QUANTIFICATION METHODS (QM)

Nov 25, 2021

Multi Stakeholder Consultative Committee (MSCC)

DISCLAIMER

- This presentation provide guidance only.

- It does not in any way supersede or modify the *Canadian Environmental Protection Act*, 1999 or the proposed *Clean Fuel Regulations* (CFR).

- In the event of an inconsistency between this document and the Act or proposed Regulations, the Act and the proposed Regulations prevail.

- This presentation and the draft quantification methods include references to the Proposed Regulations. These references may change and the final *Clean Fuel Regulations* may be different than the proposed Regulations.

CONTENT

- Introduction
  - Proposed Updates
  - International CO_2e emissions reduction projects
- Overview of the Generic QM
- Overview of the QM for Enhanced Oil Recovery with CO_2 Capture and Permanent Storage (EOR)
- Overview of the QM for Co-processing in Refineries

The presentation and the draft QMs will be made available on the CFS Google Drive in folder 15.

PROPOSED UPDATES

Compliance Category 1 crediting opportunities

- Compliance Category 1 governs credits for actions throughout the lifecycle of a <u>liquid</u> fossil fuel that reduce its carbon intensity (CI) through CO_2e emissions reduction projects.
- In line with the narrowed scope of the CFR and the focus on fuels mainly used in transportation, no credits will be provided for CO_2e emissions reduction or removal projects that reduce the lifecycle CI of <u>gaseous</u> or <u>solid</u> fuels.

> The definition of Fossil Fuel Facility was reviewed: a facility that produces, processes, stores, transports or distributes finished <u>fossil fuels that are in the liquid state </u>at standard conditions or petroleum feedstocks upstream of refining.

QMs for CO_2 capture and permanent storage & enhanced oil recovery with CO_2 capture and permanent storage

- CO_2 emissions must be captured at **a Fossil Fuel Facility** or at a hydrogen plant, prorated based on the portion of hydrogen supplied to **a Fossil Fuel Facility.**
- Direct air capture is no longer an eligible source of CO_2 for CFR crediting purposes, however, it is expected to be incented under the federal offset system.
- No more distinction between combustion emissions and process emissions is necessary, simplifying the quantification method.

INTERNATIONAL CO$_2$E REDUCTION PROJECTS

- Crediting emissions reductions projects at fossil fuel facilities in US or in other countries, prorated based on the portion of liquid fossil fuel or crude oil supplied to Canada.

- Facilities in jurisdictions outside of Canada will have a mechanism to have their projects recognized.
  - The draft QMs only apply to projects carried out in Canada, but can be adapted for other jurisdictions as part of this mechanism, ensuring the projects are comparable to Canadian projects in effectiveness, requirements, and meeting the CFR objectives.

QMS FOR LOW-CI HYDROGEN

- References used as a starting point:
  - Low Carbon Fuel Standard Regulation in California (Renewable Hydrogen Credit Program)
  - Specifications for Fuel LCA Model CI calculations
- Decision points include:
  - CO_2 captured for CCS or EOR projects: should it be moved under this QM or stay under the QMs for CCS and EOR
  - Inclusion of hydrogen used as a fuel
    - Risk of double counting with hydrogen creating gaseous class credits under compliance category 2
    - Not always possible for a hydrogen producer to distinguish hydrogen used as a feedstock or as a fuel
  - Requirements related to shared hydrogen pipelines
  - When hydrogen is used as feedstock, selection of the baseline
    - Historical CI value or dynamic CI value to take into account future improvement
    - Pre-defined CI value or facility-specific CI value for hydrogen produced from natural gas

GENERIC QUANTIFICATION METHOD (QM)

Nov 25, 2021

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CONTENT

- Introduction
- Transition from the generic QM to a specific QM
- Eligibility
- Streamlined Additionality Criteria – Regulatory Overlap
- Crediting
- Application and Approval Process
- Boundary
- Selection of the Baseline
- Emission Reduction Quantification

INTRODUCTION

Purpose

- Incent early investments and innovative technologies.

Context

- The Generic QM aims to strike a balance between providing sufficient guidance to project proponents to develop their own quantification for the project, while still providing flexibility given the wide range of projects.

Limit on Use

- A primary supplier may use credits created under this quantification method (QM) to satisfy up to 10% of its annual reduction requirement.

Examples

- Energy efficiency
- Electrification
- Fuel switching
- Methane
- Combined heat and power systems

TRANSITION FROM THE GENERIC QM TO A SPECIFIC QM

- Existing projects have the choice (i.e. it is not an obligation) to stay under the Generic QM or move to the Project-Type Specific QM for the duration of the initial crediting period.
  - Extensions and any new projects must use the Project-Type Specific QM.
- Project proponent submits new shorter application for recognition.
  - Additionality assessment already performed at project type level.
- Remaining crediting period = Crediting period allowed under Project-Type Specific QM (usually 10 years) – Years for which project already created credits under the Generic QM
- Credits may start to be created under the Project-Type Specific QM with no 10% limit on use.
- Unused banked credits previously created under the Generic QM would still be subject to the 10% limit.
- The quantification rules and the eligibility criteria may be different under the Generic QM and the Project-Type Specific QM, resulting in more or less credits after the transition.

ELIGIBILITY - GENERAL

- Please refer to paragraphs 28(1)(a) to (c) and subsections 28(3) and 30(1) of the proposed Regulations for general eligibility and ineligibility criteria.
- In addition, the following projects types are not eligible for credit creation under this QM:
  - A project of a type that is already eligible to create credits under a specific QM;
  - Virtual power purchase agreements for low-CI electricity;
  - Electricity or thermal energy transferred;
  - Book and claim accounting for RNG;
  - Carbon, capture, utilization and storage technologies.

SPECIFIC ELIGIBILITY AND INELIGIBILITY CRITERIA

	Eligible	Ineligible

Energy Efficiency and Electrification	• Project involves physical piece of equipment which was assembled and consumes energy or a system control device or equipment having an effect on energy consumption. In addition, one of the following:
	  • Evidence that the end of life of the equipment or device in the baseline occurs after the end of the period for which credits are being awarded;
	  • Evidence that there are multiple equipment options for the project, and the equipment or device to be installed is more efficient than standard industry practice.
		• Best practices in equipment operation
		• Change in equipment as a result of maintenance

Fuel Switching	• The project involves switching from a higher CI fuel to a lower CI fuel, other than a combined heat and power project. • In the case of a fuel switch to a fuel derived from biomass, the fuel meets the land use and biodiversity criteria set out in section 48 of the proposed Regulations.	• Actions which are eligible to create credits under another QM or compliance category (except for gaseous fuels under CC2) under the proposed Regulations

SPECIFIC ELIGIBILITY AND INELIGIBILITY CRITERIA

	Eligible	Ineligible
Methane	• The project involves the installation of hydrocarbon gas conservation equipment or equipment that routes a source of hydrocarbon gas that was vented, flared or destroyed before the project to an existing hydrocarbon gas conservation equipment. • The provincial or territorial jurisdiction has not directed the licensee, operator or approval holder to conserve gas that would have been flared, vented or destroyed. • In the case of a facility that is subject to an aggregate limit, that in absence of the project, the company would still be in compliance with the aggregate limit. • In the case where hydrocarbon gas was vented before the project: 　• that in absence of the project, the facility would still be in compliance with the overall objectives and the limits of the regulations and directives in their own province that are in force or that will come into force in 2023; 　• combined flaring and venting volumes at the site do not exceed 900 m^3/day, calculated based on a three-month rolling average; or 　• the facility must demonstrate that conservation was not determined to be economic using the economic decision tree process under Directive 060 in Alberta.	• Pneumatic devices, including pneumatic controllers and pneumatic pumps • Leak Detection And Repair (LDAR) • Compressors • Orphan wells • Flaring or destroying hydrocarbon emissions that were vented before the project

SPECIFIC ELIGIBILITY AND INELIGIBILITY CRITERIA

	Eligible	Ineligible

Combined Heat and Power	• The project involves at least one of the following actions:
	  1. switching from a higher CI fuel to a lower CI fuel for the production of thermal energy for a combined heat and power system;
	  2. the installation of a technology that does not combust fossil fuels for the production of thermal energy for a combined heat and power system;
	  3. the use of a fuel other than a fossil fuel.
	• In addition, in the case of thermal energy and electricity not generated at the fossil fuel facility:
	  • the electricity is provided directly to the fossil fuel facility and not provided through the electrical distribution network;
	  • the thermal energy is provided directly to the fossil fuel facility and not provided through a shared network that has more than one source of thermal energy.	

STREAMLINED ADDITIONALITY CRITERIA - REGULATORY OVERLAP (1)

- Actions that are part of a project type that are legally required by other federal or provincial laws, regulations, by-laws or directives are not additional.
- Existing projects will no longer receive credits for the remaining duration of the crediting period due to regulatory overlap.
- The following project types are not considered to be legally required:
  - A project type that overlaps with the compliance requirements or enables the creation of credits under federal, provincial or territorial carbon pollution pricing systems;
  - A project type that overlaps with BC's Low Carbon Fuel Standard.
- The proposed Regulations allow for credit creation opportunities, even if a given project generates credits in another program. However, different programs may decide not to provide credits for the same actions.
  - For example, projects creating credits as of registration of the final Regulations will not be able to seek credits under the *Federal Greenhouse Gas Offset System* for the emission reduction / removals achieved by the sources, sinks or reservoirs included in the scope of the project.
  - Stakeholders seeking clarify should contact the programs they are interested in to determine if CFS credit creation would make a project ineligible for that particular program.

STREAMLINED ADDITIONALITY CRITERIA - REGULATORY OVERLAP (2)

- Co-benefits – If an action is required by legislation, co-benefits would not be additional and therefore not credited
  - For example, if a regulation came into place requiring an action to reduce SO_2 and this action also reduced GHGs, this action would not be eligible/credited under the CFS
- If not mandated by legislation, but the action is necessary in order to comply with the legislation, it is not additional and not credited.
  - If the action is not necessary in order to comply with the legislation, it is additional and may be credited. In other words, in absence of the action (i.e. project), one is still in compliance with the legislation in question
- In the case where legislation is implemented in one P/T, but not another, regulatory overlap is based on the most stringent legislation.
  - If one P/T legislates an action, then no crediting in any P/T is allowed for this action.
  - Exception: if the most stringent legislation sets an application threshold and the facility demonstrates that the legislation would not apply to them due to not meeting the application threshold, then the action may be eligible for this facility
- Methane projects: Due to the complexities of the regulatory and legislative framework for methane across Canada, specific eligibility criteria for these projects is outlined on slide 8

CREDITING

Initial Crediting Period	• 10 years
Possible Extension	• One extension of 5 years (provided the QM still exists, eligibility criteria still met)
Default Credit Creator	• Owner or operator of a Fossil Fuel Facility
Class of Credits Created	• Liquid

APPLICATION AND APPROVAL PROCESS

- The application must include the information listed under Reporting Requirements
- In order for a project to be recognized it must meet the criteria in subsection 30(1) of the proposed Regulations and the following:
  - The selected activities and associated CO_2e emissions that would have occurred had the project not been implemented, including its boundaries, are appropriate;
 - The boundary for the project is appropriate.

PROJECT AND BASELINE SCENARIO - BOUNDARY

- The boundary on both the baseline and the project should be placed such that it is as small as possible but large enough that it still encompasses the project's effect on GHG emissions in order to reduce the likelihood of leakage.
  - Leakage refers to the implementation of an activity or project which could impact emissions outside of the project boundary.
- There may exist situations in which the boundary covers multiple facilities.
  - For example, if the emissions shift from one facility to another.

SELECTION OF THE BASELINE

- A description of activities, along with specific activity data, that would have occurred had the project not been implemented must be determined.

- In order to calculate emissions, activity data and emission factors are often used.

  - Activity data is the level of a specific action that produces emissions.

    - Examples include energy consumed, fuel produced or waste generated.

- In order to establish the baseline, this activity data may be obtained through:

  - historical activity data (based on a subset of existing components, process configurations and operating procedures within the facility prior to the implementation of the project);

  - functionally equivalent alternatives (technologies or practices that provide products and/or services of a type and quality that are functionally equivalent to a project);

  - standard industry practice (the most common practice in Canada with respect to operational practices and/or facility components), which must be functionally equivalent to the project. The standard practice must be in compliance with any federal or provincial legislation and must meet any minimum standards or codes; or

  - activity data in the project (ex. Electricity consumption in the project is the same as the baseline).

OPTIONS FOR BASELINE ACTIVITY DATA
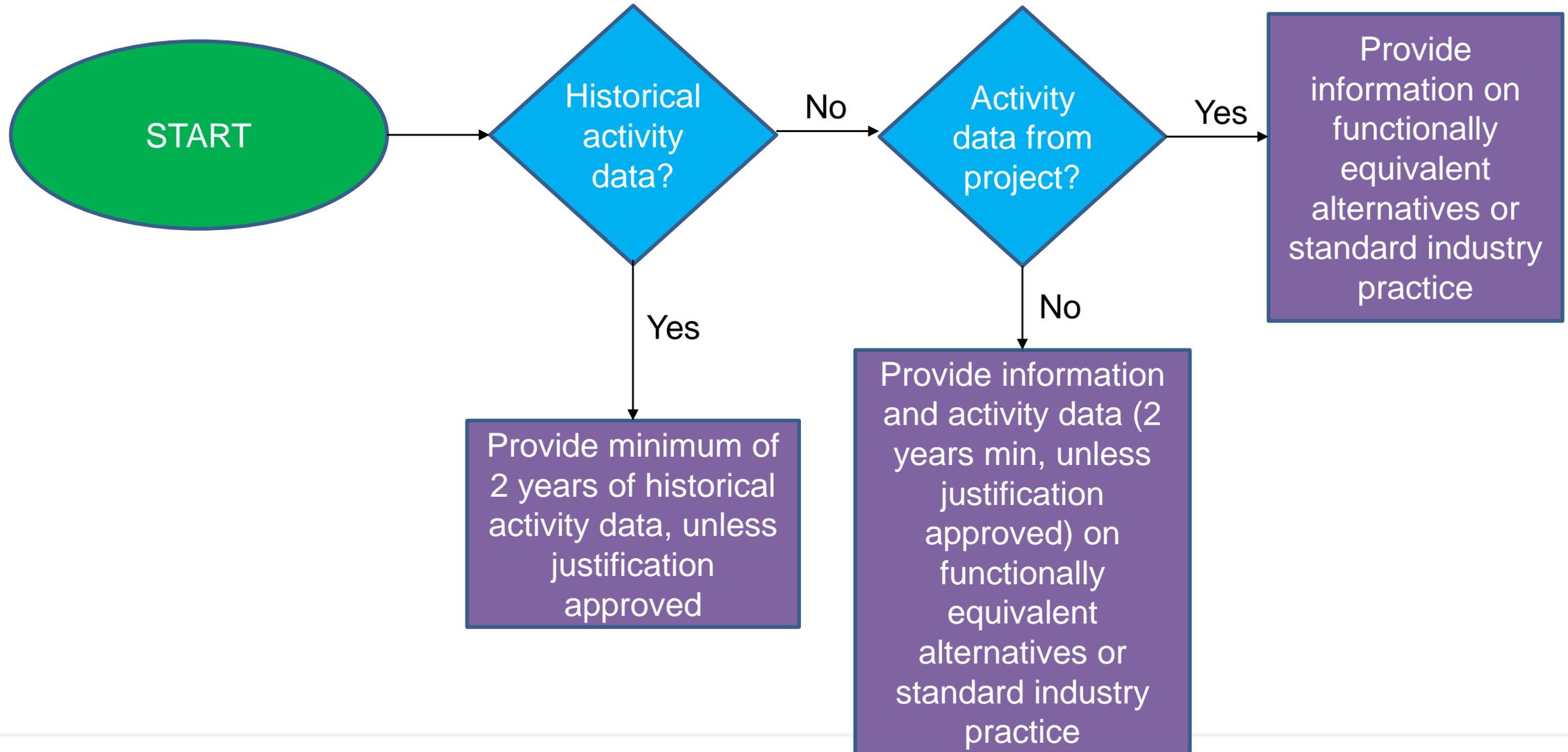
BASELINE FOR COMBINED HEAT AND POWER (1)

- For a combined heat and power system that <u>combusts fossil fuels</u>, the emissions from the baseline are based on the following formula:

$$E \times CI_E + T \times CI_T$$

where

- E – the electricity consumed by the fossil fuel facility in the project
- CI_E – The smaller of:
  - the carbon intensity of the electricity grid in the province or territory where the project occurs, as indicated in Table 37 of the *Fuel LCA Model Methodology**; and
  - 40 g CO_2e/MJ (144 g CO_2e/kWh)
- T – the thermal energy consumed by the fossil fuel facility in the project
- CI_T – One of the following:
  - the carbon intensity of the thermal energy produced before the project; or
  - in the case where no thermal energy was produced before the project, 85.6* g CO_2e/MJ

*These carbon intensities may be updated periodically. The carbon intensities published in the version of the *Fuel LCA Model Methodology* for the compliance period in which credit creation is occurring must be used.

BASELINE FOR COMBINED HEAT AND POWER (2)

- For a combined heat and power system that <u>does not combust fossil fuels</u>, the emissions from the baseline are based on the following formula:

$$E \times CI_E + T \times CI_T$$

where

- E – the electricity consumed by the fossil fuel facility in the project
- CI_E – The smaller of:
  - the carbon intensity of the electricity grid in the province or territory where the project occurs, as indicated in Table 37 of the *Fuel LCA Model Methodology**; and
  - 96.0 g CO_2e/MJ (345 g CO_2e/kWh)
- T – the thermal energy consumed by the fossil fuel facility in the project
- CI_T – One of the following:
  - the carbon intensity of the thermal energy produced before the project; or
  - in the case where no thermal energy was produced before the project, 85.6* g CO_2e/MJ

*These carbon intensities may be updated periodically. The carbon intensities published in the version of the *Fuel LCA Model Methodology* for the compliance period in which credit creation is occurring must be used.

EMISSION REDUCTION QUANTIFICATION

- Emission Reduction (tCO_2e) = Emissions $_{Baseline}$ − Emissions $_{Project}$
- Credits must be pro-rated for years where the units within the project were non-operational. This pro-rating will consider the calendar days of operation relative to non-operation.
- Emission Factors from the Fuel LCA model may be extracted for use in the generic QM. In the case where an emission factor is not available or the value in the model is not technically feasible, emission factors may be sought out from other reputable sources, listed in the QM.

EMISSION REDUCTION QUANTIFICATION FOR ELECTRICITY OR THERMAL ENERGY TRANSFERRED

- Emissions from electricity or thermal energy transferred must be subtracted from the total project emissions

  - $Emissions_{Project} = Annual\ System\ Emissions - Electricity\ Transferred \times Electricity\ CI - Thermal\ Energy\ Transferred \times Thermal\ Energy\ CI$

- In order to subtract emissions from electricity transferred, the emissions are calculated using the amount of electricity transferred multiplied by the smaller of:

  - the carbon intensity of the electricity grid in the province/territory where the project occurs, as indicated in Table 37 of the *Fuel LCA Model Methodology**; or
  - 40g CO_2e/MJ (144 g CO_2e/kWh).

- In order to subtract emissions from thermal energy transferred, the emissions are calculated using the amount of thermal energy transferred multiplied by a carbon intensity of 85.6* g CO_2e/MJ (308 g CO_2e/kWh).

*These carbon intensities may be updated periodically. The carbon intensities published in the version of the *Fuel LCA Model Methodology* for the compliance period in which credit creation is occurring must be used.

QUANTIFICATION METHOD FOR ENHANCED OIL RECOVERY WITH CO_2 CAPTURE AND PERMANENT STORAGE

Nov 25, 2021

Multi Stakeholder Consultative Committee (MSCC)

CONTENT

- Introduction
- Terms and Definitions
- Applicability and Eligibility
- Hydrogen Production Facility
- Crediting
- Permanence
- Project Scenario
- Baseline Scenario
- Quantification Methods

INTRODUCTION

- Credits can be created under the proposed Regulations with this quantification method (QM) by capturing carbon dioxide (CO_2), using it for Enhanced Oil Recovery (EOR) and permanently storing it.

- CO_2 is emitted in many processes at Fossil Fuel Facilities. This CO_2 may be captured for other uses, or vented directly to the atmosphere.

- Capturing CO_2 emissions and transferring them to permanent storage results in a reduction of anthropogenic CO_2 emissions in the atmosphere.

TERMS AND DEFINITIONS

- **CO_2 Capture:** The capture, purification and compression of CO_2 at a facility where it would otherwise be directly released to the atmosphere.

- **CO_2 Injection:** An activity that places captured CO_2 into a long-term geological storage site.

- **CO_2 Storage:** The long-term isolation of carbon dioxide in subsurface geological formations (synonymous with permanent storage).

- **CO_2 Transport System:** Any mode of transport used to move captured CO_2 to the CO_2 injection site.

- **Fossil Fuel Facility:** a facility that produces, processes, stores, transports or distributes finished fossil fuels that are in the liquid state at standard conditions or petroleum feedstocks upstream of refining.

- **Injected Gas:** The total quantity of CO_2 that is measured directly upstream of the injection wellhead. This quantity is from the project scenario and used to determine the baseline activity level.

APPLICABILITY AND ELIGIBILITY

- To demonstrate that a CO_2e emission reduction project meets the requirements under this QM, the participant must supply sufficient evidence that:

    1. The project captures CO_2 directly from an emitting facility in Canada;

    2. The project is injecting into an oil-producing geological formation capable of permanently storing CO_2 gases in Canada as defined by the relevant regulations in the province(s) or territory(ies) where it is located;

    3. The captured and injected CO_2 is from one or more of the following sources:

        a) CO_2 captured at a Fossil Fuel Facility not associated with the production of low-CI fuels other than co-processed low-CI fuels;

        b) CO_2 captured at a hydrogen production facility that supplies its hydrogen to a Fossil Fuel Facility, prorated based on the proportion of produced hydrogen supplied to the Fossil Fuel Facility;

    4. The capture of CO_2 started on or after July 1, 2017;

    5. The project must be in good standing with all operating permits and relevant regulations in the province(s) and/or territory(ies) where it is located; and

    6. The project must not be required to lower the reservoir pressure at abandonment below the pressure at the end of production operations as a condition of its permits and/or regulatory requirements.

    The Minister may not recognize projects for credit creation under the proposed Regulations in province(s) or territory(ies) if it can not be demonstrated that they have relevant regulations to ensure permanent storage.

HYDROGEN PRODUCTION FACILITY

- Hydrogen production facilities are often integrated with Fossil Fuel Facilities and a unique approach is required.

- Unique to a hydrogen production facility, a portion of the captured CO_2 is eligible if the hydrogen is supplied to a Fossil Fuel Facility:

  - This portion is determined by the proportion of produced hydrogen supplied to the Fossil Fuel Facility.

CREDITING

- **Crediting Period**

  – Eligible to create credits for a period of 10 years from the day on which the project is recognized by the Minister.

  – Following 10 years, an extension period of 5 years is permitted as per section 29(3) of the proposed Regulations.

- **Credit Creators**

  – The owner or operator of a facility that injects the CO_2 into the geological formation is the default credit creator.

  – This person must register as a Registered Creator before creating credits.

  – The Registered Creator may differ from the default, if the owner or operator of the facility that injects the CO_2 into the geological formation enters into an agreement with another participant to create credits for the CO_2 emission reduction or removal project.

PERMANENCE

- **Reversals During the Crediting Period**

  - These reversals, both intentional and unintentional, must be quantified according to the QM.
  - These reversals directly count against the amount of credits created each year.

- **Reversals After the Crediting Period**

  - A discount rate of 2% is applied to the credits created by EOR projects.
  - These credits are never returned to the Registered Creator.
  - Projects that must reduce the pressure in the reservoir at the end of production operations are not eligible under the CFS.

PROJECT SCENARIO

- The project scenario is the capture, compression, transport and injection of the CO_2 into a geological formation for permanent storage.

- **Project Locations**
  - A project consists of multiple interconnected locations. These may include:
    - A facility where the generation of CO_2 that is captured by the project occurs;
    - A facility where the CO_2 capture infrastructure, including compression/dehydration, is located (which may be at the same site as the CO_2 generation);
    - A means of transporting CO_2 from the capture facility to the injection site(s);
    - Compressor stations located along the CO_2 pipeline (where additional compression beyond what is provided at the capture facility is needed)
    - The site(s) where CO_2 is injected into the geological formation.
    - The site(s) where CO_2 is produced and processed for re-injected into the geological formation.
  - Each project location must be uniquely identified (address, GPS coordinates, boundary file).

- **Project Aggregation**
  - Multiple CO_2 generation facilities, capture facilities, pipelines, and/or injection sites may be aggregated into a single project.

BASELINE SCENARIO

- **Baseline Identification and Selection**

  - The baseline scenario for this QM is the continued emission of CO_2 to the atmosphere that is captured and injected in the project.

  - The baseline scenario does not include any amount of re-injected CO_2.

  - The baseline is dynamic and will be quantified annually, as the amount CO_2 captured and injected will change during the project period.

QUANTIFICATION METHODS

- The QM describes the following terms that must be quantified in the project and baseline scenarios. To determine the total emission reductions for the compliance period, the following equation must be used:

Emission Reduction (tCO_2e) = Emissions $_{Baseline}$ − Emissions $_{Project}$ − Discounted Emission Reductions

- **Project Scenario Sources:**
    - Production and delivery of material inputs;
    - Construction of EOR facilities and well drill and service;
    - Off-site electricity generation;
    - Off-site heat generation;
    - On-site electricity generation;
    - Fuel consumption;
    - Venting at injection and production wells and in recycle stream;
    - Fugitives from injection, recycle, and production wells;
    - Flare at injection, recycle, and production wells;
    - Emissions from subsurface to atmosphere;
    - Loss, disposal or recycling of material inputs.

- **Baseline Scenario Sources:**
    - Injected CO_2.

QUANTIFICATION METHOD FOR CO-PROCESSING IN REFINERIES
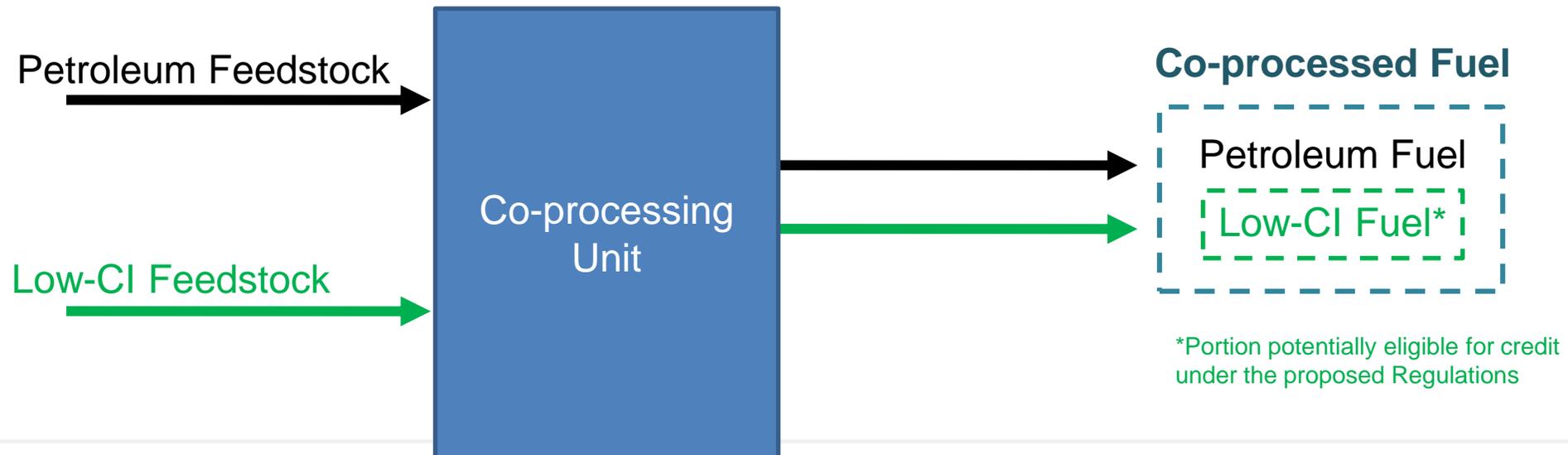
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CONTENT

- Definitions
- Introduction
- Applicability and Eligibility
- Crediting
- Project Boundary
- Baseline
- Co-Processing Benchmark Scenario
- Emissions Reduction Quantifications
  - Low-CI Mass/Volume Quantification
  - Carbon Intensity
- Additional points for consultation

DEFINITIONS

- Co-processing is the substituting of a portion of a refinery's petroleum feedstock with a low-CI feedstock to create a <u>co-processed fuel</u> that has a <u>low-CI fuel</u> component and a <u>petroleum fuel</u> component.

- The portion that requires quantification of the produced fuel mass and determination of the carbon intensity to create credits under the proposed Regulations is the <u>low-CI fuel</u> component only.

Petroleum Feedstock →

Low-CI Feedstock →

Co-processing Unit

Co-processed Fuel

Petroleum Fuel

Low-CI Fuel*

*Portion potentially eligible for credit under the proposed Regulations
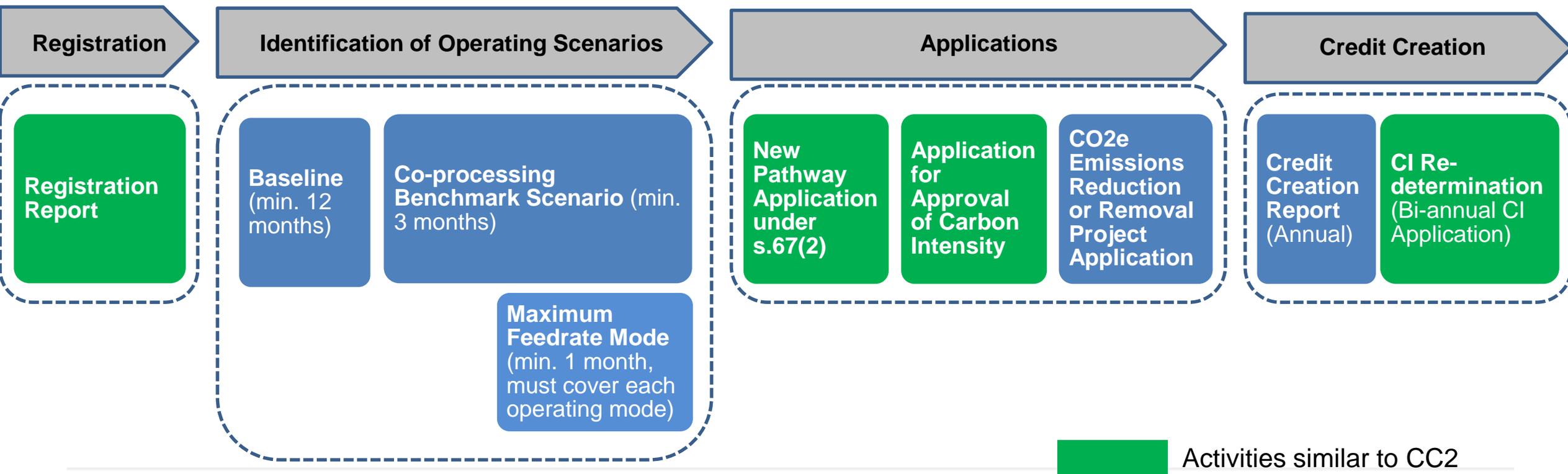
INTRODUCTION

- The QM provides the requirements for creating credits under the proposed Regulations from co-processing low-CI feedstocks with petroleum feedstocks at a refinery, including:

  - Eligible project types;

  - Calculation methods for determining the quantity and carbon intensity of the low-CI fuel produced;

  - Monitoring and reporting requirements for annual credit creation.

APPLICABILITY AND ELIGIBILITY

- Eligible projects include co-processing in a hydrotreater and in a FCC, at a refinery.

- Co-processed low-CI fuels are subject to the land use and biodiversity criteria and must be used or sold for use, in Canada whether as neat fuel or as part of a blend.

- Co-processed low-CI propane that is supplied to a vehicle fuelling station is eligible for producing liquid credits. This is the same treatment as renewable propane under Compliance Category 3 (CC3).

- Fuels exported are not eligible for creating credits under the proposed Regulations, however, in the case of multiple low-CI feedstocks being simultaneously processed, the carbon intensity of fuels can be assigned to specific batches, including for exported fuel.

CO-PROCESSING UNDER THE PROPOSED REGULATIONS

- Co-processing is a Compliance Category 1 (CC1) activity - actions throughout the lifecycle of a fossil fuel that reduce its carbon intensity through CO_2e emission reduction projects, but shares some similarities with Compliance Category 2 (CC2) - supplying low-CI fuels.

Registration

Registration Report

Identification of Operating Scenarios

Baseline (min. 12 months)

Co-processing Benchmark Scenario (min. 3 months)

Maximum Feedrate Mode (min. 1 month, must cover each operating mode)

Applications

New Pathway Application under s.67(2)

Application for Approval of Carbon Intensity

CO2e Emissions Reduction or Removal Project Application

Credit Creation

Credit Creation Report (Annual)

CI Re-determination (Bi-annual CI Application)

Activities similar to CC2

CREDITING

- **Crediting Period**
  - There is no end to the crediting period, similar to a CC2 option under the proposed Regulations.
  - This project type will be considered additional as long as other low-CI fuels are eligible for credit creation under the proposed Regulations.

- **Credit Creators**
  - The person that produces in Canada a volume of liquid co-processed low-CI fuel during a compliance period is the default credit creator.
  - This person must register as a Registered Creator before creating credits.
  - The Registered Creator may differ from the default, if the owner or operator of the facility that produces low-CI fuel in Canada through co-processing enters into an agreement with another participant to create credits for the CO2 emission reduction or removal project.

- **Credit Class**
  - Liquid class credits are created for the production of co-processed low-CI fuels that are liquid at standard conditions.
  - Gaseous class credits are created for the production of co-processed low-CI propane.
  - Liquid class credits are created for the production of co-processed low-CI propane that is supplied to a fuelling station (supporting documents are required).

GENERAL APPROACH

- Credit creation is based on the same approach as CC2.

- Credits for co-processed low-CI fuels are created based on the amount of low-CI fuel supplied to the Canadian market annually (in MJ), and the difference between the lifecycle carbon intensity of the low-CI fuel and the reference carbon intensity value for the fuel.

- Credits are only created when:
  - The operation of the refinery is within the bounds identified by the applicant in the carbon intensity application during co-processing;
  - The mass-balance error for the co-processing project is demonstrated to be within 3%.

- All fuels produced from biogenic feedstocks need to be validated through carbon-14 testing, with a requirement for the testing of each batch starting in 2025.

- Credits will be subject to verification as per the proposed Regulations.

LIQUID CLASS CREDITS

$$Emissions\ Reductions\ (tCO2e) = \left(CI_{Reference\ CI} - CI_{ij}\right) \times \left(Q_{ij} \times D_i\right) \times 10^{-6}$$

$CI_{Reference\ CI}$ is the liquid class reference carbon intensity for the compliance period as set out in item 1 of Schedule 1 of the proposed Regulations (g CO_2e/MJ)

CI_{ij} is the carbon intensity of a liquid low-CI fuel, i, for an operating mode j, as determined using the QM and the Fuel LCA Model (g CO_2e/MJ)

Q_{ij} is, subject to subsection 32(1) of the proposed Regulations (land-use and biodiversity criteria), the quantity of that low-CI fuel, i, for an operating mode j, produced in Canada by the person during the period for use as a fuel in Canada (m^3)

D is the energy density of that low-CI fuel, as set out in Schedule 2 of the proposed Regulations or as applied for in the New Pathway Application under s.67(2) using the *Specifications for Fuel LCA Model CI Calculations* (MJ/m^3)

CO-PROCESSED LOW-CARBON-INTENSITY PROPANE – GASEOUS CLASS CREDITS

$$Emissions\ Reductions\ (tCO2e) = CI_{diff} \times (Q \times D) \times 10^{-6}$$

CI_{diff} is the difference between the reference carbon intensity of renewable propane, as set out in item 3 of Schedule 1 and the carbon intensity of the co-processed low-CI propane, as determined using the QM and the Fuel LCA Model (g CO_2e/MJ)

Q is, subject to subsection 32(1) of the proposed Regulations, the quantity of that co-processed low-CI propane that was produced in Canada during the period for use as a fuel in Canada, excluding co-processed low-CI propane for which liquid class credits were created (m^3)

D is the energy density of renewable propane as set out in Schedule 2 (25,310 MJ/m^3)

CO-PROCESSED LOW-CARBON-INTENSITY PROPANE – LIQUID CLASS CREDITS

$$Emissions\ Reductions\ (tCO2e)\ = CI_{diff} \times (Q \times D) \times 10^{-6}$$

CI_{diff} is the difference between the reference carbon intensity of renewable propane, as set out in item 3 of Schedule 1 and the carbon intensity of the co-processed low-CI propane, as determined using the QM and the Fuel LCA Model (g CO_2e/MJ)

Q is, subject to subsection 32(1) of the proposed Regulations, the quantity of that co-processed low-CI propane supplied to the fuelling station, as indicated in the supporting documents referred to in subsection 86(2) of the proposed Regulations (m^3)
- The supporting documents must establish that the co-processed low-CI propane was supplied to a fuelling station and indicate the volume of fuel supplied during the compliance period and the owner or operator of the fuelling station at which the fuel was supplied.

D is the energy density of renewable propane as set out in Schedule 2 (25,310 MJ/m^3)

PROJECT BOUNDARY

- The boundary of the co-processing project includes all units downstream of the co-processing feed unit that undertake any additional processing of the low-CI fuel including blending of the fuel to a finished product, but excluding:

  – Any hydrogen production units;

  – The blending of ethanol or biodiesel with the co-processed fuel.

- A separate QM will be developed for low-CI hydrogen integration at fossil fuel facilities.

- Where different co-processing activities take place in separate units at a facility, a different project is designated for each co-processing feed unit.

  – A refiner with a Hydrotreater undertaking co-processing and a FCC undertaking co-processing will have two co-processing projects at their facility.

BASELINE

- The QM uses a static baseline which means the reference baseline is considered to be same over a period of 24 months until the next CI Re-Determination, unless the refiner changes the baseline.

- The initial baseline is a 12-month period of data as collected under the 'petroleum-only' refinery operation.

- The baseline must identify relevant operating modes which encompass a set of operational parameters that change a co-processing unit's energy usage, process CO_2e emissions or product yields, as per the thresholds in the QM.

  – Examples of operating modes for a co-processing FCC ERRP could include a summer diesel mode and a winter diesel mode.

- Changes to the baseline will require a new Application for Approval of Carbon Intensity and a New Pathway Application.

CO-PROCESSING BENCHMARK SCENARIO

- The co-processing benchmark scenario describes the operating conditions for the refinery which are established during co-processing operation.

- The benchmark scenario has the following requirements:

  - A benchmark scenario applies to one distinct low-CI feedstock being processed (multiple feedstocks will require multiple benchmark scenarios);

  - It must cover all operating modes that the refinery will undertake during the compliance period;

  - It is valid for operation up to a maximum low-CI feedstock feedrate.

- Changes to the benchmark scenario (new feedstock, new maximum low-CI feedstock feedrate) will require a new Application for Approval of Carbon Intensity and may require a New Pathway application.

CALCULATION METHODS FOR LOW-CI MASS/VOLUME QUANTIFICATION

- Multiple calculation methods for the quantification of the low-CI fuel produced are available, depending on the project and feedstock type.

- Requests for an adjusted calculation method can be made through the New Pathway Application.

Co-processing ERRP	Calculation Methodology	Feedstock Types
Hydrotreater	Mass Balance based on Observed Yields	Non-Biogenic
	Carbon Mass Balance	Non-biogenic
	Total Mass Balance	Non-Biogenic
	Mass Balance with Carbon-14 Testing	Biogenic
	Carbon-14 Testing of Produced Batches	Biogenic
FCC	Mass Balance based on Observed Yields	Non-biogenic
	Carbon Mass Balance	Non-biogenic
	Total Mass Balance	Non-biogenic
	Mass Balance with Carbon-14 Testing	Biogenic
	Carbon-14 Testing of Produced Batches	Biogenic

CARBON INTENSITY

- Carbon intensity of co-processed low-CI fuels will be based on the incremental allocation method and require the creation of a new pathway in the Fuel LCA model.

- One carbon intensity is valid for:
  - One distinct feedstock (i.e. Canola from Alberta) or one feedstock type (i.e. canola oil vs used cooking oil) if distinct feedstocks are aggregated within one feedstock type;
  - A maximum feedrate for the distinct feedstock or feedstock type (i.e. up to 10,000 BPD of canola);
  - One low-CI fuel produced (i.e. co-processed low-CI diesel);
  - One operating mode that applies (i.e. low-cloud diesel).

- The carbon intensity will be determined using the Fuel LCA Model:
  - The *Specifications for Fuel LCA Model CI Calculations* will apply to co-processed low-CI fuels.
  - Additional guidance for the carbon intensity calculations for a new diesel hydrotreater or new FCC pathway in the Fuel LCA model are being developed and are expected to be available Winter 2022.

ADDITIONAL POINTS FOR CONSULTATION

- In the draft QM, we are also asking for feedback on importing activities (through Appendix 2).
  - Imported co-processed low-CI fuels will be eligible through a mechanism to have international projects recognized.

- Additional information is required for co-processing in upgraders and co-processing of renewable naphtha (Appendix 1) to determine if these activities could be included in a future version of the Co-processing QM:
  - A description of the commercial activities that are being undertaken or are planned to be undertaken;
  - Information on the quantification of low-CI fuel produced and the calculation methods for determining the fuel carbon intensity.