

Renewable Fuels Greenhouse Gas Emissions Eligibility Standard

Alberta Renewable Fuels Standard

This information in the lookup table presented on the pages following is from the original March 4, 2011 document (last revised April 23, 2013) that was housed on the Alberta Energy website prior to the transfer of the Renewable Fuels Standard (RFS) responsibilities from Alberta Energy to Alberta Environment and Parks (AEP) in 2015.

This document outlines the Renewable Fuels Greenhouse Gas Emissions Eligibility Standard as defined by the Renewable Fuels Standard Regulation, an associated regulation for Alberta's *Climate Change and Emissions Management Act*.

No information from the original document has been changed. New header and footer information that corresponds to current Government of Alberta branding standards has been added.

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Climate Change and Emissions Management Act

Renewable Fuels Standard Regulation

**RENEWABLE FUELS GREENHOUSE GAS
EMISSIONS ELIGIBILITY STANDARD**

March 04, 2011

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Preface:

Pursuant to section 61 of the *Climate Change and Emissions Management Act* and section 5 of the *Renewable Fuels Standard Regulation*, the following Renewable Fuels Greenhouse Gas Emissions Eligibility Standard is incorporated into and forms part of the *Renewable Fuels Standard Regulation*.

Definitions:

1(1) In this Standard,

- (a) “Act” means the *Climate Change and Emissions Management Act*;
- (b) “Alberta GHGenius” means the version of GHGenius approved by the director from time to time, or versions previously approved by the director for calculating greenhouse gas emissions for the components of the life cycles of fuels;
- (c) “biofuel” means renewable alcohol or renewable diesel, whether it is qualifying renewable fuel or not;
- (d) “CO₂” means carbon dioxide;
- (e) “CO₂ eq” means carbon dioxide equivalent, specifically the 100 year global warming potential of an individual specified gas expressed in terms of equivalency to CO₂ as set out in the *Specified Gas Emitters Regulation*;
- (f) “component” means, for the purpose of determining the greenhouse gas emissions intensity of a fuel, the calculated value for the net greenhouse gas emissions deemed attributable to that fuel for a stage of life cycle as described under section 4;
- (g) “emissions threshold” means, in respect of qualifying renewable alcohol or qualifying renewable diesel, the greenhouse gas emissions intensity threshold determined under section 2(3) or 2(4), respectively;
- (h) “established pathway” means processes and feedstocks used to manufacture a biofuel that is listed as “Pass” or “Not a Pass” in the Lookup Table;
- (i) “feedstock” means the raw material from which fuel is produced, including without limitation, biological and geological sources;
- (j) “fuelling station” means a facility equipped to dispense fuel into fuel tanks or batteries of vehicles or vessels and includes a retail service station, a card lock, or a facility used primarily to fuel a fleet of vehicles or vessels;
- (k) “fuel production facility” means a facility that manufactures or produces fuel (including but not limited to gasoline, diesel, and renewable fuel);

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- (l) “GHGenius” means the spreadsheet model of that name designed for analyzing the components attributable to the stages of the life cycles of fuels for the purpose of determining all greenhouse gas emissions resulting from the production and use of those fuels for transportation purposes;
- (m) “greenhouse gas” means carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, and any other substance prescribed as a “specified gas” in the *Specified Gas Emitters Regulation*;
- (n) “greenhouse gas emissions”, in respect of a stage, includes all greenhouse gases emitted or absorbed in any process or activity that is part of that stage, whether or not the process or activity is specifically mentioned in the description of the stage in section 4, unless those greenhouse gases are specifically taken into account in another stage;
- (o) “greenhouse gas emissions intensity” means the greenhouse gas emissions attributable to the fuel proportionate to the energy provided by the fuel in its expected use for transport
 - i. expressed as grams of carbon dioxide equivalent emissions per gigajoule of energy, and
 - ii. as determined in accordance with sections 2 to 4;
- (p) “g CO₂ eq” means grams of CO₂ equivalent;
- (q) “g CO₂ eq/GJ” means grams of CO₂ equivalent per gigajoule and is referred to as an “energy unit”;
- (r) “g CO₂ eq/Litre” means grams of CO₂ equivalent per litre and is referred to as a “volumetric unit”;
- (s) “GJ” means gigajoules;
- (t) “higher heating value” means, in respect of a fuel, the amount of heat released by a specified quantity of the fuel (initially at 25 degrees Celsius) once it has undergone combustion and the products of combustion have returned to a temperature of 25 degrees Celsius;
- (u) “life cycle” means, in relation to a fuel, the stages under section 4 that occur in the manufacturing of the fuel, including, without limitation, in the preparation of land for and the production of feedstock for that fuel;
- (v) “Lookup Table” means the table in Appendix 1;

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- (w) “modified pathway” means a pathway that is amended from the Lookup Table where it was listed as “Not a Pass”;
- (x) “new pathway” means a pathway that is not listed in the Lookup Table;
- (y) “pathway” means processes and feedstocks used to manufacture a biofuel;
- (z) “Regulation” means the *Renewable Fuels Standard Regulation*;
- (aa) “stage” means, for the purpose of establishing the greenhouse gas emissions intensity of a fuel, a portion of the life cycle for that fuel described in section 4;
- (bb) “validation code” means the alphanumeric code that is
 - i. listed in the Lookup Table, or
 - ii. assigned by the director under section 5, 6, or 7.

(2) Where this Standard uses a term defined in the Act or the Regulation, the term has the meaning set out in the Act or the Regulation.

Greenhouse gas emissions intensity

2(1) For the purposes of this section, the greenhouse gas emissions intensity of gasoline fuel is deemed to be 91,559g CO₂ eq/GJ.

(2) For the purposes of this section, the greenhouse gas emissions intensity of diesel fuel is deemed to be 94,694 g CO₂ eq/GJ.

(3) For the purpose of section 3(1)(c) of the Regulation, if renewable alcohol is determined under this Standard to have a greenhouse gas emissions intensity greater than the threshold of 68,669 g CO₂ eq/GJ, that renewable alcohol

- (a) does not have greenhouse gas emissions intensity that is at least 25% less than the greenhouse gas emissions intensity of gasoline fuel, and
- (b) is not qualifying renewable alcohol.

(4) For the purpose of section 3(2)(c) of the Regulation, if renewable diesel is determined under this Standard to have a greenhouse gas emissions intensity greater than the threshold of 71,020 g CO₂ eq/GJ, that renewable diesel

- a) does not have greenhouse gas emissions intensity that is at least 25% less than the greenhouse gas emissions intensity of diesel fuel, and
- b) is not qualifying renewable diesel.

Greenhouse gas emissions intensity conversions

3(1) The greenhouse gas emissions intensity for a fuel must be converted from a volumetric unit to an energy unit using the higher heating values and must be calculated in accordance with this section.

(2) For qualifying renewable alcohol, the energy unit is calculated using the following formula:

$$\text{Energy Unit RA} = \text{Volumetric Unit RA} \div \text{Energy Density Ratio RA}$$

where:

Energy Unit RA is the greenhouse gas emissions of renewable alcohol expressed as g CO₂ eq/GJ;

Volumetric Unit RA is the greenhouse gas emissions of renewable alcohol expressed as g CO₂ eq/Litre;

Energy Density RA is the deemed energy density ratio of the renewable alcohol, which for renewable ethanol is 0.0236 GJ/Litre.

(3) For qualifying renewable diesel, the energy unit is calculated using the following formula:

$$\text{Energy Unit RD} = \text{Volumetric Unit RD} \div \text{Energy Density Ratio RD}$$

where:

Energy Unit RD is the greenhouse gas emissions of renewable diesel expressed as g CO₂ eq/GJ;

Volumetric Unit RD is the greenhouse gas emissions of renewable diesel expressed as g CO₂ eq/Litre;

Energy Density RD is the deemed energy density ratio of renewable diesel of 0.0354 GJ/Litre.

Components

4(1) The “Pass” and “Not a Pass” values in the Lookup Table and the greenhouse emissions intensity of any modified pathway or new pathway for a fuel are determined by adding the greenhouse gas emissions for each of the following stages of the life cycle of the fuel:

- Vehicle Operation: Emissions associated with the use of the fuel in the vehicle. Includes all greenhouse gases;
- Fuel Dispensing at the Retail Level: Emissions associated with the transfer of the fuel at a service station from storage into the vehicles. Includes electricity for pumping, fugitive emissions and spills;

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- Fuel Storage and Distribution at all Stages: Emissions associated with storage and handling of fuel products at terminals, bulk plants and service stations. Includes storage emissions, electricity for pumping, space heating and lighting;
- Fuel Production (as in production from raw materials): Direct and indirect emissions associated with conversion of the feedstock into a saleable fuel product. Includes process emissions, combustion emissions for process heat/steam, electricity generation, fugitive emissions and emissions from the life cycle of chemicals used for fuel production cycles;
- Feedstock Transport: Direct and indirect emissions from transport of feedstock, including pumping, compression, leaks, fugitive emissions, and transportation from point of origin to the fuel refining plant. Import/export, transport distances and the modes of transport are considered. Includes energy and emissions associated with the transportation infrastructure construction and maintenance (trucks, trains, ships, pipelines, etc.);
- Feedstock Production and Recovery: Direct and indirect emissions from recovery and processing of the raw feedstock, including fugitive emissions from storage, handling, upstream processing prior to transmission, and mining;
- Fertilizer Manufacture: Direct and indirect life cycle emissions from fertilizers, and pesticides used for feedstock production, including raw material recovery, transport and manufacturing of chemicals. This is not included if there is no fertilizer associated with the fuel pathway;
- Land use changes and cultivation associated with biomass derived fuels: Emissions associated with the change in the land use in cultivation of crops, including N₂O from application of fertilizer, changes in soil carbon and biomass, methane emissions from soil and energy used for land cultivation;
- Carbon in Fuel from Air: Carbon dioxide emissions credit arising from use of a renewable carbon source that obtains carbon from the air;
- Leaks and flaring of greenhouse gases associated with production of oil and gas: Fugitive hydrocarbon emissions and flaring emissions associated with oil and gas production;
- Emissions displaced by co-products of alternative fuels: Emissions displaced by co-products of various pathways. System expansion is used to determine displacement ratios for co-products from biomass pathways;
- Vehicle assembly and transport: Emissions associated with the manufacture and transport of the vehicle to the point of sale, amortized over the life of the vehicle;

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- Materials used in the vehicles: Emissions from the manufacture of the materials used to manufacture the vehicle, amortized over the life of the vehicle. Includes lube oil production and losses from air conditioning systems.

Validation Procedures

Validation Methodology 1 – Lookup Table

5(1) To determine if a biofuel has a greenhouse gas emissions intensity that is lower than the emissions threshold, a greenhouse gas validator may first determine whether the processes and feedstocks used to manufacture the biofuel are in an established pathway listed in the Lookup Table.

(2) If an established pathway is listed in the Lookup Table for a biofuel, and it is a

- (a) “Pass”, then the greenhouse gas emissions intensity of that biofuel is determined for the purposes of section 3 of the Regulation to be lower than the emissions threshold or
- (b) “Not a Pass”, then the greenhouse gas emissions intensity of that biofuel is determined for the purposes of section 3 of the Regulation to be higher than the emissions threshold.

(3) If subsection 2(a) applies, then a greenhouse gas validator may submit the completed validation certificate to the director for review after the greenhouse gas validator has confirmed that the biofuel that the renewable fuel provider is producing or importing is manufactured in a manner that is consistent with each one of the components described in that established pathway.

(4) If subsection 2(b) applies, then the renewable fuel provider that manufactured or imported the biofuel may challenge the established pathway in accordance with section 6.

(5) If there is not an established pathway listed in the Lookup Table for a biofuel, then the renewable fuel provider that manufactured or imported the biofuel may establish a new pathway for the biofuel in accordance with section 7.

Validation Methodology 2 – Modified pathway

6(1) A renewable fuel provider may challenge an established pathway that is listed as “Not a Pass” in the Lookup Table by submitting to the director a modified pathway that includes modifications to one or more of the components that are included in the Alberta GHGenius model to determine the greenhouse gas emissions intensity of the biofuel.

(2) A submission under subsection (1) must be in the form and manner established by the director and must include

- (a) a reference to the established pathway that is listed as “Not a Pass” in the Lookup Table, including a copy of the Alberta GHGenius model for the established pathway;

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- (b) a copy of the modified pathway, in GHGenius format, with each component listed, and a greenhouse gas emissions intensity for that biofuel that is lower than the emissions threshold;
- (c) for each component in clause (b) that is different from the component in clause (a)
 - (i) the greenhouse gas emissions determined for the stage of the biofuel under section 4;
 - (ii) an explanation of all modifications to the inputs of the component for the established pathway;
 - (iii) a list of cells that were modified in GHGenius to arrive at the modified pathway;
 - (iv) an explanation of why, for the biofuel that the renewable fuel provider is producing or importing, the component in the modified pathway is a more accurate representation of the stage of that component for the biofuel than the stage of that component for an established pathway;
 - (v) a written summary of logic used in modifying the established pathway;
 - (vi) a process flow diagram detailing the modified pathway;
 - (vii) any conversion factors and calculations used to modify the established pathway, and supporting documentation including, but not limited to, scientifically defensible materials, including refereed journals.

(3) The director may consider any information submitted by the renewable fuel provider in support of the modified pathway.

(4) The director may request further information in support of the modified pathway, and if the renewable fuel provider does not provide the requested information in writing to the director within 60 business days of the request, the director may reject the submission.

(5) If the renewable fuel provider establishes to the satisfaction of the director that

- (a) the components in the modified pathway can be appropriately included in the Alberta GHGenius model,
- (b) the modified pathway is scientifically defensible such that the data and inputs are demonstrated to be valid and technically feasible, and
- (c) the biofuel manufactured using the feedstocks and processes in the modified pathway has a greenhouse gas emissions intensity that is lower than the emissions threshold for the biofuel,

the director may establish a validation code for that modified pathway.

(6) If the director establishes a validation code for a modified pathway, a greenhouse gas validator may submit the completed validation certificate to the director for review after the greenhouse gas validator has confirmed that the biofuel that the renewable fuel provider is producing or importing is manufactured in a manner that is consistent with each one of the components described in the modified pathway.

Validation Methodology 3 – New pathway

7(1) A renewable fuel provider may propose a new pathway if a biofuel is not listed on the Lookup Table, by submitting to the director a new pathway that includes modifications to one or more of the components in an established pathway that are included in the Alberta GHGenius model to determine the greenhouse gas emissions intensity of the biofuel.

(2) A submission under subsection (1) must be in the form and manner established by the director and must contain:

- (a) a reference to the established pathway that that the new pathway is being compared to in subsection (1) including a copy of the Alberta GHGenius model for the established pathway;
- (b) a copy of the new pathway, in GHGenius format, with each component listed, and a greenhouse gas emissions intensity for that biofuel that is lower than the emissions threshold;
- (c) for each component in clause (b) that is different from the component in clause (a)
 - (i) the greenhouse gas emissions determined for the stage under section 4;
 - (ii) an explanation of all modifications to the inputs of the component for the established pathway;
 - (iii) a list of cells that were modified in GHGenius to arrive at the modified pathway;
 - (iv) an explanation of why, for the biofuel that the renewable fuel provider is producing or importing, the component for the new pathway results in a more accurate value than the component for an established pathway;
 - (v) a written summary of logic used in developing the new pathway;
 - (vi) a process flow diagram detailing the inputs that are specific to the new pathway;
 - (vii) any conversion factors and calculations used to modify the established pathway referred to in subsection (2)(a) and to develop the new pathway, and supporting documentation including, but not limited to, scientifically defensible materials, including refereed journals.

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- (3) The director may consider any information submitted by the renewable fuel provider in support of the new pathway.
- (4) The director may request further information in support of the new pathway, and if the renewable fuel provider does not provide the requested information in writing to the director within 60 business days of the request, the director may reject the submission.
- (5) If the renewable fuel provider establishes to the satisfaction of the director that
- (a) the components in the new pathway can be appropriately included in the Alberta GHGenius model,
 - (b) the new pathway is scientifically defensible such that the data and inputs are demonstrated to be valid and technically feasible, and
 - (c) the biofuel manufactured using the feedstocks and processes in the new pathway has a greenhouse gas emissions intensity that is lower than the emissions threshold for the biofuel,

the director may establish a validation code for that new pathway.

- (6) If the director establishes a validation code for a new pathway, a greenhouse gas validator may submit the completed validation certificate to the director for review after the greenhouse gas validator has confirmed that the biofuel that the renewable fuel provider is producing or importing is manufactured in a manner that is consistent with each one of the components described in the new pathway.

Validations

8(1) As per section 15 of the Regulation, in order to be eligible to submit a validation certificate to the director under Section 5, 6 or 7, a greenhouse gas validator must first submit to the director a completed “Statement of Qualification” form for approval.

(2) If the director is satisfied with a validation certificate submitted by a greenhouse gas validator under section 5(3), 6(6) or 7(6), the director will provide a validation, in the form of the validation certificate with a reference number added by the director, to the greenhouse gas validator and the renewable fuel provider named in the validation certificate.

(3) A single validation may refer to more than one validation code if the fuel production facility manufactures qualifying renewable alcohol using more than one pathway.

(4) If a fuel production facility manufactures renewable alcohol and renewable diesel, then a greenhouse gas validator must submit separate validation certificates for qualifying renewable alcohol and qualifying renewable diesel.

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(5) A greenhouse gas validator may submit an amendment to an existing validation to add or remove one or more validation codes applicable to the qualifying renewable diesel or qualifying renewable alcohol manufactured by a fuel production facility.

(6) As a result of an amendment to a validation under (5),

(a) the expiry date of the validation shall not be extended;

(b) the removal of a validation code takes effect the day it is removed from the validation;

(c) the addition of a validation code is in effect until the expiry date of the validation that has been amended.

(7) A greenhouse gas validator may terminate a validation if the renewable diesel or renewable alcohol produced by a fuel production facility no longer meets the eligibility requirements under section 3 of the Regulation.

(8) A single validation is also good for shipments containing any combination of renewable fuels produced in accordance with any of the validation codes on the certificate.

(9) Greenhouse gas validators and renewable fuel providers must retain a copy of any validation provided to them under subsection (2).

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APPENDIX 1: Lookup Table for Established Pathways

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