

CleanBC Industrial Incentive Program

Petroleum Refineries Sector Guidance

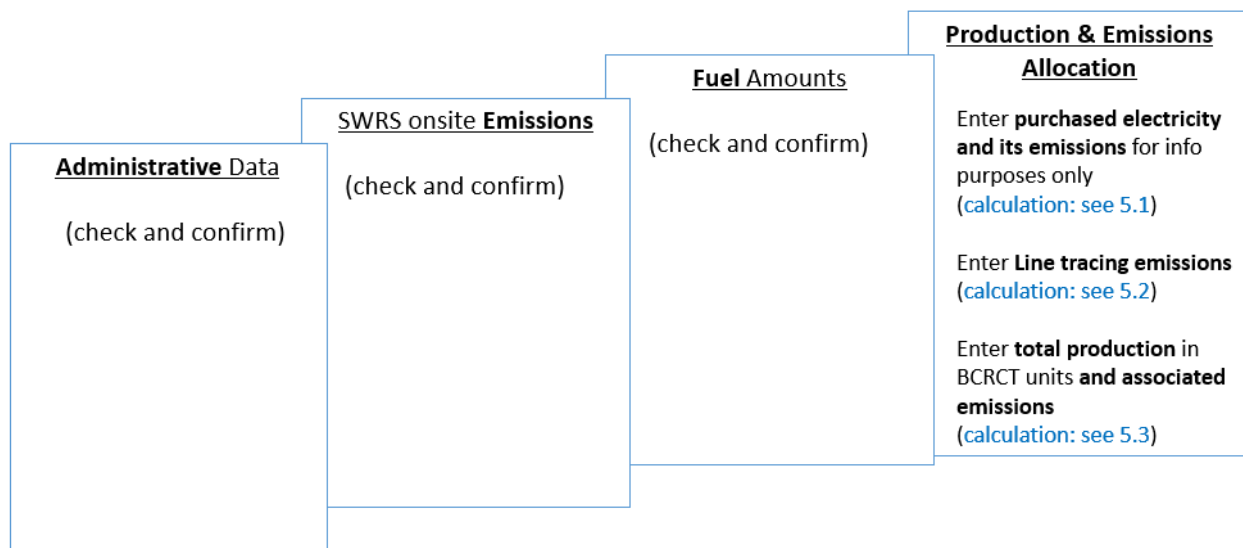
1. Applicable NAICS codes:

- **NAICS – 324110: Petroleum refineries**

Sub-Sector	CIIP Product
Petroleum refineries	BC-specific Refinery Complexity Throughput (BCRCT)
	Non-CIIP Emissions (excluded from benchmarking)
	Emissions associated with line tracing

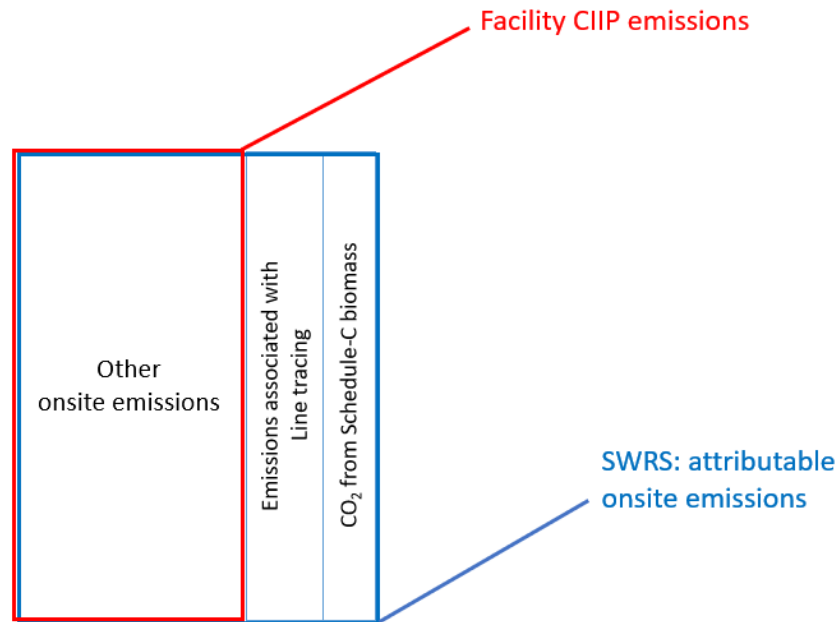
2. Quick Summary – Main Steps in CIIP application

- 2.1 Complete and submit a facility emission report in the Single Window Reporting System (SWRS)
- 2.2 Complete and submit a CIIP application (it is pre-filled with SWRS data where applicable)



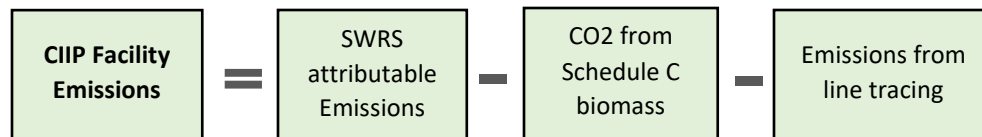
(calculation) steps are detailed in section 5. **Calculation Methodologies** below.

3. Facility Emissions for CIIP purposes



For the Facility emission total for CIIP purposes:

- Facility onsite emissions CO₂ from Schedule C biomass are excluded,
- Facility onsite emissions from line tracing are excluded



Or, equivalently,

$$E_{Facility}^{CIIP} = E_{Attr.}^{SWRS} - E_{CO2bioC}^{SWRS} - E_{Line_tracing}$$

Facility onsite emissions are pre-filled in the CIIP application with data submitted through the SWRS system.

Facility emissions associated with line tracing must be entered in the *Production and Emissions Allocation* section of the CIIP application.

4. Completing a CIIP Application

The CIIP application has four sections. Where possible, the *Administrative*, *SWRS Onsite Emissions* and *Fuels* sections are pre-populated with data reported through the SWRS system. Applicants must review, confirm, and, if applicable, update this information and also enter production and emissions allocation information in the *Production and Emissions Allocation* section.

Administrative Data

Most information in the administrative section will be pre-populated from SWRS.

- Review pre-populated data for accuracy
- Enter the BC Corporate Registry number as it appears on orgbook.gov.bc.ca

NOTE: The BC Corporate Registry number and the operator's legal name on the CIIP application must match the entry on [OrgBook](https://orgbook.gov.bc.ca). The incentive payment will be issued to the legal business name as it appears on the CIIP application.

- Please ensure all mailing addresses follow the [Canada Post address format](#)
- Enter at least one application contact. The Primary Application Contact field will be pre-populated based on the user who starts an application; please confirm or edit as applicable. This will be the primary contact CAS will use for all application-related correspondence: questions, application status changes, review results, etc. A Secondary Application Contact can be added, if applicable. Please note that automated system messages such as application status updates will only be sent to the primary contact.
- Choose the primary NAICS code that the facility operates under from the available list. The NAICS codes in the pre-populated list reflect the sectors eligible to apply for CIIP. You will not be able to enter a NAICS code that is not on the list. The production information required to be entered in the *Production and Emissions Allocation* section will depend on the NAICS code selection

If you believe your facility's sector is eligible but your NAICS code is not on the list, please contact the CIIP team at GHGRegulator@gov.bc.ca.

SWRS Onsite Emissions

This section is pre-filled with data from the facility's SWRS report. Please review and confirm. If the information needs updating, this likely means that the SWRS report has to be updated first.

Fuels

This section is pre-filled with data from the facility's SWRS report. Please review and confirm. If the information needs updating, this likely means that the SWRS report has to be updated first.

Production & Emissions Allocation

NOTE: The ministry provides a calculator spreadsheet with the appropriate calculation formulas built in, to assist in calculations at this step of the CIIP application process (available [at this link](#)).

NOTE: To enter data as required in this section, first select 'Offsite Emissions: Purchased Electricity', then 'Excluded emissions – line tracing', and finally 'BC-specific Refinery Complexity Throughput', as applicable, from the 'Product or Service' dropdown menu.

NOTE: Facility offsite emissions associated with purchased electricity must be calculated from electricity amount purchased and are required for information purposes only. These emissions do not count towards a facility's emission total for CIIP purposes (see section 3. above).

Allocating CIIP Facility emissions

CIIP facility emissions, calculated as shown in section 3, must be allocated to 'BC-specific refinery complexity throughput'.

Select '**Offsite Emissions: Purchased Electricity**'

- Enter purchased electricity (in GWh). Enter 0 if not applicable.
- Calculate and enter the emissions associated with purchased electricity:
 - multiply the amount of purchased electricity by the published [grid electricity emission intensity](#) for the year, or
 - if preferred, use the calculator (see section 5.1 below for details)

Select '**Excluded emissions – line tracing**'

- Calculate and enter the emissions associated with it, using the calculator (see section 5.2 below for details)

Select '**BC-specific refinery complexity throughput**'

- Calculate and enter total production in BCRCT units, using the calculator (see section 5.3 below for details)
- Calculate and enter the CIIP facility emissions, using the calculator (see section 5.3 below for details).

Summary

Review your application for accuracy, review the terms and conditions, and submit the application.

The system will automatically perform some checks for consistency. If inconsistencies are found, the application will show a warning message, highlighting the issue requiring attention. To address any highlighted inconsistencies, you must go back to the relevant application section/tab and either correct the reported values or provide an explanation by entering a comment in the relevant section.

Additionally, the system may detect errors in your application, such as missing data. These errors must be corrected in order to submit an application. In certain exceptional cases when the issue cannot be

addressed through the application system, you will have the ability to override the error message by providing an explanation and then submit the application.

Any unresolved warnings or errors may delay the processing of your application.

5. Calculation Methodologies

Unless explicitly stated otherwise in CIIP guidance, quantification and reporting of greenhouse gas emissions and related information under CIIP must comply with the *Greenhouse Gas Industrial Reporting and Control Act* (GGIRCA) and the Greenhouse Gas Emission Reporting Regulation (GGERR), including with the referenced in GGERR Western Climate Initiative (WCI) quantification methodologies.

The [WCI methodologies](#) typically applicable to petroleum refining reporting operations are:

- WCI.020 General Stationary Combustion
- WCI.030 Refinery Fuel Gas Combustion
- WCI.200 Petroleum Refineries
- WCI.280 Mobile Equipment at Facilities

A CIIP applicant must first submit an emission report in SWRS (SWRS report) complying with GGIRCA and GGERR and using the WCI methodologies. A CIIP application is then pre-filled where possible with applicable information from the SWRS report.

5.1 Calculating emissions associated with purchased grid electricity

The ministry provides a calculator spreadsheet with the appropriate calculation formulas built in, to assist in calculations at this step of the CIIP application process (available [at this link](#)).

In the calculator, in the section 'Purchased Electricity (for information purposes only)', select the applicable electrical grid (Integrated or Fort Nelson) from the pulldown menu in cell D11. This will cause the appropriate electricity intensity factor in tCO₂e/GWh to be displayed in cell F11.

In the blue cell, enter the amount of purchased electricity (in GWh).

Emissions associated with purchased grid electricity are then automatically calculated and displayed in cell F13, in tonnes CO₂e. For example:

Purchased Electricity (for information purposes only)

INPUT each variable listed below:

Purchased Electricity

	Electrical Grid:		Amount	Units
Emissions Intensity Factor of Grid	Integrated Grid	EIF _{El. Grid}	11.5	tCO ₂ e/GWh
Amount of electricity purchased		EL_PURCHASED	300.00	GWh
Emissions from Purchased Electricity		EL_PURCHASED	3,450.00	tCO ₂ e

Choose grid from dropdown menu

Enter the amount of emissions from purchased grid electricity in the CIIP application.

The calculator uses the following methodology to determine emissions associated with purchased grid electricity:

If

$EIF^{El-Grid}$ (selection) is the grid electricity emission factor for the selected grid and applicable year, in tCO₂e/GWh;

$Q_{Purchased}^{Electr.}$ (input) is the quantity of purchased grid electricity, in GWh;

$E_{Purchased}^{Electr.}$ are the emissions associated with purchased grid electricity, in tCO₂e.

Then

$$E_{Purchased}^{Electr.} = EIF^{El-Grid} * Q_{Purchased}^{Electr.}$$

where $EIF^{El-Grid}$ data comes from the published [electricity emission intensity factor for grid-connected entities](#) for the selected grid for applicable year.

5.2 Calculating emissions associated with line tracing

The ministry provides a calculator spreadsheet with the appropriate calculation formulas built in, to assist in calculations at this step of the CIIP application process (available [at this link](#)).

Line tracing emissions are the emissions associated with steam generation for tracing of lines to prevent freezing, for water treatment, for air compression, and for terminal stations originating from within the refinery. This category comprises the same equipment as Solomon's off-sites & non-energy utilities and non-crude sensible heat.

In the calculator, in the section 'Emissions associated with Line tracing', in the blue cells:

- Enter emissions associated off-site and non-energy utilities (tonnes CO₂e)
- Enter emissions associated with non-crude sensible heat (tonnes CO₂e)

The calculator then displays the total emissions associated with line tracing as the sum of the two. For example:

Emissions associated with Line tracing

INPUT emissions:

Do not leave blank - enter zero if needed

Line tracing Emission Sources	Emissions	Units
Off-Site and Non-Energy Utilities	20,000.00	tCO ₂ e
Non-Crude Sensible Heat	200.00	tCO ₂ e
Emissions associated with Line tracing :	20,200.00	tCO ₂ e

Enter the emissions associated with line tracing in the CIIP application.

5.3 Calculating annual production in BCRCCT units and associated emissions

The ministry provides a calculator spreadsheet with the appropriate calculation formulas built in, to assist in calculations at this step of the CIIP application process (available [at this link](#)).

BC-specific Refinery Complexity Factors

A set of BC-specific refinery complexity weighting factors (BCRCFs) were developed to recognize the processing complexity and unique operating conditions of BC refineries. Each of these factors represents the ratio of the stated emissions intensity of a given processing unit relative to that of an atmospheric crude distillation unit. A list of these emissions intensities and corresponding BCRCFs is provided in Appendix A, and they are incorporated in the calculator.

In the calculator, in the section 'Annual BCRCCT Production', in the blue cells, for each processing unit:

- Enter average daily throughput in the appropriate unit of measurement for that unit as shown in column H
 - enter 0 if not applicable

Based on the data entered above, the calculator automatically determines annual production in BCRCCT units.

For example:

Processing Unit	Process Type ID (Solomon Code)	Emissions Intensity (tCO ₂ e/unit throughput)	BC Refinery Complexity Factor	Average Daily Throughput	Units of Production	BC Refinery Complexity Throughput Units
Atmospheric Crude Distillation	SCU	0.0047	1.0000	200.00	BPSD	200.00
Vacuum Distillation	VAC	0.0081	1.7291	100.00	BPSD	172.91
Fluid Catalytic Cracking*	FCC	0.0356	7.5691	200.00	BPSD	1,513.82
Catalytic Reforming	RSR	0.0144	3.0667	150.00	BPSD	460.01
Distillate Desulfurization and Treating (Ultra-high Severity Hydrotreating)	DUS	0.0069	1.4556	80.00	BPSD	116.45
Gasoline/Naphtha Desulfurization and Treating (Conventional Naphtha Hydrotreating)	CONV - NHYT	0.0029	0.6235	240.00	BPSD	149.64
Steam Methane Reforming	HSM	0.0247	5.2384	100.00	k SCF/sd	523.84
C5/C6 Isomerization	C5ISOM	0.0020	0.4289	120.00	BPSD	51.47
Sulphur Recovery Unit	SRU	0.5018	106.6056	15.00	LT/day	1,599.08
Alkylation with Sulfuric Acid	ASA	0.0276	5.8722	40.00	BPSD	234.89
Cryogenic LPG Recovery	U60	0.0002	0.0396	80.00	k SCF/sd	3.17
Dehexanizer	Special Fractionation	0.0052	1.1052	80.00	BPSD	88.41
De-isobutanizer Mild Crude Unit	Special Fractionation	0.0065	1.3850	80.00	BPSD	110.80
Conventional Mild Crude Unit	Special Fractionation	0.0041	0.8720	100.00	BPSD	87.20
Off-Site and Non-Energy Utilities	not applicable	not applicable	not applicable	45.00	BPSD	Not included in calculation
Non-Crude Sensible Heat	not applicable	not applicable	not applicable	30.00	BPSD	Not included in calculation
BC-Specific Refinery Complexity Throughput (BCRCT) / day :						5,311.68

*Emissions intensity of Fluid Catalytic Cracking is based on assumption of 93.25 wt% carbon content and yield of 6.28 wt%

$$5,311.68 \text{ BCRCT/day} = \boxed{1,938,764.40 \text{ BCRCT}}$$

Enter the annual production in BCRCT units in the CIIP application.

The calculator uses the following methodology to determine annual production in BCRCT units:

If

$BCRCF_i$ is BC-specific refinery complexity weighting factor for processing Unit_i

P^{Unit_i} (input) is the average daily throughput in the appropriate unit of measurement for processing Unit_i

P^{BCRCT} is annual refinery production in BC-Specific Refinery Complexity Throughput (BCRCT) units

N is the total number of refinery processing units

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Then

$$P^{BCRCT} = 365 * \sum_{i=1}^N (BCRCF_i * P^{Unit_i})$$

Calculating CIIP Facility emissions

In the calculator, in the section 'CIIP Facility Emissions', in the blue cells:

- Enter SWRS attributable onsite emissions, including from Schedule C biomass (tonnes CO₂e)
- Enter CO₂ emissions from Schedule C biomass (tonnes CO₂e)

The calculator then displays the CIIP Facility emissions. For example:

CIIP Facility Emissions

INPUT emissions where applicable:

Do not leave blank - enter zero if needed

	Emissions	Units
SWRS Attributable Emissions	400,000.00	tCO ₂ e
-- CO ₂ emissions from Schedule C biomass	100.00	tCO ₂ e
-- Emissions associated with Line tracing	20,200.00	tCO ₂ e
CIIP Facility Emissions	379,700.00	tCO₂e

Enter the CIIP Facility Emissions in the CIIP application.

Appendix A – Refinery processing units and corresponding BCRCFs

<u>Processing Unit</u>	<u>Capacity Basis</u>	<u>Unit of Measure</u>	<u>B.C. Refining Complexity Factor</u>
Atmospheric Crude Distillation	Feed	BPSD ¹	1.00
Vacuum Distillation	Feed	BPSD	1.73
Fluid Catalytic Cracking (Assumes 6.28% coke yield and 93.25% carbon content in Coke) ²	Feed	BPSD	7.57
Catalytic Reforming	Feed	BPSD	3.07
Distillate Desulfurization and Treating (Ultra-high Severity Hydrotreating)	Feed	BPSD	1.46
Gasoline/Naphtha Desulfurization and Treating (Conventional Naphtha Hydrotreating)	Feed	BPSD	0.62
Steam Methane Reforming	Product	k SCF/sd	5.24
C5/C6 Isomerization	Feed	BPSD	0.43
Sulfur Recovery Unit	Product	LT/day	106.61
Alkylation with Sulfuric Acid	C5+ Alkylate	BPSD	5.87
Cryogenic LPG Recovery	Feed	k SCF/sd	0.04
De-hexanizer	Feed	BPSD	1.11
De-isobutanizer	Feed	BPSD	1.39
Conventional Mild Crude Unit	Feed	BPSD	0.87

¹ 'BPSD' means barrels per stream day. 'k SCF/sd' means thousands of standard cubic feet per stream day. 'LT/day' means long tons per day.

² Facilities applying to CIIP must consult with the ministry prior to submitting an application that uses different assumptions.