Environment and Climate Change Canada
Environnement et Changement climatique Canada
Canada

CLEAN FUEL STANDARD

Regulatory Design Paper

December 2018

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1. Introduction

The Government of Canada is developing a Clean Fuel Standard to reduce Canada's greenhouse gas emissions through the increased use of lower carbon fuels, energy sources and technologies. The objective of the Clean Fuel Standard is to achieve 30 million tonnes of annual reductions in greenhouse gas emissions by 2030, making an important contribution to the achievement of Canada's target of reducing national emissions by 30% below 2005 levels by 2030. The Clean Fuel Standard will complement carbon pollution pricing by reducing greenhouse gas emissions throughout the lifecycle of fuels and by driving investments in cleaner fuels and in clean technology in Canada.

The Clean Fuel Standard regulations will set separate requirements for liquid, gaseous and solid fossil fuels. The regulations for the liquid stream will be developed first, with the draft regulations for the liquid stream planned for publication in *Canada Gazette*, Part I in spring / summer 2019 and final regulations in 2020.

This document presents key elements of the design of the Clean Fuel Standard regulations, building on the features described in the Clean Fuel Standard regulatory framework that was published in December, 2017.[1] As the liquid stream regulations will be published first, it focuses on requirements for this stream, but it also provides some information on the gaseous and solid streams.

Key design elements covered in this paper include:

- **Requirement for the liquid stream:** the carbon intensity of liquid fuels will have to be reduced by 10 g of CO2e per MJ below their reference carbon intensity by 2030. This corresponds to a carbon intensity reduction of approximately 11% and up to 23 Mt of incremental emissions reductions in 2030.
- **Actions that generate credits, including fuel switching by end-users in the liquid stream:** credits can be generated when some fuel users switch from a higher carbon intensity fuel to a lower carbon intensity fuel by changing or retrofitting combustion devices when a liquid transportation fuel is displaced by natural gas, propane or a non-carbon energy carrier (e.g., electricity, hydrogen) or when fuels are switched along the production chain of a fossil fuel.
- **Early action credits** will be allowed for actions taken in all three fuel streams after the publication of final regulations for the liquid stream, which is expected to occur in 2020.

[1] Clean Fuel Standard Regulatory Framework (December 2017): http://gazette.gc.ca/rp-pr/p1/2017/2017-12-23/html/notice-avis-eng.html

- **Trading of credits between fuel streams:** 10% of a company's carbon intensity compliance obligation for any stream will be allowed to be met with credits from other streams.
- **Indirect land use changes** will not be accounted for in calculating the lifecycle carbon intensity of a fuel at this time. However, we are considering using proxies to account for some of these indirect land use impacts.

2. Application of the Clean Fuel Standard

The Clean Fuel Standard will apply to all those who produce, import and in some cases distribute fossil fuels in Canada. Regulated parties that have a carbon intensity compliance obligation will be referred to as fossil fuel primary suppliers in this paper.

Liquid fossil fuel primary suppliers will be required to reduce the carbon intensity of their fuels and will have a carbon intensity compliance obligation based on the amount of liquid fossil fuel they produce and import in Canada.

The carbon intensity requirements for gaseous and solid fossil fuels primary suppliers will be set at a later date. Parties that are not fossil fuel primary suppliers will be able to participate in the Clean Fuel Standard as voluntary credit generators.

Parties regulated under the Clean Fuel Standard

Fossil Fuel Primary Supplier

The ***fossil fuel primary supplier*** is the party responsible for meeting carbon intensity requirements for the fossil fuels they supply. These parties can also generate credits.

For liquid fossil fuels, the fossil fuel primary suppliers will be:

- Persons who produce liquid fossil fuels; and
- Persons who import liquid fossil fuels.

For gaseous fuels, the fossil fuel primary suppliers will be[2]:

- Persons who process or import natural gas[3]
- Persons who produce or import propane[4]; and

[2] The carbon intensity requirements for gaseous and solid fossil fuel primary suppliers are planned to come into effect in 2023.

[3] Natural gas includes liquefied natural gas and compressed natural gas.

[4] Propane producers include natural gas processors with fractionating capacity, straddle plants, stand-alone fractionators, refiners and upgraders that produce propane.

- Persons who deliver pipeline quality natural gas to end-users[5].

For solid fuels, the fossil fuel primary suppliers will be[2]:

- Persons who produce solid fossil fuels; and
- Persons who import solid fossil fuels.

Voluntary Credit Generator

A ***voluntary credit generator*** is a party other than a fossil fuel primary supplier (i.e., does not have an obligation to reduce carbon intensity) that chooses to generate credits under the Clean Fuel Standard by:

- lowering the carbon intensity of a fossil fuel throughout its lifecycle;
- producing or importing renewable or low-carbon fuels for use in Canada; or
- supporting or undertaking a specified form of end-use fuel switching.

Fuels subject to the Clean Fuel Standard

All fossil fuel supplied for use in Canada will be covered by the Clean Fuel Standard, with a few exemptions.

Covered Fuels

For liquid fuels, these include: gasoline, diesel fuel, jet fuel, kerosene and light and heavy fuel oils. For gaseous fuels[2], these include natural gas (including liquefied natural gas and compressed natural gas) and propane.

For solid fuels[2] these include coal, petroleum coke and some solid heavy fuel oils.

Non-fossil fuels will not have a carbon intensity compliance obligation under the Clean Fuel Standard.

Exemptions

The Clean Fuel Standard will not apply to:

- non-combustion end-uses of fossil fuels (e.g., solvents or diluents);
- fossil fuels used primarily as feedstocks in industrial processes (e.g., steel production);
- fossil fuels that are exported from Canada;
- fossil fuels that are in transit through Canada;
- fossil aviation gasoline;
- fossil fuels used for scientific research;

[5] Natural gas distributors include transmission pipeline companies for direct sales and distribution companies.

- fossil fuel being imported in a fuel tank that supplies the engine of a conveyance that is used for transportation by water, land or air (e.g., the fuel tank of a car); and
- coal combusted at facilities that are covered by the federal coal-fired electricity greenhouse gas emission regulations.

The Clean Fuel Standard may set record keeping or reporting requirements for some of these exemptions.

Aviation Fuels

Jet fuel that is used domestically will be subject to the Clean Fuel Standard but jet fuel that is used for international flights will not. Renewable or other low-carbon intensity aviation fuel produced and imported will be eligible to generate credits under the Clean Fuel Standard. Consideration is being given to the use of a multiplying factor for low carbon aviation fuel credits.

Self-Produced and Used Fuels

Fossil fuels are sometimes produced and used on-site by fossil fuel producers in the process to produce a finished fuel or in their facility operations. This fuel is referred to as "self-produced and used fuel". The Clean Fuel Standard will set a separate carbon intensity reduction requirement for some self-produced and used fuels:

- In the liquid fuel stream, these include commercial fuels (including diesel fuels, gasolines and light and heavy fuel oils) produced at refineries and upgraders.
- In the gaseous fuel stream, self-produced and used fuels will not have separate carbon intensity reduction requirements. The lifecycle carbon intensities of the fossil fuels produced from these fuels will account for their emissions. These include the associated gases produced from crude oil and bitumen production and refinery and upgrader still gas.
- In the solid fuel stream, some self-produced and used fuels will have a separate carbon intensity compliance obligation. These include coal used at coal mines and petroleum coke produced at refineries and upgraders. The carbon produced at refineries and upgraders from catalyst regeneration will not have a separate carbon intensity reduction requirement.
- Industrial self-produced and used fuels (by non-fossil fuel primary suppliers) will not have carbon intensity reduction requirements.

3. Calculating Carbon Intensity

For renewable fuels and other low carbon fuels and energy sources, carbon intensities will be differentiated by type and origin of the fuel to reflect the greenhouse gas emissions associated with different feedstocks and production processes.

A Canadian average carbon intensity value will be determined for each fossil fuel produced or imported in Canada. As set out in the Clean Fuel Standard regulatory framework[6], the regulation will not differentiate among crude oil types, or on whether the crude oil is produced in or imported into Canada. An average carbon intensity value of crude oil used in Canada will be used.

For natural gas-derived fuels, the Clean Fuel Standard will not differentiate between sweet and sour gas, or by origin of the gas. A Canadian average carbon intensity value for natural gas and propane produced and imported and consumed in Canada will be determined. The treatment of liquefied natural gas and compressed natural gas remains to be established.

Indirect Land Use Change

Direct land use change happens when a particular parcel of land is converted to grow crops for biofuel production. Indirect land use changes occur in response to land or crops being diverted for biofuel production elsewhere in the global agricultural system. Indirect land use change represents changes that would not have happened without an increase in biofuel demand. Carbon intensity values will not include an estimate of the impact of indirect land-use change on greenhouse gas emissions at this time, but will include direct land use change.

Consideration is being given to including criteria designed to protect against significant adverse indirect land use impacts. These could include, for example:

- Ineligibility or limits on certain types of feedstock that takes into account biodiversity and critical species habitat, land type (virgin or cultivated) and footprint, the conversion of land with high carbon stock or other adverse land use impacts;
- Ineligibility or limits on feedstock from jurisdictions that do not have strong anti-deforestation and other measures to limit cultivated land expansion;
- Mandatory tracking of feedstock, including the jurisdiction of origin, to enable verification of limitations on feedstock types permitted and to inform future policy decisions.

[6] Clean Fuel Standard Regulatory Framework (December 2017): http://gazette.gc.ca/rp-pr/p1/2017/2017-12-23/html/notice-avis-eng.html

The Clean Fuel Standard will include a requirement for a five-year review in 2025. Among other things, that review will consider whether to account for indirect land-use change, and if so, what appropriate methodologies that could be used to account for indirect-land use change.

Fuel Life Cycle Assessment Modelling Tool

Environment and Climate Change Canada is developing a new Fuel Life Cycle Assessment Modelling tool to support the Clean Fuel Standard.[7] This tool will be used to determine the carbon intensity of fuels used in Canada. Environment and Climate Change Canada will make the modelling tool available at no cost. Periodic updates to the background data sets in the model are expected (considering every three to five years).

Fossil fuel carbon intensity values

The Canadian average carbon intensity values for fossil fuels will be expressed in grams of carbon dioxide equivalents (g CO_2e) per unit of energy in megajoules (MJ), and will account for greenhouse gas emissions over the lifecycle of a given fuel. The Canadian average carbon intensity of the fuels will be calculated from the Fuel Life Cycle Assessment Modelling Tool under development by Environment and Climate Change Canada, based on 2016 data. These values will be used as the baseline for setting the carbon intensity reductions that fossil fuel primary suppliers will have to meet for the fuels they supply.

Imported liquid fossil fuels, such as gasoline or other refined petroleum products, and the petroleum portion of blended fossil fuels (e.g., E10) will be assigned the same carbon intensity value as the calculated Canadian average values.

The national crude slate carbon intensity value will be reviewed every three to five years.

Carbon intensity values of renewable and other low-carbon intensity fuels

Producers of renewable and other low carbon fuels will be able to generate Clean Fuel Standard compliance credits. The regulations will require the use of the Fuel Life Cycle Assessment Modelling Tool to calculate facility-specific carbon intensity values and their submission to Environment and Climate Change Canada for approval, along with supporting data and verification by a third party.

[7] The contract for the development of the Fuel Life Cycle Assessment Modelling Tool was awarded to EarthShift Global. A Government of Canada Technical Advisory Committee, led by Environment and Climate Change Canada with representatives from Agriculture and Agri-food Canada, Natural Resources Canada, and the National Research Council is supporting this work.

The same requirements will apply to imported renewable or other low carbon fuels, imported neat or the portion imported in a blend with petroleum fuel (e.g., E10). For imported fuels, there will also be requirements to submit data, including about feedstock and energy inputs that do not originate in Canada.

Carbon Intensity Values

Upon approval by Environment and Climate Change Canada, a carbon intensity value will be valid until criteria specified in the regulations requiring a review or update of the value are triggered. Carbon intensity values will also be a part of a credit generator's annual third-party verification requirements. The input data supporting each fuel's carbon intensity (e.g., feedstock type, energy requirements, etc.) will be verified and carbon intensity values could be revoked or updated if there are changes noted that increase the carbon intensity of the fuel or if input data is found to be incorrect, out of date or missing. Carbon intensity values will also be subject to review by Environment and Climate Change Canada.

Minimum Threshold Requirements

Process changes that reduce the carbon intensity of a renewable or low-carbon fuel could trigger an updated carbon intensity request. A minimum threshold of an improvement of 1g CO_2e/MJ or 5% difference between the current value and the proposed new value, whichever is greater, will be required in order to submit a request for a new carbon intensity value.

Energy Effectiveness Ratio

The energy efficiency ratio measures the relative efficiency with which a vehicle or engine uses a specific fuel. The higher the energy effectiveness ratio is, the more efficient the use of the fuel or energy. Some energy effectiveness ratios may be developed for credits generated from specified end-use fuel switching, for example from displacing gasoline with electricity to power light-duty and heavy-duty vehicles.

4. Carbon Intensity Reduction Requirements

Liquid fossil fuel primary suppliers will have carbon intensity reduction requirements for each fuel they produce and import, for each annual compliance period (from January 1st to December 31st). Carbon intensity reduction requirements will be expressed in grams of carbon dioxide equivalents (g CO_2e) per unit of energy in megajoules (MJ), and will account for greenhouse gas emissions over the lifecycle of a fuel. The carbon intensity reduction

requirements will become more stringent over time. Non-fossil fuels will not have a carbon intensity reduction requirement.

Liquid fossil fuel primary supplier annual compliance obligation

The Clean Fuel Standard will set an annual maximum standard (or limit) carbon intensity for each fossil fuel produced and imported in Canada. The carbon intensity standard for 2030 will require a 10 g of CO_2e per MJ reduction from the Canadian average carbon intensity of each fossil liquid fuel in 2016, as determined by the Fuel Life Cycle Assessment Modelling Tool. This represents a decrease of 10% to 12% in carbon intensity below 2016 fossil fuel carbon intensity values, depending on the fuel type.

Fossil fuel primary suppliers will generate CO_2e exceedances annually based on the amount (expressed in MJ of energy) of each fossil fuel they produce and import for use in Canada. The sum of the CO_2e exceedances from each fuel will be their annual carbon intensity compliance obligation. Each CO_2e exceedance will represent one tonne of carbon dioxide equivalent (t CO_2e).

At the end of each compliance period, each fossil fuel primary supplier will need to cancel the number of credits equal to their carbon intensity compliance obligation for that year plus any CO_2e exceedances carried forward from previous years.

Annex 1 presents the methodology for calculating the annual carbon intensity obligation.

5. Credit Generation

The Clean Fuel Standard will allow three methods for generating credits:

1. actions that reduce the carbon intensity of the fossil fuel throughout its lifecycle;
2. the supply of renewable and other low-carbon intensity fuels; and
3. some end-use fuel switching.

Credits may be generated by fossil fuel primary suppliers or by voluntary credit generators that undertake these actions.

Fuels that can be used in more than one fuel stream will generate credits in the stream where they are actually used (e.g., natural gas used to displace liquid fuels in the transportation sector would generate credits in the liquid stream).

Compliance Category 1: Actions that reduce the carbon intensity of the fossil fuel throughout its lifecycle

The Clean Fuel Standard will recognize actions that reduce greenhouse gas emissions at any point in the lifecycle of the fossil fuel. These may include actions such as process improvements, electrification, switching from a higher carbon intensity fuel to a lower carbon intensity fuel and carbon capture and storage (i.e., actions that reduce the lifecycle carbon intensity of the obligated fuel). These actions can be taken by fossil fuel primary suppliers and by others upstream or downstream of a refinery.

A project or action that reduces emissions throughout the fuel lifecycle in only one stream will generate credits in that stream. If the carbon intensity of fuels is reduced in more than one stream (e.g. at refineries that produce liquid, solid and gaseous fuels), the credit generator will be allowed to select which stream the credits are generated in.

The ability of an action or type of project to generate a credit will be governed by a protocol, some of which may be developed by Environment and Climate Change Canada. The Clean Fuel Standard regulations will also allow parties to submit a protocol to Environment and Climate Change Canada if the existing protocols don't apply to their project. The regulations will specify the requirements for developing and obtaining approval of a protocol.

Once a protocol has been approved, parties wishing to obtain credits by undertaking a project covered by the protocol will be required to submit the information specified in the protocol. This information will need to be accompanied by third party verification. An application for a project may include an aggregate of emission reductions from multiple facilities owned or operated by the fossil fuel primary supplier or the voluntary credit generator. The project must yield measurable greenhouse gas emission reductions above an annual threshold.

Each protocol will define (among other things):

- Information to be submitted (i.e. reporting requirements);
- Methodology to quantify and calculate carbon intensity reductions, emission reductions and credits generated;
- Verification methodology;
- Credit generation threshold (a minimum threshold of 10kt/year by project type, aggregated at a company level, is being considered); and
- Time limits (Environment and Climate Change Canada is considering limiting the number of years during which a project can generate credits before the project approval needs to be renewed).

The Clean Fuel Standard will recognize the following projects as eligible for credit generation, as long as the project is compliant with the criteria set in the relevant protocol:

- projects that allow compliance with, or generate credits in a federal, provincial or territorial carbon pricing system; and
- projects that receive funding under federal, provincial, territorial or municipal mechanisms.

However, the Clean Fuel Standard will not allow the generation of credits for the following:

- actions that are legally required under a federal, provincial, territorial or municipal law or regulations; and
- projects that begin before the publication of the final regulations.

There will be no limitations for using credits generated under compliance category 1 in the credit and trading market (i.e. the credits would be tradeable or could be used to balance deficits).

Compliance Category 2: Supplying low-carbon fuels

The Clean Fuel Standard will allow producers and importers of renewable or other low-carbon fuels to generate credits, based on the amount (energy in MJ) of renewable or other low carbon fuel, they supply to the Canadian market annually.

Eligible fuels must have a carbon intensity lower than the fuel stream credit reference carbon intensity value, and may include (but not limited to): renewable natural gas; ethanol and renewable diesel; biodiesel; hydro-treated vegetable oil; alternative jet fuel; hydrogen; biogas; synthetic fuels; renewable propane; biomass; wood pellets; biochar; municipal solid waste; and forestry and agricultural residues.

Credit Generation

Credits will be generated based on the difference between the carbon intensity of the renewable or low-carbon fuel and the credit reference carbon intensity value of the fuel stream in which it is used. All renewable or other low carbon fuel supplied to the Canadian market will be able to generate credits under the Clean Fuel Standard, including fuel used to comply with existing renewable fuel mandates.

Renewable Fuel Volumetric Mandate

The federal *Renewable Fuels Regulations* require 5% renewable content in gasoline and 2% renewable content in diesel fuel and heating distillate oil. The Clean Fuel Standard will

incorporate the volumetric mandate of the *Renewable Fuels Regulations* when the liquid fuel regulations under the Clean Fuel Standard come into force, in 2022. Fossil fuel primary suppliers will be required to demonstrate that they meet the requirements for 5% renewable content in gasoline and 2% renewable content in diesel fuel and heating distillate oil. This could be done through the credit trading system. The Clean Fuel Standard will not set renewable volumetric requirements for natural gas.

Point of Credit Generation

Credits for renewable and low carbon fuels will be generated by the producer and importer of those fuels. For renewable fuels that are imported in a blended product (e.g., E10), the credit will go to the importer of the blended fuel. Environment and Climate Change Canada is considering allowing the transfer of the credit generation to parties downstream of production and importation to points of blending, and is seeking feedback on this option.

Annex 1 provides the calculations for credit generation from renewable or low carbon fuels.

Compliance Category 3: Specified end-use fuel switching

The Clean Fuel Standard will allow some end-use fuel switching to generate credits. End-use fuel switching occurs when an end-user of fuel changes or retrofits its combustion devices (e.g., an engine) to be powered by another fuel or energy source. End-use fuel switching does not reduce the carbon intensity of the fossil fuel. Instead, it reduces greenhouse gas emissions by displacing the fossil fuel with a fuel or energy with lower carbon intensity.

In the liquid stream, end-use fuel switching from a higher carbon intensity fossil fuel used for transportation to the following lower carbon intensive fuels will be eligible for credit generation: natural gas, propane and non-carbon energy carriers, such as electricity or hydrogen. For the gaseous and the solid fuel streams, the type of end-use fuel switching that may be recognized for credit generation is still to be determined.

End–Use Fuel Switching to Electricity

Electricity used by light duty and heavy duty electric vehicles will generate credits proportional to the avoided emissions when factoring lifecycle emissions of the fossil fuels being displaced and of the electricity being used to charge the electric vehicles. Credits for light-duty passenger electric vehicles and on-road heavy-duty electric vehicles will be calculated as a substitute to gasoline and diesel, respectively. A baseline of existing electric vehicles and the estimated associated electricity use in Canada in a reference year (e.g., 2016) will be deducted from future electricity use for electric vehicle charging in the calculations for credits.

The Clean Fuel Standard will allow credits be generated by the following parties:

- distribution utilities will generate credits for home charging of electric vehicles;
- electric vehicle charging network operators will generate credits for public charging of electric vehicles; and
- site hosts will generate credits for private / commercial charging of electric vehicles.

Environment and Climate Change Canada is considering whether the Clean Fuel Standard should allow other actors (other than distribution utilities, site hosts and network operators) to generate credits, including who should be the credit generator for the charging of heavy-duty electric vehicles.

The regulation will allow credits to be generated relating to electric off-road vehicles and hydrogen fuel cell vehicles in a similar manner as on-road electric vehicles, with credit calculations based on the fuel being displaced and the energy efficiency ratio for the type of vehicle being displaced.

A requirement for recipients of these credits (utilities, network operators and site hosts) to recycle all or a minimum percentage of the revenues generated from electric vehicle charging credits to further incent the adoption of zero-emission vehicles is being considered.

Early credit generation

The Clean Fuel Standard will allow credits to be generated from each fuel stream (liquid, gaseous and solid) beginning on the date of publication of the final regulations for the liquid fuel stream, which is expected in 2020. All solid or gaseous fuel credits generated before the solid or gaseous fuel stream regulations come into effect can be banked for future compliance.

Trading between fuel streams

When requirements for the liquid fuel stream come into effect, a fossil fuel primary supplier will be able to meet up to 10% of its liquid fuel stream obligation with credits from the gaseous or solid fuel streams.

After all three fuel stream requirements are in effect, the Clean Fuel Standard will allow fossil fuel primary suppliers in each stream to discharge a modest percentage of their carbon intensity compliance obligation using credits from the other fuel streams. Environment and Climate Change Canada is considering setting this limit at 10%.

6. Credit Trading System

Participation in the credit trading system

Participants in the credit trading system include fossil fuel primary suppliers and voluntary credit generators. These participants will be able to generate, own and acquire credits. Environment Climate Change Canada is considering whether other parties should be permitted to participate in the system under limited conditions for the purpose of acting on behalf of smaller credit generating parties or aggregating credits.

A voluntary credit generator will be able to end its participation in the Clean Fuel Standard trading system (i.e., be relieved of reporting requirements) with appropriate record keeping and reporting requirements for cancelling banked credits or ending ownership of these credits.

Provisions to ensure the integrity of the credit and trading system

The Clean Fuel Standard will set requirements to ensure the integrity of the credit and trading system. These will include:

- A unique identification number will be assigned to each credit.
- Everyone who registers as a participant in the credit trading system will have to complete credit transfer forms and have their forms verified annually by a third party verifier.
- Environment and Climate Change Canada is considering requirements to put credits on hold for specified reasons.

Provisions to support the liquidity of the credit and trading systems

The Clean Fuel Standard will include various provisions to support the liquidity of the credit and trading system:

- Credits will not expire.
- There will be no limit to the number of credits that can be transferred among parties.
- There will be no limit to the amount of times a single credit can be transferred.
- Credits may be generated on a quarterly basis or annually, at the preference of the credit generator.
- Credits can be banked, with no limit on the amount of credits that can be banked.

Other provisions related to the credit market system

Reporting and Issuance of Credits

Credit generators will be required to submit a Fuel Transaction Report once a year, on February 28th, or quarterly if they want to generate credits on a quarterly basis. Environment and Climate

Change Canada will endeavor to deposit credits into each party's account within 10 working days of the receipt of the report. Credits may then be traded, banked or used for compliance.

A diagram showing the credit life-cycle (i.e. all the steps between undertaking an action that generates a credit and submitting the annual report) is included in Annex 2.

Transparency
While protecting confidential information, Environment and Climate Change Canada may publish the following information publically:

- Number of credits generated in a given period;
- Number of credits used to meet compliance;
- Number of credits traded in a given period; and
- Average credit price for a given period.

Credits cancelled for exported renewable and other low-carbon fuels

Credits generated for renewable and low-carbon fuels that are exported from Canada will be required to be cancelled. A mechanism will be developed under the Clean Fuel Standard that will require the cancellation of credits for all exported renewable and low-carbon fuels by the party that exports them.

7. Meeting Obligations

Each fossil fuel primary supplier must meet its carbon intensity compliance obligation for the compliance period by demonstrating through submission of its annual compliance report that it has retired a number of credits from its account that is equal to its carbon intensity compliance obligation for the compliance period plus any CO_2e exceedances carried forward. Fossil fuel primary suppliers may not borrow or use anticipated credits from future projected or planned carbon intensity reductions for compliance.

Credits generated under the federal output-based pricing system and other programs

Fossil fuel primary suppliers may not use credits that have been generated under another federal, provincial or territorial program or regulations, such as credits from the federal Output-Based Pricing System, for compliance under the Clean Fuel Standard.

However, as mentioned in Section 5, the Clean Fuel Standard will allow the generation of credits for actions that also generate credits or comply with federal, provincial or territorial

carbon pricing systems as long as these actions are otherwise compliant with the Clean Fuel Standard. For example, a refinery that undertakes a process improvement that reduces the carbon intensity of its facility may be entitled to surplus credits under the federal Output Based Pricing System. That same process improvement might also reduce the carbon intensity of the fuel it supplies. Credits would be allowed under the Clean Fuel Standard for that process improvement.

Calculation of the credit balance

The credit balance for fossil fuel primary suppliers will be calculated separately for each of the three fuel streams.

Additional compliance flexibilities

In addition to generating or acquiring credits from other participants in the credit trading system, a primary fossil fuel supplier will have additional compliance flexibilities:

- **CO2e exceedance carry-forward:** 10% of a company's annual carbon intensity compliance obligation (CO_2e exceedances) will be allowed to be carried-forward into the next compliance period, with a maximum carry-over of 2 years and a 20% annual interest penalty.
- **Market stability:** Environment and Climate Change Canada is considering including mechanisms to reinforce market and investment certainty. These could include allowing fossil fuel primary suppliers to discharge a specified amount of their obligation by payment into an emissions reduction fund at a specified price level that will have a mandate to invest in actions that will reduce greenhouse gas emissions. Consideration is also being given to a market clearing mechanism, which would be activated if a fossil fuel primary supplier has insufficient credits for compliance. Parties with credits would be able to pledge credits for sale in this market with a specified price limit.

8. Audit and Verification

The Clean Fuel Standard will include audit and verification requirements. These will require an independent, accredited third-party verification body to provide assurance that the information submitted to Environment Climate Change Canada is accurate and complete, and compliant with the requirements of the regulations.

The regulations will require independent third-party verification of compliance reports submitted to Environment and Climate Change Canada by fossil fuel primary suppliers and participants in the credit and trading system. The regulations will define the level of assurance

required. The regulations will also include accreditation requirements for the third-party verifiers, including requirements respecting independence and conflict of interest.

9. Review and update

The Canadian Fuel Life Cycle Assessment Modelling Tool and the carbon intensity values will be updated and revised periodically.

The Clean Fuel Standard will include a requirement for a five-year review (i.e., in 2025). The review will consider whether and how the impacts of indirect land use change should be accounted for and treatment of renewable fuel minimum renewable content requirements.

10. Next Steps

Timing of regulations

Draft regulations for the liquid fuel stream are planned for publication in the *Canada Gazette*, Part I in spring / summer 2019, with final regulations in 2020 and coming into force in 2022.

The draft regulations for the gaseous and solid fuel streams are targeted for publication in the *Canada Gazette*, Part I in late 2020, with final regulations in 2021 and coming into force in 2023.

Emission-intensive and trade-exposed sectors

Emission-intensive and trade-exposed sectors have expressed concerns that the cumulative cost impacts from the Clean Fuel Standard combined with carbon pricing could impact their competitiveness. In July 2018, Environment and Climate Change Canada announced that the timing of the compliance obligations under the gaseous and solid stream regulations would be postponed by approximately 18 months to allow for more time to assess these impacts for gaseous and solid fuels and to take the time necessary to design the policy effectively.

Environment and Climate Change Canada has established a multistakeholder task group on emission-intensive and trade-exposed sectors under the Clean Fuel Standard consultations. This task group will provide a forum to better understand the concerns of these sectors and to consider options that could be integrated in the Clean Fuel Standard to mitigate competitiveness impacts sectors while meeting the Clean Fuel Standard's 2030 emissions reduction goal.

Annex I – Methodology for calculation of carbon intensity compliance obligation and credits

Calculation of carbon intensity compliance obligation

- Step 1: Calculate the volume of each type of liquid fuel in the fossil fuel primary supplier's pool

$$Volume\ (m^3) = Volume_{Imported} + Volume_{Produced} - Volume_{Exported} - Volume_{Exempted}$$

- Step 2: Calculate energy in megajoules (MJ) by multiplying the volume of fuel (Step 1) by the energy density of the fuel

$$Energy\ (MJ) = Volume\ (m^3) * \ Energy\ Density\ (\frac{MJ}{m^3})$$

- Step 3: Calculate grams of carbon dioxide equivalent by multiplying the energy (Step 2) by the absolute carbon intensity reduction requirement

$$g\ CO_2e = \ Energy\ (MJ) * \ CI_{Absolute}\left(\frac{g\ CO_2e}{MJ}\right)$$

- Step 4: Calculate the CO2e exceedances generated in tonnes of carbon dioxide equivalent by dividing the grams of carbon dioxide equivalent (Step 3) by 1,000,000 grams per tonne

$$CO_2e\ Exceedances_{Generated}\ (t\ CO_2e) = \frac{g\ CO_2e}{1{,}000{,}000\ \text{grams/t}}$$

- Step 5: Calculate the compliance obligation for a given compliance period, based on the CO_2e exceedances generated (Step 4) plus any CO_2e exceedances carried over from a previous compliance period

$$ComplianceObligation = CO_2e\ Exceedances_{Generated} + CO_2e\ Exceedances_{Carried\ Over}$$

Where,

$CO_2e\ Exceedances_{Generated}$ are the CO_2e exceedances generated in the current compliance period

$CO_2e\ Exceedances_{Carried\ Over}$ are CO_2e exceedances carried over from the previous compliance period

Credit Generation: Calculation of a credit for supplying low-carbon fuels

- Step 1: Calculate the volume of the fuel

  a) Applicable to solid fuels, liquid fuels, and gaseous fuel other than a gaseous fuel delivered via gas distribution systems:

$$Volume\ (m^3) = Volume_{Imported} + Volume_{Produced} - Volume_{Exported} - Volume_{Excluded}$$

  b) Applicable to a gaseous fuel delivered via gas distribution systems:

$$Volume\ (m^3) = Volume_{Imported} + Volume_{Distributed} - Volume_{Exported} - Volume_{Excluded}$$

- Step 2: Calculate the energy of the low carbon fuel in megajoules (MJ) by multiplying the volume of fuel by the energy density of the fuel (as specified in the regulations)

$$Energy\ (MJ) = Volume\ (m^3) * Energy\ Density\ (\frac{MJ}{m^3})$$

- Step 3: Calculate the carbon intensity difference by subtracting the carbon intensity of the low carbon fuel from the stream credit reference of the compliance period for the fuel stream

$$CI_{difference}\left(\frac{g\ CO_2e}{MJ}\right) = CI_{Stream\ Credit\ Reference} - CI_{Low\ Carbon\ Fuel}$$

- Step 4: Calculate grams of carbon dioxide equivalent by multiplying the energy (Step 2) by the carbon intensity of the fuel (Step 3)

$$g\ CO_2e = Energy\ (MJ) * CI_{Difference}\left(\frac{g\ CO_2e}{MJ}\right)$$

- Step 5: Calculate the credits generated in metric tons of carbon dioxide equivalent by dividing the grams of carbon dioxide equivalent (Step 3) by 1,000,000 grams per tonne

$$Credits_{Generated}\ (tCO_2e) = \frac{g\ CO_2e}{1{,}000{,}000\ grams/t}$$

Calculation of the stream credit reference carbon intensity value

Environment and Climate Change Canada will calculate the stream credit reference carbon intensity value for each compliance year.

- Step 1: Calculate the average carbon intensity of:
  - each fossil fuel in the liquid stream supplied to Canada in 2016 using the Fuel Life Cycle Assessment Modelling Tool; and
  - each renewable and low-carbon fuel supplied to Canada in 2016.

- Step 2: Determine the energy in megajoules (MJ) of:
  - each fossil fuel supplied to Canada in 2016 for combustion purposes, based on the 2017 reference case from the Energy-Emissions-Economy Model for Canada; and
  - each renewable and low-carbon fuel supplied to Canada in 2016 from data reported to the Federal *Renewable Fuel Regulations.*

- Step 3: Calculate the weighted average carbon intensity of the liquid stream ($CI_{WAverage}$), based on the energy in megajoules (MJ) of each fuel supplied in Canada in 2016 for combustion purposes.

- Step 4: Calculate the stream credit reference based on the absolute carbon intensity reduction requirement ($CI_{Absolute}$) for a given compliance year (e.g., 10 g/MJ in 2030), total energy in megajoules (MJ) of fossil fuels (TMJ_{fossil}) and total energy in megajoules (MJ) of renewable and low-carbon fuels ($TMJ_{renewable}$) supplied in Canada in 2016 for combustion purposes.

$$Stream\ Credit\ Reference\ \left(\frac{g\ CO_2e}{MJ}\right) = CI_{WAverage}\left(\frac{g\ CO_2e}{MJ}\right) - CI_{Absolute}\left(\frac{g\ CO_2e}{MJ}\right) * \frac{TMJ_{fossil}}{(TMJ_{fossil} + TMJ_{renewable})}$$

Annex II – Clean Fuel Standard Credit Lifecycle