

LOW CARBON FUEL STANDARD



cleanBC
Roadmap
To 2030

Low Carbon Fuel Standard (LCFS) Information Sessions November 2023

- One of BC's most successful approaches to reducing greenhouse gases in B.C.

Signs of Lekwungen

- Established in 2008, the Signs of Lekwungen is an interpretive walkway along the Inner Harbour and surrounding areas that honours the art, history and culture of the Coast Salish people who have resided in the Victoria area for hundreds of years.
- Conceptualized and carved by Coast Salish artist, Butch Dick.
- The site markers are placed at seven culturally-significant sites to the Songhees and Esquimalt Nations along the Inner Harbour and surrounding areas.

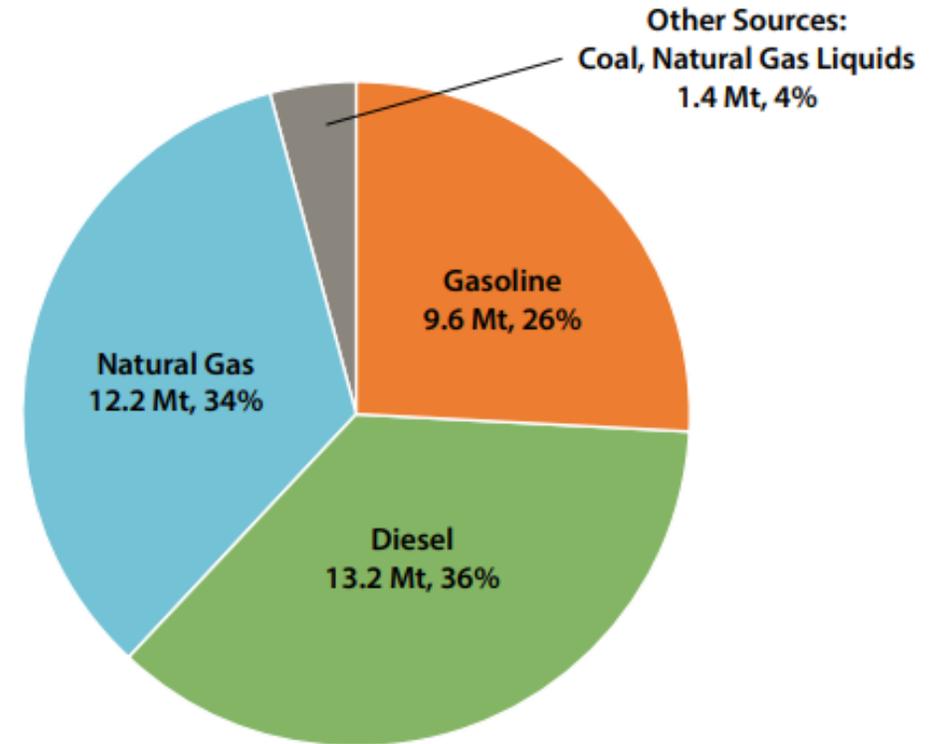
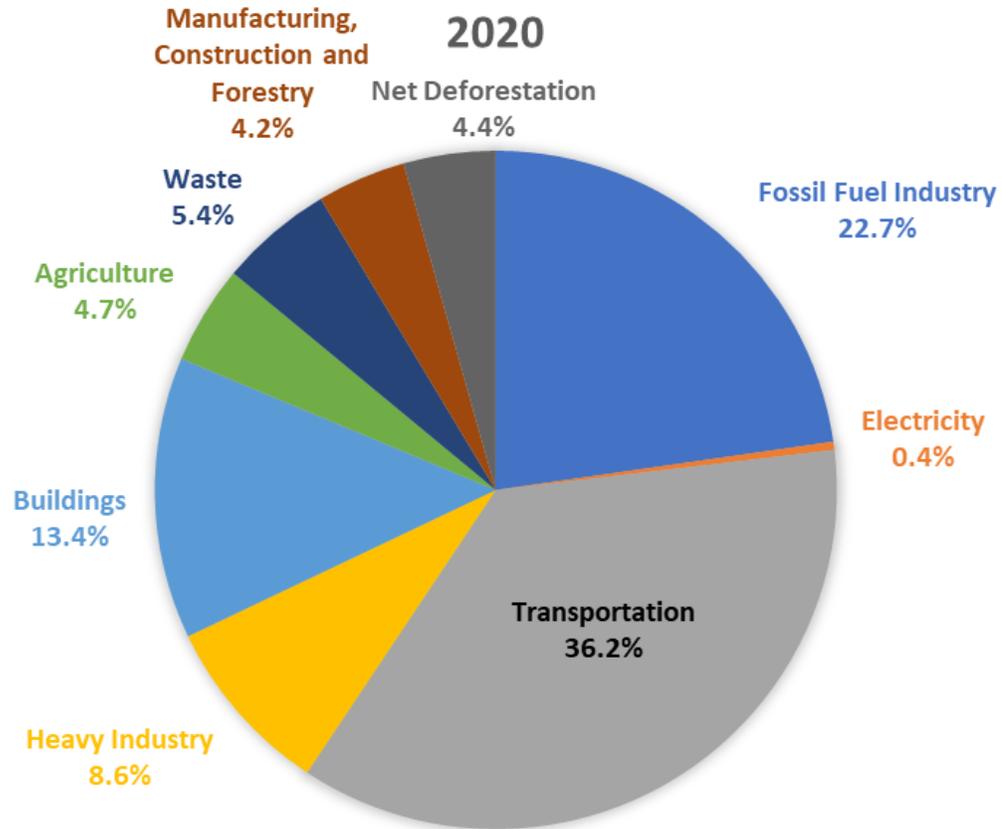


Agenda

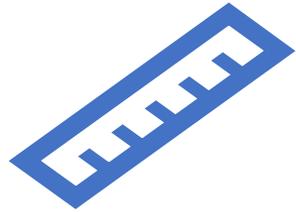


1. Introduction
2. Changes under the new Low Carbon Fuels Act
 - Scope Expansion
 - Compliance Reporting
 - Compliance Unit Calculation
 - Part 3/Initiative Agreements
3. Q&A

Provincial Greenhouse Gas Emissions



How the LCFS works

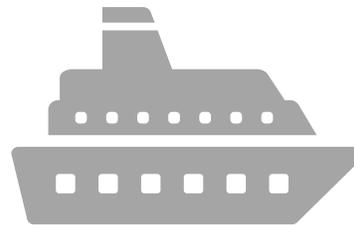


Design

Reduce reliance on fossil fuels

Reduce environmental impact of transportation fuels

Spur growth in the clean fuels industry



Requirements

Annual carbon intensity targets

Minimum renewable content



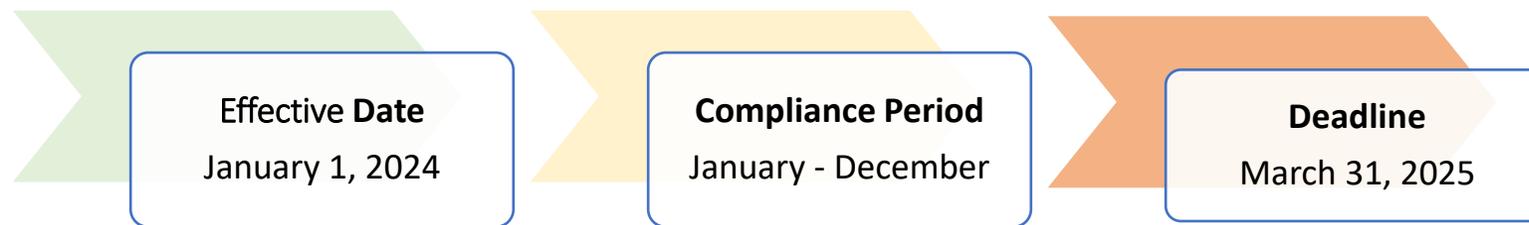
Implementation

Fuel suppliers earn credits for low carbon fuels

Fuel suppliers receive debits for high carbon fuels

Low Carbon Fuels Act Timeline

- LCFA planned to come into force January 1, 2024.
 - First compliance reporting deadline March 31, 2025



- Carbon intensity requirements under new Act will be required as of January 1, 2024.

Scope Expansion for 2024:

- Jet Fuel will be a prescribed fuel
 - Increasing carbon intensity reduction targets leading to a 10% reduction by 2030
 - Renewable Fuel Requirements begin in 2028 (3% by 2030)
 - Exemption available for low volume suppliers
- Prescribed non-transportation uses:
 - Cargo handling equipment at seaports
 - Ground support equipment at airports



Compliance Reporting

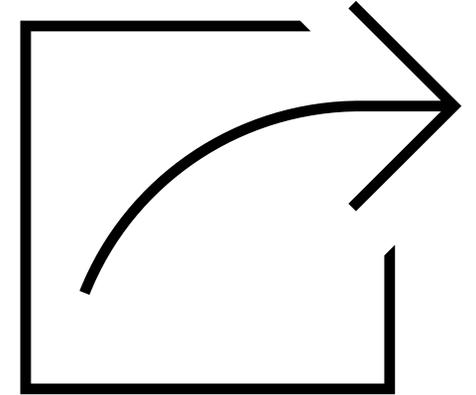
What's new (for 2024 compliance period, reported in March 2025):

- 1) Allocation agreements
- 2) Minimum electricity consumption required to report
- 3) Exports are reported



1) Allocation Agreement Intentions

- Makes another person responsible for the fuel and all compliance obligations
- More streamlined process for third-party representation
- Will be required to include legislated information and can contain additional information agreed upon by the two parties subject to the agreement
- All fuels can be allocated
 - Electricity - allocatable to anyone
 - Other Type B fuels (CNG, Propane, etc.) – up or down-stream
 - Type A Fuels (Non-Type B Fuels) – allocatable down-stream.



2) Minimum electricity consumption to report

- A minimum of 15,000 kWh of electricity supply is required to report that supply.
 - This will reduce the reporting burden on small suppliers.
- Low-volume suppliers can still participate in LCFS and report supply if they aggregate with other suppliers and the aggregate supply meets the minimum kWh.
 - A person with electricity supply of less than 15,000 kWh can only report that supply through aggregation with other suppliers.
 - Cooperate with your sector, community or others if you can.

3) Export Reporting

- Reportable exports (exported fuels that were previously reported as supplied in BC) must be reported for low carbon fuels
 - Debits may be issued to the person who exports the fuel

Compliance Unit Calculation

$$\text{number} = \left(\text{TCI} \times \text{EER} - (\text{RCI} + \text{UCI}) \right) \times \frac{\text{EC}}{1\,000\,000 \text{ grams}}$$

TCI = the target carbon intensity for the fuel (*used to be CI Class*)

EER = the energy effectiveness ratio of the fuel

RCI = the recorded carbon intensity of the fuel (*RCI and UCI used to be CI fuel*)

UCI = the additional carbon intensity attributed to the use of the fuel

EC = the energy content of the fuel in megajoules (energy density of fuel * amount of fuel)

Recorded Carbon Intensity (RCI)

- RCI may be a published carbon intensity, or a default carbon intensity when a published value is unavailable
- Two types of published carbon intensities:
 - Unique carbon intensities, based on facility-specific information provided by the applicant
 - Generic carbon intensities, based on limited fuel pathway details (e.g. propane sourced from a natural gas plant)
- Fuel codes will be issued for both types when supporting evidence is provided and approved by the Director
- Will be published with more information about the fuel pathway (feedstock, facility location, and other relevant details, e.g. inclusion of CCS)

Recorded Carbon Intensity (RCI)

- As of January 1, 2024, carbon intensities must be calculated using GHGenius5.02 with GWPs from the IPCC 5th Assessment Report
- Avoided emissions for some fuels are prescribed (fuel produced from manure, organic waste, or municipal solid waste)
- Fuel code backdating is not allowed
- All RCIs must be reported with an approved fuel code or default for 2024 compliance period onward (Schedule D removed)

Default Carbon Intensities

- The default CIs are calculated in GHGenius 5.02b (with the year set to 2024) using updated data within the GHGenius model, GWPs from the 5th IPCC AR and improved carbon accounting methods.
- The electricity and natural gas defaults represent the average carbon intensity for the B.C. electrical grid and natural gas distribution system. All others represent conservative yet realistic values.

Fuel Category	Carbon intensity (gCO ₂ e/MJ)
Electricity	12.14
Non-fossil diesel fuel	100.21
Non-fossil gasoline fuel	93.67
Non-fossil jet fuel	88.83
Hydrogen	123.96
Natural gas - CNG	63.91
Natural gas - LNG	90.11
Propane	79.87

Target Carbon Intensities (TCIs)

$$TCI = BCI \times (1 - R)$$

BCI = the carbon intensity specified for the base fuel for the category to which the fuel belongs

R= the prescribed reduction for that category

Base Fuel	Base Carbon Intensity (BCI)
Diesel fuel	94.38 gCO ₂ e/MJ
Gasoline Fuel*	93.67 gCO ₂ e/MJ
Jet Fuel	88.83 gCO ₂ e/MJ

*The BCI of gasoline has increased because oxidation of CO and VOCs to CO₂ is now included in the BCI. This practice brings the value into alignment with the National Inventory report approach, GREET and the ECCC Fuel LCA Model

EER - Methodology Changes

- Align with current best practices and use updated data
- Expand to include EERs for specific end uses
- Recognize BC context, such as climate and inventory

Base unit = km

$$EER = \frac{Fuel\ economy_{LCF}}{Fuel\ economy_{BF}}$$

Base unit = other

$$EER = \frac{Efficiency_{LCF}}{Efficiency_{BF}}$$

EER – Proposed EERs

Diesel Category:

Fuel	End Use	Diesel Category Energy Effectiveness Ratio
CNG	Any	0.9
Electricity	Airport Ground Support Equipment	2.5
	Battery Bus	3.8
	Battery Truck	3.2
	Fixed Guiderail	2.9
	Marine	2.5
	Sea Port Cargo Handling Equipment	3.1
	Shore Power	2.8
	Trolley bus	2.4
	Forklift	4.9
	Other or unknown	2.3
Hydrogen	Fuel Cell Vehicle	1.8
	Other or unknown	0.9
LNG	Compression-ignition Engines	1
	Other or unknown	0.9
Propane	Any	0.8

EER - Proposed EERs

Gasoline
Category:

Fuel/End-use Combination	End Use	Gasoline Category Energy Effectiveness Ratio
CNG	Any	0.9
Electricity	Any	3.8
Hydrogen	Fuel Cell Vehicle	2.4
	Other or unknown	0.9
Propane	Any	0.9

EER - Proposed EERs

Jet Category:

Fuel/End-use Combination	End Use	Jet Category Energy Effectiveness Ratio
Electricity	Any	2.5

- Fuels not listed in the table have an EER of 1.0
- Several EERs are still being reviewed and may be added or modified
- EERs will be reviewed on a regular basis

Use Carbon Intensities (UCIs)

- Purpose: To recognize the additional emissions that may occur when a fuel is used for an end use other than road transportation
- For example, liquified natural gas used in marine dual fuel engines can result in unburned methane emissions in the engine exhaust (“methane slip”)
- Based on feedback from the December 2022 technical intentions paper, we have developed UCIs that include this methane slip but that also recognize technological upgrades and operational improvements made to reduce emissions.

Proposed UCIs for LNG Marine Vessels

Methane Reduction Kit Installed (y/n)	Average annual engine operating load (%)	UCI (gCO ₂ e/MJ)
Yes	Data not available	10.6
Yes	26-75%	8.4
Yes	76-100%	8.0
No or unknown	Data not available	27.3
No	51-75%	17.8
No	76-100%	12.2

Example 1: 10,000 L Ethanol (2026)

$$\text{number} = (\text{TCI} \times \text{EER} - (\text{RCI} + \text{UCI})) \times \frac{\text{EC}}{1\,000\,000 \text{ grams}} = \frac{\text{compliance units}}{\text{L of fuel supplied}}$$

$$\text{TCI} = 74.37 \text{ gCO}_2\text{e/MJ} \quad (\text{TCI} = \text{BCI}_{\text{gasoline}} \times (1 - R_{2026}); \frac{93.67 \text{ gCO}_2\text{e}}{\text{MJ}} \times (1 - 0.206) = 74.37 \frac{\text{gCO}_2\text{e}}{\text{MJ}})$$

$$\text{EER} = 1.0 \text{ (if EER is not listed in Regulations use 1.0)}$$

$$\text{RCI} = 32.00 \text{ gCO}_2\text{e/MJ}$$

$$\text{UCI} = 0 \text{ gCO}_2\text{e/MJ}$$

$$\text{EC} = 23.58 \text{ MJ/L (energy density)} * 10,000 \text{ L ethanol}$$

$$\begin{aligned} \text{number} &= \left(74.37 \frac{\text{gCO}_2\text{e}}{\text{MJ}} \times 1.0 - \left(\frac{32.00 \text{ gCO}_2\text{e}}{\text{MJ}} + \frac{0 \text{ gCO}_2\text{e}}{\text{MJ}} \right) \right) \times \frac{\frac{23.58 \text{ MJ}}{\text{L}}}{1\,000\,000 \text{ grams}} \times 10,000 \text{ L} \\ &= 10 \text{ compliance units} \end{aligned}$$

Example 2: 10,000 kg LNG used in dual fuel marine engines (2025)

$$\text{number} = (\text{TCI} \times \text{EER} - (\text{RCI} + \text{UCI})) \times \frac{\text{EC}}{1\,000\,000 \text{ grams}} = \frac{\text{compliance units}}{\text{L of fuel supplied}}$$

$$\text{TCI} = 77.11 \text{ gCO}_2\text{e/MJ} \quad (\text{TCI} = \text{BCI}_{\text{diesel}} \times (1 - R_{2025}); \frac{94.38 \text{ gCO}_2\text{e}}{\text{MJ}} \times (1 - 0.183) = 77.11 \frac{\text{gCO}_2\text{e}}{\text{MJ}})$$

EER = 1.0 (compression-ignition engine)

RCI = 10.00 gCO₂e/MJ

UCI = 8.4 gCO₂e/MJ (LNG, marine, methane reduction kit installed, engine load within 26-75% range)

EC = 53.54 MJ/kg (energy density) * 10,000 kg LNG

$$\text{number} = \left(77.11 \frac{\text{gCO}_2\text{e}}{\text{MJ}} \times 1.0 - \left(\frac{10.00 \text{ gCO}_2\text{e}}{\text{MJ}} + \frac{8.4 \text{ gCO}_2\text{e}}{\text{MJ}} \right) \right) \times \frac{\frac{53.54 \text{ MJ}}{\text{kg}}}{1\,000\,000 \text{ grams}} \times 10,000 \text{ kg}$$

= 31 compliance units

Export Reporting

$$\text{Debits} = \left(\text{TCI} \times \text{EER} - (\text{RCI} + \text{UCI}) \right) \times \frac{\text{EC}}{1\,000\,000 \text{ grams}}$$

TCI = the target carbon intensity for the fuel, at the time of reportable supply. If unknown, for type B fuels, that of fuel in the diesel category.

EER = the energy effectiveness ratio of the fuel, at the time of reportable supply. If unknown, for type B fuels, the highest published EER for the fuel type.

RCI = the recorded carbon intensity of the fuel. If unknown, the lowest carbon intensity published within the past 12 months.

UCI = the additional carbon intensity attributed to the use of the fuel, at the time of reportable supply. If unknown, 0.

EC = the energy content of the fuel in megajoules (energy density of fuel multiplied by the quantity of fuel exported within the compliance period).

Export example: 10,000 L Ethanol (2026)

$$\text{Debits} = (\text{TCI} \times \text{EER} - (\text{RCI} + \text{UCI})) \times \frac{\text{EC}}{1\,000\,000 \text{ grams}} = \frac{\text{compliance units}}{\text{L of fuel supplied}}$$

$$\text{TCI} = 74.37 \text{ gCO}_2\text{e/MJ} \quad (\text{TCI} = \text{BCI}_{\text{gasoline}} \times (1 - R_{2026}); \frac{93.67 \text{ gCO}_2\text{e}}{\text{MJ}} \times (1 - 0.206) = 74.37 \frac{\text{gCO}_2\text{e}}{\text{MJ}})$$

EER = 1.0 (EER of fuels not listed in EER tables)

RCI = 23.00 gCO₂e/MJ (lowest RCI published in 12 months prior to date of export)

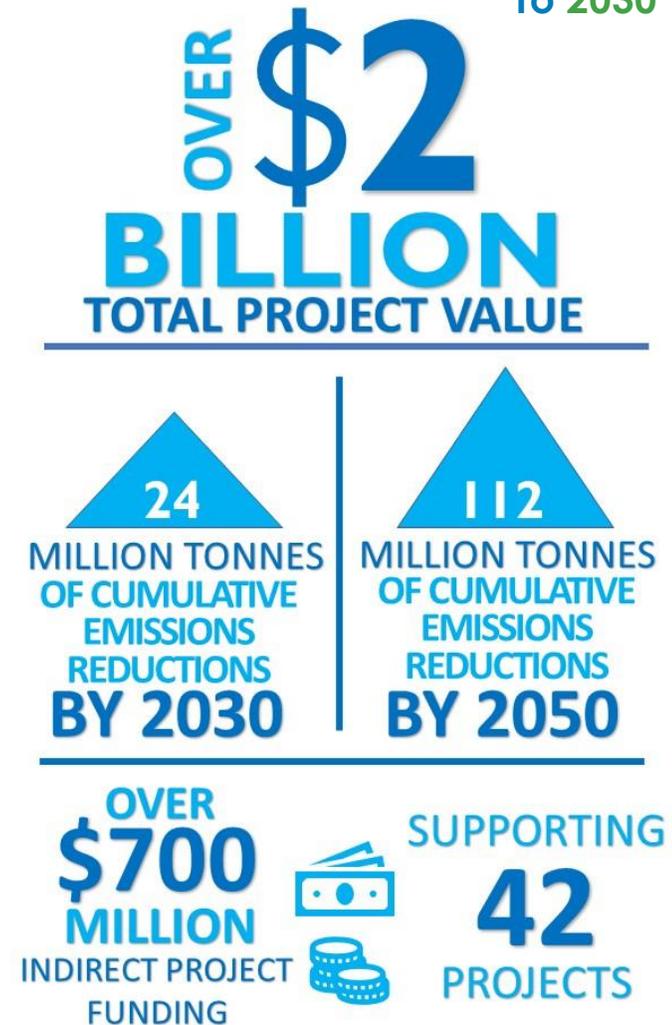
UCI = 0 gCO₂e/MJ

EC = 23.58 MJ/L (energy density) * 10,000 L ethanol

$$\text{Debits} = \left(74.37 \frac{\text{gCO}_2\text{e}}{\text{MJ}} \times 1.0 - \left(\frac{23.00 \text{ gCO}_2\text{e}}{\text{MJ}} + \frac{0 \text{ gCO}_2\text{e}}{\text{MJ}} \right) \right) \times \frac{23.58 \text{ MJ}}{1\,000\,000 \text{ grams}} \times 10,000 \text{ L} = 12 \text{ debits}$$

Part 3 Agreement Program

- Agreement between a fuel supplier and the Director for actions that reduce or enable GHG emission reductions in B.C.
- Intended to promote innovation, diversity and greater uptake of lower carbon transportation fuels – all contributing to accelerated market transformation.
- Help fuel suppliers undertake actions that are not otherwise economically viable, and that will help create future pathways for compliance.
- Since 2014, 42 projects have been awarded over 2,000,000 credits for compliance with the LCFS.
- Projects supported by the Part 3 Agreement program have committed to investing over \$2 billion dollars in emissions reductions in low carbon fuel supply.



Initiative Agreement Program Introduction

The Part 3 Program will be renamed as “Initiative Agreements” and expanded to allow those along the fuel supply chain to participate in the program instead of being limited to fuel suppliers only:

- A) Manufactures or supplies fuel, in British Columbia or elsewhere, for use in British Columbia;
- B) Manufactures or supplies feedstock, in British Columbia or elsewhere, for manufacturing described in point A above;
- C) Intends to become a person described in paragraph above;
- D) The proposed action has a reasonable possibility of reducing the use of a base fuel in British Columbia for a purpose for an applicable purpose.

Examples of program eligibility expansion opportunities:

- New fuel types: Low Carbon Jet Fuel
- New proponents: Eligibility will no longer be limited to fuel suppliers only, allowing for proponents such as feedstock producers and retailers to be eligible to apply directly.
- New applications: Some non-transport fuel applications will be regulated allowing for the eligibility of new low carbon fuel applications

Initiative Agreement Program Introduction

An initiative agreement must achieve either of these eligible goals':

- Reduce the carbon intensity of a fuel; or
- Increase the use of a fuel that has a carbon intensity (CI) below a prescribed value.

Expecting open call in 2024:

- Ministry staff currently developing the Initiative Agreement program and materials such as selection criteria are under development
- Information and guidance material to be released prior to open call on Ministry website when finalized.

Q&A

- Please use Q&A option in Teams
- Questions after the session can be emailed to lcfs@gov.bc.ca

Thank you for attending