

Canada Clean Fuel Standard Special Market Report January 08, 2019



Best Advisory / Consultancy North American Carbon Markets
(All & California)

The Elephant in the Room

The purpose of this Special Report is to update clients on the current regulatory status and design of the Clean Fuel Standard. The government of Canada announced in late 2016 that it would develop a Clean Fuel Standard (**CFS**) to reduce Canada's greenhouse gas emissions (GHG) by decreasing the life cycle carbon intensity of fossil fuels through the increased use of lower carbon fuels, energy sources and technologies. The objective of the CFS is to achieve 30 million tons of annual reductions in GHG emissions by 2030. Unlike other fossil fuel carbon intensity reduction programs, Canada intends to target not only Liquid but also Gaseous and Solid fuels **Streams**. After publishing a first regulatory framework in December 2017 and engaging with stakeholders throughout 2018, Environment Canada released a regulatory design paper, covering mostly the Liquid Stream, on December 20th, 2018.

Comments on this design paper will be open until February 1st, 2019. A draft regulation for the Liquid Stream is expected in Spring/Summer 2019, and it will come into force in 2022. ClearBlue Markets will continue to monitor the development of these regulations as well as prepare our clients for this new program.

Application of the Clean Fuel Standard

The CFS 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 (FFPS)**.

Fossil Fuel Primary Suppliers	
Liquid Stream	<ul style="list-style-type: none"> • Producer / importer of fossil fuel
Gaseous Stream	<ul style="list-style-type: none"> • Producer / importer natural gas / propane • Natural gas transmission and distribution delivering to final consumer
Solid Stream	<ul style="list-style-type: none"> • Producer / importer of fossil fuel

Furthermore, **Voluntary Credit Generators** will also be able to join the market. They are parties other than FFPS (i.e. does not have an obligation to reduce carbon intensity) that may perform an activity that generates Credits under the CFS by lowering the carbon intensity of a fossil fuel throughout its lifecycle; by producing or importing renewable or low-carbon fuels for use in Canada; or supporting or undertaking a specified form of end-use fuel switching.

Carbon Intensity calculations and targets

The Canadian average carbon intensity values for fossil fuels will be expressed in grams of carbon dioxide equivalents per unit of energy (gCO_{2e}/ MJ) and will account for GHG emissions over the lifecycle of a given fuel. The specific carbon intensity of each regulated fossil fuel will be determined through a **Fuel Life Cycle Assessment Modelling Tool**, to be developed by ECCC and based on 2016 data. Producers of renewable/low carbon fuels will also need to use this tool for determining their carbon intensity by creating what is commonly referred to in other

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Timeline

Year	Liquid	Gaseous and Solid
2019	Draft	
2020	Final	Draft
2021		Final
2022	In Force	
2023		In Force

The regulation includes a five-year review in 2025

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Low Carbon Fuel systems as a **Pathway**. Carbon intensities will be updated periodically.

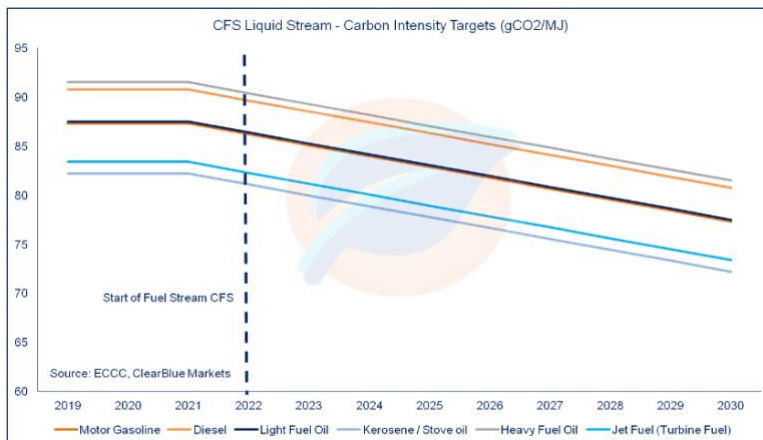
The CFS mechanics are based on reducing the carbon intensity of the entire lifecycle of the regulated fuels vs a baseline. Each Stream will have a baseline carbon intensity. In the case of the Liquid Stream, the baseline corresponds to the **Weighted Average Carbon Intensity** of the regulated fuels in 2016. A **Carbon Intensity Standard or Limit** will be applicable for each **Compliance Period**, which is intended to reach an **Absolute Carbon Intensity or Target** reduction of 10 gCO₂e/MJ in 2030 for the Liquid Stream (approximately 1,1 gCO₂e/MJ per year).

The CFS will regulate the Carbon Intensity of fossil fuels expressed in gCO₂e/MJ

Regulated fossil fuels	
Liquid Stream - Gasoline - Diesel fuel - Jet fuel (domestic use) - Kerosene - Light fuel oil - Heavy fuel oil	Solid Stream - Coal - Petroleum coke - Specific heavy fuel oils
Gaseous Stream - Natural gas (including LNG and CNG) - Propane	Exceptions - Non-combustion use (i.e. solvents) - Feedstock use - Export and transit - Aviation fuel international - Scientific research use - "In-tank" fuel - Coal used in facilities covered by federal GHG regulations
<i>Self-produced fuels: separate carbon intensity to be developed by ECCC</i>	

Renewable/Low carbon fuels producers will need to determine their unique Carbon Intensity or "Pathway"

The chart below shows all the fuels that are expected to be regulated under the Liquid Stream of the CFS. Starting in 2022, these fuels' carbon intensity target will reduce until 2030 by 10gCO₂e/MJ.



Compliance Period will follow calendar years and reporting will be either Quarterly or Yearly

Compliance and Credit generation

The Compliance Period is proposed to be yearly (January to December), with annual or quarterly reporting (Yearly **Fuel Transaction Report** submission deadline of February 28th). Each fossil fuel will generate an **Exceedance** as per the specific year Carbon Intensity Standard ($MJ_{y_{fossil\ fuel}} * Standard\ CI_y$ gCO₂e/MJ_{fossil fuel}). The Carbon Intensity Standard would be based on the weighted average carbon intensity of the fossil fuels for the Liquid Stream in 2016 (Gas and Solid fuels year are still to be determined). The total Exceedances for that year will be the carbon intensity **Compliance Obligation** expressed in tons of CO₂. In each

Compliance Period FFPS will need to retire a number of **Credits** also expressed in tCO₂ that is equivalent to the Compliance Obligation. In the case of FFPS active in several Streams, the Credit balance requires to be calculated separately for three Streams. The appendix section at the end of this document presents a simplified example of calculating the Compliance Obligation in the Liquid Stream.

The regulation allows for three different alternatives for Credit generation, defined as **Compliance Categories**:

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



Example: flare recovery or energy efficiency in upstream oil & gas extraction; leak reduction in natural gas pipeline; carbon capture and storage/utilization.

This is project specific, using carbon accounting protocols to be developed by ECCC or project sponsor if applicable to more than one Stream. Developer can choose the Stream where Credits can be used. Actions legally required are not allowed to generate Credits

Category 2: Supply of renewable and other low-carbon intensity fuels



Example: Addition of ethanol to gasoline, or bio-diesel to diesel. The use of biomethane (RNG).

Credit will be generated by the producer or importer of renewable/low carbon fuel. Eligible fuels must have a lower carbon intensity than the reference carbon intensity. The Credit generation will be based on the difference of carbon intensity between the reference and renewable/low-carbon fuel. The transfer of Credits to parties downstream of production/import is still under consideration.

Category 3: Specified end-use fuel switching.



Example: gas to electricity switching schemes. Electric Vehicle charging stations, Electric Vehicle fleets.

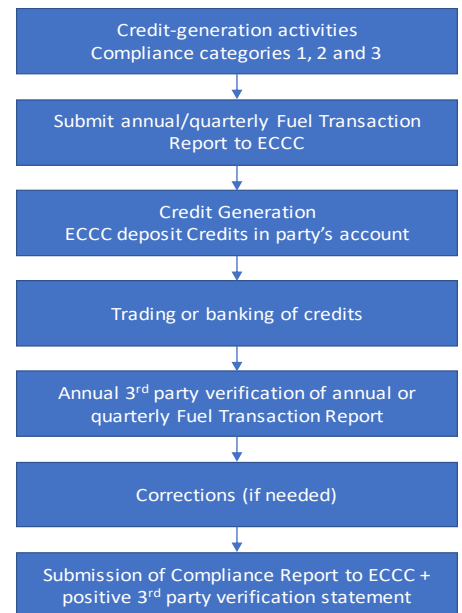
End-use fuel switches to electricity: the emission reduction occurs by displacing fossil fuel consumption against a baseline. Credits will be generated by a) distribution utilities (home charging); b) charging network operators, and c) private/commercial charging station hosts.

ECCC is still considering if Credit recipients (utilities, network operators and site hosts) are requested to recycle all or a minimum % of revenues into further adoption of zero-emission vehicles

Three different alternatives are considered for Credit generation:

- **Actions that reduce the carbon intensity throughout its lifecycle**
- **Supply of Renewable and other Low-carbon intensity fuels**
- **Specified end-use fuel switching**

CFS Credit Life Cycle



Compliance determination, Carbon Intensity Pathways assessment and Credit generation will be subject to **auditing and verification by independent third-party** bodies and in some cases final ECCC approval. ECCC will develop relevant levels of assurance, accreditation standards and conflict of interest/independence requirements.

Trading and flexibility

The **Credit Trading System** will include both FFPS and Voluntary Credit Generators, who can **generate, own and acquire** Credits. Although not explicitly stated in the ECCC released documents, this implies that the purchase of Credits can be used as a Compliance Category.

In the case of inter-stream flows, for example, the delivery of biomethane (natural gas) via pipeline for use a vehicle fuel, Credits will be allocated to the Stream where they are used, in this example, it will be the Liquid Stream. Trading between Streams will be allowed for up to 10% of a company's Compliance Obligation.

Liquidity of the trading system is a concern, as there may be limited Credits and/or limited players in the market to support a robust market trading system. To account for the liquidity concerns, ECCC has proposed several attributes to support the Credit market, including:

- Credits will not expire
- No limit to the number of Credits exchanged between parties nor how many times a Credit can be transferred
- Banking for future use will be allowed, and in case of an Exceedance deficit, up to 10% of the deficit can be carried forward into the next period, for a max of 2 years and a 20% penalty.
- ECCC is also still considering the creation of a market stability mechanism, where FFPS could discharge part of their obligation into a specific fund at a certain price level, which will be used for GHG reduction activities.
- Early Credit Generation will be allowed for all three Streams before the release of the final regulation for the Liquid Stream in 2020. Credits from the Gaseous and Solid Stream generated in this fashion can be bankable for future use.

Trading between streams will be allowed for up to 10% of a company's Compliance Obligation

Liquidity of the CFS system is a concern and ECCC has proposed flexibility mechanisms

Overlapping regulations

The CFS has certain interaction with other GHG regulations already in place or under development. For Category 2 renewable / low-carbon fuels, the CFS will incorporate the volumetric mandate of the existing Renewable Fuels Regulations for gasoline (5%) and diesel and heating distillate oil (2%). By 2022, FFPS can demonstrate compliance with the renewable content required through the CFS Credit Trading System. There will be no renewable requirement for natural gas under the CFS, though, in some provinces like Quebec, there will be separate mandates. Under the CFS, FFPS cannot use Credits from other federal systems for compliance (Federal Output Based Pricing System -OBPS). However, the CFS will allow for the generation of Credits for activities that also generate or comply with the OBPS system. Discussions are also ongoing for the case of existing fuel standards, as the case of British Columbia's Renewable & Low Carbon Fuel Requirements Regulations. Finally, although the early generation of Credits is proposed in the current document, further clarity is required on the transition for these activities for when the final regulations are in place.

The British Columbia Low Carbon Fuel Requirement Regulation, the Federal Backstop OBPS, as well as the Renewable Fuels Regulation volumetric mandates will overlap with the CFS system

Open Questions and Key Issues for regulated players

The CFS will be a crucial component of ECCC's GHG policies targeting climate change. It brings an ambitious target with several compliance alternatives for FFPS, and by doing this, it does not pick between winners and losers (technology neutral). There are several open points that ECCC will be developing further that will be relevant for potential FFPS or Voluntary Credit Generators, which could lead to increased need for compliance resources and further development of risk management strategies, but also possible optimization and commercial opportunities.

On the points that are still under development, ECCC is still considering the validity of providing access to the CFS Credit market to parties that are not FFPS or

Voluntary Credit Generators. This would impact players downstream from the current FFPS who could acquire Credits and for potential aggregators for small sized FFPS. There is no mention now of the inclusion of brokers in the regulations, although ECCC has indicated that it has no problem with their participation outside of the regulation. The market stability mechanism could create a price floor/ceiling that could help obligated parties understand the impacts of non-compliance and avoid tight market situations. In the case of end-use fuel switch to electricity, ECCC is still considering if utilities, network operators and site hosts should use any CFS Credit revenue (or a percentage) to develop zero-emission vehicles further.

In contrast with other fuel standards, CFS aims to bring Solid and Gaseous Streams into the regulation. The Liquid Stream regulations, to be implemented first, should create a precedent for certain areas for the Solid and Gaseous Streams, but also several specific considerations will need to be designed for these sectors. For example, the risk for Emission Intensive and Trade Exposed industries (EITE), especially for the Solid and Gaseous Streams is one of the reasons for the delay in these sector's regulations final documentation compared to the Liquid Stream. The regulation currently doesn't consider indirect land use, which may be reconsidered in 2025 and could have a considerable impact of certain fuels carbon intensities.

Although the final goal for Absolute Carbon Intensity for the Liquid Stream has been indicated at 10gCO_{2e}/MJ, there is still need of clarity on how the goal will be split over the years between 2022 and 2030 (in case of non-linear distribution) and the Carbon Intensity targets for the Gaseous and Solid Streams. Finally, in the case of complex supply chains, for example in natural gas, the situation where several players are involved there is the need for further clarity on who is the FFPS and how would the overlap be managed between players in the same supply chain.

Moving forward

As mentioned above, the CFS has several compliance alternatives, which on the one hand generate interesting options for generating Credits and managing obligations, while on the other hand, it requires complex assessments to optimize the best path to compliance. In any given year and the short-mid term horizon, FFPS and Voluntary Credit Generators will need to consider at least their own internal cost for producing fossil fuels and low carbon/alternative fuels, and the cost of decreasing production of fossil fuels in addition of any technical issues for blending the renewable/low carbon fuel. They will need to monitor the prices for both fossil fuel and the alternative/low carbon fuel and to identify and secure a reliable supply of alternative/low carbon fuels. They will also need to understand the price of CFS Credits and the impact of any potential cap price when (and if) the market stability mechanism is developed. They will need to observe the availability (supply-demand balance) of CFS Credits, from the context of inter-stream trading between Liquid, Solid and Gaseous Streams, CFS Credit bankability and the possibility of carry forward a deficit for up to two years and the payment of interest for such a delay.

ClearBlue Markets has considerable experience in Environmental and Carbon Markets and will be assisting its clients in understanding further the developments of the CFS, how it will affect them, and in finding the most optimal compliance strategy.

The risk for Emission Intensive and Trade Exposed industries will be considered when developing the Gaseous and Solid CFS streams

The CFS system will add a new layer of complexity for parties impacted and will require them to be proactive in the coming years

Appendix - Obligation and Credit generation calculations

Based on the documentation released by ECCC, this section presents a simplified example of how Credits and Deficits are calculated in the proposed CFS system. Since ECCC is still developing the Fuel Life Cycle Assessment Modelling tool, calculations should be considered preliminary. Other fuel standards like California’s Low Carbon Fuel Standard, British Columbia’s Renewable & Low Carbon Fuel Requirements Regulations and the European Union’s Fuel Quality Directive, have been used as a reference. Canada fuel data was sourced from E3MC.

Obligation and Credit calculation (gasoline as an example)

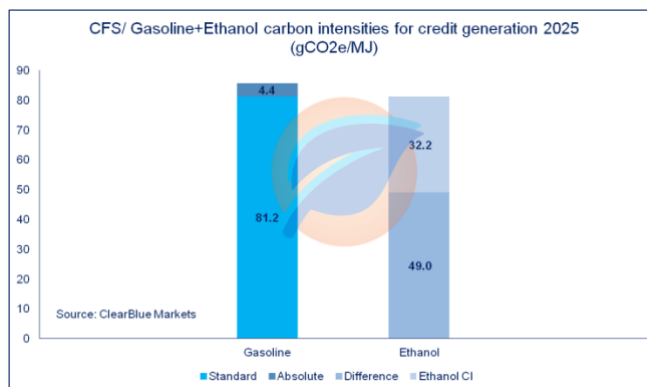
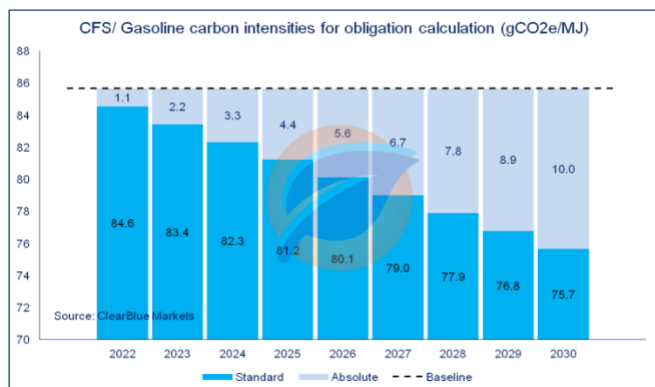
1. Exceedances calculation

- Baseline CI** (gCO₂e/MJ) calculated based on the weighted average of the carbon intensities of all fossil and renewable fuels covered in the Liquid Stream in 2016 = 85.7 gCO₂e/MJ. This will be the starting point for all the fuels in the Liquid Stream.
- Absolute CI_y** (gCO₂e/MJ) is the yearly decrease in carbon intensity from the Baseline. 1.1 gCO₂e/MJ per year up to 10 gCO₂e/MJ in 2030. The Absolute CI is the Carbon Intensity reduction target per year, as shown in Figure 1.
- Standard CI_y** (gCO₂e/MJ) = Baseline CI – Absolute CI_y. It is the maximum carbon intensity for a given year for the Liquid Stream (acts as a limit of GHG emissions). The Standard becomes the limit Carbon Intensity in a given year, as shown in Figure 1.
- Exceedance generated_y** (tCO₂e) = Quantity of fossil fuel in a given year (MJ_y) * Absolute CI_y (gCO₂e/MJ). The Obligation is calculated for each fossil fuel under the Liquid Stream.
- Compliance Obligation_y** (tCO₂e) = Exceedance generated_y (tCO₂e) + Exceedance carried over_y (tCO₂e)
- FFPS** need to retire a number of Credits equal to their Obligation on a given year

2. Credit calculation

- Difference CI_y** (gCO₂e/MJ) = Standard CI_y (gCO₂e/MJ)– Alternative / low carbon fuel CI (gCO₂e/MJ). It corresponds to the Carbon Intensity for which Credits can be generated in a given year. Its based on the alternative/low carbon fuel carbon intensity and the Standard CI_y of a given year, as shown in Figure 2.
- Credits Generated_y** (tCO₂e) = Quantity of Alternative / low carbon fuel in a given year (MJ_y) * Difference CI_y (gCO₂e/MJ). The Credits generated can be used to offset or cancel out FFPS’s Obligations.

Simplified example of compliance calculation gasoline 2025



Obligation	1000 liters of gasoline in 2025 generate 154tCO ₂ e as an Obligation <ul style="list-style-type: none"> 1000 l_{gasoline} = 34.7 MJ 34.7 MJ * 4.44 gCO₂e/MJ (Absolute CI₂₀₂₅) = 154 tCO₂e
Compliance	Assuming 100% with Ethanol, 154tCO ₂ e Obligation Credit need requires 202 litres of ethanol <ul style="list-style-type: none"> 202 l_{ethanol} = 154tCO₂e / 32.22 gCO₂e/MJ (Ethanol Difference CI₂₀₂₅) Please notice that such blending is not feasible (>10% ethanol blend) or it will require a specific engine type FFPS will need to consider other compliance categories or purchasing Credits from other FFPS or Voluntary Credit Generators

ClearBlue Markets

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