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Vol. 145, No. 15 — July 20, 2011

Registration

SOR/2011-143 June 29, 2011

CANADIAN ENVIRONMENTAL PROTECTION ACT, 1999

P.C. 2011-795 June 29, 2011

Whereas, pursuant to subsection 332(1) ([see footnote a](#)) of the *Canadian Environmental Protection Act, 1999* ([see footnote b](#)), the Minister of the Environment published in the *Canada Gazette*, Part I, on February 26, 2011, a copy of the proposed *Regulations Amending the Renewable Fuels Regulations*, substantially in the annexed form, and persons were given an opportunity to file comments with respect to the proposed Regulations or to file a notice of objection requesting that a board of review be established and stating the reasons for the objection;

Whereas the Governor in Council is of the opinion that the *Renewable Fuels Regulations* ([see footnote c](#)), as amended by the proposed Regulations, could make a significant contribution to the prevention of, or reduction in, air pollution;

And whereas, pursuant to subsection 140(4) of that Act, before recommending the proposed Regulations, the Minister of the Environment offered to consult with the provincial governments and the members of the National Advisory Committee who are representatives of Aboriginal governments;

Therefore, His Excellency the Governor General in Council, on the recommendation of the Minister of the Environment, pursuant to sections 140 ([see footnote d](#)) and 326 of the *Canadian Environmental Protection Act, 1999* ([see footnote e](#)), hereby makes the annexed *Regulations Amending the Renewable Fuels Regulations*.

REGULATIONS AMENDING THE RENEWABLE FUELS REGULATIONS

AMENDMENTS

1. (1) The definition “pre-distillate compliance period” in subsection 1(1) of the *Renewable Fuels Regulations* ([see footnote 1](#)) is replaced by the following:

“pre-distillate compliance period”

« période précédant la période de conformité visant le distillat »

“pre-distillate compliance period” means the period that begins on December 15, 2010 and that ends on June 30, 2011.

(2) Paragraph (a) of the definition “distillate compliance period” in subsection 1(1) of the Regulations is replaced by the following:

(a) the period that begins on July 1, 2011 and that ends on December 31, 2012; and

2. (1) Paragraph 4(7)(a) of the Regulations is replaced by the following:

(a) under section 29 — if the volume is the volume of a batch referred to in subparagraph 29(e)(iii) or (iv) — or under paragraph 32(1)(d) or (2)(d) or any of subsections 32(4), (5) and (8) may be expressed in cubic metres to three decimal places, rather than in litres, if that unit is indicated in the record; and

(2) Section 4 of the Regulations is amended by adding the following after subsection (8):

Rounding — percentages of volume

(9) The percentage of a volume of renewable fuel that is determined for the purpose of the definition “high-renewable-content fuel” in subsection 1(1) or of subsection 17(1) is to be rounded to the nearest whole number percentage and, if the percentage is equidistant between two whole number percentages, to the nearest even whole number percentage.

3. Paragraphs 6(4)(g) and (h) of the Regulations are replaced by the following:

(g) gasoline, diesel fuel or heating distillate oil, as the case may be, sold for or delivered for use in Newfoundland and Labrador, the Northwest Territories, Yukon, Nunavut and that part of Quebec that is north of latitude 60°N;

(h) on or before December 31, 2012, diesel fuel or heating distillate oil, as the case may be, sold for or delivered for use in Nova Scotia, New Brunswick, Prince Edward Island and that part of Quebec that is on or south of latitude 60°N;

4. The marginal note to subsection 8(2) of the English version of the Regulations is replaced by “Distillate pool”.

5. Subsection 9(2) of the Regulations is replaced by the following:

Change of information

(2) If the information provided in the registration report — other than the information referred to in paragraph 1(b) or (c) of Schedule 1 — changes, the primary supplier must send a notice to the Minister that provides the updated information no later than five days after the change.

6. Subsection 11(2) of the Regulations is replaced by the following:

Change of information

(2) If the information provided in the registration report — other than the information referred to in paragraph 1(b) or (c) of Schedule 2 — changes, the elective participant must send a notice to the Minister that provides the updated information no later than five days after the change.

7. The description of RF_G in subsection 21(2) of the English version of the Regulations is replaced by the following:

RF_G is the volume, expressed in litres, that the primary supplier determined for RF_G in accordance with subsection 8(1) for that gasoline compliance period; and

8. (1) The description of RF_D in subsection 22(2) of the English version of the Regulations is replaced by the following:

RF_D is the volume, expressed in litres, that the primary supplier determined for RF_D in accordance with subsection 8(2) for that distillate compliance period; and

(2) Subsection 22(3) of the Regulations is repealed.

9. Section 23 of the Regulations is replaced by the following:

Carry forward into first distillate compliance period

22.1 (1) On September 30, 2011, a primary supplier may carry forward into the first distillate compliance period distillate compliance units that they own that were created before July 1, 2011 and that have not been assigned, under subsection 7(3), as the value for DtG_{DG} in subsection 8(1). The number of distillate compliance units that may be so carried forward must not exceed 0.004 multiplied by the number of litres in the primary supplier's distillate pool determined using the pre-distillate compliance period as if it were the distillate compliance period in question.

Identification

(2) A record referred to in section 31 or subsection 32(6) or a report referred to in section 33 or 39 that is related to the creation, transfer in trade, receipt in trade, carrying forward, cancellation, or assignment under subsection 7(3) as the value for DtG_{DG} in subsection 8(1), of distillate compliance units — in the period that begins on July 1, 2011 and that ends on September 30, 2011 — must identify the number of those distillate compliance units that were created

- (a) in that period; and
- (b) before July 1, 2011.

Written statement

(3) A participant who — in the period that begins on July 1, 2011 and that ends on September 30, 2011 — transfers in trade distillate compliance units must, on the transfer, provide to the primary supplier who receives in trade those distillate compliance units a written statement that indicates the number of those distillate compliance units that were created

- (a) in that period; and
- (b) before July 1, 2011.

Carry forward — elective participants

23. An elective participant may, before the end of the trading period in respect of a compliance period, carry forward their compliance units — up to a maximum of the number of compliance units that they created during the compliance period — into the next compliance period. For greater certainty, no distillate compliance units may be carried forward by an elective participant into the first distillate compliance period.

10. (1) The portion of subsection 25(2) of the English version of the Regulations before paragraph (a) is replaced by the following:

Exports

(2) For each litre of renewable fuel content in a batch of liquid petroleum fuel exported by a participant, or by one of their affiliates who is not a participant, during a compliance period, the participant must, before the end of the trading period in respect of the compliance period, cancel compliance units that were created during, or carried forward or carried back into, the compliance period as follows:

(2) Section 25 of the Regulations is amended by adding the following after subsection (4):

Biocrude as feedstock

(5) If, during a compliance period, a primary supplier produces a liquid petroleum fuel at a facility that uses biocrude as a feedstock and subsequently the primary supplier, or an affiliate of the primary supplier, exports a volume of the fuel during the trading period in respect of the compliance period, the primary supplier must — except for any of that volume that the primary supplier demonstrates was produced from feedstock that did not include any biocrude — cancel before the end of that trading period

(a) for exported diesel fuel or heating distillate oil, a number of distillate compliance units equal to the number of distillate compliance units created under subsections 15(1) and (2) during the compliance period as a result of the use of biocrude as feedstock to produce liquid petroleum fuel at the facility multiplied by the volume of the exported fuel and divided by the sum of the volume of diesel fuel and heating distillate oil produced at the facility during the compliance period; and

(b) in any other case, a number of gasoline compliance units equal to the number of gasoline compliance units created under subsection 15(2) during the compliance period as a result of the use of biocrude as feedstock to produce liquid petroleum fuel at the facility multiplied by the volume of the exported fuel and divided by the sum of the volume of fuel, other than diesel fuel and heating distillate oil, produced at the facility during the compliance period.

October 1, 2011 — distillate compliance units

(6) As of October 1, 2011, all of a participant's distillate compliance units that they own and that were created before July 1, 2011 are cancelled unless they have been carried forward under subsection 22.1(1) or assigned, under subsection 7(3), as the value for DtG_{DG} in subsection 8(1) for the first gasoline compliance period.

11. (1) Subsection 28(3) of the French version of the Regulations is replaced by the following:

Non-application — aucune unité créée

(3) Les paragraphes (1) et (2) ne s'appliquent pas, à l'égard d'une période de conformité donnée, au producteur ou à l'importateur de carburant renouvelable qui établit, documents à l'appui — lesquels sont transmis au ministre avec le rapport requis aux termes du paragraphe 34(4) —, qu'aucune unité de conformité n'a été créée à partir du carburant renouvelable qu'il a produit ou importé au cours de cette période de conformité.

(2) Subsection 28(4) of the Regulations is repealed.

12. (1) The portion of subsection 31(1) of the Regulations before paragraph (a) is replaced by the following:

Compliance unit account book

31. (1) For the trading period in respect of each compliance period, a participant must, in a compliance unit account book, make a record of the gasoline compliance units and of the distillate compliance units, as the case may be, that they

(2) Paragraph 31(1)(b) of the Regulations is replaced by the following:

(b) transferred in trade, received in trade or cancelled during the trading period in respect of the compliance period; or

(3) Subsection 31(2) of the Regulations is amended by adding the following after paragraph (f):

(f.1) the number of their compliance units cancelled under subsection 25(5);

(1.2) the number of their compliance units cancelled under subsection 25(6);

13. Paragraph 32(3)(a) of the Regulations is amended by striking out “or” at the end of subparagraph (i), by adding “or” at the end of subparagraph (ii) and by adding the following after subparagraph (ii):

(iii) was later blended at a blending facility to result in liquid petroleum fuel that was not high-renewable-content fuel;

14. (1) Subsection 34(2) of the Regulations is replaced by the following:

Change of information

(2) If the information provided in the registration report — other than the information referred to in paragraph 1(b) or (c) of Schedule 6 — changes, the producer or importer must send a notice to the Minister that provides the updated information no later than five days after the change.

(2) Paragraph 34(3)(e) of the English version of the Regulations is replaced by the following:

(e) for a batch that was imported, the province via which importation occurred, the date of importation of the batch and its country of origin;

(3) The portion of paragraph 34(3)(g) of the Regulations before subparagraph (ii) is replaced by the following:

(g) if known, whether the batch of renewable fuel is to be exported and, if so,

(i) in the case of fuel that is sold for export by the producer or the importer before its exportation, the province in which the batch was located when ownership of the batch was transferred by that sale, and

15. Subsection 35(2) of the Regulations is replaced by the following:

Change of information

(2) If the information provided in the report on measurement methods — other than the information referred to in paragraph 1(b) or (c) of Schedule 8 — changes, the person must send a notice to the Minister that provides the updated information no later than five days after the change.

16. Section 39 of the French version of the Regulations is amended by replacing “15 décembre 2011” with “15 décembre 2010”.

17. Subsection 40(3) of the Regulations is replaced by the following:

Distillate requirements

(3) Subsection 5(2) comes into force on July 1, 2011.

18. Schedule 1 to the Regulations is amended by replacing the reference after the heading “SCHEDULE 1” with “(Subsection 3(2) and section 9)”.

19. Schedule 2 to the Regulations is amended by replacing the reference after the heading “SCHEDULE 2” with “(Paragraph 11(1)(b), subsection 11(2) and item 5 of Schedule 1)”.

20. Item 3 of Schedule 4 to the Regulations is replaced by the following:

3. The volume, expressed in litres

(a) in the case of the first gasoline compliance period, of their distillate pool determined using the pre-distillate compliance period as if it were the distillate compliance period; and

(b) in any other case, of their distillate pool.

21. Item 5 of Schedule 5 to the Regulations is amended by striking out “and” at the end of paragraph (b), by adding “and” at the end of paragraph (c) and by adding the following after paragraph (c):

(d) the number of gasoline compliance units and of distillate compliance units cancelled under subsection 25(5) of these Regulations.

22. Item 10 of Schedule 5 to the Regulations is amended by striking out “and” at the end of paragraph (c) and by adding the following after that paragraph:

(c.1) under subsection 25(6) of these Regulations because compliance units were neither carried forward nor assigned as envisaged by that subsection; and

23. Schedule 6 to the Regulations is amended by replacing the reference after the heading “SCHEDULE 6” with “(Subsections 3(2) and 34(1) and (2))”.

24. Schedule 8 to the Regulations is amended by replacing the reference after the heading “SCHEDULE 8” with “(Subsections 35(1) and (2))”.

COMING INTO FORCE

25. (1) Subject to subsection (2), these Regulations come into force on the day on which they are registered.

(2) Sections 5 and 6, subsection 14(1) and section 15 come into force on the day that is 60 days after the day on which these Regulations are registered.

REGULATORY IMPACT ANALYSIS STATEMENT

(This statement is not part of the Regulations.)

Executive summary

Issue: Greenhouse gases (GHGs) are primary contributors to climate change. The most significant sources of GHG emissions are anthropogenic, mostly as a result of combustion of fossil fuels. The emissions of GHGs have been increasing significantly since the industrial revolution and this trend is likely to continue if no action is taken. In 2008, GHG emissions from the transportation sector contributed around 27% of Canada’s inventory of emissions. Nationally, historical data indicates that emissions in 2008 were about 19% above the 1990 levels. The Government of Canada is committed to reducing Canada’s total GHG emissions by 17% from 2005 levels by 2020.

The *Renewable Fuels Regulations* (the Regulations), published in the *Canada Gazette*, Part II, on September 1, 2010, include provisions requiring an average 2% requirement for renewable content in diesel fuel and heating distillate oil. The Regulations do not specify a start date for this requirement as it was subject to the demonstration of technical feasibility under the range of Canadian conditions.

An assessment by Natural Resources Canada (NRCan) through the National Renewable Diesel Demonstration Initiative (NRDDI) has led to the conclusion that renewable diesel can meet the Canadian petroleum industry accepted standards, subject to timing considerations for infrastructure readiness.

In finalizing the coming-into-force date, the Government has carefully considered all the comments received and is balancing competitiveness impacts on eastern refiners with the need to minimize delays to support the Canadian biodiesel industry in moving forward. A permanent exemption is being provided for diesel fuel and heating distillate oil sold in Newfoundland and Labrador and temporary exemptions for the first compliance period for

diesel fuel and heating distillate oil sold in Quebec and all other Atlantic provinces. Further flexibilities include an extended first compliance period, as proposed in the *Canada Gazette*, Part I, and the following, which were provided for in the original Regulations: carrying forward of pre-distillate compliance units, trading of compliance units, carrying back of compliance units and other flexibilities already in the Regulations. The 2% requirement is being put in place with a coming-into-force date of July 1, 2011.

Description: The *Regulations Amending the Renewable Fuels Regulations* (the Amendments) set a date of coming into force of the 2% requirement for diesel fuel and heating distillate oil. The coming into force of this requirement would provide further reductions in greenhouse gas emissions, in addition to the reductions estimated from the 5% in gasoline requirement of the Regulations. Further details on the evaluation, reporting and assessments activities for the 5% *Renewable Fuels Regulations* are available in the Regulatory Impact Analysis Statement (RIAS) that was published with the Regulations on September 1, 2010, in the *Canada Gazette*, Part II. ([see footnote 2](#))

The Regulations already include full provisions to require fuel producers and importers of diesel fuel and heating distillate oil to have an average annual renewable fuel content equal to at least 2% of the volume of distillates that they produce and import. Section 17 of the Amendments amends subsection 40(3) of the Regulations to set a coming-into-force date of the 2% requirement for diesel fuel and heating distillate oil as of July 1, 2011.

The Amendments are estimated to result in an incremental reduction of GHG emissions of about 1 megatonne (Mt) of carbon dioxide equivalent (CO₂e) per year directly attributed to the 2% requirement. The Amendments fulfill the commitments under the Renewable Fuels Strategy of reducing GHG emissions from liquid petroleum fuels and strengthening the demand for renewable fuels in Canada.

In addition to the overall environmental benefits, one of the key drivers for supporting renewable fuels production and use is the benefit that it can bring to the agriculture sector and rural Canada. Increased renewable fuels production in Canada will result in increased local demand for feedstocks and new markets for Canadian agricultural producers' crops. For example, biodiesel facilities can provide a market for off-grade canola, which is not suitable for the food market.

Providing agricultural producers with the opportunity to invest in and develop profitable renewable fuels projects that use agricultural products as inputs will help to create a positive stream of income that could be more independent of commodity price swings. This would also encourage an approach that goes beyond simple commodity production to focus on new ways to add value to biomass produced on farms. Renewable fuel plants would inject additional spending into the local rural economies, broadening their tax base and generating additional jobs at the local level.

Cost-benefit statement: Over a 25-year period, the Amendments will result in a cumulative reduction of 23.6 Mt of CO₂e in GHG emissions (or an average incremental reduction of about 1 Mt CO₂e per year). Although it is difficult to quantify and monetize the full range of benefits attributable to the Amendments, and such an exercise does not take into account the broader socio-economic benefits of the full range of elements of Canada's climate change and Renewable Fuels Strategy, it is estimated that the Amendments will have overall benefits for Canada of \$10.4 billion over a 25-year period. These include the value of GHG reduction benefits with an estimated present value of approximately \$495 million, using a social cost of carbon value of \$25 per tonne in 2010 and the avoided cost of displaced diesel fuel and heating distillate oil with an estimated present value of \$9.9 billion. There are other complementary benefits to the economy from the Amendments, including benefits from increased employment and income resulting from increased production of renewable fuels. Other government initiatives to improve vehicle efficiency and to develop next generation renewable fuel production technologies are also expected to contribute towards GHG emission reductions and socio-economic benefits over time.

The present value of the costs associated with the Amendments is estimated to be \$12.8 billion. Costs of incremental production of biodiesel are estimated at \$4.8 billion. Fuel producers and importers would incur estimated costs of \$7.8 billion, which include the cost of purchasing kerosene, used as a biodiesel diluent, as well as capital investments needed to upgrade or modify refinery installations, distribution and blending systems. Incremental costs to consumers are estimated at \$201.7 million resulting from increased fuel consumption due to the lower energy content of kerosene used in biodiesel blends.

Overall, the Amendments are expected to result in a net cost of \$2.4 billion over 25 years, or an average net cost of approximately \$94 million per year. A sensitivity analysis shows that this net cost could change somewhat depending on the value of certain key variables.

Business and consumer impacts: The distribution of impacts on industry would be relatively uneven across the country in part due to existing mandates in western provinces and the availability of renewable fuels. As a result, the Amendments will have minimal impacts in some western provinces (such as British Columbia, Manitoba and Alberta) where biodiesel-blended diesel fuel is already available, with most impacts concentrated in regions where provincial renewable fuel requirements are not yet in place.

The renewable fuel production sector stands to gain in terms of the ability to grow its production capacity from the increase in the demand for renewable fuels. Some increase in employment and other economic activities for the sector is expected from this expansion.

Consumers will also be impacted by a small increase in fuel price at the pump as the fuel producers pass on their incremental costs down the supply chain. The precise magnitude of the price impact, given differences between regions and across fuel suppliers, is difficult to predict but will be relatively small. In the event that all industry costs are passed on to the consumers, it is estimated that the average price increase for the biodiesel blend over the 25-year period would be about one third of a cent per litre, an amount likely to be unnoticeable in comparison with the usual day-to-day price fluctuations experienced in the diesel fuel market.

Performance measurement and evaluation plan: The evaluation of the Regulations will be focused on the volume of renewable fuel blended with liquid petroleum fuels in Canada. A detailed performance measurement and evaluation plan (PMEP) was developed for the *Renewable Fuels Regulations*. The PMEP is being revised to include elements for the 2% renewable fuel requirement for diesel fuel and heating distillate oil. The revised PMEP will be made available, upon request, from Environment Canada.

Issue

Greenhouse gases (GHGs) are primary contributors to climate change. The most significant sources of GHG emissions are anthropogenic, mostly as a result of combustion of fossil fuels. The emissions of GHGs have been increasing significantly since the industrial revolution and this trend is likely to continue if no action is taken. Historical data indicates that emissions in 2008 were about 19% above the 1990 levels. The Government of Canada is committed to reducing Canada's total GHG emissions by 17% from 2005 levels by 2020.

In 2008, GHG emissions from the transportation sector contributed around 27% of Canada's inventory of emissions. Modelling results from Natural Resources Canada (NRCan) indicate that the use of renewable fuels in liquid petroleum fuel for transportation can contribute to GHG emission reductions on a lifecycle basis.

The *Renewable Fuels Regulations* (the Regulations), published in the *Canada Gazette*, Part II, on September 1, 2010, include provisions requiring an average 2% requirement for renewable content in diesel fuel and heating distillate oil but do not specify a start date for this requirement. This

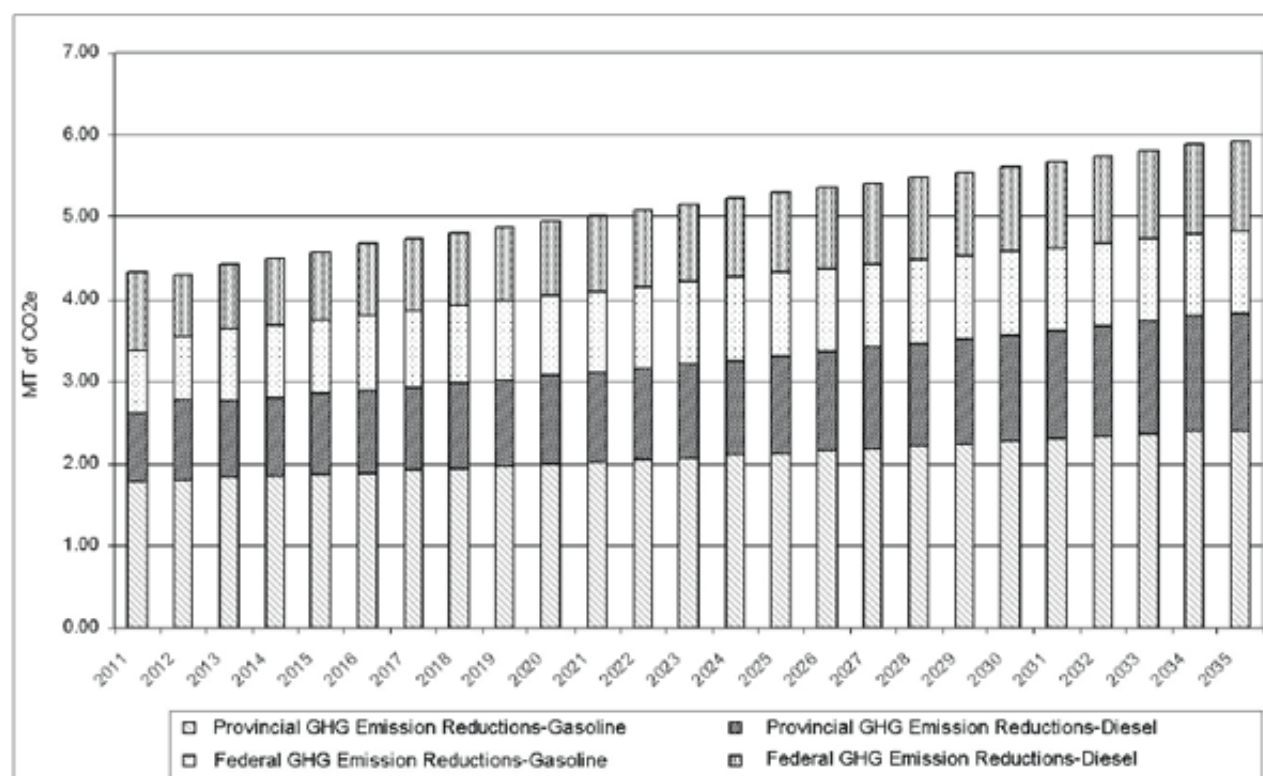
requirement was subject to the demonstration of technical feasibility under the range of Canadian conditions, which was assessed by NRCan through the National Renewable Diesel Demonstration Initiative (NRDDI). In consultation with Environment Canada, Agriculture and Agri-Food Canada and Transport Canada, seven demonstration projects were delivered by stakeholders with funding assistance from NRDDI. In addition to the demonstration projects, a study of the readiness of the Canadian petroleum distribution infrastructure was also conducted through the NRDDI. The technical information and experience gathered through the NRDDI projects led to the conclusion that renewable diesel can meet the Canadian petroleum industry accepted standards, subject to timing considerations for infrastructure readiness. ([see footnote 3](#))

Now that the technical feasibility has been demonstrated, Environment Canada is amending the Regulations to set a coming-into-force date of July 1, 2011, for the 2% requirement for diesel fuel and heating distillate oil.

Objectives

The *Regulations Amending the Renewable Fuels Regulations* (the Amendments) set a date of coming into force of the 2% requirement for diesel fuel and heating distillate oil. The coming into force of this requirement will provide further reductions in greenhouse gas emissions, in addition to the reductions estimated from the 5% in gasoline requirement of the Regulations (see Figure 1 below). It will also establish a demand for renewable content in diesel fuel in Canada and provide the renewable fuels industry with the regulatory certainty needed to secure investments to build new production plants and ensure an adequate supply of renewable fuels for the Canadian market.

Figure 1: Estimated GHG Emissions Reductions from the *Renewable Fuels Regulations*



Description

The Amendments

The Regulations already include full provisions to require fuel producers and importers of diesel fuel and heating distillate oil to have an average annual renewable fuel content equal to at least 2% of the volume of distillates that they produce and import. However, the Regulations do not specify a start date for this requirement. Section 17 of the Amendments amends subsection 40(3) of the Regulations

to set a coming-into-force date of the 2% requirement for diesel fuel and heating distillate oil of July 1, 2011. This requirement leads to the following changes:

- Subsection 1(1) clarifies the definition of “pre-distillate compliance period” by explicitly including the exact dates, specifically from December 15, 2010, to June 30, 2011. This does not result in any change of the actual requirements; and
- Subsection 1(2) clarifies the definition of “distillate compliance period” by explicitly including the exact dates; specifically, the first compliance period is from July 1, 2011, to December 31, 2012. This does not result in any change to the actual requirements.

In response to comments from stakeholders, the Government has carefully considered all the comments received and is balancing competitiveness impacts on eastern refiners with the need to minimize delays to support the Canadian biodiesel industry. Some transitional flexibility has been added to the Amendments. For the first distillate compliance period only, section 3 allows a primary supplier to subtract from its distillate pool the volume of diesel fuel and heating distillate oil that it sold for, or delivered for, use in New Brunswick, Nova Scotia, Prince Edward Island or Quebec south of 60°N. In addition, for all distillate compliance periods, section 3 also allows a primary supplier to subtract from its distillate pool the volume of diesel fuel and heating distillate oil that it sold for, or delivered for, use in Newfoundland and Labrador.

In addition, Environment Canada and industry stakeholders have identified some issues, minor inconsistencies and lack of clarity in parts of the regulatory text since the publication of the Regulations in the *Canada Gazette*, Part II. The Amendments also include the following revisions on that account:

- Subsection 2(1) corrects paragraph 4(7)(a) of the Regulations by removing the phrase “or report”. The various clauses referred to in paragraph 4(7)(a) do not cover reports;
- Subsection 2(2) adds a new subsection 4(9) to the Regulations which clarifies the rules on how the percentages of renewable fuel in petroleum fuel, determined for the purposes of the definition of “high-renewable-content fuel” or in subsection 17(1) of the Regulations, are to be determined. Consistent with current industry standards, these percentages are to be rounded to the nearest whole number percentage or, if equidistant between two whole number percentages, to the nearest even whole number percentage;
- Section 4 revises the marginal note in the English version of subsection 8(2) of the Regulations from “Distillate” to “Distillate pool”, which aligns with the marginal notes for subsections 5(2) and 6(2) of the Regulations;
- Sections 5 and 6, subsection 14(1) and section 15 adjust the requirement for sending a notice of changed registration information, under subsections 9(2), 11(2), 34(2) or 35(2) of the Regulations, by now requiring such a notice five days after the company’s name or address has changed. Under subsection 25(2), these provisions are brought into force 60 days after the Amendments are registered;
- Section 7 and subsection 8(1) remove the phrase “the description” from the English versions of definitions of RF_G and RF_D in subsections 21(2) and 22(2) of the Regulations. This phrase is superfluous;
- Section 9 combines all changes to provisions related to carrying forward of distillate compliance units into the first distillate compliance period. These provisions have extended the trading period for these units by an additional three months. This extended trading period necessitates the differentiation by vintage of these compliance units from those created during those three months, and requires a written statement as to their vintage. As a consequence of the combination of these provisions into one section, subsection 8(2) of the Amendments repeals the existing provisions under subsection 22(3) of the Regulations. Because the implementation date is now known, section 9 also simplifies section 23 of the Regulations by removing references to gasoline compliance periods that precede the first distillate compliance period as there are now no such periods;
- Subsection 10(1) adds the word “content” after “renewable fuel” in subsection 25(2) in the English version to make it consistent with the French version and with other parts of the Regulations;

- Subsection 10(2) adds a new subsection 25(5) to the Regulations which clarifies that compliance units that were created as a result of the use of biocrude are to be cancelled in proportion to the volume of biocrude content in the exported fuel produced from that biocrude;
- Subsection 10(2) also adds a new subsection 25(6) to the Regulations which clarifies that excess distillate compliance units owned by an elective participant at the end of the pre-distillate compliance period are cancelled. Subsection 12(3) and sections 21 and 22 of the Amendments add recordkeeping and reporting requirements for information regarding such cancellations to subsection 31(2) and Schedule 5 of the Regulations;
- Subsection 11(1) revises the French version of subsection 28(3) of the Regulations to make it consistent with the English version;
- Subsection 11(2) repeals section 28(4) of the Regulations because the implementation date is now known;
- Subsection 12(1) revises the wording of subsection 31(1) of the Regulations to clarify the requirement to make records in a compliance unit account book. As a consequence of those changes, subsection 12(2) of the Amendments changes “and” to “or” at the end of the English version of paragraph 31(1)(b) of the Regulations;
- Section 13 adds a new subparagraph 32(3)(a)(iii) to the Regulations providing for compliance units to be created for a two-step blending process that initially results in high-renewable-content fuel which is later re-blended into fuel that is no longer high-renewable-content fuel. Some companies are considering such two-step blending, particularly for biodiesel where B50 can be stored unheated and then re-blended to create B5;
- Subsection 14(2) corrects the English spelling of “occurred” in paragraph 34(3)(e) of the Regulations, and subsection 14(3) of the Amendments clarifies the requirements of the Regulations’ paragraph 34(3)(g) and makes them more closely align with the text of paragraph 34(3)(h);
- Section 16 corrects the duration of interim period in the French version of section 39 of the Regulations to align with the duration in the English version;
- Sections 18, 19, 23 and 24 correct the references below the headings of Schedules 1, 2, 6 and 8, respectively, to reflect the provisions to which the schedules refer; and
- Section 20 simplifies the requirements of Item 3 of Schedule 4 of the Regulations, now that the implementation date is known.

Background

National context

Since 1980, the Government of Canada has supported the development of alternative fuels and has been active in the research and development of technologies and in the implementation of market-based programs (such as fiscal incentives and economic assistance) that encourage the production and use of renewable fuel.

A number of demonstration programs aimed at evaluating and promoting the production and use of renewable fuels have been implemented by the Government of Canada, such as the Biodiesel Targeted Measure and the Ethanol Expansion Program.

Through the implementation of programs such as these, the Government of Canada has demonstrated its commitment to expanding the production and use of cleaner, renewable biofuels such as ethanol and biodiesel. More recently, the Government of Canada adopted the four-pronged Renewable Fuels Strategy to

- reduce GHG emissions resulting from fuel use;
- encourage greater production of renewable fuels;
- provide new market opportunities for agricultural producers and rural communities; and
- accelerate the commercialization of new renewable fuel technologies.

In addition to the overall environmental benefits, one of the key drivers for supporting renewable fuels production and use is the benefit that it can bring to the agriculture sector and rural Canada. Increased renewable fuels production in Canada will result in increased local demand for feedstocks and new

markets for Canadian agricultural producers' crops. For example, biodiesel facilities can provide a market for off-grade canola, which is not suitable for the food market.

Providing agricultural producers with the opportunity to invest in and develop profitable renewable fuels projects that use agricultural products as inputs will help to create a positive stream of income that could be more independent of commodity price swings. This would also encourage an approach that goes beyond simple commodity production to focus on new ways to add value to biomass produced on farms. Renewable fuel plants would inject additional spending into the local rural economies, broadening their tax base and generating additional jobs at the local level.

In support of the Renewable Fuels Strategy, on December 30, 2006, the Government of Canada published a notice of intent ([see footnote 4](#)) to develop regulations that would require an average 5% renewable fuel content based on gasoline volumes by 2010 and an average 2% for diesel fuel and heating distillate oil volumes by no later than 2012.

On April 23, 2007, the Government of Canada established the ecoAgriculture Biofuels Capital Initiative ([see footnote 5](#)) for which Agriculture and Agri-food Canada (AAFC) is responsible. This four-year, \$200-million initiative would provide repayable contributions of up to \$25 million per project to help farmers overcome the challenges of raising the capital necessary for the construction or expansion of renewable fuel production facilities.

A program in support of the Renewable Fuels Strategy is the ecoENERGY for Biofuels Initiative (ecoENERGY) ([see footnote 6](#)) managed by NRCan. Announced on December 3, 2007, the ecoENERGY program supports the production of renewable alternatives to gasoline and diesel and encourages the development of a competitive domestic industry for renewable fuels. This program will invest up to \$1.5 billion over nine years in support of renewable fuels production in Canada.

The 2007 budget also made \$500 million available over eight years to Sustainable Development Technology Canada, ([see footnote 7](#)) overseen by Environment Canada (EC) and NRCan to establish — in collaboration with the private sector — large-scale facilities for the production of next-generation renewable fuels. Next-generation renewable fuels produced from non-food feedstocks (such as wheat straw, corn stover, wood residue and switchgrass) have the potential to generate greater environmental benefits in terms of GHG emission reductions than traditional renewable fuels.

In addition to these commitments, the 2008 budget provided a further \$10 million over two years for scientific research and analysis on renewable fuels emissions to support the development of regulations, and demonstration projects to assess the technical feasibility of biodiesel under Canadian climate and conditions.

The Amendments further support the use of renewable fuels in Canada and increase the demand for these fuels. Domestic production levels are expected to be influenced by the initiatives in place under the Renewable Fuels Strategy. Combined with other Government of Canada programs, the Amendments assist in the creation of jobs in rural areas and provide new market opportunities for rural Canada.

Actions in other Canadian jurisdictions

Some provinces have established minimum renewable diesel content requirements for distillates. The following table summarizes the provincial requirements for distillates that have been announced or implemented to date.

Table 1: Legislated Provincial Renewable Fuel Mandates for Distillates

Province	Regulated level	Implementation timeframe
Manitoba	2%	2009
Alberta	2%	2011

British Columbia	3%	2010
	4%	2011
	5%	2012

In addition, Saskatchewan announced, in March 2011, a 2% biodiesel mandate starting in July 2012.

Actions in international jurisdictions

Renewable diesel requirements have been implemented by various jurisdictions, including the United States, the European Union and Brazil.

United States

The U.S. *Energy Policy Act of 2005* established the Renewable Fuels Standard (RFS), requiring 7.5 billion gallons (approximately 34 billion litres) of renewable fuels to be blended into gasoline by 2012. The *Energy Independence and Security Act of 2007* expanded the program and established what is commonly referred to as RFS2, with annual volume requirements that increase to 36 billion gallons (about 164 billion litres) by 2022. The RFS2 also created various renewable fuel categories, and requirement for biomass-based diesel, with each category having lifecycle greenhouse gas performance threshold standards and specific volume requirements.

As of July 31, 2010, five states and one city have renewable diesel mandates in effect:

- Minnesota has a 5% requirement for all diesel fuel sold in the state. The Minnesota mandate increases to 10% in 2012 and 20% in 2015, but only from April through October.
- Oregon has a 2% mandate that increases to 5% when annual in-state production of biodiesel reaches 15 million gallons.
- Washington State has a mandate for 2% biodiesel or renewable diesel content. This mandate increases to 5% once in-state feedstock and oil-seed crushing capacity can meet a 3% requirement.
- Pennsylvania has a 2% mandate for all diesel fuel sold in the state. This increases to 5%, 10% and 20% once in-state production can meet those levels.
- Massachusetts has a 2% renewable diesel fuel mandate that increases to 5% by 2013; however, the current mandate has been suspended indefinitely due to concerns that higher costs would be borne by the consumer as a result of the expiration of the U.S. biodiesel federal tax credit.
- Portland, Oregon, has a 10% mandate for all diesel fuel sold in the city.

Two additional states have enacted biodiesel mandates that have not yet taken effect:

- New Mexico's 5% mandate for diesel fuel used in motor vehicles takes effect in 2012.
- Louisiana's 2% mandate takes effect once in-state annual production from domestically grown feedstock reaches 10 million gallons.

United States biodiesel production capacity in 2009 was approximately 5.9 billion litres, while actual production was approximately 1.7 billion litres.

European Union

The Renewable Energy Directive (Directive 2009/28) came into force on June 25, 2009, and one of its core elements is a 10% binding target for renewables in the transportation sector for 2020 and the introduction of a comprehensive set of sustainability requirements for biofuels in order to be counted towards the target.

The European Union (E.U.) Biofuels Directive (Directive 2003/30/EC) set non-binding targets for biofuels use as a percentage of fossil fuel use. In 2005, the target was 2%, and in 2010, it is 5.75%. An amendment to the Fuels Quality Directive was voted in December 2008 to allow biodiesel blends of up to 7%. The related diesel fuel quality specification EN 590 was modified in 2009 to align with the directive.

Several E.U. member states have biodiesel or renewable diesel specific mandates, such as Germany (4.4%), Italy (3.5% in 2010, 4% in 2011, and 4.5% in 2012), Lithuania (5%), and Portugal (10%).

Brazil

In 2005, Brazil established minimum percentages for biodiesel in diesel fuel. The mandatory requirement is 2%, for 2008 to 2012, and 5% from 2013 onwards.

Sector profiles

Renewable fuel facilities

To increase the availability of biodiesel in Canada, the government has initiated the ecoENERGY for Biofuels program, which supports the production of renewable alternatives to gasoline and diesel and encourages the development of a competitive domestic industry for renewable fuels. The program, administered by NRCan, is investing up to \$1.5 billion over nine years in support of biofuels production in Canada.

There are currently seven commercial-scale biodiesel producing plants in operation in Canada, accounting for approximately 118 million litres per year in production as of 2007. Other plants are under construction, mostly in the Prairie provinces. When considering all these biodiesel plants, the Canadian biodiesel industry would have a total production capacity of 600 million litres by 2012.

Biodiesel can be produced from a large variety of feedstocks, including vegetable oils, animal fats and recycled cooking oils (also known as yellow greases). In Canada, the most common vegetable oils are from dedicated crops such as soybean and canola. Since canola has a higher oil content, lower cloud points ([see footnote 8](#)) and pour points ([see footnote 9](#)), and is in a large net export position compared to soy, it is considered a better feedstock for biodiesel production. Currently, biodiesel produced in Canada is mainly made from yellow grease and animal fats, which are the most cost-effective feedstocks and generate relatively fewer GHG emissions than others.

Petroleum refining sector

In 2007, there were 16 refineries in Canada operated by 9 refining-marketing companies. Imperial Oil, Shell and Suncor marketed nationally and operated three or more refineries each. The other companies only operated one refinery each and, for the most part, marketed locally. In 2007, these facilities employed approximately 7 400 people in the sector. Of these facilities, four were located in Ontario, three were located in each of Alberta and Quebec, two were located in British Columbia, and Saskatchewan, New Brunswick, Nova Scotia and Newfoundland and Labrador had one facility each.

Refineries in Canada have generally been operating at 90% of their capacity (95% being considered as the optimum utilization rate, taking into account maintenance shutdowns and other unplanned events). A total of 108 billion litres of crude oil was sent to refineries in 2007, with imports accounting for 49.9 billion litres. The total production of refined petroleum products was approximately 123 billion litres, of which motor gasoline is the most important refined product, representing about 36% of the total production. Diesel fuel accounts for another 23%. While the total production of refined products varies from year to year, the proportion of each product on the total does not change significantly. In January of 2007, the distribution of total domestic sales of refined petroleum products by region was 32% in Ontario, 20% in Quebec, 18% in Alberta, 11% in the Atlantic provinces, and 19% in the other provinces and territories in Canada.

Canadian petroleum refiners and producers of other petroleum and coal products (e.g. producers of petroleum waxes, petroleum jelly, recycled motor oils) contributed an estimated \$2.6 billion to Canadian gross domestic product (GDP) and accumulated \$68.6 billion in total revenues in 2007. Canadian refineries supplied approximately 84% of domestic demand for refined petroleum products. Canada exported over 25 billion litres of refined petroleum products while importing 16 billion litres. ([see footnote 10](#))

The net revenues in the petroleum refining industry have increased from \$0.8 billion in 1998 to \$5.2

billion in 2007 or by 20.8% per year on average. In 2007, the increase was 16%.

Fuel transportation and distribution sector

The transportation and distribution infrastructure for petroleum-based fuels is primarily dominated by national fuel producers in Canada. Regional fuel producers and independent marketers have a smaller share of the distribution system. The petroleum distribution system caters to both the transportation of crude oil to refineries as well as the distribution of the refined petroleum products to the primary storage terminals, bulk plants and service stations/cardlocks. The transportation of refined petroleum product is done by tanker trucks, rail, marine tankers or pipeline, depending on the quantity of fuel and the geographic location.

The Canadian downstream petroleum industry can be divided into three distinct regions: Western Canada, Ontario and Quebec/Atlantic Canada. In the Quebec/Atlantic region, product movements from refineries to terminals occur primarily by ship and rail, except for the products moved to Ontario via the Trans Northern Pipeline (TNPL) and the products moved by rail between Saint-Romuald and Montréal — for which a pipeline replacement is being considered.

In 2006, approximately 80 billion litres of refined petroleum products were moved via pipelines in Canada. In 2007, crude oil and other pipeline transportation contributed approximately \$1.4 billion or approximately 0.1% to GDP. The share of total transportation of goods by rail, water and truck transportation to GDP, on the other hand, was approximately \$28.5 billion or nearly 2.3% in 2007.

Fuel storage terminals

There are 1 833 storage terminals spread across Canada, comprising 76 primary terminals, 614 bulk plants and 1 143 cardlock facilities. The majority of the terminals (approximately 67%) are located in the West, with Ontario and the eastern provinces accounting for 16% and 17%, respectively. Ontario, British Columbia and Quebec account for 66% of the primary terminals in Canada. These primary terminals are owned by the petroleum fuel producers and are shared to optimize efficiency. Primary terminals are, for the most part, located close to major markets and transportation modes. Multiple producers often load petroleum products at the same terminal, where the addition of proprietary additives takes place before distribution to bulk plants or retail stations. Most blending with renewable fuels would typically occur at the terminals (a small amount currently takes place at retail stations as well) and separate tanks are required on-site for renewable fuel storage before blending. Biodiesel generally requires heated tanks to prevent gelling in cold weather.

The bulk plants, representing the second level of storage facility, account for 33% of all storage facilities in Canada and are located in areas where retail distribution directly from terminals is not economical. They operate as secondary points of storage and distribution, but also of sales, and as such are typically not shared facilities (unlike primary terminals).

Cardlock facilities provide fuel to commercial truckers such as long-distance haulers and delivery vehicles. These are controlled access facilities, as opposed to retail stations. Diesel is the main fuel offered for sale at these facilities, primarily as it is the principal fuel used by commercial fleets. In the last 30 years, cardlock facilities have become the principal suppliers of fuel to commercial trucking operations. Due to the lack of availability of total cardlock supply data for Canada, it is difficult to accurately estimate the share of cardlock sales volume. However, it is likely that cardlock operations account for roughly 70% of all diesel fuel demand in Canada.

Some producers may be considering the possibility of reconfiguring existing refineries in order to produce hydrotreated vegetable oil (HVO). HVO has significant physical advantages over biodiesel in that it has superior cold flow properties and higher energy content. The transportation, storage and blending of HVO does not require temperature regulation (such as heated and insulated tanks and lines), significantly reducing costs. However, HVO is currently less economic than biodiesel, resulting in a low level of supply.

Retail sector

Marketing and retailing of fuel is carried out by many different firms. Some of these firms are integrated refiner-marketers who produce the fuel, distribute it and market it through affiliated or licensed operators who own the individual retail outlets. Approximately 28% of retail stations are owned or operated by integrated refiner-marketers. Independent marketers (the remaining 72%) buy their product from Canadian fuel producers or import fuels and tend to be smaller operators.

The number of retail stations has declined steadily from around 20 000 in the late 1980s to less than 13 000 in 2008. Quebec and Ontario had the largest number of retail stations accounting for more than half of the total, followed by Alberta and British Columbia with 13% and 11%, respectively. It should be noted that the retail market for distillate represents a small portion of overall diesel fuel and heating distillate oil sales in western Canada (approximately 35%), while in Ontario and Quebec it represents approximately 50%.

Agricultural sector

In the primary agriculture sector, large farms dominate production, accounting for only 2.5% of farms, but 40% of revenues. In 2007 and 2008, as commodity prices have risen, farm market receipts and net farm income for grain and oilseed farms have also increased. Canada ranks as the second largest in the world for the availability of arable land per person which also accounts for Canada's being a large producer and exporter of agricultural products. Canada's share of land suitable for agricultural production accounts for only a small percentage (5%) of the total land in Canada.

The agriculture, forestry, fishing and hunting sector contributed nearly 2.2% to Canadian GDP in 2007, of which crop production accounted for approximately 54.5%. The crop production sector employed nearly 298 844 persons. In 2007, the value of crops exported was nearly \$13 billion while imports totalled \$6.4 billion with the United States being the largest trading partner, followed by Japan.

Regulatory and non-regulatory options considered

Status quo

As described previously, the Regulations include provisions requiring an average 2% requirement for renewable content in diesel fuel and heating distillate oil but do not specify a start date for this requirement. This requirement was subject to the demonstration of technical feasibility under the range of Canadian conditions. The technical feasibility has been assessed by NRCan through the NRDDI project and is supportive of the implementation of the 2% requirement for renewable content in diesel fuel and heating distillate oil as long as sufficient time is provided to the fossil fuel industry for infrastructure readiness. The option of taking no action, i.e. of not setting the coming-into-force date, was rejected as it would diminish the effectiveness of the Renewable Fuel Strategy and would not result in achieving further reduction of GHG emissions that will arise by requiring renewable fuel content based on distillates volumes.

Amendments

To set a coming-into-force date for the 2% requirement, it is necessary to amend subsection 40(3) of the Regulations. Therefore, the Amendments are the only option.

Benefits and costs

An analysis of benefits and costs was conducted to assess the impacts of the Amendments on stakeholders, including the Canadian public, industry and government.

Analytical framework

The approach to cost-benefit analysis identifies, quantifies and monetizes, where possible, the incremental costs and benefits of the Amendments. The cost-benefit analysis framework applied to this study incorporates the following elements:

Regions — The costs and benefits have been estimated on a regional basis. The regions are defined

as “West,” which includes British Columbia, Alberta, Saskatchewan and Manitoba; “Ontario”; and the “East,” which includes Quebec, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador. These regions have been defined as such in order to preserve the confidentiality of the data collected for this analysis. Since the volumes of diesel fuel or heating distillate oil sold or delivered for use in the Yukon, the Northwest Territories, Nunavut and the regions of Quebec north of 60° north latitude are excluded from a producer or importer’s distillate pool, these regions have not been included in the analysis.

Incremental impact — Impacts are analyzed in terms of incremental changes to emissions, costs and benefits to stakeholders and the economy. The incremental impacts were determined by comparing two scenarios: one with and the other without the Amendments. The two scenarios are presented below.

Timeframe for analysis — The time horizon used for evaluating the economic impacts is 25 years. The first year of the analysis is 2011, when the Amendments are expected to come into force. This analysis assumes a first compliance period starting in January 2011 for 12 months for all regions.

Costs and benefits — These have been estimated in monetary terms to the extent possible and are expressed in 2007 Canadian dollars. Whenever this was not possible, due either to lack of appropriate data or difficulties in valuing certain components, incremental impacts were evaluated in qualitative terms.

Discount rate — A discount rate of 3% is used in the analysis for estimating the present value of the costs and benefits under the central analysis. A sensitivity analysis of discount rates and other key variables to test the variability of cost estimates was also conducted.

The Amendments do not specify the type of renewable fuel used to meet the 2% requirement. Biodiesels ([see footnote 11](#)) typically have lower energy content than petroleum diesel, have higher cloud point temperatures and are generally blended only up to 5%, since high blend levels (i.e. 20%) may not be compatible with certain vehicle technologies. However, according to NRCan, in low-level blends of B2-B5, this lower energy content is not noticeable and no significant change in fuel consumption is observed. Kerosene can be added to biodiesel blends to improve the cloud point in winter temperatures. Kerosene has about a 2.5% lower energy content than diesel fuel. With kerosene, the effect on energy content may be more significant because much higher volumes of kerosene are expected to be blended than of biodiesel. A pour point depressant is an additive that lowers the temperature at which a fluid will continue to flow under standard conditions. Pour point depressants can be added to renewable diesel blends without a loss in energy content.

Hydrotreated vegetable oil (HVO) ([see footnote 12](#)) has physical properties that allow it to be blended seamlessly into fossil diesel fuel and therefore can be mixed up to 100% blends. HVO typically has a higher cetane count and slightly higher energy content than fossil diesel. ([see footnote 13](#)) However, it is currently relatively expensive and supply is limited to less than a handful of production centres in Southeast Asia, Finland, the Netherlands and the United States.

Benefit and cost estimates are based primarily on Environment Canada’s updated study of the Amendments conducted in 2010. ([see footnote 14](#))

Business-as-usual scenario

The business-as-usual (BAU) scenario is based on provincial mandates that were in place as of December 1, 2010. Provincial mandates have been put in place in three provinces (Manitoba, British Columbia and Alberta) with varying levels of renewable diesel requirements (see Table 1).

To estimate the demand volumes for biodiesel as a result of provincial requirements, it is necessary to estimate the “business- as-usual” demand volumes for diesel fuel and heating distillate oil over the 25-year period. To achieve that, average annual growth rates of diesel fuel and heating distillate oil demand obtained from NRCan’s “Canadian Energy Outlook: The Reference Case 2006” (see Table 2) were used to grow the actual 2009 diesel fuel and heating distillate oil demand volumes. ([see footnote 15](#))

Demand volumes for biodiesel as a result of provincial requirements were calculated by multiplying the estimated demand volumes for diesel fuel and heating distillate oil by the officially mandated renewable fuel requirements in those provinces. Annual demand for renewable fuel is therefore estimated to increase from 274 million litres per year in 2011 to 483 million litres per year by 2035. It is expected that these provincial requirements can be met through existing and planned annual biodiesel production capacity, estimated to total approximately 600 million litres by 2012 (based on volumes supported under the ecoENERGY for biofuels program). Table 3 shows estimated demand volumes for diesel fuel, heating distillate oil and biodiesel due to the provincial requirements.

Table 2: Annual Growth Rates for Diesel Fuel and Heating Distillate Oil Demand (2011–2035)

West	Ontario	East	
Diesel fuel	0.0198	0.0179	0.0105
Heating distillate oil	0.0194	0.0150	0.0047

Source: NRCan Canadian Energy Outlook: The Reference Case 2006.

Table 3: Estimated Cumulative Demand for Diesel Fuel, Heating Distillate Oil and Renewable Diesel Under the BAU Scenario (2011–2035)

(Million litres)

Demands	West	Ontario	East	Total
Diesel fuel demand	404 182	206 112	201 742	812 036
Heating distillate oil demand	3 681	25 847	64 814	94 342
Biodiesel demand over the 25-year period	9 653	0	0	9 653
Average annual biodiesel demand	386	0	0	386

The estimated reductions in GHG emissions attributable to provincial mandates under the BAU were based on the life cycle emission reduction factors for each of the different types of biodiesel and for HVO. Life cycle emission factors for biodiesel and HVO were estimated using NRCan's GHGenius model, version 3.19, under average Canadian conditions, and were compared with life cycle emission factors for conventional diesel fuel in order to obtain GHG emission reduction factors for the different renewable diesel fuel types. The resulting GHG emission reduction factors are presented in Table 4 below (e.g. in the case of canola, the displacement of 1 litre of diesel from fossil fuels results in an incremental reduction of 3.012 kg of CO₂e emissions).

Table 4: GHG Emission Reduction Factors for Biodiesel From Soy, Canola and Tallow and for HVO

Canola B100 (kg CO ₂ e/L)	3.012
Soy B100 (kg CO ₂ e/L)	2.704

Tallow B100 (kg CO ₂ e/L)	3.228
U.S. soy B100 (kg CO ₂ e/L)	2.463
HVO Palm (kg CO ₂ e/L)	1.470

Kerosene is added to biodiesel blends to improve the cloud point in winter temperatures. To estimate the changes in emissions, a life cycle emissions reduction factor for kerosene would ideally be used. At the same time, since kerosene and diesel have a similar production pathway, it is not likely that life cycle emissions will differ greatly between the two. It is therefore assumed that the emissions reduction factor for kerosene will be zero, pending the conclusion of NRCAN analysis now underway.

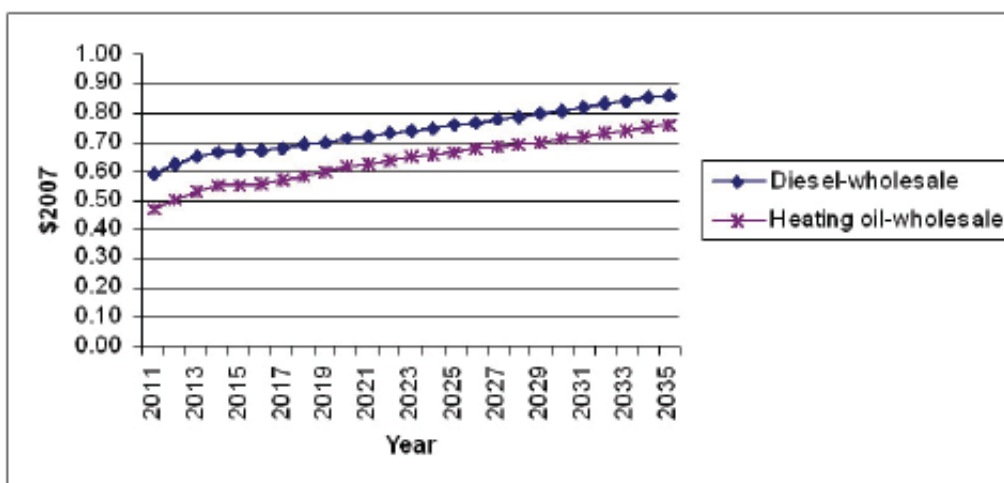
It was further assumed that given the current and planned production of renewable fuels in Canada, Canadian biodiesel would be produced from soy, canola and tallow. The proportion of feedstocks used to make Canadian biodiesel from 2011 to 2016 was estimated by NRCAN and is based on projected usage provided by companies that have signed or intend to sign a contribution agreement under the ecoENERGY for biofuels program. In consultation with NRCAN and AAFC, EC has assumed an annual 2% decrease in the proportion of tallow used relative to vegetable oil in each region from 2017 to 2035. This is because vegetable oils have lower cloud points than tallow (see Table 9 below) and therefore as vegetable oils become more available, refiners will tend to choose biodiesel made from them over biodiesel made from tallow. This reduces the need to use kerosene or pour point depressants and would therefore be more efficient and reduce carbon emissions over time. The distribution of feedstocks over time is presented in the table below.

Table 5: Distribution of Feedstocks for the Production of Canadian Biodiesel

2011	2015	2020	2025	2030	2035	
WEST						
Canola	43%	45%	49%	54%	58%	62%
Tallow	57%	55%	51%	46%	42%	38%
ONTARIO						
Soy	60%	67%	70%	72%	75%	78%
Tallow	40%	33%	30%	28%	25%	22%
EAST						
Soy	53%	60%	63%	66%	69%	72%
Tallow	47%	40%	37%	34%	31%	28%

Fuel prices were estimated by applying growth rates from an NRCan oil price forecast to historical prices for diesel and heating oil. The values are presented below in Figure 2.

Figure 2: Estimated Diesel and Heating Oil Wholesale Prices



The reductions in GHG emissions attributable to provincial mandates under the BAU scenario were estimated by multiplying the BAU demand volumes of Canadian canola fatty acid methyl esters and tallow acid methyl esters, hydrotreated vegetable oils and kerosene over the 25-year period by the corresponding GHG reduction factors. The provincial mandates are estimated to achieve approximately 28.7 Mt CO₂e of GHG emission reductions over a 25-year period (or an average of 1.1 Mt CO₂e per year).

Regulatory scenario

Following the effective date for the 2% biodiesel content requirement, the demand for renewable diesel is expected to increase over and above the demand forecasted in the BAU scenario. The additional renewable diesel demand is the difference between the BAU demand and the total demand required to meet the Amendments. The total annual demand for renewable diesel, to meet both provincial and federal requirements, is estimated to increase from approximately 583 million litres in 2011 to 858 million litres in 2035, or about 40% per year higher on average than under the BAU scenario.

The incremental renewable diesel demand is presented in Table 6 below.

Table 6: Estimated Incremental Demand for Renewable Diesel Under the Regulatory Scenario (2011–2035)

(Million litres)

Demand	West	Ontario	East	Total
Renewable diesel demand over the 25-year period	1 931	3 562	2 618	8 111
Average annual renewable diesel demand	77	142	105	324

Given the current BAU demand associated with provincial renewable diesel mandates, it is assumed that the increased demand for renewable diesel under the regulatory scenario would require increased production capacity beyond existing levels. However, during the first year of the coming into force of the Amendments, some level of imports, primarily from the United States, would be needed while domestic production capacity increases. For the purpose of the analysis, the following assumptions are made:

- Biodiesel plants are assumed to have a lifespan of 20–25 years.
- Biodiesel demand over and above the 2011 capacity of approximately 500 million litres (based on volumes supported under the ecoENERGY for biofuels program) would be met in 2011 through imports from the United States until capacity increases to 600 million litres in 2012.
- For 2012–2035, it is assumed that 90% of incremental demand will be met by domestic production of biodiesel and 10% by imports of HVO. It is further assumed that imported HVO is a NExBTL-type product produced from palm oil. Volumes of HVO imports were estimated based on an industry survey. ([see footnote 16](#))

Costs to industry

Cost of producing biodiesel

Investments would be needed to build additional renewable fuel production facilities. The capital costs are modelled by NRCan to be approximately \$30 million for a 30-million-litre capacity animal fats-based plant and \$25 million for a 30-million-litre capacity vegetable oil-based plant. Including operating costs, total costs would be approximately \$1.01 per litre for a 30-million-litre capacity animal fats-based plant and \$1.09 per litre for a 30-million-litre capacity vegetable oil-based plant. Based on this information, the present value of the incremental cost of producing biodiesel over the 25-year period is estimated to be about \$4.8 billion.

Table 7: Present Value of Incremental Cost of Producing Biodiesel (2011–2035)

(Constant 2007 \$M)

Cost	West	Ontario	East	Total
Cost of producing biodiesel	719.1	2,407.4	1,650.9	4,777.4

Fuel producers and importers

Fuel producers and importers of diesel fuel and heating distillate oil would bear a portion of the incremental cost associated with the Amendments. The different properties between regular diesel fuel and renewable fuels blended diesel would require some new infrastructure and upgrades. Specifically, biodiesel must be transported and stored separately from the base diesel fuel. Unblended biodiesel also requires heated tanks to prevent gelling in cold weather. As the renewable fuel content in diesel fuel and heating distillate oil increases with the Amendments coming into force, investments will be needed to upgrade or modify refinery installations and distribution and blending systems. The investments to be made comprise both one-time capital investments incurred in the first year of the implementation of the Amendments, as well as ongoing additional operations and maintenance costs. Based on information provided by fuel producers and importers, investments of \$157.2 million will be required to produce diesel fuel and heating distillate oil blended with renewable fuels. In addition to the capital costs, \$112.4 million in operation and maintenance costs will be incurred.

Incremental capital costs for terminal upgrades will also be incurred by fuel producers, as these are owned and operated by them. Due to confidentiality of the cost data, the information provided by the fuel producers was aggregated for all refinery and terminal upgrades and/or modifications at the regional level. The capital costs for terminals include the building of truck, rail or barge receiving facilities, purchase of new storage capacity, the installation of blending equipment, the upgrade of lines, pumps, seals and vapour recovery systems, as well as the installation of heating systems for tanks and lines.

The details of the incremental costs to fuel producers and importers for the 25-year analysis period are presented in the table below.

Table 8: Present Value of Incremental Costs to Fuel Producers and Importers (2011–2035)

(Constant 2007 \$M)

Costs	West	Ontario	East	Total
Capital costs	22.7	39.7	94.8	157.2
Operation and maintenance costs	15.2	3.1	94.1	112.4
Imports of biodiesel	4.2	5.9	2.1	12.2
Imports of kerosene	1,286.3	3,797.5	1,452.5	6,536.3
Imports of HVO	608.1	0	156.1	764.2
Renewable diesel transportation costs	29.7	97.1	66.7	193.5
Administrative costs	2.5	2.2	2.5	7.1
Total	1,968.7	3,945.5	1,868.8	7,783.0

It should be noted that the cost to fuel producers and importers of purchasing Canadian biodiesel has not been included here, as the cost of producing biodiesel has already been accounted for in the costs to biofuel producers outlined in Table 7. The avoided costs to fuel producers and importers from displacement of diesel fuel and heating distillate oil due to the use of domestic and imported biodiesel, kerosene and HVO are accounted for in the benefits section.

The source of the biodiesel, regardless of the region, will of course depend on availability, quality and cost, but it is assumed in this analysis that it will come from within Canada. It is expected that during the first year, some imports from the United States would be needed to meet the demand until domestic renewable diesel production capacity is increased.

Differences are expected in how national versus regional fuel producers and marketers will meet the Amendments. National fuel producers and importers operating in the West would choose to blend in high concentrations (B5 ([see footnote 17](#))) in the West only during the warmer months, mostly April to September, in order to help them meet their national 2% average. Therefore, in the West, kerosene would be required only during the season transition months of March, April, May and August, September, October with no blending occurring during winter months. The situation is quite different in Ontario and in the East. Since there are no existing provincial regulations for renewable content in diesel fuel and heating distillate oil in these regions, the volumes of biodiesel that regional fuel producers and importers operating in these regions would need to blend in order to meet the federal mandate would be higher.

In addition, soy and tallow fatty acid methyl esters both have higher cloud points than canola fatty acid methyl esters (which is expected to be the dominant biodiesel source in the West), as can be seen in Table 9, and therefore require greater use of kerosene for a longer period of time in order to meet year-round cloud point specifications. In the regulatory scenario, canola fatty acid methyl esters are not used in Ontario and in the East and these regions use higher proportions of tallow fatty acid methyl esters relative to the West.

Table 9: Cloud Point Specifications of Different Biodiesel Types

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Biodiesel type	Cloud point (degrees Celsius)
TFAME (tallow)	+15
CFAME (canola)	+2
SFAME (soy)	-3

Kerosene is assumed to be imported mostly from the United States. The estimated cost of kerosene is 4.9 cents per litre higher than conventional diesel fuel. This is based on the average historic differential in wholesale prices for kerosene and No. 2 distillate during winter months (October to March) for the last three years (2007–2010), according to the Energy Information Administration of the United States Department of Energy. [\(see footnote 18\)](#) Gallons were converted to litres and the U.S. price differential was converted into Canadian currency using the average historical exchange rate for the last three years (2007–2010) from the Bank of Canada. [\(see footnote 19\)](#) The total cost of the incremental imports of kerosene over the 25-year period is estimated to be \$6.5 billion.

It can also be seen in Table 8 that in both the West and the East, it is predicted that some volumes of HVO would be used. Higher volumes of HVO would be blended in the West, due to greater accessibility of the product in that region. In addition, blenders in the West are already using HVO to meet provincial requirements and therefore already have the necessary infrastructure and planning to deal with HVO. This product is desirable due to its high cetane number and low cloud point relative to biodiesel (can go to -25°C). It is currently produced in relatively low quantities and must be transported long distances (from Singapore, Finland, the Netherlands and the United States to a certain extent), rendering it costly. The volumes of HVO used to calculate the costs and the average differential cost of 35 cents per litre between HVO and diesel fuel were provided by the industry. The total incremental cost of the imported HVO over the 25-year period is estimated to be \$764 million.

Some fuel producers are or have been investigating the possibility of producing HVO themselves, but have also indicated that the capital costs remain too high. Most producers would prefer to blend with HVO, but current availability and prices of the product render it inaccessible at this time.

The estimated costs of transportation of renewable diesel are approximately \$193.5 million and are based on the information provided by fuel producers. These costs vary depending on the proximity of the refinery to renewable fuel production facilities. An approximate average transportation cost of 4.0 cents per litre has been used to estimate the total transportation costs. This cost is similar to the cost used by the U.S. Environmental Protection Agency in the regulatory impact analysis study for its *Renewable Fuel Standard*.

The administrative costs of \$7.1 million can be attributed to the regulatory requirements of measuring distillates and renewable fuel volumes, reporting, and record keeping. These costs to meet the specific requirements of the Amendments would be incurred in addition to those respecting the provincial mandates.

Retail outlets

The incremental costs to fuel retail outlets primarily include one-time capital costs of \$3 million for retail site conversion, including purchase of new tanks and/or cleaning of old tanks in order to accommodate the new blended fuel and installation of new filters. Additional operating and maintenance costs were estimated to be negligible.

Table 10: Present Value of Incremental Costs to Upgrade Retail Outlets (2011–2035)

(Constant 2007 \$M)

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Capital costs	West	Ontario	East	Total
Diesel fuel	0.88	0.99	0.60	2.47
Heating distillate oil	0.26	0.15	0.18	0.58
Total	1.14	1.14	0.78	3.05

Costs to consumers

The values in the literature for the energy content of biodiesel relative to diesel fuel vary from 5% to 10%. However, operability studies carried out by NRCan's National Renewable Diesel Demonstration Initiative and others have found that in low-level blends of B2–B5, no significant change in fuel consumption is observed. Therefore, it has been assumed that there is no cost to consumers associated with the use of biodiesel in blended fuel.

Hydrotreated vegetable oil has a slightly (about 2%) higher energy content than fossil diesel (SAE, 2008). Again, in low-level blends, it has been assumed that there are no savings to consumers associated with decreased fuel purchases due to the higher energy content of HVO.

Kerosene has about a 2.5% lower energy content than diesel fuel. However, as relatively high proportions of kerosene are expected to be included in the blended fuels, the costs to consumers of additional fuel purchases due to the lower energy content of kerosene has been considered. For example, in 2% biodiesel blends with biodiesel made from canola, up to 22% of the blend must be kerosene, while with biodiesel made from lard, up to 92% of the blend must be kerosene. This increase in consumer expenditure was calculated as the product of the incremental volumes of diesel fuel and heating distillate oil multiplied by the projected retail blended diesel fuel prices in Canada. The results are shown in the table below.

Table 11: Present Value of Incremental Costs to Consumers (2011–2035)

(Constant 2007 \$M)

Increments	West	Ontario	East	Total
Diesel fuel				
Incremental diesel blend purchases due to the lower energy content of kerosene (ML)	52	172	58	282
Incremental cost of diesel blend purchases (\$M)	31.5	103.7	35.8	171.1
Heating distillate oil				
Incremental heating oil blend purchases due to the lower energy content of kerosene (ML)	14	24	16	63
Incremental cost of heating oil blend purchases (\$M)	7.9	13.7	9.0	30.6
Total cost of incremental diesel and heating oil	39.5	117.4	44.8	201.7

purchases (\$M)				
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Costs to the Government

The government has incurred costs in order to set up and monitor the regulations requiring 5% renewable content in gasoline. The incremental costs to set up and monitor the 2% requirement in diesel fuel and heating distillate oil were deemed to be negligible.

Benefits to Canadians

Avoided costs of purchasing diesel fuel and heating distillate oil

The Amendments will result in volumes of conventional diesel fuel and heating distillate oil that would otherwise be produced or imported into Canada being displaced by renewable diesel and kerosene. The avoided costs of the displaced diesel fuel and heating distillate oil are therefore an incremental benefit of the Amendments. The present value of the avoided costs of purchasing diesel fuel and heating distillate oil was estimated by multiplying the displaced volumes by their respective projected prices. The results are presented in the table below.

Table 12: Present Value of Incremental Avoided Costs of Purchasing Diesel Fuel and Heating Distillate Oil (2011–2035)

(Constant 2007 \$M)

Avoided cost	West	Ontario	East	Total
Diesel fuel	1,704.8	4,518.0	2,108.4	8,331.2
Heating distillate oil	394.5	703.2	486.1	1,583.8
Total	2,099.3	5,221.2	2,594.5	9,915.0

Reduced emissions of greenhouse gases

Achieving a renewable diesel volume equal to 2% of Canada's diesel fuel and heating distillate oil pool would result in an average incremental volume of 323 million litres per year of renewable fuel being blended with diesel fuel and heating distillate oil each year. This is expected to result in an incremental lifecycle GHG emission reduction of an average of about 1 Mt CO₂e per year. This is a significant contribution to the reduction in air pollution associated with GHG emissions, which is equivalent to taking a quarter of a million vehicles off the road. Over the 25-year period, the cumulative reductions in GHG emissions attributable to the Amendments are estimated to be approximately 23.6 Mt CO₂e.

The incremental reductions in GHG emissions for the regulatory scenario are calculated as the product of the GHG emission reduction factors in Table 4 (as used for the BAU scenario) and the corresponding incremental volume of Canadian canola fatty acid methyl esters, soy fatty acid methyl esters and tallow fatty acid methyl esters, hydrotreated vegetable oils and kerosene required to meet the 2% federal mandate. In addition, as some imports of biodiesel (primarily from the United States) would be needed to meet the shortfall in domestic production, the GHG emissions have been adjusted to reflect the emission factor of American SME.

The largest gains in GHG emission reductions would occur in Ontario and the East, accounting for approximately 80% of the reductions. This is primarily attributed to the fact that renewable diesel is not currently used in those regions.

Table 13: Present Value of Estimated Incremental Benefits of GHG Emission Reductions (2011–

2035)

(Constant 2007 \$M)

West	Ontario	East	Total	
Diesel fuel				
GHG emission reductions (Mt CO ₂ e)	3.7	8.8	6.2	18.7
Regulated scenario estimate \$25/tonne	76.8	183.3	130.0	390.1
Heating distillate oil				
GHG emission reductions (Mt CO ₂ e)	0.9	2.3	1.7	4.9
Regulated scenario estimate \$25/tonne	20.5	49.2	35.0	104.7
Total diesel fuel and heating distillate oil				
GHG emission reductions (Mt CO ₂ e)	4.6	11.1	7.9	23.6
Total benefit for Canada	97.3	232.5	165	494.8

The value of GHG reductions is critically dependent on the climate change damages avoided at the global level. These damages are usually referred to as the social cost of carbon (SCC). Estimates of the SCC vary widely. For example, experts such as Tol, Nordhaus and Hope have reported mean SCC values in the range of \$10 to \$25 per tonne of CO₂e, whereas Stern has reported a value closer to \$100. In large part this variability relates to uncertainties around key parameter choices in the estimation of the SCC, for example the appropriate discount rate to use in the calculation. It is generally acknowledged that estimates, even from the same model, vary widely depending on the chosen levels of key variables. While research by Environment Canada to determine the appropriate SCC for use in cost-benefit analysis is continuing, an estimated value of \$25 per tonne of CO₂e has been adopted for this analysis. This value is consistent with the expected U.S. price of carbon and the trading value of permits in the European Climate Exchange. It is also generally consistent with the values presently being used by the U.S. government as well as by the European Commission. Based on this estimate, the present value of incremental GHG emission reductions under the regulatory scenario is estimated to be \$494.8 million under the central scenario.

Impact on air quality and health

Health Canada is currently conducting a health impact analysis of biodiesel use in Canada, and although the study is not finalized, preliminary results are presented here to provide a general indication of potential effects. The study includes an analysis of the impact of biodiesel use on mobile sector emissions from on-road heavy duty diesel vehicles (HDDVs), and the impacts of those emission changes on air quality and health. These impacts are evaluated relative to those associated with the use of conventional diesel fuel. Light-duty diesel vehicles, which form a very minor component of the Canadian vehicle fleet, are not included due to a lack of relevant emissions data. Mobile emissions modelling and air quality modelling have been completed in collaboration with Environment Canada.

Estimating the health impacts of a predicted change in emissions is complex and involves some uncertainty, such as projecting impacts to future years. However, as detailed below, Health Canada's preliminary analyses indicate that the health impacts associated with on-road use of B2 or B5 in Canada are likely to be minimal.

Mobile sector air contaminant emissions

The specific scenarios examined in the analysis of biodiesel impacts on Canadian mobile sector emissions include a comparison of nationwide use of B2 or B5 or B20 (summer only) versus conventional diesel, for the years 2006, 2010, 2015 and 2020. Vehicle emissions of the following air pollutants were considered: particulate matter (PM_{2.5}, PM₁₀ and TPM); carbon monoxide (CO); nitrogen oxides (NO_x); volatile organic compounds (VOCs); mobile source air toxics (benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein); and several polycyclic aromatic hydrocarbons (PAHs). For the B2 scenario, the results reveal minor reductions (approximately 1%–2%) in on-road HDDV emissions in 2010 of all compounds except NO_x and a 0.36% increase in NO_x. These reflect overall on-road mobile emission changes of less than 1% for all compounds. The effects of nationwide use of B5 (2010) would result in 2%–4% reductions in on-road HDDV emissions for most compounds and a 1% increase in NO_x emissions. These reflect changes in overall on-road emissions for all compounds of less than 2%. The use of B20 in 2010 (May to September only) would result in the following changes in summer on-road mobile emissions: 8% reduction in PM_{2.5}, 2% increase in NO_x, and less than 4% reductions in air toxics and CO. All emission impacts are estimated to diminish over time due to the introduction of new vehicle technologies. It should be noted that the scenarios considered here (i.e. nationwide use of B2, B5 or B20) are not directly comparable to the assumptions of the cost-benefit analysis (incremental impacts of the federal *Renewable Fuels Regulations* above existing provincial mandates). However, incremental on-road emission effects due to the Amendments are expected to be less than those reported for the B5 scenario of the Health Canada analysis.

Air quality and health impacts

The impacts on Canadian air quality of changes in mobile sector emissions due to biodiesel use were examined by Health Canada for the B5 and B20 scenarios using photochemical modelling. Results of national on-road B5 or B20 (summer only) use in Canada suggest very minimal impacts on mean ambient concentrations of PM_{2.5}, tropospheric ozone (O₃), CO, nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) of less than 1% in 2006 and 2020 compared to conventional diesel. The human health implications of these changes in air quality were assessed nationally and include both mortality and morbidity outcomes. Preliminary national results indicate that some minimal health benefits would be expected in 2006 under a B5 scenario, and that these would be reduced by 2020.

Incremental health benefits due to the changes in on-road emissions associated with the Amendments are expected to be less than those estimated for the B5 scenario of the Health Canada analysis.

Impact of a spill or leak to soil

Health Canada also undertook modelling to examine the impacts of biodiesel and biodiesel blends on fuel movement following a spill or leak to soil. Preliminary results indicate that biodiesel fuel components are expected to migrate less than diesel fuel components, thus resulting in contamination plumes that would affect a smaller volume of soil. Although a number of data gaps were identified, this analysis suggests that the risk that biodiesel fuels would impact on human health following an uncontrolled release to the environment would be more manageable than for conventional diesel fuel.

Impact on agriculture

Agriculture and Agri-Food Canada (AAFC) conducted an internal analysis of the impact of 2% biodiesel targets on the Canadian agriculture sector in early 2007, considering all jurisdictions in Canada. Based on the AAFC analysis, the agriculture sector would experience very small impacts. These impacts are discussed in more detail below.

Impact on the crop sector

Based on the AAFC analysis, the Amendments are expected to have no measurable impact on the crops sector. There could be minor increases in domestic oilseed crushing but overall oilseed acreages planted are expected to show only marginal impacts. There are no measurable changes in producer

surplus for crop producers as a result of increased biodiesel production. The biodiesel market can serve as a new market outlet where producers can sell off-grade seed.

This minimal impact is due to the fact that Canada is a price taker in the world market for crops, and changes in Canadian demand would not have any significant impact on world prices. However, there could be small shifts in local prices as a result of increased demand for renewable fuel feedstock, but no changes are expected in the prices of other crops.

Impact on livestock

As negligible impacts are expected on crop prices, livestock feed prices are consequently not expected to show any significant change as a result of the Amendments. While larger scale biodiesel production has the potential to increase protein meal availability by stimulating more oilseed crushing, biodiesel production to meet mandated levels of consumption is not expected to have any measurable impacts on the availability of protein meal. As oilseed acreages planted are expected to show very little change, there will be no measurable effect on the availability of feed grains for livestock producers.

In addition, no changes are expected in the trade of live animals or of meat, or in other related sectors such as poultry and dairy. Impacts on employment in the livestock industry are expected to be negligible.

Impact on land use

The Amendments are not expected to result in changes in land use. Changes in cropping activities as a result of the renewable diesel requirement are expected to take place within the existing crop land base. Since no significant changes in crop prices or land use would occur, there would be little impact on crop intensification at the national level. However, there could be a limited impact in a few regions. There may be small increases in fertilizer use as there could be small regional expansion of oilseed production, but this is not expected to result in changes on water quality or GHG emissions from the agriculture sector.

Distributional impacts

Fuel producers and importers

There are investments to be made by the fossil fuels sector due to the Amendments. These investments comprise both one-time capital investments incurred in the first year of the implementation of the Amendments, as well as ongoing additional operations and maintenance costs. Costs are incurred at virtually every step of the supply chain, from refineries to retailers. It is expected that these costs will be passed along down the supply chain to the final retail price.

Renewable fuels facilities

The Amendments would result in an increase in domestic biodiesel production with the demand for renewable fuel expected to increase from 583 million litres in 2011 to 858 million litres in 2035. While forecasts of renewable fuel production are somewhat uncertain, it is assumed that the majority of the renewable fuel demand would be met through domestic production.

In the longer term, as the demand for renewable fuels continues to increase, it would be reasonable to assume that additional domestic renewable fuel production facilities would come on-line over the 25-year period.

Agricultural sector

In addition to reductions in GHG emissions, one of the key drivers for supporting renewable fuels production and use is the benefit that it can bring to the agriculture sector and rural Canada. Increased renewable fuels production in Canada will result in increased local demand for feedstocks and new markets for Canadian agricultural producers' crops. For example, biodiesel facilities can provide a market for off-grade canola, which is not suitable for the food market.

Providing agricultural producers with the opportunity to invest in and develop profitable renewable fuels projects that use agricultural products as inputs will help to create a positive stream of income that could be more independent of commodity price swings. This would also encourage an approach that goes beyond simple commodity production to focus on new ways to add value to biomass produced on farms. This would also encourage an approach that goes beyond simple commodity production to focus on new ways to add value to biomass produced on farms. Renewable fuel plants would inject additional spending into the local rural economies, broadening their tax base and generating additional jobs at the local level.

Further expansion of the renewable fuel industries in Canada is expected to rely on feedstock supplied by the Canadian agricultural sector. However, the projected level of renewable fuel production in Canada is not expected to impair the agriculture sector's ability to provide agricultural commodities for traditional uses, such as for food production and livestock feed. Consequently, downstream industries such as meat and food processing are not expected to be impacted with respect to production, employment, price and trade. Furthermore, impacts on consumer food prices are not expected.

Employment

The capital investments to upgrade the refineries, terminals and retail outlets are expected to create employment in the initial years as the industry ramps up to comply with the Amendments. In addition, the transportation of renewable fuels would require expansion of the existing fuel transportation infrastructure which would also have a positive impact on employment. Due to the characteristics of biodiesel, the most likely mode of transportation from production facilities to the point where it is blended with diesel fuel would be through trucking. Some transportation would also be done through rail. However, due to lack of data, it is not possible to estimate the specific shares for these modes of transportation. Nonetheless, it is likely that the increase in renewable fuel being transported would also result in an increase in employment in this sector.

As demand and, consequently, production of renewable fuels increase as a result of the Amendments, new jobs would be created in the renewable fuel industry. According to NRCan, a biodiesel plant with an annual production capacity of 30 million litres would require 20 employees for operations. Taking into consideration these employment numbers and assuming 10 additional biodiesel plants would be built, the renewable fuels production sector would be responsible for a total of approximately 200 direct jobs per year, over the period considered. This is a maximum estimate of the employment impacts on the renewable fuels sector, considering that if larger plants are constructed, they would likely employ less people per megalitre (ML) of capacity (due to economies of scale). Blenders have also indicated their preference for using HVO to blend with biodiesel. There are currently no HVO production facilities in Canada and any intentions to start-up such facilities would be expected only in the medium to long term.

As with any industrial sector, the biofuels production sector not only creates direct employment, but it also creates indirect employment. Subsequently, the expenditure of employees' salaries creates induced impacts within the economy. For diesel fuel alone, it is estimated that a 2% renewable fuel standard would entail not only direct employment in biodiesel facilities, but would also indirectly create an additional 4 000 employment positions. ([see footnote 20](#)) In the state of Georgia, an analysis using the IMPLAN model to predict the economic impact of an increase in biodiesel production estimated that a 15-million-gallon (annual production of approximately 57 million litres) biodiesel plant would generate a total of 132 new jobs. ([see footnote 21](#))

Consumers

In addition to the direct cost of incremental volumes of blended diesel purchases, consumers would likely experience a small increase in the price of diesel fuel at the pump as the incremental costs for the petroleum refining sector are passed on to consumers. Assuming an upper bound in which all of the estimated incremental costs are passed along, the corresponding cost to the consumer would be up to \$2.7 billion. ([see footnote 22](#)) In that case, the average cost increase to consumers across Canada would be one third of a cent per litre of diesel fuel, an amount likely to be unnoticeable in the usual day-to-day price fluctuations experienced in the diesel fuel market. For a typical class 7 or 8 truck

consuming 80 000 litres of diesel fuel per year, this would increase fuel costs by an estimated \$5 per week.

Competitiveness

The Canadian economy is highly integrated with the United States economy. As the United States has implemented similar requirements for renewable fuel content in diesel, no international competitiveness impacts are anticipated on the refining industry.

The Amendments may have a short-term impact on the competitiveness of blenders and regional refining companies in those regions that have not been subject to provincial regulations, mostly in Ontario and the East. The national refining companies can make investments strategically in large markets and/or to meet national requirements by capitalizing on investments made in provinces where regulations already exist. The Amendments provide for an initial compliance period of 18 months and other flexibilities in order to allow the time for industry to meet the requirements.

Conclusions

Although the Amendments impose costs on industry and consumers, these costs are likely to be manageable (e.g. one third of a cent per litre of diesel for consumers). They will also result in benefits from reduced GHG emissions, and combined with other Government of Canada programs, they would assist in the creation of jobs in rural areas and opportunities for rural Canada to participate in biodiesel production. While realized costs and benefits will be sensitive to changes in key parameters such as diesel fuel price forecasts, expected values arising from this analysis are summarized in the table below.

Table 14 suggests an overall net cost of \$2.4 billion over 25 years on a net present value basis. This equals an average annual cost of \$94 million in net present value terms. In this respect, costs exceed benefits by a ratio of 1.2 to 1, without taking into account the unquantified role that the 2% biodiesel requirement plays in supporting broader Canadian policy objectives relating to the Renewable Fuels Strategy and climate change. Table 14 also indicates that the net socio-economic cost per tonne of GHG emissions avoided in Canada through this measure, without accounting for the global value of the GHG reductions in terms of the social cost of carbon, is about \$121 per tonne.

A sensitivity analysis reveals that these impacts are robust across a range of plausible variations in the underlying assumptions. At the same time, this analysis shows that actual impacts could differ from these central estimates. For example, the net cost could decline significantly under a higher assumed SCC value, and will also vary depending on changes to other key parameters, as detailed in the sensitivity analysis section below.

Table 14: Incremental Cost-Benefit Statement (2011–2035)

(2007 \$ million)

Base Year: 2011	2023	Final Year: 2035	Total 10 Year (2011– 21)	Total 25 Year (2011–35)	Average Annual	
A. Quantified industry costs						
<i>Biofuel producers</i>						
Cost of producing biodiesel	306.9	277.9	308.7	2,417.5	4,777.4	191.1
<i>Sub-total</i>	<i>306.9</i>	<i>277.9</i>	<i>308.7</i>	<i>2,417.5</i>	<i>4,777.4</i>	<i>191.1</i>

Blenders, importers and retailers						
Capital costs — Blenders	9.0	9.0	9.0	83.5	157.2	6.3
Operation and maintenance costs	6.6	6.4	6.5	59.8	112.4	4.5
Cost of imports of biodiesel	12.6	0.0	0.0	12.2	12.2	0.5
Cost of imports of HVO	0.0	40.7	50.5	399.5	764.2	30.6
Cost of imports of kerosene	142.8	401.2	503.1	2,920.0	6,536.3	261.5
Biodiesel transportation costs	12.4	11.4	13.4	94.2	193.5	7.7
Administrative costs — Blenders	0.4	0.4	0.4	3.8	7.1	0.3
Capital costs — Retailers	3.1	0.0	0.0	3.0	3.1	0.1
<i>Sub-total</i>	<i>186.8</i>	<i>469.2</i>	<i>582.8</i>	<i>3,576.0</i>	<i>7,786.1</i>	<i>311.4</i>
Total industry costs	493.6	747.0	891.5	5,993.5	12,563.5	502.5
B. Quantified consumer costs						
Additional blended diesel and heating oil consumption	4.6	12.4	151.6	91.4	201.7	8.1
Total consumer costs	4.6	12.4	151.6	91.4	201.7	8.1

TOTAL COSTS	498.2	759.4	1,043.1	6,084.9	12,765.2	510.6
C. Quantified benefits						
Avoided diesel and heating oil consumption	301.3	600.2	783.5	4,412.9	9,915.0	396.6
Avoided social costs of carbon from GHG emission reductions (SCC at \$25/tonne)	23.3	29.1	42.9	213.3	494.8	24.1
TOTAL BENEFITS	324.6	629.3	826.4	4,626.1	10,409.8	416.4
D. NET PRESENT VALUE	(173.6)	(130.2)	(216.7)	(1,458.8)	(2,355.4)	(94.2)
D1. Net present value — Avoided SCC at \$100/tonne	(103.5)	(42.9)	(88.0)	(818.9)	(870.6)	(34.8)
Reduction in GHG emissions (Mt CO₂e)	1.0	0.9	1.1	9.5	23.6	0.9
Cost to benefit ratio					1.2 times	
Socio-economic cost per tonne (\$/T) (see footnote 23)					\$120.8	
E. Qualitative Impacts						
Fuel producers and importers	<ul style="list-style-type: none"> There could be additional costs related to new volume measurement equipment if current measurement equipment is inadequate. This could impose costs over those identified above. 					

Agriculture	<ul style="list-style-type: none"> • Small changes in local prices of crops used as renewable fuel feedstock are expected as a result of increased demand for these crops; however, no impacts are expected in the prices of other crops. • Minor increases in domestic oilseed crushing but overall oilseed acreages are expected to show only marginal impacts. • No measurable changes in producer surplus for crop producers. • No expected impacts on feed prices and no measurable effect on the availability of feed grains for livestock producers. • Changes in cropping activities are expected to take place within the existing crop land base, with little impact on crop intensification at the national level.
Health	<ul style="list-style-type: none"> • The use of B2 would have very minimal impacts on criteria air contaminants with an overall neutral effect on human health.
Employment	<ul style="list-style-type: none"> • Some increases in employment are expected due to increased transportation of renewable fuels, construction of renewable fuel plants, and upgrades to refineries, terminals and storage facilities.

Sensitivity analysis

A sensitivity analysis was carried out to determine the direction and magnitude of changes to the final results associated with assumptions regarding variations in key variables. This includes varying diesel and heating oil prices, the social cost of carbon, the required kerosene volumes and the discount rate.

Diesel and heating oil prices

As the analysis is sensitive to the forecasts for diesel and heating oil prices over the relevant time period, Environment Canada (EC) has incorporated a range of +/-10% on forecasted wholesale and at-the-pump diesel and heating oil pre-tax prices in order to better reflect the level of uncertainty on this key parameter.

Table 15: Sensitivity to Diesel and Heating Oil Prices

(Constant 2007 \$M)

–10% scenario	Central scenario	+10% scenario	
Cost of purchasing HVO	712.7	764.2	805.3
Cost of purchasing kerosene	5,923.6	6,536.3	7,043.6
Cost to consumer	182.8	201.7	220.7
Total cost	12,082.0	12,765.2	13,332.7
Avoided cost of purchasing diesel and heating oil	(8,923.5)	(9,915.0)	(10,759.8)

Net present value	(2,663.7)	(2,355.4)	(2,078.1)
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Lower wholesale diesel and heating oil prices make diesel fuel and heating distillate oil more competitive compared to biodiesel. In response to a 10% reduction, the present value of the net cost of the Amendments would rise by \$300 million to \$2.7 billion. Conversely, if the price of diesel and heating oil were to be 10% higher, the present value of the net cost of this measure would decline by a similar amount to approximately \$2.1 billion. The results demonstrate a relatively high sensitivity to diesel and heating oil price assumptions.

Social cost of carbon

Estimates of the social cost of carbon (SCC) vary widely. For example, experts such as Tol, Nordhaus and Hope ([see footnote 24](#)) have reported mean SCC values in the range of \$10 to \$25 per tonne of CO₂e, whereas Stern has reported a value closer to \$100. In large part, this variability relates to uncertainties around key parameter choices in the estimation of the SCC, for example the appropriate discount rate to use in the calculation. It is generally acknowledged that estimates, even from the same model, vary widely depending on the chosen levels of key variables.

In addition, it is widely acknowledged that the SCC would normally increase by about 2% per year. Important work on the SCC has been recently conducted by the U.S. Environmental Protection Agency through an interdepartmental process. EC is currently undertaking a similar review to update its assumptions about the SCC. This work is not yet complete, and for the purposes of this analysis EC will continue to rely on existing estimates of the SCC, which relies on proxies for the SCC, including the price of carbon on exchange markets and target prices announced by key jurisdictions.

Table 16: Sensitivity to the Social Cost of Carbon

(Constant 2007 \$M)

Location	GHG emission reductions (Mt CO₂e)	Low estimate \$10/tonne	Central scenario estimate \$25/tonne	High estimate \$100/tonne
West	4.6	38.9	97.3	389.2
Ontario	11.1	93.0	232.5	930.3
East	7.9	66.0	165.0	660.1
Total for Canada	23.6	197.9	494.8	1,979.6
Net present value		(2,652)	(2,355)	(871)

Sensitivity analysis on the \$10 to \$100 range (including a growth rate of 2% per year) was conducted. The results, presented above, reveal benefit estimates are sensitive to SCC values, with the present value of GHG reduction benefits ranging from \$198 million to \$1.9 billion, and the net present value of the Regulations ranging from a cost of \$871 million to almost \$2.7 billion.

Kerosene volumes

The sensitivity analysis to kerosene volumes is based on two scenarios. The first (HVO in heating oil) scenario assumes that instead of using biodiesel in heating distillate oil, HVO would be used and there would be no need to use kerosene in heating oil. The second (no kerosene) scenario assumes that there would be no use of kerosene in both diesel fuel and heating distillate oil. It is assumed that biodiesel is blended during the summer months without the need of kerosene and that a pour point depressant would be used in furnace oil instead of kerosene.

Table 17: Sensitivity to Kerosene Volumes

(Constant 2007 \$M)

description	No kerosene in heating oil scenario	Central scenario	No kerosene scenario
Costs			
Cost of producing biodiesel	3,760.9	4,777.4	4,777.4
Cost of purchasing HVO	1,872.1	764.2	764.2
Cost of purchasing kerosene	5,483.3	6,536.3	0
Cost to consumer	172.0	201.7	0
Total cost	11,730.7	12,765.2	6,036.4
Benefits			
Avoided cost of purchasing diesel and heating oil	9,067.5	9,915.0	3,927.2
Benefits of GHG emission reductions at \$25/tonne	443.1	494.8	494.8
Total benefit	9,510.6	10,409.8	4,422.1
Net present value	(2,220.1)	(2,355.4)	(1,614.3)

The sensitivity analysis shows that the results are somewhat sensitive to this assumption. However, even in the extreme case of zero use of kerosene, the net present value of the Amendments would still be a net cost of \$1.6 billion.

Discount rates

The sensitivity analysis to the discount rate is based on a scenario with a 0% discount rate and a scenario with a 7% discount rate. The results are presented in the table below.

Table 18: Sensitivity to Discount Rate

(Constant 2007 \$M)

Discount rate	0%	3%	7%
Costs			
Cost of producing biodiesel	6,947.9	4,777.4	3,148.6
Cost of purchasing HVO	1,104.4	764.2	508.2
Cost of purchasing kerosene	9,796.2	6,536.3	4,128.3
Cost to consumer	301.2	201.7	128.0
Total cost	18,777.9	12,765.2	8,291.4
Benefits			
Avoided cost of purchasing diesel and heating oil	14,862.9	9,915.0	6,271.7
Benefits of GHG emission reductions at \$25/tonne	746.4	494.8	311.5
Total benefit	15,609.3	10,409.8	6,583.1
Net present value	(3,168.6)	(2,355.4)	(1,708.2)

The analysis indicates that the net present value of the Amendments is sensitive to the discount rate assumptions.

Rationale

The Government of Canada is committed to reducing GHG emissions and to increase the use of renewable fuels through a number of regulatory and non-regulatory actions. In order to do so, the Government of Canada has adopted a comprehensive Renewable Fuels Strategy to reduce GHG emissions, encourage the use and production of renewable fuels and promote economic growth and sustainable development. A number of initiatives have been put in place to achieve the objectives of the Renewable Fuels Strategy.

One of the key elements of the Renewable Fuels Strategy was to require 2% renewable diesel in distillate fuels. In order to achieve this objective, the use of regulations in combination with a trading system was considered to be an effective way of achieving this requirement. While reducing GHG emissions, this approach also provides flexibility to industry to meet the requirement and ensures production and use of renewable fuels in Canada. Combined with other Government of Canada programs, it would also assist in the creation of jobs in rural areas and opportunities for rural Canada to participate in biodiesel production.

As a consequence, a cost-benefit analysis was conducted for the selected regulatory instrument,

which indicated that it would result in a reduction of approximately 23.6 Mt CO₂e of GHG emissions over a period of 25 years. The incremental cost of achieving these reductions is estimated to be \$12.8 billion over the same period with associated benefits of \$10.4 billion or a net average annual incremental cost of approximately \$94 million. The overall impacts are estimated to be about one third of a cent per litre of diesel fuel and heating distillate oil, which would likely go unnoticed in the day-to-day fluctuations in diesel fuel and heating distillate oil prices.

As a consequence of the above, the Amendments are considered to be an effective way of fulfilling the Government of Canada's commitment outlined in the Renewable Fuels Strategy, and make an effective contribution to its national greenhouse gas objectives.

Consultation

Consultation process

Since 2006, Environment Canada has organized a number of consultation and information sessions with various stakeholders on the proposed regulatory approach for requiring renewable fuel content based on gasoline, diesel fuel and heating distillate oil volumes. A complete description of the consultation process, as well as responses to comments, were provided in the regulatory impact analysis statement (RIAS) published in the *Canada Gazette*, Part II, on September 1, 2010. ([see footnote 25](#))

In May 2009, an information session ([see footnote 26](#)) was organized by Environment Canada to communicate the key decisions taken by the Government of Canada on developing the proposed Regulations. At the information session, Environment Canada also outlined the next steps in the regulatory development process, which include drafting, consulting and publishing the proposed Regulations in the *Canada Gazette*.

In the summer of 2009, in order to ensure the workability of a regulatory design, Environment Canada set up a technical advisory working group comprised of the key stakeholders from the most affected industries. The technical advisory working group reviewed the draft document for the proposed regulatory text, and provided advice on the definitions, workability and technical details. ([see footnote 27](#))

CEPA National Advisory Committee (CEPA NAC) consultations

Environment Canada offered to consult with CEPA NAC members in February 2011. A bilateral meeting between Environment Canada and New Brunswick officials was held in March 2011.

New Brunswick raised concerns about a competitive imbalance in distillate markets, a lack of biodiesel availability (no production in Atlantic Canada), industry and consumer impacts in Atlantic Canada and compliance timeline (require more time to develop infrastructure).

The Government has carefully considered all the comments received and is balancing competitiveness impacts on eastern refiners with the need to minimize delays to support the Canadian biodiesel industry in moving forward. A permanent exemption is being provided for diesel fuel and heating distillate oil sold in Newfoundland and Labrador and temporary exemptions for the first compliance period for diesel fuel and heating distillate oil sold in Quebec and all other Atlantic provinces. Further flexibilities also include an extended first compliance period (July 1, 2011, to December 31, 2012), as was proposed in the *Canada Gazette*, Part I, as well as having carrying forward of pre-distillate compliance units, trading of compliance units, carrying back of compliance units and other flexibilities already in the Regulations. The coming-into-force date is maintained as July 1, 2011.

The National Renewable Diesel Demonstration Initiative

During consultations, Canadian industry sectors and end-users raised questions related to the large-scale use and integration of renewable diesel into Canadian fuel distribution networks. The National Renewable Diesel Demonstration Initiative (NRDDI), led by NRCan, was designed to address these technical feasibility questions in advance of the Amendments coming into effect and supported

demonstration projects with non-repayable contributions. The assessment by NRCan through the NRDDI has led to the conclusion that renewable diesel can meet the Canadian petroleum industry accepted standards, subject to timing considerations for infrastructure readiness. Accordingly, the 2% requirement is being put in place by this Amendment and the coming-into-force date is July 1, 2011.

Fuel quality specifications and labelling

A consultation of stakeholders was also done within the NRDDI program. Issues raised by stakeholders included the mandating of fuel quality standards and labelling of high-renewable-content fuels.

- These issues were covered in the RIAS for the Regulations published in the *Canada Gazette*, Part II, on September 1, 2010.

Coming-into-force date

Bilateral meetings focused on the coming-into-force date for the 2% requirement were held with some key stakeholders on their request. While the petroleum industry and some users had concerns related to the time needed to implement the necessary infrastructure (up to 36 months) and ensure an adequate availability of biodiesel and/or renewable diesel in Canada, the biofuel industry expressed the need for an early start date to ensure a market for their product.

- In finalizing the coming-into-force date, the Government has carefully considered all the comments received and is balancing competitiveness impacts on eastern refiners with the need to minimize delays to support the Canadian biodiesel industry in moving forward. A permanent exemption is being provided for diesel fuel and heating distillate oil sold in Newfoundland and Labrador and temporary exemptions for the first compliance period for diesel fuel and heating distillate oil sold in Quebec and all other Atlantic provinces. Further flexibilities also include an extended first compliance period (July 1, 2011, to December 31, 2012), as was proposed in the *Canada Gazette*, Part I, as well as having carrying forward of pre-distillate compliance units, trading of compliance units, carrying back of compliance units and other flexibilities already in the Regulations. The coming-into-force date is maintained as July 1, 2011.

Comments received following pre-publication of the proposed Amendments in the Canada Gazette, Part I, on February 26, 2011

The proposed Amendments were pre-published in the *Canada Gazette*, Part I, for a 60-day public comment period. During that period, 39 comments were received from stakeholders including the petroleum industry, producers of renewable fuel, users of petroleum fuels, vehicle manufacturers, petroleum and renewable fuels' stakeholder associations and provincial governments.

Comments received focused on the timing of the 2% renewable fuel requirement in diesel fuel and heating distillate oil and on exclusions for various types of diesel fuel from a primary supplier's distillate pool. These and other comments relating to the regulations are summarized below with how they are addressed in the final Amendments.

A Notice of Objection was received from one petroleum company requesting that the Minister of the Environment exempt their diesel production that they consume in their own mining operations, or alternatively, establishes a board of review under section 333 of CEPA 1999, citing technical and logistical concerns associated with blending biodiesel. The Minister of the Environment has fully and carefully considered the issues identified in the submission in deciding whether or not to establish a board of review. The mandate of a board of review as set out in CEPA 1999 is to inquire into the nature and extent of the danger posed by the substance in respect of which the regulation is proposed. The notice of objection was considered in this context and the Minister will not establish a board of review. A response will be provided to the intervener. In regard to the issue of excluding fuel consumed in mining operations, this is discussed in the Excepted Fuels section below.

Implementation timing and start of the 2% requirement

The petroleum industry and some provincial governments considered that the proposed July 1, 2011,

start date did not provide sufficient lead time for industry. The petroleum industry pointed out that time was required to make necessary changes to infrastructure to produce, import and blend biodiesel. Comments received from the renewable fuel industry on the implementation date indicated that it should not be delayed from July 1, 2011, as doing so would interfere with marketplace expectations.

- The Amendments retain the proposed start date for the 2% requirement of July 1, 2011. A permanent exemption is being provided for diesel fuel and heating distillate oil sold in Newfoundland and Labrador and temporary exemptions for the first compliance period for diesel fuel and heating distillate oil sold in Quebec and all other Atlantic provinces. The first compliance period is 18 months long (July 1, 2011, to December 31, 2012) so that industry will have an extended period of time in which to fulfill the blending requirement. This, combined with other provisions currently in the Regulations, will provide flexibility for companies in meeting the 2% requirement.

Exempted fuels

The petroleum industry recommended adding additional exceptions for diesel fuel used in marine vessels, mining and heating distillate oil. Supporting arguments included lack of renewable fuel standard specification for heating distillate oil and marine distillates and technical limitations using renewable fuels in mining equipment. Some petroleum refiners also recommended that the exception for gasoline used in Newfoundland and Labrador be extended to include diesel fuel and heating distillate oil so used.

- After consulting on the logistical infrastructure, supply options and availability of renewable fuel for diesel fuel and heating distillate oil for use in Newfoundland and Labrador, these issues were seen as significant for these fuels as they were for gasoline. Consequently, a permanent exemption is being provided for diesel fuel and heating distillate oil sold in Newfoundland and Labrador. For the instances where a primary supplier decides it is not desirable to add renewable fuel content to a particular distillate fuel type, those volumes can be made up by blending elsewhere. In addition, where a primary supplier does not wish to add renewable fuel to its petroleum fuel, it can obtain compliance units from other parties through the trading system. Removing volumes of heating distillate oil and distillates used in marine vessels and mining fleets from the volume obligation could create competitiveness issues between primary suppliers. In addition, during consultations on the original regulations, there were polarized views from the petroleum industry on excluding these volumes. For these reasons, no additional exceptions for diesel fuel used in marine vessels, mining and heating distillate oil have been added.

Regional implications

Some regional stakeholders, particularly in Quebec and Atlantic Canada, were concerned about the competitive disadvantage regional fuel producers could face in comparison to their national counterparts. This competitive disadvantage would be further compounded by the short lead time for implementation of the Amendments. It was also noted that it contravenes a Quebec provincial regulation to distribute heating oil with renewable fuel content until more than 90 days after the industry heating oil standard (Canadian General Standards Board, CAN/CGSB-3.2) is updated and in place.

- These concerns from regional stakeholders and the industry were taken into consideration during the drafting of the Amendments. A temporary exemption for the first compliance period is being provided for diesel fuel and heating distillate oil sold in Quebec, New Brunswick, Nova Scotia and Prince Edward Island. (A permanent exemption is being provided for diesel fuel and heating distillate oil sold in Newfoundland and Labrador for technical reasons.) This, combined with other provisions currently in the Regulations, will provide flexibility for companies in meeting the 2% requirement.

Some renewable fuel stakeholders requested that the Regulations require facility-based rather than corporate-wide averaging.

- The Regulations rely on a trading system of compliance units as the regulatory mechanism for demonstrating compliance. A company-wide limit was selected over a facility-based limit as

renewable fuels are typically added downstream of the point at which they can be regulated, making a facility limit impossible. In addition, the use of company-wide limits aligns with an effective system of tradable compliance units. No changes were made to the Regulations in this regard.

Mandate for fuel quality standards

Vehicle manufacturers and a number of stakeholders who use fuels in vehicles or other mobile equipment recommended that fuel quality standards be mandatory for petroleum fuels, as well as for the renewable fuels that are blended into them.

- Environment Canada maintains the view set out in the original Notice of Intent, which is that the application of such commercial specification should be left to the private industry. Fuels standards are developed for the Canadian context by the Canadian General Standards Board through a consensus process involving fuel and engine manufacturers, fuel users and public sectors. The Government considers the application of such commercial specifications is best left to private industry rather than imposing these specifications through regulation. Therefore, fuel quality standards were not added to the Amendments.

Waivers

Some fuel users stakeholders associations commented that waivers should be granted by Environment Canada, should supply disruptions of biofuels reach a critical level or should the gap between biodiesel prices and regular diesel reach a predetermined level.

- In regard to the supply disruptions, section 147 of the *Canadian Environmental Protection Act, 1999* allows the Minister, under prescribed circumstances, to grant temporary waivers from any requirements of fuel regulations made under section 140 of the Act (including the *Renewable Fuels Regulations*). *Regulations Prescribing Circumstances for Granting Waivers Pursuant to Section 147 of the Act* were published in the *Canada Gazette*, Part II, on July 7, 2010. The Regulations allow the Minister of the Environment to grant temporary waivers if there is an actual or anticipated fuel supply shortage during a declared emergency, and/or at the request of the Minister of National Defence if there is an actual or anticipated fuel shortage that could affect national defence operations. However, these Regulations do not provide for the granting of waivers in the event that the price differential between biodiesel and regular diesel reaches a predetermined level. Controls on market pricing are beyond the scope of these and the *Renewable Fuels Regulations*.

Restrictions on renewable fuels use

Some fuel user associations requested limiting the use of biodiesel in winter and in certain geographic areas, and that a maximum blend level be in place for on-road use.

- The Regulations do not limit blends of biodiesel greater than 5% by volume. However, to create compliance units for blends of biodiesel greater than 5%, records must demonstrate that information on the nature of the fuel was provided to the consumer. Regarding seasonal and geographical restrictions and controls on blending practices, Environment Canada believes that those issues are best dealt with by the industries involved. No changes to the Regulations were made in this regard.

A shipping association indicated that the fourth edition (2010) of the ISO 8217 marine fuel standard specifications has determined that due to safety concerns and the potential effects of biofuels on ships' engines and other equipment, marine distillates for ships should be free (or in trace quantities) from bio-derived materials. The shipping association asked for confirmation that sellers of marine diesel fuel are permitted to sell non-bio content fuel to ships.

- The Regulations provide sufficient flexibility in allowing primary suppliers to choose which distillate petroleum stream to add renewable fuel content to. Where a primary supplier decides it is not desirable to add renewable fuel content to a particular distillate fuel type, such as marine diesel,

the averaging provisions and other flexibilities in the Regulations allow for those volumes to be made up by blending elsewhere. In addition, where a primary supplier does not wish to add renewable fuel to its petroleum fuel, it can obtain compliance units from other parties through the trading system. For these reasons, no additional exceptions for diesel fuel used in marine vessels, mining and heating distillate oil have been added.

Price monitoring mechanism

Some end-use sector organizations asked to have price monitoring and reporting mechanisms included in the Regulations that will allow gauging of the price difference between biodiesel and regular diesel on an ongoing basis.

- The inclusion of such measures in the Regulations is beyond the scope of the Regulations.

Trade policy position

One organization asked that Canada develop a trade policy position on biodiesel that accords fair, equitable and equal treatment of biodiesel trade flows both into Canada and from Canada into export markets.

- Trade policy is beyond the scope of the Regulations.

Comments on the Regulatory Impact Analysis Statement

GHG reductions

According to fuel users and the petroleum industry, GHG reductions are too minimal to justify the costs of the proposed Regulations.

- Environment Canada reiterates that 1 Mt per year is a significant contribution to meeting the Government of Canada's goal to cut greenhouse gas emissions by 17% from 2005 levels by 2020. In the broader national context, along with the requirements for renewable fuel content in gasoline and provincial regulations, up to 4 Mt of annual GHG reductions will be achieved. This is the equivalent of taking about one million vehicles off the road. Canada's renewable fuels strategy is a key to meeting GHG reductions targets in Canada, as well as aligning with U.S. climate change policy. Renewable fuels are also part of meeting E.U. climate change targets.

Diesel and heating oil pricing

According to a renewable fuel association, the wholesale diesel and heating oil prices used for 2011 are too low compared to observed market prices. They also state that Environment Canada use a rate of growth of less than 1% per year, while they consider a 5% growth per year to be more realistic.

- It is acknowledged that the analysis is highly sensitive to the forecasts for diesel and heating oil prices over the relevant time period. At the same time, these are particularly difficult parameters to predict with a high degree of confidence given the large price fluctuations that crude oil markets have recently experienced. The fuel prices in the RIAS analysis are based on NRCan's most recent oil price forecast. That forecast indicates an average growth rate of 2% over the 25-year period considered. This is consistent with U.S. EIA's Annual Energy Outlook 2011 forecast. The price forecast used in the RIAS analysis corresponds to \$120/barrel oil in 2035, while EIA's 2011 price forecast for 2035 was approximately \$125/barrel; using the growth assumptions proposed by the renewable fuel association, the price in 2035 would be over \$300/barrel of crude oil.

HVO pricing

A petroleum industry stakeholder stated that the price of HVO used in the analysis was too low.

- It is challenging to accurately predict the price of HVO over the 25-year period of the analysis. The estimate used in the analysis was provided by industry through a survey done by the

consultants.

Kerosene and HVO volumes

According to the renewable fuel industry there is no need to use kerosene or HVO to meet the 2% requirement.

- This was a difficult assumption for EC to determine on its own. The analysis relies on the views expressed by industry to the consultant. According to the petroleum industry some kerosene will be needed especially in colder climates of eastern Canada. Environment Canada has carried out a sensitivity analysis to kerosene volume; it includes a scenario with no kerosene in heating oil and a scenario with no kerosene at all. The Amendments result in a net cost for both scenarios.

Cost to consumers

Fuel users and a petroleum industry from Atlantic Canada are of the view that the cost to consumers is underestimated.

- Environment Canada's estimate in the RIAS was for a third of a cent per litre average increase in diesel prices at the pump, adding \$260 per year to the cost of operating a long-haul tractor-trailer consuming 80 000 litres of diesel fuel per year. This estimate was based on the assumption that all costs incurred by refiner/marketers in order to purchase and blend biodiesel into the diesel pool would be passed on to consumers dollar for dollar and spread equally across all litres sold, blended or unblended. In reality, it will be up to the individual refiners/marketers to determine their pricing strategies, but we would expect that all cost increases will be passed on, with the average cost increase as estimated.

Agricultural impacts

A stakeholder association has stated that there are very significant positive benefits due to the Amendments that are not accounted for in the RIAS, in particular the increase in canola production.

- International prices for vegetable oil are the most important driver for domestic vegetable oil prices. The key assumption made by the AAFC analysis is that the incremental impact of the biodiesel mandate in Canada will have no measurable impact on international prices and as a result the impact on domestic prices will be minimal. AAFC acknowledged that there could be local impacts due to close proximity to biodiesel production facilities but these impacts are expected to be small and have little to no impact on national overall crop production levels.

Implementation, enforcement and service standards

Implementation

For the purpose of implementing the requirements of the Regulations, Environment Canada is undertaking a number of compliance promotion activities. These activities are targeted toward raising awareness and encouraging the regulated community to achieve a high level of overall compliance as early as possible during the regulatory implementation process. This would include the following:

- Developing and distributing basic compliance promotion material (including explanatory notes) nationally to regulatees and stakeholders;
- Focusing on those regulatees who would be most impacted by the Regulations within the first few years;
- Upon request, distributing additional information, industry-specific information or focused information regionally in a tailored approach at a later time; and
- Training Environment Canada compliance promotion staff in a comprehensive manner to respond to regulatees' technical or regulatory questions.

The Regulations already include provisions requiring an average 2% renewable fuel content in diesel fuel and heating distillate oil based on annual volumes. The Amendments implement this requirement by

providing the coming-into-force date. Once published, the Amendments will be addressed through the activities and materials noted above.

As the regulated community becomes more familiar with the requirements of the Regulations, these activities are expected to decline to a maintenance level. Compliance promotion activities will be revisited from time to time to ensure that the Regulations be implemented in the most effective and efficient manner.

Enforcement

The Regulations were made under the *Canadian Environmental Protection Act, 1999* (CEPA 1999), and enforcement officers will, when verifying compliance with the Regulations, apply the Compliance and Enforcement Policy implemented under the Act. This Policy would also apply when verifying compliance with the Amendments.

The Policy sets out the range of possible responses to violations, including warnings, directions, environmental protection compliance orders, ticketing, ministerial orders, injunctions, prosecution, and environmental protection alternative measures (which are an alternative to a court trial after the laying of charges for a CEPA 1999 violation). In addition, the Policy explains when Environment Canada will resort to civil suits by the Crown for cost recovery.

When, following an inspection or an investigation, an enforcement officer discovers an alleged violation, the officer will choose the appropriate enforcement action based on the following factors:

- Nature of the alleged violation: This includes consideration of the damage, the intent of the alleged violator, whether it is a repeat violation, and whether an attempt has been made to conceal information or otherwise subvert the objectives and requirements of the Act.
- Effectiveness in achieving the desired result with the alleged violator: The desired result is compliance within the shortest possible time and no repetition of the violation. Factors to be considered include the violator's history of compliance with the Act, willingness to cooperate with enforcement officers, and evidence of corrective action already taken.
- Consistency: Enforcement officers will consider how similar situations have been handled in determining the measures to be taken to enforce the Act.

Environment Canada will monitor renewable fuel content in gasoline, diesel fuel and heating distillate oil and compliance with the Regulations.

Service standards

There are no service standards associated with the Amendments.

Performance measurement and evaluation

Measuring the performance of regulatory activities to ensure they continually meet their initial objectives is an important responsibility for the regulating department. The regulatory activities that are required for the Amendments will be considered when measuring the performance of the *Renewable Fuels Regulations*. The evaluation and reporting of performance of the Regulations would take place via several regular assessment activities that will vary in scope of analysis and that will be carried out in conjunction with other partners, as required. The evaluation and reporting, and the various assessments and reporting requirements that apply to the Regulations, would also take into consideration the regulatory requirements of the Amendments.

Further details on the evaluation, reporting and assessments activities for the *Renewable Fuels Regulations* are available in the RIAS that was published with the Regulations on September 1, 2010, in the *Canada Gazette*, Part II. ([see footnote 28](#))

A detailed performance measurement and evaluation plan (PMEP) was developed for the *Renewable Fuels Regulations*. The PMEP is currently being revised to include elements for the 2% renewable fuel requirement for diesel fuel and heating distillate oil. The revised PMEP will be made available, upon

request, from Environment Canada. The various evaluations pertaining to the Regulations are highlighted below.

The objective of the *Renewable Fuels Regulations* is to reduce GHG emissions by mandating an average of 5% renewable fuel content in most of the produced or imported gasoline, thereby contributing to the protection of Canadians and the environment from the impacts of climate change. The objective of the Amendments is to further reduce GHG emissions by mandating an average of 2% renewable fuel content in most of the diesel fuel and heating distillate oil produced or imported. The Regulations and the Amendments support the Renewable Fuels Strategy's objective to expand Canadian production of renewable fuels by ensuring demand for renewable fuels in the marketplace. It is estimated that the Regulations would result in an incremental GHG reduction of about 1 Mt CO₂e per year.

The *Renewable Fuels Regulations* and the Amendments seek to influence primary suppliers and other entities such as blenders or sellers of fuel that elect to participate in the trading mechanism.

Performance of the Amendments will be measured with the Regulations through a set of key indicators. The indicators will also be developed to reflect the activities that would be undertaken by the Government and regulated parties. These indicators would be evaluated to assess whether the immediate as well as long-term results have been achieved. The indicators developed for the *Renewable Fuels Regulations* will be adjusted, where appropriate, to include reference to the 2% requirement for diesel fuel and heating distillate oil.

The immediate outcomes that will serve to track the performance of the Regulations, and the key indicators to monitor performance of the *Renewable Fuels Regulations*, will also be adjusted to include consideration of the Amendments for the 2% requirement. These outcomes would be achieved via a series of activities related to the development and implementation of the Regulations, including the Amendments.

In addition to measuring and reporting performance as described above, several formal evaluations of the Regulations, the Amendments, and supporting activities, will be conducted through different initiatives. These include the evaluation plan of Environment Canada's components of the regulation of renewable fuel content in gasoline, diesel fuel and heating distillate oil, which may also encompass data from external sources or published materials to support a broader scope of enquiry. The plan for this evaluation will be in the 2011–12 fiscal year.

Other indirect impacts of the Regulations and Amendments, such as those on the agricultural community, renewable fuels producers and other areas, will be monitored, as appropriate, through the evaluation of other programs supporting the Renewable Fuels Strategy led by Agriculture and Agri-Food Canada. Specifically, NRCan will evaluate its ecoENERGY for biofuels program and AAFC will conduct an evaluation of its ecoABC initiative in 2010–11 and will coordinate an analysis of the Renewable Fuels Strategy in 2010–11.

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[Footnote a](#)

S.C. 2004, c. 15, s. 31

[Footnote b](#)

S.C. 1999, c. 33

[Footnote c](#)

SOR/2010-189

[Footnote d](#)

S.C. 2008, c. 31, s. 2

[Footnote e](#)

S.C. 1999, c. 33

[Footnote 1](#)

SOR/2010-189

[Footnote 2](#)

www.ec.gc.ca/lcpe-cepa/eng/regulations/detailReg.cfm?intReg=186

[Footnote 3](#)

"Report on the Technical Feasibility of Integrating an Annual Average 2% Renewable Diesel in the Canadian Distillate Pool by 2011", NRCan.

[Footnote 4](#)

The notice of intent can be accessed from gazette.gc.ca/archives/p1/2006/2006-12-30/html/notice-avis-eng.html.

[Footnote 5](#)

Additional information on the program is available at www.ecoaction.gc.ca/index-eng.cfm.

[Footnote 6](#)

Ibid.

[Footnote 7](#)

Additional information on the program is available at www.sdte.ca/index.php?page=home&hl=en_CA.

[Footnote 8](#)

The cloud point is the temperature at which dissolved solids in a liquid are no longer completely soluble.

[Footnote 9](#)

The pour point is the lowest temperature at which oil or other liquids will pour under standard conditions.

[Footnote 10](#)

Note that the preceding numbers for production, sales, imports and exports do not add up due to inventory changes, the refineries' own consumption of products, and other reasons.

[Footnote 11](#)

The term “biodiesel” refers collectively to renewable diesel produced from canola, soy and animal fats (tallow) via conventional transesterification. “Canola fatty acid methyl esters” refers to biodiesel from canola oil, “soy fatty acid methyl esters” refers to biodiesel from soybean oil and “tallow fatty acid methyl esters” refers to biodiesel from tallow.

[Footnote 12](#)

Hydrotreated vegetable oil is renewable diesel produced using hydrotreatment and isomerization processes. This renewable diesel is indistinguishable from diesel derived from fossil fuels.

[Footnote 13](#)

Garraín, D.; Herrera, I.; Lago, C.; Lechon, Y.; and Saez, R. (2010). *Renewable Diesel Fuel from Processing of Vegetable Oil in Hydrotreatment Units: Theoretical Compliance with European Directive 2009/28/EC and Ongoing Projects in Spain*. Smart Grid and Renewable Technology, 2010 (1) 70-73.

[Footnote 14](#)

Updating the Cost-Benefit Analysis of the Proposed 2% Renewable Fuels Regulation, Final Report, EcoRessources, December 2010.

[Footnote 15](#)

Historical data was obtained from *The Supply and Disposition of Petroleum Products*, Statistics Canada, 2010.

[Footnote 16](#)

Updating the Cost-Benefit Analysis of the Proposed 2% Renewable Fuels Regulations, Final Report, ÉcoRessources, December 2010.

[Footnote 17](#)

B2, B5, and B20 refer to blended fuels containing 2%, 5%, and 20% biodiesel by volume in conventional diesel fuel.

[Footnote 18](#)

Energy Information Administration (EIA, 2010) *Refiner Petroleum Product Prices by Sales Type*. Available online: tonto.eia.doe.gov/dnav/pet/pet_pri_refoth_dcu_nus_m.htm.

[Footnote 19](#)

Bank of Canada (2010). *Monthly and Annual Average Exchange Rates*. Web site: www.bankofcanada.ca/en/rates/exchange_avg_pdf.html.

[Footnote 20](#)

BBI Biofuels Canada (2006). *Economic Impact Study for a Canola-Based Biodiesel Industry in Canada*. Prepared for the Canola Council of Canada, 146 p.

[Footnote 21](#)

Shumaker, G. A., McKissick, J., Ferland, C., and Doherty, B. (2002). *A Study on the Feasibility of Biodiesel Production in Georgia*.

[Footnote 22](#)

Note that if a portion of the costs of producing biodiesel in Canada are subsidized by the Canadian government, this portion of the costs will technically be felt by Canadian taxpayers rather than by the refiner/marketers and blenders and fuel consumers.

[Footnote 23](#)

The socio-economic cost per tonne is calculated by subtracting the sum of all of the non-GHG benefits from the total costs of the proposal and then dividing by the tonnes of GHGs reduced by the measure.

[Footnote 24](#)

Watkiss and Downing (2008), “The Social Cost of Carbon: Valuation estimates and their use in UK policy.” IAJ The Integrated Assessment Journal, *Bridging Sciences & Policy*, Vol. 8, Iss. 1 (2008), pp. 85–105.

[Footnote 25](#)

Available at gazette.gc.ca/rp-pr/p2/2010/2010-09-01/html/sor-dors189-eng.html.

[Footnote 26](#)

The information presented can be accessed at www.ec.gc.ca/energie-energy/default.asp?lang=En&n=BDB8F633-1.

[Footnote 27](#)

Technical issues raised and the means proposed to address them can be accessed from www.ec.gc.ca/ceparegistry/documents/participation/renewable_fuels/default.cfm.

[Footnote 28](#)

www.ec.gc.ca/lcpe-cepa/eng/regulations/detailReg.cfm?intReg=186

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