

With regards to the idea that large emitters would purchase renewable content of the associated compliance units from Enbridge or Union Gas, ONEIA points out that this would add a layer of cost to purchasers, as Enbridge or Union Gas would have to first have to purchase from the producer facilities, then turn around and re-sell to the large emitters. As ONEIA represents the majority of RNG producers in this Province, ONEIA recommends that large emitters simply transact for the RNG and associated compliance units with the individual producer on a sale-by-sale basis. This assures purchasers they are receiving the lowest possible costs and allows the distribution system to function as intended by getting these products to the end-user.

2. Exemptions: Should any natural gas be excluded? Or should this follow existing regulatory precedent (e.g. cap and trade program)?

ONEIA believes that natural gas for northern and rural communities should be excluded.

3. Regulated entities: What is the status of embedded distributors within franchise territories? Are their volumes considering system gas?

ONEIA understands that the regulated utilities make up to 60-70% of the volume of the natural gas used in Ontario; while marketers are 5-10% and large gas users are between 20-35%. ONEIA would defer to the gas utilities for their thoughts on the status of embedded distributors within their franchise territories, and whether it would be considered system gas.

4. Competition: Is there evidence to support concerns of retail market

distortion if natural gas marketers are able to offer a “non-RNG” package?

ONEIA supports a system that lowers the carbon intensities of all fuels, regardless of the various subsectors that exist. We recommend that the Provincial government ensures that its strategy is consistent with the Climate Action Plan.

Compliant Fuel Options

1. Sourcing – should there be limitations on how regulated entities can source content (e.g. require physical delivery, consistent with approach taken in cap and trade program)?

ONEIA wants to ensure that all producers have a chance to succeed in the developing RNG market in Ontario. This requires a transparent and flexible system that allows for a clear cost for interconnection and a competitive market to incent all parties. With regards to limitations on how regulated entities can source renewable content, ONEIA advocates for a system that aligns with other jurisdictions in the Western Climate Initiative, namely Quebec and California. ONEIA also seeks clarification from the MOECC on the comments surrounding physical delivery.

Compliance Flexibility

1. Preference – is there any strong feeling or preference for the availability of flexibility options? If so, which and why?

ONEIA recommends that the Province prioritize the highest and best use of RNG, which is in the transportation sector. However, the Province cannot mandate which customers the RNG is sold to, and the policy framework must allow the RNG to be moved to any market the producers wish to participate in.

2. Impact on Targets – how could the choice of flexibility options support the achievement of greater renewable content? How would this influence GHG reductions?

Competition for the RNG content in the RFS would allow for significant monetization, and facilitate more growth in the RNG sector, thereby generating more renewable content. Since the RNG would be displacing fossil-derived diesel, it would have a direct influence on GHG reductions.

Other Questions

1. Gas Consumption by Segment – System vs non-system gas has been identified; is it possible to get similar breakdown of approximate marketer vs direct purchase volumes?

As outlined above, ONEIA has seen the projections for system and non-system gas. It has also reviewed the volumes that are managed by marketers and procured directly from end users. The large users are likely picked up in the “large emitters” list from the Province. Thus, ONEIA would defer to the gas utilities on this question.

2. Hydrogen – what is the maximum concentration (% vol) of hydrogen that the distribution system can tolerate with no/minimal changes? What are the limiting factors to hydrogen substitution (e.g. customers, equipment, and infrastructure)?

ONEIA does not have any comments on the maximum concentration of hydrogen that the distribution system can tolerate.

3. Technology costs – for the sources and technologies illustrated in the 2011 Alberta Innovates and Electrigan reports, are there more recent estimates of cost and supply potential? Is similar information available for advanced or alternative technologies (e.g. gasification, methanation, hydrogen)?

We outlined member feedback on the different sources of RNG in the Province and the challenges that surround each one. ONEIA also reviewed the Alberta Innovates Report on RNG Potential from May 2011 as well as the Electrigan report from 2011 that assessed the amount of RNG that could be created and the costs associated with this fuel. ONEIA believes that these costs are out of date along with the projected volumes of RNG that could be generated. It believes that the government should assess the resource recovery efforts and determine the volume of gas that is reasonably achievable now and in the future.

Existing sources of RNG and the feedstock supply are described later in this letter. In regard to new/different feedstock sources, we have outlined our initial thoughts for reference purposes:

- a) Biomass – the Province does an excellent job of sustainable forestry management through the Ministry of Natural Resources. A considerable amount of this biomass is allocated to companies that send the product to the power generation markets in Canada and Europe or into the residential market for bio heat. Therefore, it is unlikely that the use of this material as a feedstock for RNG purposes could be achieved in the next 10 years. These feedstocks would need to be gasified to produce RNG, and since they are mainly dry streams then it is more likely to combust them for energy/heat recovery. The use of thermal gasification still has considerable uncertainties surrounding its development and thus, the timelines are also uncertain for the development of gasification facilities and the production of syngas that is suitable for RNG. These materials are better used for biochemical, biomaterials, and bioenergy (fuel, heat, etc.) as heat is the largest component of Ontario's energy use.
- b) Agricultural crop residues – the Province is considering the use of these materials for RNG, which is surprising given the dry nature of this material. The most recent IEA Bioenergy report from 2017 states that this material is not as good as forest woody biomass for the purpose due to the cost of the collection and management of crop residues and the current use of this material as animal bedding, animal feed. This material is also important to the management of soil health, which is also a focus for OMAFRA. The use of agricultural crop residues also relies on the original intent for the crop which is tied to the world grain markets. This would lead to questions surrounding the cost and infrastructure to collect and deliver the residues, the bulk density of the residues and the feedstock availability.
- c) Purpose grown energy crops – the Province should assess the land inventories and the economics for the agricultural sector to develop, construct and operate purpose grown energy crop digestion facilities that produce RNG to facilitate the GHG mandates that the Province has undertaken. However, further work on the indirect land use changes would need to be evaluated.
- d) Power to Gas – the Province should assess the viability of power to gas at RNG production facilities due to the source of pure carbon dioxide that could be

used to assist in the conversion of surplus electricity to hydrogen and RNG. This could assist the province in increasing RNG production and alleviating the pressures to sell surplus renewable electricity.

As with any burgeoning market, the technology that supports the development of RNG projects is advancing quickly. The costs for this technology are also changing. It would be difficult to establish a benchmark for cost/unit production of RNG as each facility has unique gas streams, infrastructure requirements and scale of operations that require a project-specific approach to technology solutions. These challenges also highlight the need to let the RNG producers develop projects by matching the needs of the project to the technology solution that suits the individual facility operations.

SUMMARY

ONEIA appreciates the opportunity to provide MOECC with comments and suggestions, and stands ready to work with the Province and the MOECC in the development of an RFS and the renewable content requirements for RNG.

Should you have any questions about the information contained herein, please do not hesitate to contact the co-chairs of our working group, Brandon Moffatt and/or Randy Cluff or feel free to contact the ONEIA office directly at 416-531-7884.

Yours truly,



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Chair of Board of Directors

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