

TIER Conventional Oil and Gas Compliance Spring 2023 Webinar

Conventional Oil and Gas
Climate Regulation and Carbon Markets
Alberta Environment and Protected Areas
March 29, 2023



Alberta

Alberta Land Acknowledgement



Agenda

-  Aggregate Facilities Program Background
-  Facilities Integration and Covered Emissions
-  2021 Compliance Update
-  Reconciling Petrinex Volumes
-  2022 Facility Specific Benchmark
-  2022 Benchmark Applications
-  Stakeholder Questions for the 2022 Compliance Report
-  2023 Flaring Methodologies & Benchmarks
-  Q & A on 2023 Flaring

Aggregate Program Background

- The TIER Aggregate program was introduced with the following objectives:
 - Provincial jurisdiction over industrial emissions
 - Reducing GHG emissions
 - Maintaining provincial industry competitiveness
- Aggregate Facility Program is based on a voluntary enrollment.
- Conventional Oil and Gas facilities regulated under TER can apply for exemption from the federal fuel charge.
- As of today 56,553 facilities have entered the program through 250 aggregate facilities.

Elements of the Program

- The building block of the Aggregate program is the “Conventional Oil and Gas facility” (COG).
- A COG can be comprised of a single facility or 2 or more contiguous, adjacent facilities that are operated in an integrated manner and have the same person responsible.
- An “Aggregate Facility” – a group of two or more conventional oil and gas facilities designated as such upon an application of the person responsible and approved by the director.

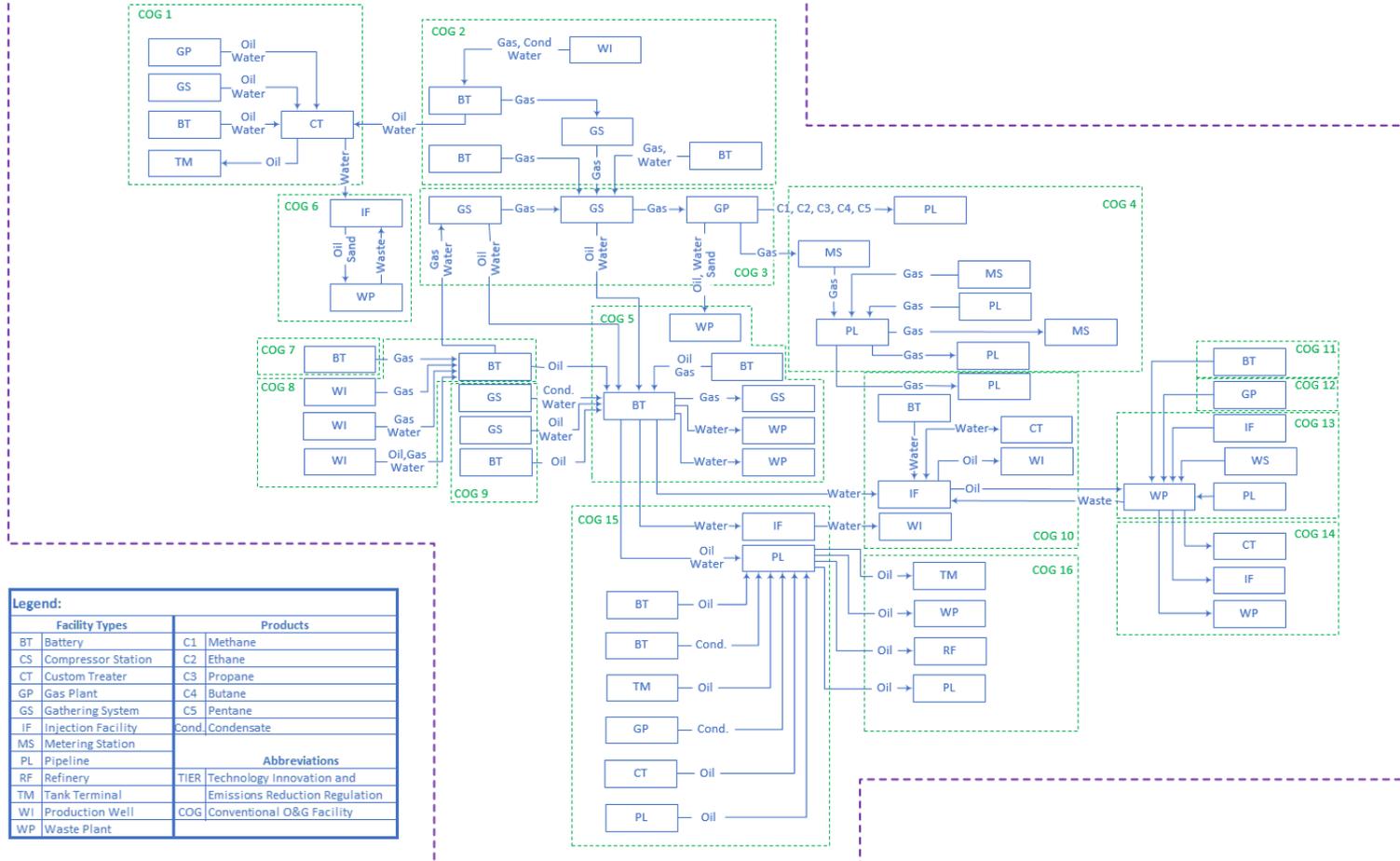
Facilities Integration under COG

- The TIER Regulation considers an individual facility to include all integrated components.
- Multiple adjacent individual facilities operating in an integrated manner, which have the same person responsible, should be grouped together as a single conventional oil and gas facility:
 - When including a battery in a COG it will be understood that all wells linked to the battery are also part of the COG and therefore, they do not need to be listed separately.
 - Several batteries in relative physical proximity can be grouped into a single COG while providing facility IDs of the individual batteries.
 - Facilities not in physical proximity but connected through a pipeline could still be grouped under a single COG if operated in an integrated way.
 - Multiple facilities can be grouped as part of a gas gathering system, a custom treating facility or a tank terminal facility while providing IDs of the individual facilities.
 - Injection facilities could be grouped under a waste plant linked to it, where practical.
- Boundary file (kml or kmz) is required for any COG exceeding 10,000 tCO₂e/year

TIER AGGREGATE FACILITY

Example

Aggregate Facility



Specifics Of the Program

- Calendar year based coverage:
 - If a COG is part of an aggregate facility on January 1 of a year, the COG continues to be part of the aggregate facility for the whole year
 - If a COG is added to an aggregate facility during a year, the COG is part of the aggregate facility for the whole year.
- Expanded facility eligibility:
 - A facility for supplying or transporting water in relation to an activity described in subclauses (i) to (vi) of the regulation (*new for 2023*)

COG Removal from the Aggregate

- A conventional oil and gas facility shall be removed from the aggregate facility if:
 - the conventional oil and gas facility ceases to be a conventional oil and gas facility,
 - the conventional oil and gas facility direct emissions exceed 100,000 CO₂e tonnes in a year,
 - the conventional oil and gas facility imports more than 10,000 tonnes of hydrogen in a year (*new for 2023*),
 - the conventional oil and gas facility is decommissioned,
 - the person responsible for the conventional oil and gas has changed (unless the same change has every COG in the aggregate)
 - the conventional oil and gas facility is designated as an opted-in facility.
- Section 25(1) – Duty to notify director
- The revocation of an aggregate facility may only be made effective on December 31st of a year.

Operatorship Change Scenarios

1. Company A wholly acquires aggregated conventional oil and gas facilities from Company B or merges with Company B.
 - Reporting duty under TIER stays with Company B for the year of the merger/acquisition
2. Company A purchases some of the aggregated conventional oil and gas facilities from Company B.
 - Individual facilities registered within Company B's aggregate remain part of Company B's aggregate for the full compliance year.
3. Company B is no longer in business, aggregated conventional oil and gas facilities acquired by Company A.
 - Company A is responsible for reporting and true up obligation for the entire compliance year in which the aggregate is acquired
4. Company B is no longer in business, aggregated conventional oil and gas facilities acquired by multiple companies.
 - Facilities from the Company B's aggregate are distributed to identified aggregates of the purchasing companies who become responsible for the whole year compliance of those facilities
 - The department will review and adjust aggregate FSBs of purchasing companies if needed

Application Deadlines

Deadline Date	Application / Request
June 30, 2023	Compliance Report for 2022.
September 1, 2023	Request for review of the aggregate's facility-specific benchmark for 2023 for existing aggregate facilities.
September 1, 2023	Application for Benchmark Unit and Benchmark for 2023.
September 1, 2023	Notification about selected Benchmark Reference Years for 2023.
November 15, 2023	Application for adding a facility to an existing aggregate facility for 2023. (<i>new for 2023</i>)
November 15, 2023	Application for creating a new aggregate facility for 2023. (<i>new for 2023</i>)
December 1, 2023	Application for removal of a facility from an existing aggregate facility for 2024.
December 1, 2023	Application for revocation of aggregate facility designation for 2024.

Regulated and Allowable Emissions

- Total regulated emissions for an aggregate facility for **2022**:

$$TRE = E_{SFC} + E_{CO2} \quad [t_{CO2e}]$$

E_{SFC} – stationary fuel combustion emissions

E_{CO2e} – exported CO2 emissions

- Allowable emissions:

$$AE = FSB * P + HPB_E * Electricity_{exported}$$

FSB – facility specific benchmark $[t_{CO2e}/m^3_{OE}]$

P – total production $[m^3_{OE}]$

HPB_E – electricity high performance benchmark $[t_{CO2e}/MWh]$

Emission Performance Credits

- Emission performance credits can be earned when $TRE < AE$:

$$EPC = AE - TRE \quad [t_{CO_2e}]$$

- EPC validity:
 - EPC issued for 2020, 2021 and 2022 may only be used within the 8-year period
 - EPC issued for 2023 and subsequent years may only be used within the 5-year period (*new for 2023*)

2022 Aggregate Compliance

- **NO Flaring Emissions**
- \$50 per tonne to obtain one fund credit for 2022 compliance true-up
- Use the latest Confirmation of Regulation notice for 2022 compliance report with issued 2022 Facility-Specific Benchmark
- If no changes in facility list in 2022 use last 2021 issued
- All compliance reports need to be third party verified
- Submit Credit Purchase Fund Forms ahead of payment: Note AG ID
- **June 30, 2023 deadline for all 2022 Compliance Reports & Payments**

2021 Compliance update:

- 91% Compliant to date
- 5 Compliance Orders issued
- Total Regulated Emissions: over 18 Megatonnes
- Credits Required: over 1 Megatonnes
- EPCs requested: ½ Megatonne
- 2021 TIER Report GoA Open Government Program Portal

Common Issues in Compliance 2021 Submissions:

- Wrong facility list (Confirmation of Regulation/CoR)
- Omission of Facilities from 2021 CoR
- Extra facilities not listed in 2021 CoR
- Incomplete facility volumes for all 12 months
- Petrinex volumes updated following submission
- Inconsistent Methods from 2020 benchmarking/CR & 2021 Compliance
- Incorrect Facility Specific Benchmark or product unit
- Empty tab E2 (finance tracking issue): fund credits submitted
- Gaps in verification procedures
- Inconsistency in reporting Petrinex compressor station volumes (under gas gathering system vs. separate from gas gathering system)

Reconciling Petrinex Volumes

- Computer code (in *Python*) is used to check many parameters in the compliance reports
- The Python code generates a workbook
 - Summary of parameters checked or tracked for all the aggregates (e.g., issued vs. submitted FSB; recently pulled Petrinex volumes vs. those submitted in the CR; true-up obligations/credits)
- Petrinex volume comparison is done at the total and Petrinex ID levels for each aggregate
 - **Alberta Public Data:** Conventional Volumetric Data Download
 - e.g., [BT, GP, GS, IF]; helpful for re-calculations (verification)
 - Confidential Data
 - e.g., [CT, PL, TM, WP, CS, MS, GP (subtype 407), OS]
 - ~ 4.6 GB of Petrinex data (2019 – 2021)

Examples of Petrinex Volume Mismatches

A	B	C	D	E	F
Agg_id	ReportingFacility	BU Volumes (m3oe) (petrinex)	B6 volumes m3oe (submitted in CR)	Present in CoR list for 2021 (T/F)	Is this Facility present in the Petrinex raw data for 2021
AG	ABGS013		0	TRUE	TRUE
01 AG	ABBT004		759.988	Facility should be in this Aggregate AG	TRUE
02 AG	ABBT006		586.484	Facility should be in this Aggregate AG	TRUE
03 AG	ABGS015	61.36		TRUE	TRUE
05 AG	Oilandga			Facility should be in this Aggregate nan	FALSE
06 AG	ABBT010	384.516	21432.2782	TRUE	TRUE
07 AG	ABBT010	1249.7828	19983.7626	TRUE	TRUE
08 AG	ABBT010	24028.7544	43244.9415	TRUE	TRUE
09 AG	ABBT012	2245.5346		TRUE	TRUE
10 AG	ABBT012	2766.9616		TRUE	TRUE
11 AG	ABBT013	1811.5947	10173.1669	TRUE	TRUE
12 AG	ABBT013	1216.4688		TRUE	TRUE
13 AG	ABBT014	9252.3677		TRUE	TRUE
14 AG	ABBT014	290.4435		TRUE	TRUE
15 AG	ABGP000	22463.6966	20538.4727	TRUE	TRUE
16 AG	ABGS000	53890.3058	48612.2411	TRUE	TRUE

- Further reviews are needed to resolve issues after the automated batch checks
 - Other internal records; Communications with stakeholders
- Sign off, acceptance letter, and data transfer for FSB setting

FSB Adjustment for Aggregate Composition Changes

$$FSB_{adjusted} = \frac{IR_1 \sum_{i=1}^{n1} E_{SFC_i} + IR_2 \sum_{i=1}^{n2} E_{SFC_i} + IR_3 \sum_{i=1}^{n3} E_{SFC_i}}{\sum_{i=1}^{n1} P_{i,1} + \sum_{i=1}^{n2} P_{i,2} + \sum_{i=1}^{n3} P_{i,3}} \times (1 - RT_y)$$

i – conventional oil and gas facility

1,2,3 – first, second, third (if applicable) reference year

n1 – number of COGs in the first reference year

n2 – number of COGs in the second reference year

n3 – number of COGs in the third reference year (if applicable)

IR – fuel use intensity ratio (a.k.a., *icast/i* as described in the benchmark standard)

Note: No exported CO₂ assumed for the simplicity of the calculation

$$IR(a.k.a.: \textit{icast/i}) = \frac{\textit{Fuel use intensity using the reference year volumes for 2022 population}}{\textit{Fuel use intensity for the reference year}}$$

$$\textit{Fuel Use Intensity} = \frac{\textit{Fuel volume}}{\textit{Production volume}}$$

Intensity Ratio-based Adjustment Criteria

- The way Petrinex and non-Petrinex emissions are used in the FSB adjustment depends on the Intensity Ratio (IR, a.k.a., icast/i).

Fuel Use Intensity Ratio IR	Petrinex Emissions Adjustment	Non-Petrinex Emissions Adjustment
$0.98 < \text{IR} < 1.02$	No adjustment	No Adjustment
$1.02 \leq \text{IR} \leq 1.10$	Multiply by IR	Multiply by IR
$\text{IR} > 1.10$	Multiply by IR	No Adjustment
$\text{IR} < 0.98$	Multiply by IR	Multiply by IR

2022 Benchmarking Adjustments

- Example FSB letter supporting workbook

FacilityList	SummedActivityID	2019	2020	2021
CoR 2020	DISP	101341.5738	112957.5306	100354.3373
CoR 2020	FUEL	4137.5	3985.6	3358.4
CoR 2020	PROD, PROC, FRAC	64365.986	77928.8875	68874.7623
CoR 2020	REC	41181.962	39826.0685	35788.7039
CoR 2021	DISP	91637.4779	95260.9428	88703.6515
CoR 2021	FUEL	3883.9	3549.4	3318.9
CoR 2021	PROD, PROC, FRAC	56967.0717	64085.7923	57961.6601
CoR 2021	REC	38585.4109	35466.5698	34982.3493
CoR 2022	DISP	98516.1115	106862.4647	98906.3349
CoR 2022	FUEL	3999.3	3683.3	3479.6
CoR 2022	PROD, PROC, FRAC	62329.9167	70523.2056	63998.6688
CoR 2022	REC	40247.9571	40943.8889	39596.3471

Item	2019	2020	2021	2022
CoR Issued_Fuel	4137.5	3985.6	3318.9	
CoR Issued_Production Accounting	64365.986	77928.8875	57961.6601	
Past Fuel to Production Intensity (a.k.a. "i" as in Chapter 9.4 of the Standard for Developing Benchmarks v2.2)	0.064280845	0.051144064	0.057260265	
2022CoR_Fuel	3999.3	3683.3	3479.6	
2022CoR_Production Accounting	62329.9167	70523.2056	63998.6688	
2022CoR_Fuel to Production Intensity (a.k.a. "icast" as in Chapter 9.4 of the Standard for Developing Benchmarks v2.2)	0.06416341	0.052228199	0.054369881	
Ratio (icast/i)	0.998173087	1.021197668	0.949521997	
Benchmark Unit				PROD, PROC, FRAC

Selecting a Benchmark Unit

- Option 1 - Utilizing one of the following benchmark units:
 - production (PROD, PROC, FRAC)
 - disposition (DISP) or
 - receipts (REC)of specified energy products, expressed in m³ oil equivalent volumes.
- Option 2 – Utilizing an alternative benchmark unit derived from any other Petrinex activity category using a single or multi-products. Multi-variable linear regression would be used in the latter case.

Benchmark Unit Assessment

- Correlation coefficient to evaluate the representativeness of a benchmark unit:

$$r_{Agg} = \frac{\sum_{i=1}^{12k} (P_{Agg_i} - \bar{P}_{Agg}) \times (CO_{2_i} - \bar{CO}_2)}{\sqrt{\sum_{i=1}^{12k} (P_{Agg_i} - \bar{P}_{Agg})^2} \times \sqrt{\sum_{i=1}^{12k} (CO_{2_i} - \bar{CO}_2)^2}}$$

P_{Agg_i} - aggregate's production based on the selected unit in month "i"

\bar{P}_{Agg} - aggregate's average monthly production over 12 x k months period

k – number of reference years

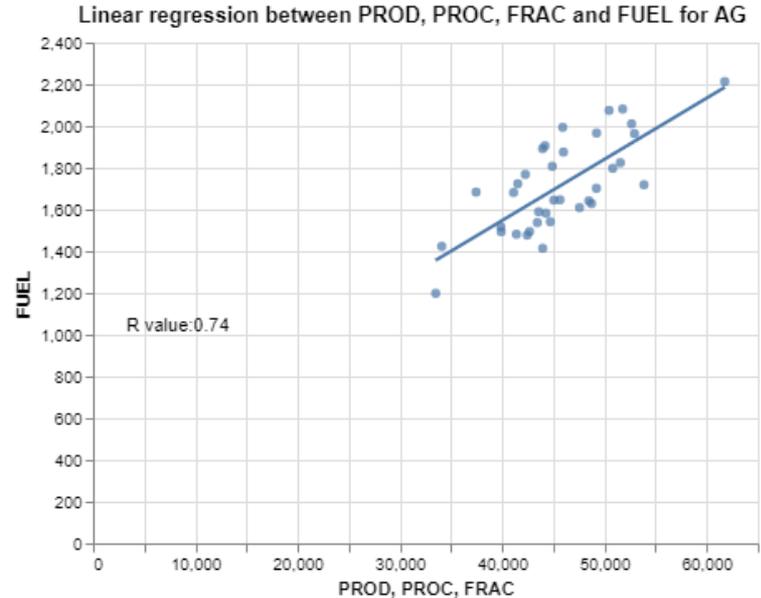
CO_{2_i} - aggregate's emission in month "i"

\bar{CO}_2 - aggregate's average monthly emissions over 12 x k months period

(check the function Correl() in Excel, Corr() in Python)

An example scatter plot of fuel against prod

- “The product(s) and benchmark unit(s) for an aggregate facility must be representative of the aggregate facility’s composition, configuration and emissions” (Section 9.1.2 of the TIER Standard for Developing Benchmarks v2.2).
- Poor Correlations could mean strong and maybe unfair fluctuations in payments and/or credits



An example of a fair/good benchmark unit

Selecting Benchmark Years

- “The default reference period includes the year prior to being accepted into TIER and the first two years regulated under TIER.”
- “In case the first reference year cannot be the year before the first compliance year, one of the following two options should be the first reference year.”
 - Two years before the first compliance year, if the data is viable; or,
 - The first compliance year.
- To request for reference years other than the default three years, the Aggregate Facility Reference Years Notification Form must be submitted to the department on or before September 1 of the year to which the benchmark is to apply.
 - Refer to TABLE 4: BENCHMARK REFERENCE YEAR OPTIONS FOR AN AGGREGATE FACILITY REGULATED UNDER TIER (Standard for Developing Benchmarks v2.2)

2022 Benchmark Applications by Facilities

- Total 34 notifications: 5 new aggregates and 29 existing aggregates.
- New Aggregates: Benchmarks for the first year of compliance
- Existing Aggregates: Re-benchmarking due to
 - Population changes;
 - Benchmark years changes;
 - Product unit changes;
 - Petrinex data updates after submissions of previous compliance reports or benchmark applications
 - Fuel excluded in the previous compliance reports/ benchmark applications, which were under Federal fuel charges
 - A combination of any of the above changes

2022 Benchmark Applications-Issues

- Issues found in 2022 Benchmark Applications
 - Wrong facility lists: missing and additional facilities or wrong version of CoR list
 - Inconsistence between the submitted fuels or productions with the Petrinex data
 - Inconsistent methods used between benchmark years for a COG
 - Low Correlations for the selected product unit and other products: a provisional product unit was assigned for 2022, and further correlation analysis should be done in the following years

2022 Benchmark Applications-Adjustment

- If the newest 2022 CoR facility list was used for all the benchmark years, an adjustment was not necessary.
- If the newest 2022 CoR list was used at the submission, but 2022 CoR was updated after the submission, an adjustment might apply based on the population changes in the two versions of the CoR.
- If a re-benchmark application used the 2022 CoR list, but another benchmark year used the previous approved compliance reports (CR), an adjustment might apply for the previous CR data.
- If the CoR facility lists for the corresponding benchmark years were used, an adjustment might apply for each benchmark year.
- Operators are recommended to use the last version of the CoR list for accurate re-benchmarking applications to prevent potential adjustments.

2022 Benchmark Applications-Methods

- Relatively conservative methods should be used for benchmarks than compliance reports: the methods leading to a lower benchmark
- Determine the quantification methods by predicting/planning the methods used for future compliance reports in order to avoid re-benchmarking
 - If gas analysis will be used in the compliance reports for COGs, the same method with gas analysis should be used in benchmark application; if gas analysis is not available for benchmark years, the CO₂ EF for sales gas in Table 15-2 must be used.
- Consistent technology-based CH₄ and N₂O EFs in Table 15-6 should be used in benchmark and compliance reports unless technology improvements were implemented for the COGs in compliance years
- The rich gas EF in Table 15-2 should be used for COGs without gas analysis in the benchmark and compliance reports

2022 Compliance Questions



2023 Flaring Methodologies for Benchmarking

This section will include:

- 2023 Benchmarks for aggregate facilities
- Tightening rates
- Two draft flaring methods

2023 Facility Specific Benchmarks

- 2022 compliance year:

$$FSB = \frac{\sum_{y=1}^m \sum_{i=1}^n (E_{SFC_{i,y}} + E_{CO2_{i,y}})}{\sum_{y=1}^m \sum_{i=1}^n P_{i,y}} (1 - RT_y)$$

- 2023 compliance year: *(new for 2023)*

$$FSB = \frac{\sum_{y=1}^m \sum_{i=1}^n \left[(E_{SFC_{i,y}} + E_{CO2_{i,y}}) \times (1 - RT_y) + E_{FLR_{i,y}} \times (1 - RT_{y,F}) \right]}{\sum_{y=1}^m \sum_{i=1}^n P_{i,y}}$$

$E_{SFC_{i,y}}$ - stationary fuel combustion for COG “i” in year “y”

$E_{CO2_{i,y}}$ - exported CO2 from COG “i” in year “y”

$E_{FLR_{i,y}}$ - flaring emissions for COG “i” in year “y”

$P_{i,y}$ - total product volume for COG “i” in year “y”

RT_y - stationary fuel combustion reduction target for year “y”

$RT_{y,F}$ - flaring reduction target for year “y”,

Benchmark Tightening Rates

- Reduction target consists of a basic target and annual tightening rate for a year
- SFC and export CO₂ reduction target was set at 10% basic target rate in 2022, tightening at 2% annually, starting from 2023
- Flaring reduction target was set at 10% basic target rate in 2023, tightening at 2% annually, starting from 2024
- New aggregates are subject to the reduction rate for the compliance year immediately, no transition period.

	2022	2023	2024	2025	2026
RT _{SFC}	10%	12%	14%	16%	18%
RT _{FL}	N/A	10%	12%	14%	16%

2023 Benchmark and Methodologies

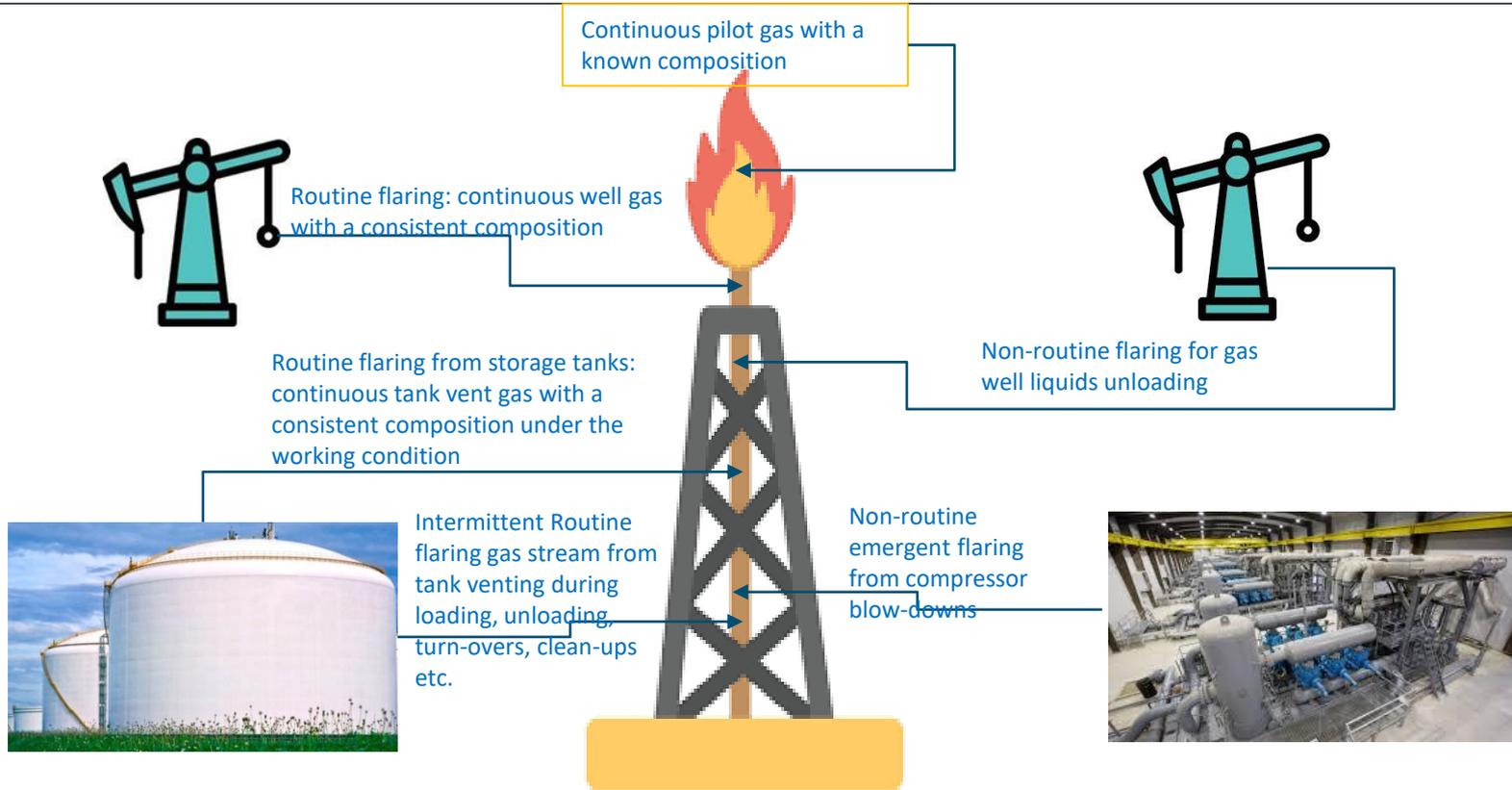


Figure: An Example of Multiple Flaring Streams

2023 Benchmark and Flaring Methodologies

Draft flaring methodologies will be in the current Chapter 15 of Alberta Quantification Methodology for aggregates.

- **Flaring Method 1:** Default emission factors (EF)
 - Applies to a single flare stream with a consistent composition but without composition measurement data
 - Three sets of EFs were developed based on three types of flaring technologies using the default Alberta gas compositions
 - Defaults can be applied for benchmarking in absence of historic data for facility applications
 - EPA is in process of determining which flaring EF will be used if a benchmark application is not submitted

2023 Benchmark and Flaring Methodologies

- **Flaring Method 2: Multiple flare gas streams**
 - Applies to flare stacks with measurements on all or some of flare streams
 - Total volumes of all the flare gas streams should align with the reported flare volume in Petrinex
 - For flare gas streams without measurements
 - Mass balance, Engineering-estimates or Manufacture specifications
 - Estimation through venting volume quantification methods for over twenty types of routine and non-routine venting sources in Chapter 4 if they are tied to flare stack
- Draft Chapter 15 will be posted for stakeholder feedback in June

Contact the Department

Conventional Oil and Gas
Climate Regulation and Carbon Markets
Alberta Environment and Protected Areas

Web site:

<https://www.alberta.ca/conventional-oil-and-gas.aspx>

- Email: AEP.GHG@gov.ab.ca
- Request an in-person meeting at 3535 Research Road N. W., Calgary
- Request an MS Teams meeting
- Request a phone call back

Questions

END OF PRESENTATION