CLEAN GAS STANDARD

A Policy Proposal for Canada

Fall 2023
BiogasAssociation.ca/cleangas

Canadian Biogas Association | Clean Gas Coalition

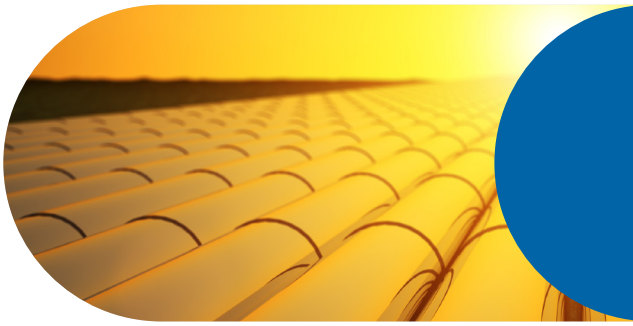
EXECUTIVE SUMMARY

Clean gas includes biogas, renewable natural gas, bio-synthetic gas, and low-carbon hydrogen: gases with lower life-cycle carbon intensity than fossil-sourced gases. Clean gas can be utilized by end users in a wide range of applications to decarbonize the gaseous energy stream.

The federal climate change regulations and programs do not provide strong support for the production of clean gas in Canada. The opportunity to realize significant greenhouse gas (GHG) reductions via clean gas in Canada remains unrealized. Additional policy signal is needed.

Canada has set targets to reduce national GHG emissions by 2030 and to achieve net-zero GHG emissions by 2050. Even if all existing, announced, and proposed climate change policies and programs are fully instituted, there will still be a gap.

The proposed Clean Gas Standard would require suppliers of natural gas to show a minimum clean gas content based on the volume of natural gas that they deliver to end users. The Clean Gas Standard would result in significant incremental GHG emission reductions.



A Clean Gas Standard can decarbonize the gas stream, deliver GHG reductions for Canada and help close the gap to achieve national GHG emission reduction targets all while utilizing current infrastructure.

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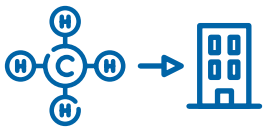
Biogas and **renewable natural gas** are produced from **organic materials** and have **lower carbon intensity** than natural gas.

Low-carbon hydrogen is the production of hydrogen using technologies that result in significantly **lower GHG emissions**.



Clean gas can be **utilitzed by end users** to **decarbonize the gaseous energy stream without changes to current infrastructure**.

1 WHAT IS CLEAN GAS?

1.1 BIOGAS, RENEWABLE NATURAL GAS, AND BIO-SYNTHETIC NATURAL GAS

Biogas is gas produced from the decomposition of organic materials such as agricultural waste, manure, municipal waste, wastewater, plant waste, and food waste under anaerobic conditions. Renewable natural gas (RNG) is a term used to describe biogas that has been upgraded for use in place of fossil natural gas. Raw biogas typically has a methane (CH_4) content between 40 and 65 percent, and must go through a series of steps to be converted into RNG. RNG injected into the natural gas pipeline system commonly has a methane content between 96 and 98 percent.

SOURCES AND CURRENT STATUS

Landfill Gas

Landfill gas is a mix of different gases created by the action of microorganisms within landfill as they decompose organic waste. Landfill gas is typically 40 to 60 percent methane, with the remainder being mostly carbon dioxide (CO_2). Methane is a powerful GHG with a global warming effect 80 times stronger than CO_2. The gases released from landfill waste are captured by perforated pipes and then upgraded into RNG. There are currently 50 landfill gas systems in operation across Canada. A 2020 study commissioned by Natural Resources Canada calculates that Canada is utilizing less than one third of easily available landfill gas.

Agricultural Waste

Agricultural waste, including from animal manure and crop residues, is responsible for 4 percent of Canada's methane emissions and 11 percent of its nitrous oxide (N_2O) emissions, another potent greenhouse gas. These emissions can be abated through biogas & RNG systems. Canada currently has 43 agricultural biogas & RNG systems on farms and in agricultural communities across Canada. Estimates are that we're tapping as little as 1.3 percent of Canada's available agricultural biogas & RNG feedstock.

Wastewater Treatment Facilities

Many municipal wastewater treatment facilities (WWTFs) use anaerobic digestion to treat sewage sludge on site. Biogas is one of the by-products of sludge treatment through anaerobic digestion. The biogas may typically be discharged to atmosphere. This makes wastewater sites attractive candidates for RNG projects. Currently there are 123 wastewater treatment facilities (WWTFs) with biogas & RNG systems across Canada. There is, however, the opportunity for even more methane abatement from wastewater. Analysis shows that only 14 percent of eligible WWTFs are abating methane through biogas & RNG systems.

Synthetic Natural Gas (Bio-SNG)

Synthetic natural gas from gasification of biomass (Bio-SNG) is produced using a wide range of biomass materials such as forestry or agricultural residues while generating a relatively low GHG impact. Production of Bio-SNG in Canada is currently near zero, likely due to a higher cost of production relative to fossil natural gas and to biogas & RNG systems. A 2010 study showed, however, that the land area within 100 km of Canada's network of natural gas pipelines was capable of producing enough biomass to produce volumes of Bio-SNG, equivalent to 16-63 percent of Canada's current natural gas use at the time.

APPLICATIONS

RNG is interchangeable with conventional fossil-based natural gas and can be injected into energy networks as a substitute for conventional natural gas. RNG can replace fossil natural gas to produce electricity, heat buildings, and provide thermal heat for industrial use. RNG can also be used as a vehicle fuel after it is converted to compressed natural gas (CNG) or liquefied natural gas (LNG). Blending RNG into Canada's natural gas distribution networks displaces conventional natural gas and decarbonizes the gaseous fuel stream in Canada.

1.2 LOW-CARBON HYDROGEN

The majority of hydrogen is produced using natural gas in a process called steam methane reforming. The hydrogen molecules are stripped out of methane leaving carbon molecules that readily combine with oxygen to produce CO_2. The CO_2 is typically vented to atmosphere, adding to climate change. This production pathway is often labeled as "grey hydrogen". Low-carbon hydrogen can, however, be created from two key technologies-electrolysis, and steam methane reforming with carbon capture and storage. These production pathways are often labeled as "green hydrogen" and "blue hydrogen", respectively.

SOURCES AND CURRENT STATUS

Blue Hydrogen

Canada is one of the top ten global producers of hydrogen today, producing large volumes via the typical steam methane reforming process. If the CO_2 created via the process can be captured and stored permanently in geology rather than vented to atmosphere, the carbon intensity of the resulting hydrogen can be reduced by up to 90 percent. Canada has one of the largest geologic basins in the world suitable for carbon capture and storage. The Government of Canada writes that by 2050, Canada could grow production of hydrogen by a factor of seven to meet the potential for increasing domestic demand.

Green Hydrogen

Green hydrogen is produced by using electrolyzers and a clean electricity source such as hydro power or wind power to split water into hydrogen and oxygen. The resulting hydrogen is very pure and can be used directly in end-use applications. Considering that 82 percent of Canada's electricity supply comes from either renewable or non-GHG-emitting sources, green hydrogen has enormous growth potential in Canada. The costs for green hydrogen production are currently higher than for grey or blue hydrogen but costs are on decline, and many analysts are anticipating green hydrogen will be on-par with costs for blue hydrogen within the next decade.

APPLICATIONS

Low-carbon hydrogen has a wide-range of potential uses including manufacturing fertilizer, petrochemicals and alcohols, and refining oil. Hydrogen can be used to decarbonize steel production, provide long-term energy storage for the power system, power vehicles and trains, in long-haul trucking and in shipping via ammonia.

CURRENT POLICIES AND ROLE FOR CLEAN GAS
KEY TAKEAWAYS

The federal climate change regulations and programs **do not provide strong support** for the **production of clean gas in Canada**.

A **limited number of provinces** have policies that would provide support for clean gas.

The opportunity to attain **significant GHG reductions via clean gas in Canada remains unrealized**. Additional policy signal is needed.

2 CURRENT POLICIES AND ROLE FOR CLEAN GAS

2.1 CURRENT GHG EMISSION REDUCTION REGULATIONS

The federal government and several provincial governments have instituted a number of policies that provide some support for clean gas.

Federal Carbon Pricing (Output-Based Pricing System)

The federal Output-Based Pricing System (OBPS) sets an emissions limit for each facility subject to the OBPS. Facilities that emit less than their emissions limit earn surplus credits they can sell or save for later use. As well, registered projects that prevent or avoid GHG emissions relative to "business as usual" GHG emissions can generate offset credits. Facilities that emit more than their annual emissions limit must address excess emissions by submitting credits.

The federal OBPS only applies, however, in those provinces and territories that do not otherwise have an equivalent carbon pricing regime for large emitters. Currently, this is just Manitoba, Prince Edward Island, Nunavut and Yukon. Further, there are currently no quantification protocols in place under the federal offset system that would enable clean gas projects to generate offset credits, and even if there was, **the small demand for compliance credits from these four relatively small jurisdictions would not deliver much support for clean gas overall**.

Federal Clean Fuel Regulations

The federal Clean Fuel Regulations require suppliers of gasoline and diesel to gradually reduce the carbon intensity of the fuels they produce and import into Canada. The CFR provides a few avenues for producers of clean gas to generate CFR compliance credits. Proponents can generate credits for the amount of clean gas supplied for vehicle use (e.g. CNG). Producer or importers of clean gas (e.g. biogas, renewable gas, and hydrogen) can also generate credits for the volumes produced or imported. Obligated parties can, however, only utilize these gaseous class credits for a maximum of 10 percent of compliance. The **CFR does not deliver substantive support for clean gas**.

Provincial Regulations: British Columbia

The British Colimbia (B.C.) Greenhouse Gas Reduction Regulation (GGRR) first introduced in 2012 allows the province to prescribe undertakings which utilities may choose to carry out to reduce GHG emissions while recovering the costs in rates. The GGRR includes a renewable portfolio allowance of up to 5 percent renewable gas on the natural gas system, increasing up to 15 percent of the total annual supply by 2030. The regulation also enables utilities to produce, purchase and distribute green hydrogen, waste hydrogen and synthetic gas through the natural gas system to their customers. This policy has resulted in B.C. utilities tripling the proportion of clean gas in its system in 2021 and again in 2022.

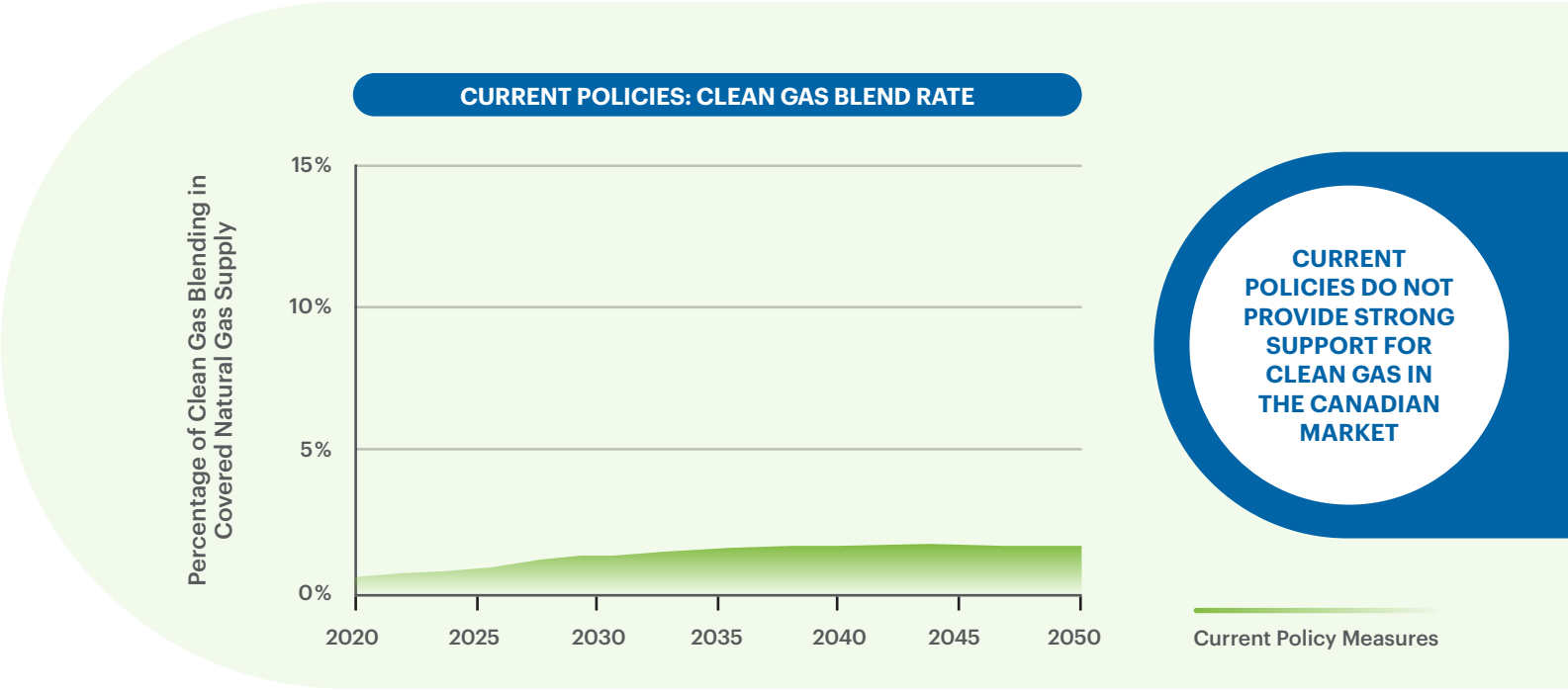
Provincial Regulations: Québec

The 2030 Energy Policy Action Plan first released in 2016 enables the province to set an increasing requirement for minimum renewable natural gas in the natural gas system, beginning with a requirement for 1 percent of total volume in 2020, and increasing to 5 percent of the total volume in 2025. In 2020 Québec announced into to further that requirement to 7 percent volume by 2028 and 10 percent by 2030. In 2022, the Government of Québec also released a new green hydrogen and bioenergy strategy including a renewed commitment to 10 percent renewable source in the natural gas network by 2030 and replacing all fossil sources of hydrogen with green hydrogen.

2.2

CURRENT POLICIES AND GHG EMISSION REDUCTIONS FROM CLEAN GAS

The Canadian Biogas Association and the Clean Gas Coalition have analyzed the impact of current government policies on the demand for clean gas in Canada. Modeling shows that together current policies would increase the percentage of clean gas in the sectors covered from 0.6 percent in 2020 to 1.7 percent by 2040. **At less than 2 percent blend rate by 2040, the current federal and provincial policies and programs do not provide strong support for clean gas in the Canada domestic market**. The opportunity to attain GHG reductions via clean gas remains largely unrealized. **Additional policy signal is needed**.



NET ZERO TARGET AND GHG EMISSIONS REDUCTION GAP
KEY TAKEWAYS

Canada has set a target to reduce national GHG emissions 40-45 percent relative to 2005 levels by 2030.

Even if all existing and announced federal and provincial climate change policies and programs are fully instituted, **there will still be a significant gap with GHG emissions above the 2030 national target**. More policy measures are needed.

Clean gas can bring **GHG emission reductions** and help contribute toward Canada's climate goals.

3 NET ZERO TARGET AND GHG EMISSIONS REDUCTION GAP

3.1 CANADA'S GHG EMISSION REDUCTION COMMITMENTS

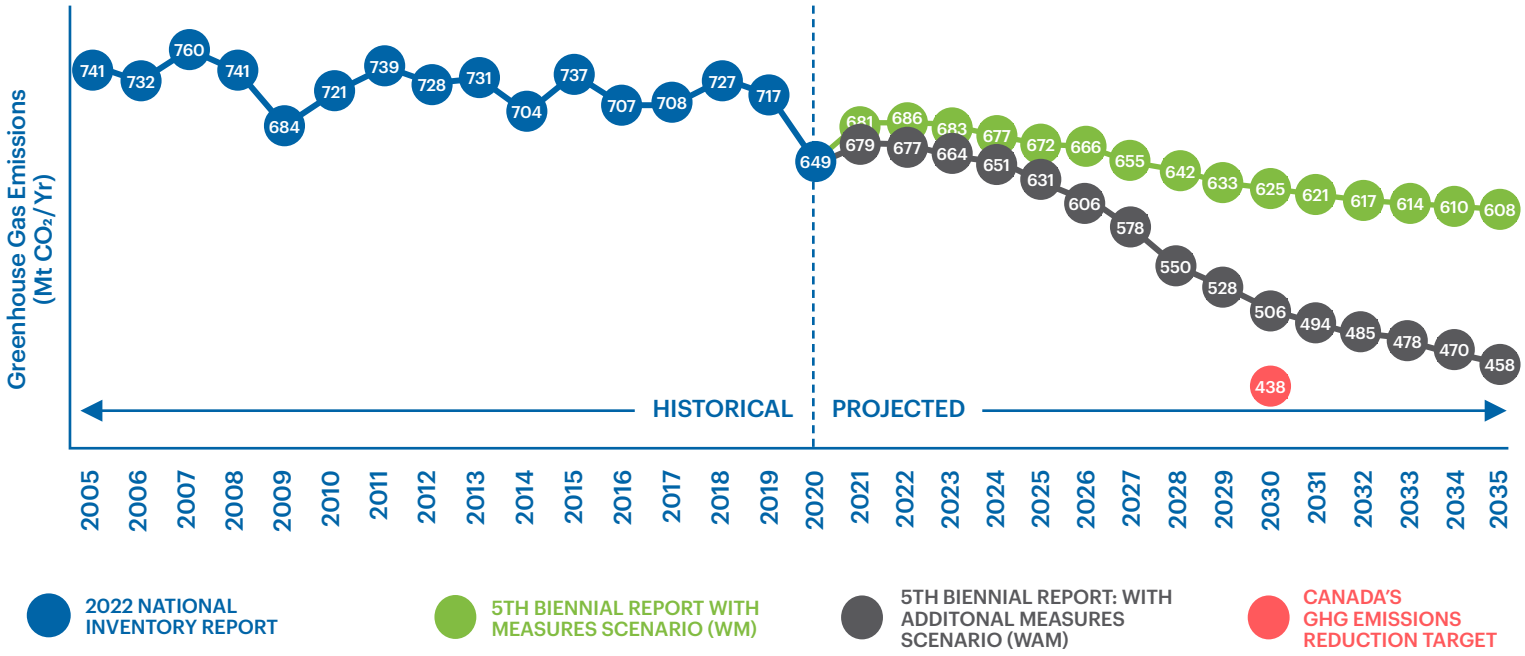
Under the United Nations Framework Convention on Climate Change (UNFCC) Paris Agreement Canada has submitted a target to reduce GHG emissions 40-45 percent below 2005 levels by 2030. Canada's national GHG emissions were 731 Mt in 2005. To meet this target, Canada will then have to reduce GHG emissions to no more than 438 Mt CO_2e by 2030.

3.2 PROGRESS TOWARDS CANADA'S GHG EMISSIONS REDUCTION TARGET

Parties to the Paris Agreement must submit a report every two years with details on current national GHG inventory and projections on the expected impacts of the suite of existing measures. In its most recent Biennial Report, analysis by the Government of Canada shows that with all federal and provincial policy measure introduced thus far (i.e. With Measures Scenario) national GHG emissions will be 625 Mt in 2030, and if regulations that have been announced but that have not yet been implemented are also considered (i.e. With Additional Measures Scenario) national GHG emissions will be 506 Mt by 2030. Under best scenario, **this leaves a gap of 67 Mt of GHG emissions that Canada will still need to address to deliver on our Paris Agreement target**.

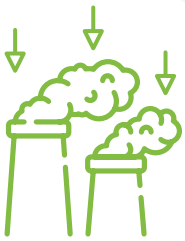
TO REACH THE PARIS AGREEMENT TARGET, CANADA WILL HAVE TO REDUCE GHG EMISSIONS TO NO MORE THAN 438 MT CO_2e BY 2030

CANADA'S GHG EMISSIONS REDUCTION TARGET



POLICY PROPOSAL
KEY TAKEAWAYS

The Clean Gas Standard would result in **increased introduction of clean gas** in the market, from 0.6 percent of the natural gas stream in 2020 to 4.2 percent by 2030 and 13.3 percent by 2040.



The Clean Gas Standard **delivers significant incremental GHG emission reductions**: 4.8 Mt of emission reductions in 2030, 19 Mt of emission reductions in 2040.

Incremental costs to end-users as a result of the Clean Gas Standard are **estimated to be minimal**, an overall increase of less than 2 percent in 2030.

4 POLICY PROPOSAL

4.1 CLEAN GAS STANDARD

Climate change is a significant and pressing issue that requires concerted and comprehensive efforts to address. No solutions can be left behind. A Clean Gas Standard can deliver GHG reductions for Canada and help close the gap to achieve national GHG emission reduction targets while utilizing current infrastructure.

Requirement

Primary Suppliers will have a requirement for minimum clean gas content based on the volume of natural gas that they deliver to end users. This minimum volume requirement for clean gas will increase with time. The obligation will be calculated on a corporate and nation-wide basis. Compliance with the regulation is demonstrated through the ownership of a sufficient number of compliance units.

Covered Fuels

The regulation would cover all end-uses for natural gas in Canada except natural gas used as feedstock in industrial production, and natural gas used in the electricity and petroleum sectors if already addressed via sector-specific regulations.

Clean Gas

Clean gases that are eligible to generate compliance credits are: biogas, renewable natural gas, synthetic natural gas, and low-carbon hydrogen. To be eligible to generate a credit, the volume of clean gas must be produced or imported into the Canadian domestic market.

Each eligible clean gas will have a Maximum Carbon Intensity. To be eligible to generate units, each clean gas must have a carbon intensity that does not exceed the Maximum Carbon Intensity for that compliance period. The Maximum Carbon Intensity for hydrogen will be set at a level that is inclusive of blue and green hydrogen, but would exclude hydrogen produced from natural gas without integrated carbon capture and sequestration.

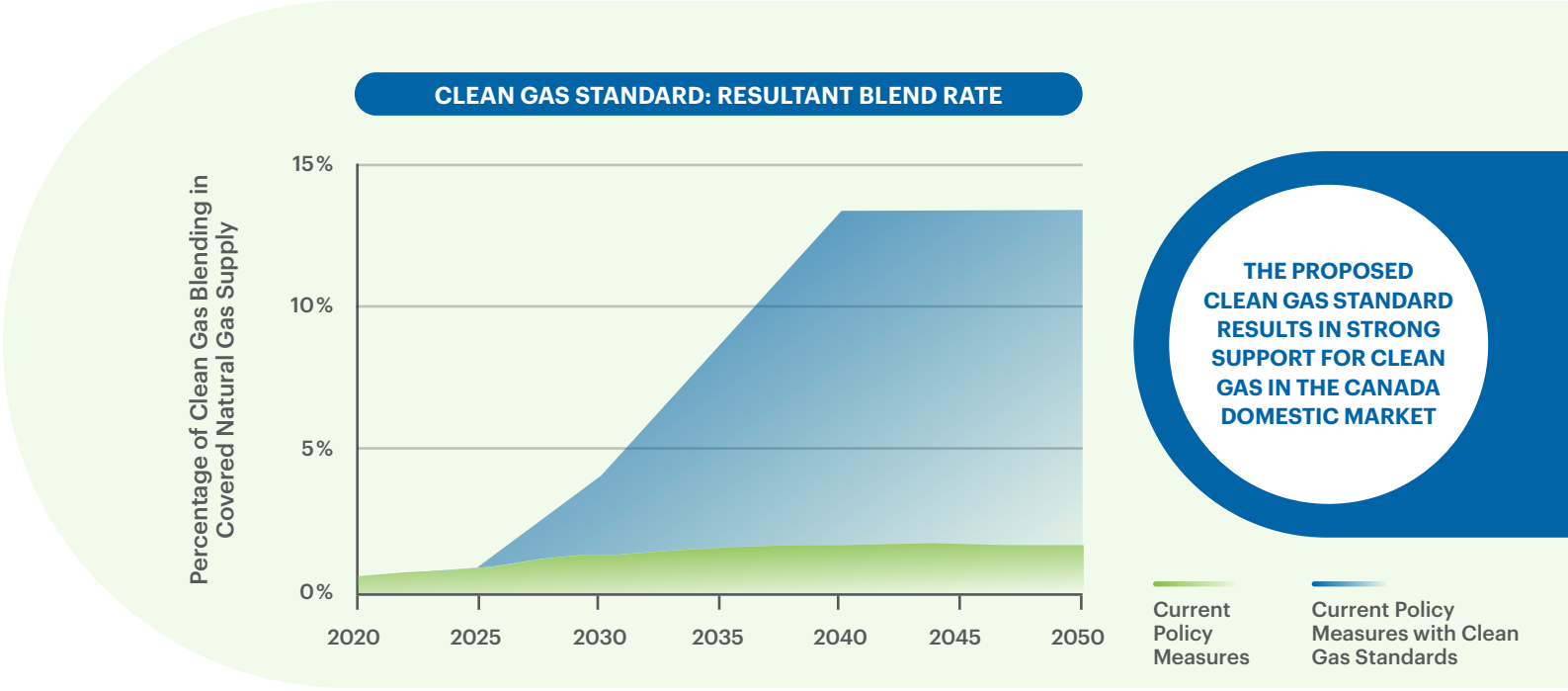
Credit Generation

Companies that produce or import eligible clean gas into Canada may create compliance units. Producers and importers of clean gas fuels would generate units based on the volume of eligible clean gas they supply to the Canadian market annually. All eligible clean gas supplied to the Canadian market will be able to generate units, including fuel used to comply with other federal and provincial mandates and regulations.

4.2

CLEAN GAS DEMAND AS RESULT FROM THE CLEAN GAS STANDARD

The proposed Clean Gas Standard results in strong support for clean gas in the Canada domestic market. With the Clean Gas Standard the percentage of clean gas blended in the sectors covered by the modeling increases from 0.6 percent in 2020, to 4.2 percent in 2030, and to 13.3 percent by 2040.



4.3

GHG EMISSION REDUCTIONS FROM THE CLEAN GAS STANDARD

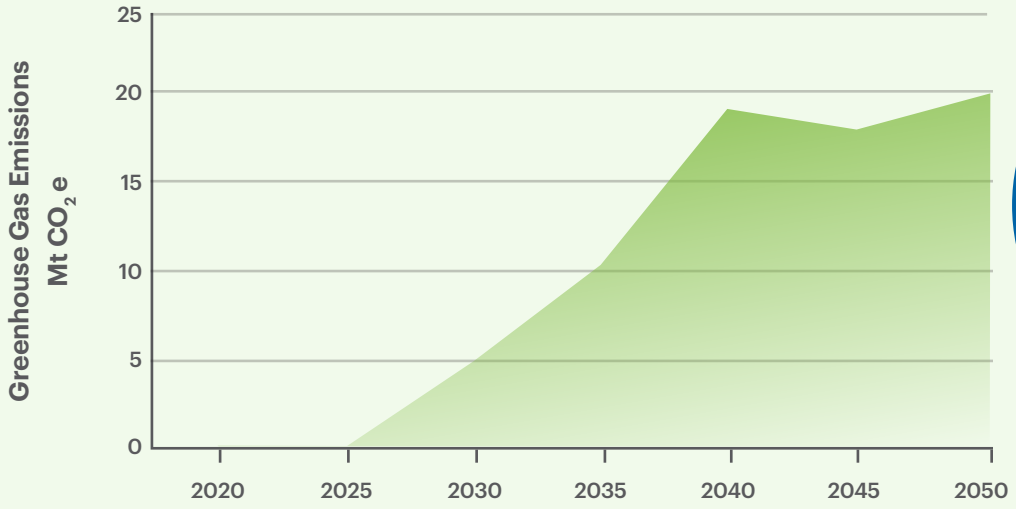
The proposed Clean Gas Standard delivers significant incremental GHG emission reductions — 4.8 Mt of emission reductions in 2030, and increasing until reaching 19 Mt of emission reductions in 2040.

4.4

COST TO END-USERS

The majority of the cost for regulated companies to comply with the Clean Gas Standard would be passed along to end users. Incremental costs to end-users are estimated to be $0.25/GJ by 2030, an overall increase of less than 2 percent, or an additional $21.00/yr/household for residential end-users.

CLEAN GAS STANDARD : GHG EMISSIONS REDUCTIONS



SIGNIFICANT GHG EMISSIONS REDUCTIONS WITH A COST INCREASE OF LESS THAT 2 PERCENT TO END-USERS

IN CONCLUSION

Biogas, RNG, and low-carbon hydrogen can be utilized by end users in a wide range of applications. The different federal and provincial climate change regulations and programs already in place do not provide strong support for the production of clean gas in Canada.

Modeling by the Government of Canada shows that even if all current and proposed federal and provincial climate change policies and programs are fully instituted, Canada will still not meet the 2030 national GHG emission reduction targets.

The proposed Clean Gas Standard would require suppliers of natural gas to lower the carbon intensity of the natural gas fuel they provide. The Clean Gas Standard would result in significant increase in demand for clean gas and deliver significant incremental GHG emission reductions. A Clean Gas Standard can decarbonize the natural gas stream and result in incremental GHG reductions for Canada while utilizing current infrastructure.

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