February 2017

Clean Fuel Standard: Discussion Paper

1. Introduction

Environment and Climate Change Canada (ECCC) is consulting with provinces, territories, stakeholders as well as Indigenous Peoples to develop a regulation under the *Canadian Environmental Protection Act, 1999* to reduce Canada's greenhouse gas (GHG) emissions through the increased use of lower carbon fuels and alternative technologies.

The purpose of this discussion paper is to facilitate consultations by seeking early views to help inform the development of the regulatory framework in advance of developing a Clean Fuel Standard. It lays out different approaches being used in other jurisdictions and poses technical questions related to the potential applicability of various elements including scope, timing and stringency. ECCC will undertake meaningful consultations with provinces, territories and Indigenous Peoples, as well as with a range of stakeholders (e.g., environmental non-governmental organizations, industry) to ensure that relevant expertise and perspectives are considered in the development of the standard. Interested parties are asked to submit written comments on this discussion paper (details are provided at the end of the paper).

2. Proposed Regulatory Approach

New regulatory requirements for a Clean Fuel Standard would be developed under the *Canadian Environmental Protection Act*, 1999. The standard will be a modern, flexible, performance-based approach that would incent the use of a broad range of lower carbon fuels and alternative energy sources and technologies, such as electricity, renewable natural gas, hydrogen, and renewable fuels. It would address a broad suite of fuels, including liquid, gaseous and solid fuels, and would go beyond transportation fuels to include those used in industry, homes and buildings. The approach would not differentiate between crude oil types produced in or imported into Canada. It would build on the foundation set by the federal *Renewable Fuels Regulations*, and would consider the flexibilities and exemptions that are currently included in the Regulations.

The Clean Fuel Standard will be outcome-oriented. The overall objective is to achieve 30 megatonnes of annual reductions in GHG emissions by 2030, contributing to Canada's effort to achieve its overall GHG mitigation target of 30% emission reduction below 2005 levels by 2030. This 30 megatonne reduction would be incremental to what is achieved as a result of current measures. The standard will incent the creation of lower carbon fuel pathways and drive technology and innovation to achieve the desired outcomes. It will be non-prescriptive and designed to provide maximum flexibility to fuel suppliers, and will include a market-based approach, such as a crediting and trading system.

Requirements would be set to reduce the lifecycle carbon intensity of fuels supplied in a given year, based on lifecycle analysis. Overall life-cycle carbon intensity reductions of approximately 10-15% by 2030 are being considered. Carbon intensity requirements would be measured against a baseline. The baseline could be a sector-wide average, facility-specific or set on some other basis.

The standard would include requirements for the regulatees to reduce the GHG emissions from the fuel they supply.

Overall, the flexibility and the measure of performance on a lifecycle carbon intensity basis would result in increasing emission reductions while minimizing the compliance costs.

3. Context

There are two main models that have been used throughout the world to reduce the emissions related to the use of fuel. Many jurisdictions, like Canada and many provinces, use renewable fuel mandates, under which a minimum amount of renewable fuel is required to be blended into traditional petroleum fuel such as gasoline or diesel. Some jurisdictions (e.g., Alberta, Ontario) also require the renewable fuels used to meet a specific GHG performance standard. Other jurisdictions, like British Columbia and California, have implemented standards to lower the carbon intensity of fuels (called low carbon fuel standards or clean fuel standards), under which requirements are set (e.g. 10%) to reduce the lifecycle GHG emissions intensity of the fuels supplied in a given year.

A. Renewable Fuel requirements

This section provides information on the current renewable fuel requirements in Canada and other jurisdictions in order to assess their successes and limitations.

Federal *Renewable Fuels Regulations*

The federal *Renewable Fuels Regulations* are an important contributor to reducing GHG emissions from fuels used in Canada. The Regulations require petroleum fuel producers and importers to have an average renewable content of at least 5% based on their volume of gasoline and an average renewable content of at least 2% based on their volume of diesel fuel and heating distillate oil. The purpose of the Regulations is to reduce overall GHG emissions from gasoline and diesel fuel, primarily used in transportation. There are exemptions which can apply for specialty fuels (e.g. used in aircraft, competition vehicles, military combat equipment), for fuel used in northern regions and Newfoundland and Labrador, for export and for space heating purposes.

The *Renewable Fuels Regulations* do not require reductions in GHG emissions on a lifecycle basis, nor does it contain sustainability requirements.

The federal *Renewable Fuels Regulations* are meeting their objective of GHG reductions, and together with existing provincial policies, are achieving an estimated 4 Mt/year of reductions.

PROVINCES / TERRITORIES

Five provinces (British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario) already have renewable fuels mandates equal to or higher than the current federal requirements for the transportation sector. Most of these provinces, along with Quebec, have established renewable fuels industries. British Columbia also has a low carbon fuel standard in place, in addition to its renewable fuel requirements.

British Columbia's Renewable Fuel Regulations

British Columbia adopted a renewable fuel regulation in 2008 with its low carbon fuel standard. British Columbia's regulation requires minimum renewable fuel content of 5 percent renewable for gasoline and 4 percent for diesel (along with a requirement to reduce the carbon intensity of fuels). These requirements apply to all fuels used for transportation in British Columbia with the exception of fuel used by aircraft or for military operations.

Ontario

Ontario's *Greener Diesel Regulation* (2014) requires both a minimum volume of bio-based diesel to be blended into petroleum diesel as well as minimum reductions in lifecycle GHG intensity. Implementation of the regulation is being phased in over 3 years, with final requirements, which came into effect in 2017, for bio-based diesel to comprise at least 4% of total diesel and have at least a 70% reduction in lifecycle GHG intensity. The regulations allow fuel suppliers to lower their minimum volume requirements if the fuels they supply have a lower GHG intensity than the standard, incenting greater use of lower carbon intensity renewable fuels. Fuel suppliers may also transfer their credits to other fuel suppliers.

Ontario's *Ethanol in Gasoline Regulation* (2007) requires at least 5% ethanol in gasoline and provides a regulatory incentive for cellulosic ethanol (1 litre cellulosic ethanol is equivalent to 2.5 litres of ethanol). Ontario is looking to go further with respect to requirements for gasoline, and in their 2016 Climate Change Action Plan, announced their intention to increase the availability and use of lower carbon fuels including the renewable fuel content of gasoline.

UNITED STATES

Federal Renewable Fuel Standard

The U.S. Renewable Fuel Standard requires increasing annual volumes of renewable fuels to be blended. The regulations differentiate renewable fuels based on lifecycle GHG emissions reductions, including emissions from indirect land use change. The annual volumetric requirements are set out for four categories of renewable fuels. Each category must meet a certain GHG reduction threshold: 20% for conventional or first generation renewable fuels, 50% for advanced biofuels and biomass-based diesel and 60% for cellulosic biofuel. The categories are used to drive increased use of renewable fuels with lower GHG lifecycle intensity. Most recently, renewable natural gas was added as an accepted fuel for

the category of cellulosic biofuel. The U.S. Renewable Fuel Standard requires the creation of credits, representing volumes of renewable fuels and has a credit trading system.

STATES

Seven states (Louisiana, Minnesota, Missouri, Montana, Oregon, Pennsylvania, and Washington) have renewable fuels mandates. Minnesota, Montana, Oregon, and Pennsylvania include minimum ethanol production capacity mandates in their regulations. Oregon's Renewable Fuel Standard requires all motor gasoline sold in Oregon to have a minimum 10 percent ethanol, and all diesel sold to have a minimum 5 percent biodiesel or other renewable diesel. State legislation prevents ethanol blending at higher than 10 percent into motor gasoline, with the exception of high-level ethanol blends for flex fuel vehicles. These requirements came into effect in 2007 and 2011 respectively, once renewable fuel production capacity reached targets set out by the Government of Oregon. Oregon also has a Clean Fuel Standard, in addition to its renewable fuel requirements.

B. CLEAN FUEL STANDARDS / LOW CARBON FUEL STANDARDS

Some jurisdictions have gone further than setting volumetric and / or performance requirements for renewable fuels, and have mandated a reduction in carbon intensity for gasoline and diesel fuel that can be met with a range of lower carbon fuels, including but not limited to renewable fuels.

PROVINCES / TERRITORIES

British Columbia is currently the only province with a low carbon fuel standard in place, in addition to its renewable fuel requirements.

British Columbia's Low Carbon Fuel Standard

British Columbia adopted a low carbon fuel standard in 2008 with its renewable fuels regulation. British Columbia's standard is based on a requirement to reduce the carbon intensity of fuels by 10 percent by 2020 from a 2010 baseline. As part of the 2016 Climate Leadership Plan, British Columbia announced an increase of the carbon intensity target to 15 percent by 2030. The low carbon fuel standard applies to all fuels used for transportation in British Columbia with the exception of fuel used by aircraft or for military operations. British Columbia's requirement does not differentiate between crude oil types.

Suppliers comply with the British Columbia low carbon fuel standard by reducing the overall carbon intensity of fuels they supply; acquiring credits from another fuel supplier; or by entering into a Part 3 agreement with the Government of British Columbia. Part 3 agreements can be entered into if a fuel supplier takes actions or causes others to take actions that would have a reasonable possibility of reducing emissions through the use of lower carbon fuels sooner than would have otherwise occurred without the action. There are three categories of Part 3 agreements: improve the lifecycle carbon intensity of a fuel; increase lower carbon fuel supply (quantity and access); and increase lower carbon fuel demand. British Columbia certifies the pathways before issuing credits. Additionally, requirements can be designated from the fuel supplier to another party (e.g. from fuel producer to distributor).

UNITED STATES

California

California's Low Carbon Fuel Standard originally introduced in 2009 and re-adopted in 2015, requires fuel suppliers to reduce the carbon intensity of the transportation fuels (petroleum fuels and those replacing them) they supply by at least 10% by 2020, from a 2010 baseline. The California Air Resources Board sets a declining maximum carbon intensity limit, or standard, for each year to 2020. The standard was less stringent in the initial years to allow for the development of lower carbon intensive fuels and advanced vehicles. Volumes of fuels supplied with carbon intensities above the standard accrue deficits. These deficits are offset by supplying volumes of fuels with carbon intensities below the standard and creating credits, or by acquiring credits from other suppliers. Before a fuel supplier can generate credits for lower carbon fuels, the carbon intensity of the fuel must be estimated using CA GREET, the lifecycle analysis tool used in California, and subsequently approved by the Government of California. Fuel suppliers must meet the standard each year. Credit provisions exist for electricity and hydrogen used in transportation. California's Low Carbon Fuel Standard also has provisions that set a price cap on the price of credits to protect consumers and for a Credit Clearance Market for fuel suppliers who may experience a credit shortfall.

California does not differentiate between crude slates in its lifecycle analysis for gasoline and diesel. Recent amendments to their Low Carbon Fuel Standard set a California Average Crude Oil approach to offset increases in the GHG intensity of the crude oil slate. Under this approach, the California Air Resources Board sets a baseline average carbon intensity for all crudes processed in 2010 and compares it to the subsequent year's average carbon intensity for a three-year rolling period. If the 2010 average baseline is exceeded, then incremental deficits are added to each compliance obligation of the regulated party.

There are also additional credit opportunities under the California program that allows some credits to be generated by refineries using renewable hydrogen, for refinery investments in GHG reductions projects and for innovative crude production methods, such as solar steam or heat generation, solar or wind based electricity and carbon capture and storage. Additionally, obligations can be transferred from the fuel supplier to another party (e.g. from fuel producer to distributor). This allows more flexibility for companies to develop their compliance approach.

Oregon

Oregon's Clean Fuel Standard took effect in 2016 and requires a reduction in the annual average carbon intensity of Oregon's transportation fuels (gasoline and diesel) by 10 percent from the 2015 level by 2025. As there are no refineries in Oregon, regulated parties are importers of gasoline and diesel. Fuel importers can blend biofuels such as ethanol, biodiesel or renewable diesel to comply with the standards. Additionally, regulated parties can provide alternative fuels such as natural gas, biogas, electricity, propane or hydrogen, or purchase credits from producers of these fuels to meet requirements. These requirements can be suspended or modified if the supply of lower carbon fuels is not sufficient to comply with the regulation. Lifecycle pathways for carbon intensities of fuels as approved by California are acceptable for the purposes of the Clean Fuel Standard.

EUROPEAN UNION

The European Union Fuel Quality Directive requires that fuel suppliers reduce the lifecycle GHG emissions from fuels by up to 10 percent by 2020. Six percent of the 10 is binding, two percent can be achieved using carbon sequestration and storage and another two percent can be attained through 'Clean Development Mechanism' projects. The Fuel Quality Directive works in tandem with the EU Renewable Energy Directive which stipulates that the share of biofuels in the transportation sector should be 10% (by energy content) for each member country by 2020. The Renewable Energy Directive does not account for GHG emissions from indirect land-use change, but it does require reporting of these emissions and includes provisions to ensure that biofuel production is sustainable (e.g. biofuels produced on "at risk" lands are excluded from being counted towards the 10% renewable energy mandate). Fuel suppliers must also verify that all sustainability criteria for raw materials used in biofuel production have been met.

4. Scope

A large variety of energy sources is used in Canada, including natural gas, crude oil, coal and hydrocarbon gas liquids. Some of these energy sources are used directly, and some, such as crude oil, are transformed, before being used as fuel, into refined products such as gasoline and diesel fuels.

ECCC will consider setting carbon intensity requirements for fuels used in the transportation, building and industry sectors. This could include liquid fuels (e.g., gasoline, kerosene, diesel fuel, light fuel oil, heavy fuel oils), gaseous fuels (e.g., natural gas, propane, butane), and solid fuels (e.g., petroleum coke).

There are a number of lower carbon fuels which are currently being integrated into the market. Initial policies to reduce emissions from fuels focused on renewable fuels mandates to replace portions of gasoline and diesel. However, alternative fuels or energy sources such as electricity, natural gas, biogas or renewable natural gas, and hydrogen, both from natural gas and from renewable electricity are also part of the lower carbon fuel mix.

ECCC is considering regulating fuel suppliers (e.g., producers, importers and/or distributors) under this regulation. This would include both fossil fuel and alternative fuel suppliers. The requirements would also apply to the fuel used by a producer/importer (e.g. fuel oil or natural gas that is produced by an oil and gas company for its own use).

Questions for Discussion

1. **Are there any considerations that should be taken into account with respect to fuel suppliers being the regulated party?**
2. **For liquid fuels, are producers and importers of fuel the appropriate point along the fuel supply chain to apply this regulation, and if not, why not?**
3. **For gaseous and solid fuels, are producers and importers of fuel the appropriate point along the fuel supply chain to apply this regulation, and if not, why not?**
4. **Are there cross-cutting barriers (e.g. feedstock supply, technology) to the production and use of lower carbon fuels and alternatives in Canada? If so, please describe.**

5. **How might the Clean Fuel Standard be designed to address those barriers?**
6. **How would the supply of lower carbon fuels and alternatives affect the design of Canada's Clean Fuel Standard?**
7. **Should different carbon intensity reduction targets be set for different fuels? If so, on what basis (e.g. more stringent target for fuels that have a higher carbon intensity)?**
8. **Should different carbon intensity requirements be set for the same fuel for use in different sectors or applications?**

Transportation

The current federal *Renewable Fuel Regulations* apply to gasoline and diesel used and throughout the transportation sector, with certain exemptions, e.g. for the aviation sector. The intent of the Clean Fuel Standard would be to set requirements for a broader range of transportation fuels.

On-road transportation and off-road sources

Setting carbon-intensity reduction requirements for gasoline and diesel would ensure a broad coverage of on-road transportation (light-duty and heavy-duty vehicles) and most off-road sources (e.g. snowmobiles) as gasoline and diesel represents the fuel use in the sector. Some off-road sources (e.g. lawn mowers, forklifts) do have a greater use of alternatives to gasoline or diesel such as electricity.

Rail, marine and aviation

Ensuring a broad coverage of emissions from the rail, marine and aviation sub-sectors would require setting requirements for a number of other fuels used in these sub-sectors, including heavy oil, jet fuel and other specialty fuels.

Because locomotives, ships and airplanes operate across national boundaries, international cooperation and harmonization considerations are key, in particular for the international maritime and international aviation sector. The approach will consider harmonization with any international requirements by organizations such as the International Maritime Organization and the International Civil Aviation Organization.

Questions for Discussion

9. **What lower carbon fuels and alternatives are available for use in each transportation sub-sector (e.g., on-road heavy duty, on-road light duty, off-road, rail, marine, aviation)?**
10. **What is the technology-readiness for possible lower carbon fuels and alternatives in this sector?**
11. **What barriers to the use of lower carbon fuels and alternatives are there in the transportation sector:**
    - **technology/technical barriers (e.g. equipment, fuel quality, operability);**
    - **legislative/regulatory barriers (e.g. fuel quality standards);**
    - **other barriers (e.g., regional access)?**
12. **What may be needed for transportation to transition to lower carbon fuels?**
13. **For rail, marine and aviation, are there considerations that need to be taken into account? Are additional flexibilities or sector-specific requirements needed?**

Industry

The current *Renewable Fuels Regulations* apply to a small share of energy use in the industrial sector, via gasoline and diesel fuel used in non-road applications, such as construction equipment and power generation. Similarly, setting requirements for carbon-intensity of gasoline and diesel would have some application in the industrial sector.

Addressing the carbon intensity of fuels used in the industrial sector will require targeting fuels beyond gasoline and diesel, such as natural gas, heavy fuel oils, and potentially including electricity, solid fuels and other liquid and gaseous fuels.

Applying the standard to fuels other than diesel and gasoline presents significant emission reduction opportunities in the industry sector; however it may also present a number of challenges. Certain industrial uses of higher carbon fuel may not be readily replaceable, such as petroleum coke in cement kilns. Supply of alternate fuel may also be challenging in some locations (e.g. remote mining operations).

Questions for Discussion

14. **What lower carbon fuels and alternatives are available to industrial sectors?**
15. **What is the technology-readiness for possible lower carbon fuels and alternatives in this sector?**
16. **What barriers to the use of lower carbon fuel are there in the industrial sector:**
    - **technology/technical barriers (e.g. equipment, process, heating value);**
    - **legislative/regulatory barriers (e.g. prohibition of burning certain type of agricultural or wood waste);**
    - **other barriers (e.g., regional access)?**
17. **What may be needed for industry to transition to lower carbon fuels?**
18. **Are there particular issues or flexibilities associated with the use of lower carbon fuels in specific industrial sectors that should be taken into account in the design of the Clean Fuel Standard?**

Buildings

The buildings sector includes residential, commercial and institutional buildings, which use fuel or alternatives for space heating and power needs. Energy use in Canada's buildings sector is mainly from natural gas 46%, electricity 38%, heating oil 6% and biomass 10% (ECCC National Inventory Report), with important regional variation in the share of each fuel. The *Renewable Fuels Regulations* currently exempts space heating oil from the regulations to mitigate cost increases for Canadians who use oil to heat their homes. The additional flexibility provided by the Clean Fuel Standard may make it easier to apply requirements to heating oil.

Questions for Discussion

19. **What lower carbon fuels are available in the buildings sector?**
20. **What is the technology-readiness for possible lower carbon fuels and alternatives in this sector?**
21. **What barriers to the use of lower carbon fuels and alternatives are there in the buildings sector:**
    - **technology/technical barriers (e.g. equipment, heating value);**
    - **legislative/regulatory barriers (e.g. building codes, municipal by-laws);**

- **other barriers (e.g., regional access)?**

22. **What may be needed for buildings to transition to lower carbon fuels?**
23. **What are the opportunities and challenges with replacing and/or lowering the carbon intensity of heating oil in the residential sector? Are there regional and social issues that should be taken into account? If so, what additional flexibilities could be provided to address these considerations, and what impact might these flexibilities have?**

5. Determining carbon intensity

The Clean Fuel Standard would set requirements to reduce the carbon intensity of fuels covered by the regulations. Carbon intensity is the measure of how much carbon is emitted to the atmosphere relative to the amount of energy in the fuel consumed (e.g. grams of CO_2 equivalents per megajoule). The carbon intensity requirement would be set on a lifecycle basis.

Methodology and tools

Lifecycle analysis is a method used to assess the environmental and GHG impacts associated with the manufacture, use and ultimate disposal of a product. A full lifecycle analysis assesses all stages in a product's life, from cradle to grave (i.e., from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling). Lifecycle analysis models typically use carbon intensity as the measurement or output of the GHG impacts of a product. Lifecycle analysis is an important tool that allows the GHG impacts of energy sources to be compared on an equal basis.

ECCC intends to require a lifecycle analysis methodology or model to assess the carbon intensities of fuels, which would be science-based and follow a standardized approach compliant with the International Organization for Standardization standard IS/ISO-14040: Environmental Management - Life Cycle Assessment - Principles and Framework, which describes the principles, framework and boundaries for lifecycle analysis.

Some emissions are difficult to measure and require complex dynamic modelling of trade flows at the global scale, such as indirect land-use change. While difficult to measure, these impacts are taken into account in the US EPA's Renewable Fuel Standard program and California's Low Carbon Fuel Standard.

The tool that is the most commonly used in Canada to model lifecycle carbon intensity of fuels is GHGenius v4.03. GHGenius is a Microsoft Excel based data analysis tool with a comprehensive database of lifecycle inventories for various fuel and energy pathways. GHGenius takes into account GHGs and some criteria air contaminants. System boundaries for the analysis include well (or seed)-to-wheel emissions specific to the Canadian context. It is used by British Columbia to assess the carbon intensities of fuels under its low carbon fuel standard and by Ontario for its Green Diesel program. The U.S. federal government uses a similar model, GREET, developed by Argonne National Laboratory under contract with the U.S. Department of Energy, while California and Oregon use tailored versions of GREET. GHGenius presently does not account for emissions associated with indirect land-use change.

ECCC is considering using GHGenius as the main tool to assess lifecycle carbon intensity under the standard. Other tools are also being considered to assess the lifecycle carbon intensity of fuels.

Questions for Discussion

24. What lifecycle analysis method should be used under Canada's Clean Fuel Standard to assess lifecycle carbon intensity?
25. What system boundaries should be considered for raw materials and finished products?
26. What tools are best suited to conduct the lifecycle analysis under Canada's Clean Fuel Standard for the various fuels (liquid, gaseous and solid)? What gaps exist, if any, in existing tools like GHGenius or GREET to address these fuel types?
27. What are the needs for users of these tools?
28. Should emissions related to indirect land-use change be considered in the lifecycle analysis? If so, what basis should be used to assess these emissions? If not, are there alternative methods that could be employed to address significant carbon intensity values along the lifecycle?

6. Compliance mechanisms

A variety of compliance mechanisms will be included to provide flexibility in meeting the objective of the Clean Fuel Standard. Flexibilities could include:

- Reducing the average carbon intensity of fuels supplied by switching to lower carbon fuels;
- Reducing facility emission;
- Obtaining credits from other fossil fuel or alternative fuel suppliers;
- Generating credits from other actions that have a possibility of reducing the carbon intensity of fuels improve market access for lower carbon intensity fuels (e.g., actions under *Part 3 Agreements* in the British Columbia system, provisions under California system for innovative crudes and low-complexity / low-energy-use refineries).

Compliance with existing lower carbon fuel standards rely to a large extent on credit trading systems, although the design and implementation of these systems vary. A federal standard would consider the use of a credit trading system as integral to the design of the standard to improve the cost-effectiveness of emissions reductions and incent investments in alternative, lower carbon fuels and technologies. Key elements of a trading system may include the ability to bank credit and trade credits and to carry forward of surplus credits into subsequent years. Consumer protection is an additional consideration in the design of credit trading system, where other jurisdictions have addressed this concern by putting in place a cap on price of credits.

The implementation of a credit trading system would have to consider how credits are created and verified, tracked, traded and retired once used for compliance. California has the Credit Bank and Transfer System, which allows regulated parties to register and trade credits, while British Columbia operates on a system of declaration of trades between regulated parties.

In British Columbia and California, regulated parties and others may generate credits for projects related to lower carbon fuels. In California, a non-regulatee can generate credits by implementing innovative crude projects that reduce the carbon intensity of crude production. In British Columbia, regulated parties can generate credits by means of agreements for projects that result in emission reduction via the use of fuels (e.g., infrastructure for higher biofuels blending, hydrogen refueling infrastructure).

Questions for Discussion

29. **Should there be any limitation in the trading of credits? If so, on what basis (e.g., by fuel)?**
30. **Should all credits be generated through lowering emissions within the fuel lifecycle (i.e., in the full supply chain and use of the fuel) or should the Clean Fuel Standard consider credits from other types of projects?**
31. **Should a safety-valve be included to cap compliance costs? How would such a safety-valve work?**
32. **What additional flexibility or compliance mechanisms could be provided to facilitate compliance and minimize potential negative impacts while achieving the overall goals?**

7. Other considerations

Interaction with carbon pricing

On October 3, 2016, the Government of Canada signaled its intent to implement a pan-Canadian approach for carbon pricing. Under the new plan, all Canadian jurisdictions will have carbon pricing in place by 2018. Provinces and territories will have flexibility in deciding whether they implement a direct carbon price or a cap-and-trade system.

As in other jurisdictions, the Clean Fuel Standard can be complementary to a carbon price. Together, carbon pricing and the Clean Fuel Standard would be an efficient approach to reducing emissions, to stimulating the market to make investments in innovation and to deploying low-carbon technology. The E.U., California and BC also use a combination of carbon pricing with a low-carbon fuel standard to ensure that emission reductions are achieved and innovation takes place. Targeted regulatory actions – such as a clean fuel standard – are an excellent means of driving industry innovation towards low-carbon fuels and technologies while carbon prices gradually rise. They also minimize price impacts on consumers.

Future of federal Renewable Fuels Regulations

The *Renewable Fuels Regulations* play an important role in providing demand certainty and supporting the development of the biofuels industry in Canada, its role under a broader Clean Fuel Standard may need to be adjusted. As indicated above, other jurisdictions with low carbon regulatory frameworks are also subject to renewable fuels mandates. An assessment of how the *Renewable Fuels Regulations* would support the Clean Fuel Standard would need to be undertaken, including identifying how the two measures would work together to achieve meaningful GHG emission reductions while minimizing the burden to regulated parties for compliance. Consideration would be given to existing flexibilities and exemptions in the federal *Renewable Fuels Regulations,* and whether regional or other circumstances would require special provisions in the Clean Fuel Standard.

Non-regulatory measures that could stimulate alternate fuel supply under the new framework
Accelerating the deployment of lower carbon fuels and clean technology to markets may require other complementary policies. Alternative fuel supply could be supported through existing federal funding for research, development and demonstration of fuel technologies as well as new measures to enable retrofits and commercial scale buildout of facilities for production of advanced biofuels. As an example, the Energy Innovation Program is providing funding to support the demonstration of next-generation electric vehicle charging infrastructure in Canada.

Other sustainability issues
Sustainable development means achieving lower carbon, environmentally responsible economic growth, maintaining and restoring our ecosystems, and ensuring Canadians can flourish in clean and healthy environments. Beyond GHGs, sustainability is assessed across a broad spectrum of environmental impacts categories: other air pollutants emissions, releases to water and soil, biodiversity and species at risk impacts, as well as human health impacts. Social and economic concerns are also considered when determining sustainability of products and services. Clean fuel standards and renewable fuel mandates can have impact, both positive and negative, on sustainability (e.g. issues related to the production of alternate fuels such as water use or impacts on the soil). While the primary objective of clean fuel standards and renewable fuel mandates is to address GHG emissions, other jurisdictions, like the European Union, take into account other sustainability criteria in their approaches.

Questions for Discussion

33. **Could other policies facilitate the deployment of lower carbon fuels and technology to markets?**
34. **Are there regional considerations that should be considered in the design of the Clean Fuel Standard?**
35. **How could Canada's Clean Fuel Standard be harmonized with measures from provinces and territories?**
36. **Should the *Renewable Fuels Regulations* be maintained or phased-out? If maintained, how should the two instruments work together? If phased-out, should volume requirements for renewable fuels be included in the Clean Fuel Standard?**
37. **What would be the benefits or drawbacks to phasing in carbon intensity reductions under the Clean Fuel Standard? What approach to phasing in carbon intensity reductions would be most effective and why?**
38. **Fuel production and use can have impacts, both positive and negative, on sustainability. What are these key impacts for fuels used in Canada? Are these impacts different for fuel produced domestically than for imported fuels? Should these impacts be addressed in Canada's Clean Fuel Standard?**
39. **What are the lessons from other jurisdictions that have implemented low carbon fuel regulations which could inform the development of the Clean Fuel Standard?**

8. Next steps

ECCC is seeking your views on the key considerations and questions described above. A workshop is planned for March 6, 2017 in Ottawa, Ontario to discuss the issues laid out in this document in more depth. Building on the feedback received on this paper and through further consultations, ECCC will develop a draft regulatory framework for a Clean Fuel Standard.

Your input and ideas are important. Please submit written comments by mail or email by April 25, 2017, to the following address. Questions about the workshop can also be sent to this address:

Mark Cauchi
Executive Director, Oil, Gas and Alternative Energy Division
Clean Fuel Standard
Energy and Transportation Directorate
Environment and Climate Change Canada
351 St. Joseph Boulevard, 12th Floor
Gatineau, QC
K1A 0H3
Email: ec.cfsncp.ec@canada.ca