Compliance year 2020
LFE/Opt-in Compliance Workshop

Technology Innovation and Emissions Reduction Regulation (TIER)

Climate Implementation and Compliance
Alberta Environment and Parks
March 2021
Introductions

Climate Implementation and Compliance Branch
Policy Division
Alberta Environment and Parks
Key Take Aways

• Person responsible to submit verified compliance report by June 30, 2021 for the 2020 compliance year
• Required true-up (credits retired or fund payment made) should be complete before submitting your compliance report
• Verification firms will be busy this year, so start early and have the compliance report, QMD and any calculation sheets ready at the start of the verification. Contact AEP if unable to find a verifier
## Agenda

<table>
<thead>
<tr>
<th>Agenda Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Introductions and Organization</td>
</tr>
<tr>
<td>• Background and Regulatory Overview</td>
</tr>
<tr>
<td>• Specified Gas Reporting Regulation</td>
</tr>
<tr>
<td>• Prior Period Results and Learnings</td>
</tr>
<tr>
<td>• Obtaining Verification</td>
</tr>
<tr>
<td>• Alberta Greenhouse Gas Quantification Methodologies</td>
</tr>
<tr>
<td>• Methods of True-up</td>
</tr>
<tr>
<td>• Compliance Form Overview</td>
</tr>
</tbody>
</table>
Organization

Air and Climate Policy
Robert Hamaliuk (ED)

Air Policy
Hamid Namsechi (Dir)

Strategic Climate Policy
Heather Carmichael (Dir)

Industrial Climate Policy
Sam Fiorillo (Dir)

Climate Adaptation and Resource Efficiency
Roger Armstrong (Dir)
Background and Regulatory Overview

GHG Regulation
Regulatory Background

  – Facility specific baselines based on historical performance
  – Based on direct emissions only

• Carbon Competitiveness Incentive Regulation (2018 – 2019)
  – Output based allocation system using assigned and established benchmarks
  – Based on direct and indirect emissions
  – Provincial carbon levy in place until June 2019
  – Opted-in facilities
Overview of TIER

• Technology Innovation and Emissions Reduction Regulation (TIER) (2020 – present)
  – TIER implemented on January 1, 2020
  – Regulated facilities:
    • Annual emissions above 100,000 tonnes of carbon dioxide equivalent in 2016 or subsequent; or
    • Voluntarily entered the regulation (including aggregate facilities and opted in facilities)

- TIER is a recognized provincial program under the Greenhouse Gas Pollution Pricing Act for 2020 and 2021
Overview of TIER

• Facilities must comply with the least stringent of:
  – High Performance Benchmark (HPB)
    • In regulation and can be set or updated through Ministerial Order
    • No tightening rate
  – Facility-Specific Benchmark (FSB)
    • 90% of historical emissions intensity
    • Ramp in for new facilities

• Regulated Emissions
  – Large emitters and opted in facilities – regulated for all direct emissions with accounting for imported heat, hydrogen and electricity
  – Direct emissions – do not include biomass CO₂ nor federally levied fuels where exemption certificate in place
Overview of Standards

• Four standards under TIER:
  – Standard for Developing Benchmarks
  – Standard for Completing Greenhouse Gas Compliance and Forecasting Reports
  – Standard for Validation, Verification and Audit
  – Standard for Greenhouse Gas Emission Offset Project Developers
  – Part 1 of these standards are law and are binding. Part 2 are also requirements, but not binding.

• Alberta Quantification Methodologies (AQM)
  • Provides mandatory quantification methodologies for regulated facilities
  • Is made mandatory through standards
Overview of Standards

• Standard for Developing Benchmarks
  – Provides methodologies for developing facility-specific benchmarks and high performance benchmarks.
  – Provides treatment of indirects, cogeneration, and self generation of electricity in benchmark setting.
  – Deals with entry into the regulation through opt-in as well the cost containment program.

• Standard for Completing Greenhouse Gas Compliance and Forecasting Reports
  – Facility requirements for reporting and forecasting
  – Provides level requirements for selecting quantification methodologies
Overview of Standards

• **Standard for Validation, Verification and Audit**
  - Requirements for third party assurance providers (validators and verifiers) and auditors.
  - Focus of this training is verification of compliance reports, benchmark applications, data submissions, and emission offset project reports.
  - Validation and audit requirements for cost containment applications and details on cost containment designated facilities are provided in the standard, but not covered in depth in this presentation.

• **Standard for Greenhouse Gas Emission Offset Project Developers**
  - Requirements for developing emission offset projects
Types of Submissions – Annual Compliance Reports

- Verified annual reports must be submitted by June 30, 2021
- Requires positive verification opinion – any material errors must be resolved before submission
- Forecasting reports do not need to be verified
- Differences in compliance report content – large emitters/opted in facilities vs aggregate facilities
Types of Submissions - Forecasts

- Forecasting facilities have had emissions over 1Mt in 2016 or a subsequent year.
- Need to submit forecasts for the upcoming year by Nov 30\textsuperscript{th} unless:
  - The current year is the first year over 1Mt
  - The previous year’s emissions were less than 1Mt
  - The previous year’s true-up obligation less than 50,000 tonnes
- Forecasting facilities also need to submit an update to their forecast by March 31\textsuperscript{st} covering the prior year compliance period (i.e. for the 2020 compliance period)
Cost Containment

• The Compliance Cost Containment Program has been transitioned to the TIER system.
• Eligibility: LFE or Opt-in facility annual TIER compliance costs are greater than 3% of annual facility sales, 10% of facility profits.
• Support Mechanisms:
  • Removal of compliance credit limit (credits or offsets may be used for 100% of compliance)
  • Additional emissions benchmark allocation
Cost Containment

• Deadline to apply for 2020 compliance year is March 31, 2021. Applications may cover 2020 and future years (up to 5 consecutive years).
• Application requirements include third-party audited financial statements and third-party validated emissions reduction plan.
• See the TIER website for more information and the application form.
Specified Gas Reporting Regulation
Specified Gas Reporting Regulation

• Alberta’s mandatory GHG reporting program for facilities emitting over 10,000 tonnes of CO2 equivalent per year
• Builds on voluntary reporting by most Alberta emitters since the mid-1990’s
• This regulation and standard were passed in 2003
• One reporting window with Environment and Climate Change Canada (ECCC) GHG Reporting Program
• Emissions reporting data is used to inform policy development and analysis, and support federal national inventory reporting (NIR)
• Annual reporting deadline is June 1
• The Specified Gas Reporting Standard will be updated
Specified Gas Reporting Regulation – 2020
Updates

• Mandatory quantification methodologies:
  – Facilities regulated in TIER must use the Alberta Greenhouse Gas Quantification Methodologies (AQM)
  – Facilities not regulated in TIER must use either the AQM or the Quantification Methodologies for the Carbon Competitiveness Incentive Regulation and the Specified Gas Reporting Regulation
  – Tier 1 methodologies in those documents are the minimum requirement for SGRR reporting, and are aligned with ECCC minimum requirements.
  – Equation numbers must be reported in SWIM, and guidance will be provided for the small number of cases where AQM equation numbers do not align with the drop-down options in SWIM

• Production reporting requirements were eliminated for products that compete with products in TIER.
Prior Periods Results and Learnings
## Prior Year Results


<table>
<thead>
<tr>
<th>Compliance Year</th>
<th>Emission Offset Credits Submitted (Mt CO$_2$e)</th>
<th>EPCs Submitted (Mt CO$_2$e)</th>
<th>Fund Credits Submitted (Mt CO$_2$e)</th>
<th>Total Compliance (Mt CO$_2$e)</th>
<th>Fund Payment ($Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 (half year)</td>
<td>0.9</td>
<td>0.2</td>
<td>3</td>
<td>4.1</td>
<td>45.2</td>
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<tr>
<td>2008</td>
<td>2.9</td>
<td>0.6</td>
<td>5.9</td>
<td>9.4</td>
<td>88.3</td>
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<tr>
<td>2009</td>
<td>3.8</td>
<td>1.5</td>
<td>4.4</td>
<td>9.7</td>
<td>66.3</td>
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<td>2010</td>
<td>3.9</td>
<td>1.9</td>
<td>5.3</td>
<td>11.1</td>
<td>78.9</td>
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<tr>
<td>2011</td>
<td>5.4</td>
<td>0.8</td>
<td>4.2</td>
<td>10.4</td>
<td>62.9</td>
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<tr>
<td>2012</td>
<td>3</td>
<td>0.7</td>
<td>5.9</td>
<td>9.5</td>
<td>93.7</td>
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<tr>
<td>2013</td>
<td>2.2</td>
<td>1.3</td>
<td>6.3</td>
<td>9.8</td>
<td>94.4</td>
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<td>2014</td>
<td>2.3</td>
<td>1.3</td>
<td>5.6</td>
<td>9.3</td>
<td>84.3</td>
</tr>
<tr>
<td>2015</td>
<td>0</td>
<td>0.3</td>
<td>9</td>
<td>9.3</td>
<td>135.7</td>
</tr>
<tr>
<td>2016</td>
<td>0.8*</td>
<td>1</td>
<td>10.3</td>
<td>12.2</td>
<td>206.5</td>
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<tr>
<td>2017</td>
<td>9.2*</td>
<td>6.2</td>
<td>3.1</td>
<td>18.5</td>
<td>94</td>
</tr>
<tr>
<td>2018</td>
<td>8.0*</td>
<td>3.9</td>
<td>17.8</td>
<td>29.7</td>
<td>533.5</td>
</tr>
<tr>
<td>2019</td>
<td>9.9*</td>
<td>5.3</td>
<td>15.9</td>
<td>31.1</td>
<td>476.1</td>
</tr>
<tr>
<td>Total</td>
<td>52.3</td>
<td>25.0</td>
<td>96.7</td>
<td>174.1</td>
<td>2059.8</td>
</tr>
</tbody>
</table>

Note: Mt = Million Tonnes

*Includes 2.6 Mt total from 2016-19 of additional credits issued under section 7(1.2) of the SGER and section 16(3) of the CCIR

Figures are subject to change as a result of auditing and are rounded for presentation purposes.

Updated November 4, 2020
Offsets – Results (Compliance)

- 25% from wind, 23% from CCS (incl. additional), 18% from conservation cropping, 9% NERP, and 26% from others (rounded)
- No offsets were retired in 2019 by federal Output-Based Pricing System-regulated facilities
Offsets – Results

- 13.3 MtCO2e active as of March 3, 2018
  - **29% CCS** (incl. additional), 20% wind, 12% pneumatics
- 21 new projects in 2020, 291 total
Offsets

Clarifications
- No offset generation if opted in (aggregates may still be eligible depending on activity)

Updates
- New Biogas protocol released (replaces two previous Anaerobic ones)
- Two protocols under revision: Enhanced Oil Recovery and Solution Gas Reduction
- Currently developing two protocols: Biocover for landfill and Improved Forest Management on Private Land
Learnings – Usage of Credit

• Reminders
  – Max credit usage for 2020, 60% of tonnes owed
  – 40% may be pre-2017 vintage
  – 2014 and older credits expire after the 2020 compliance year. (68kt offsets, 194kt EPC)
  – 2015 and 16 credits expiring 2022 (3.3 Mt offsets, 2.2 Mt EPC)

• To improve
  – Credits need to be held by person responsible.
  – When using EPCs, credits should be in the account of the facility using them, and in pending retired status
  – Separate tabs in compliance report for offsets and EPCs. Make sure they are not entered into wrong tab.
  – Serial ranges should be correct and match reported totals.
Learnings – Quantification Methodology Document (QMD)

- Facility is responsible for preparing a Quantification Methodology Document
- QMD not updated or partially updated
  - Understand there were significant timing challenges for 2018 with introduction of new quantification
  - Should not have annual values
  - Must follow the format in the Compliance Standard
- QMD important reference for verification and for our internal reviews
- QMD should reflect quantification requirements except where a deviation has been granted
Learnings – Emissions Completeness

• “direct emissions” means all specified gases released from sources located at a facility, not including biomass CO\textsubscript{2} emissions or fuels where the federal fuel charge was paid at a time when an exemption certificate was in place…
• This means all emissions inside the facility boundary (boundary files have been reviewed and shared back to facilities).
• Drilling, service rigs, contractors etc. are in this scope.
• Estimates can be used where the source meets the criteria for negligible.
Learnings – Verification

• To improve
  – Review of production quantities (especially more involved throughput based products AB-CWB, AGPI)
  – Reporting consistency with quantification requirements
  – Confirmation of QMD completeness consistency with quantification requirements
  – Confirmation back to physical meter readings
  – Confirmation of correct application of benchmarks
Learnings – Deviation Requests

• Reminders
  – Where you are unable to fully implement the prescribed quantification requirement a deviation request can be made.
  – Deviations do not cover cases the prescription can be applied but is not preferred.
  – Where the prescribed quantification is not followed and no deviation is in place a verification finding should result.
  – Deviations are time limited and part of the request is to outline how the prescription can be met in subsequent reporting.
  – This is also a very useful feedback for us to understand areas where the quantification is not immediately implementable and may sometimes lead to updates to the quantification requirements.
Learnings – Confidentiality

• Reminders
  – Suggest: When requesting confidentiality in the form, include a request letter.
  – Letter should clearly justify how the data requested meets the criteria under the regulation.
  – We will reject unjustified requests. Please review our decision letter.
Learnings – Indirect Emissions Reporting Went Well

- Reporting of indirect quantities a fairly new requirement.
  - Hydrogen, Heat and Electricity imports
- In general this went well and we had good agreement between suppliers and consumers.
- We will again be confirming alignment in 2020 submissions.
Questions?
Obtaining Verification

Verification Requirements
Verification Requirements

• All facilities (including opted in facilities) regulated under TIER must hire a third party assurance provider to verify their compliance report

• Purpose of verification is to provide assurance to the department that there are no material errors in the facility’s compliance report

• For the compliance submission on June 30, 2021, the facility is required to submit a verification report including:
  – Statement of Verification
  – Statement of Qualifications
  – Conflict of Interest Form

• Approx. 460 facilities require verifications for 2020 more than doubling from 2019

• Verifications may take up to 6 to 8 weeks or more to complete depending on site complexity. Start early.
Verification Requirements

- Standard for Validation, Verification, and Audit outlines the requirements for the verification process
- Highlights of a verification process:
  - Conflict of Interest (COI) assessment (COI form)
  - Execution of contract
  - Provision of complete materials included in the verification process (CR, QMD, calculations, etc.)
  - Verification plan (including risk assessment and sampling plan)
  - Data and information request
  - Site visit
  - Review and analysis of data and information gathered
  - Develop and communicate findings and issues
  - Resolve and finalize issues and findings
  - Verification report (report template)
Verification Requirements

• Verifiers are required to conduct a site visit unless otherwise authorized by the director.

• Due to COVID-19, the director granted authorization to verifiers to conduct “virtual” site visits up to September 1, 2021:
  – 2020 Compliance reports
  – Benchmark applications
  – Emission offset project reports

• Requirements of a virtual site visit are provided in the verification standard.
Verification Requirements

• Part 1 outlines the mandatory requirements for third party assurance providers and auditors
  – Facilities are responsible to ensure that the selected verifier meets regulatory requirements
  – Additionally, verifiers are required to complete verification training in order to conduct verifications of 2020 compliance reports

• Contraventions of the following are offences under the regulation:
  – 7(5), 15(6), 17(5) – third party assurance providers must follow the Standard for Validation, Verification, and Audit
  – 33(f), 33(g) – the facility and third party assurance provider responsible for ensuring the third party assurance provider meet qualification requirements
Verification Requirements

• Verifiers may only conduct verifications for:
  – A regulated facility for 5 consecutive years followed by a two year break
  – An emission offset project report for 5 consecutive reporting periods followed by a two reporting period break

• Regulation requires a positive opinion in the Statement of Verification

• Qualified opinions are reviewed on a case-by-case basis

• Verification report template used for verifications of compliance reports or emission offset project reports:
Verification Requirements – Risk Areas

- Production and Imports of Heat, Hydrogen and Electricity
- Source data
- Quantification methodologies
- Total error quantification and materiality assessment
- Working papers and documentation requirements
Government Re-Verifications

- Re-verification are conducted by the department on a portion of submissions (compliance reports and emission offset project reports)
- Facilities and projects are selected based on a risk-based and random selection process
- The department establishes master agreements with verifiers and issues statements of work for annual re-verifications
- Generally, the process follows the verification standard with some specific focuses based on individual facilities and projects
- Anticipate initiating reverifications of 2019 and 2020 compliance reports in Summer 2021
Questions?
Alberta Greenhouse Gas Quantification Methodologies (AQM)
AQM Objectives

- Provide consistent and standardized approach to quantifying emissions, production and other reported parameters
- Provide level playing field for facilities within the same sector and across all sectors
- Standardize benchmarking approaches for regulated facilities
- Align with federal greenhouse gas reporting where appropriate
Mandatory Quantification Methodologies

- Mandatory Quantification Methodologies for 2020
  - Chapter 1 – Stationary Fuel Combustion
  - Chapter 4 – Venting
  - Chapter 5 – On-Site Transportation
  - Chapter 8 – Industrial Processes
  - Chapter 12 – Imports
  - Chapter 13 – Production
  - Chapter 14 – Carbon Dioxide Emissions from Combustion of Biomass
  - Chapter 15 – Aggregate Facilities
  - Chapter 16 – Cogeneration Benchmark Calculation
  - Chapter 17 – Measurements, Sampling, Analysis and Data Management
Mandatory Quantification Methodologies

- Mandatory Quantification Methodologies for 2020
  - Appendix A – References
  - Appendix B – Fuel Properties
  - Appendix C – General Calculation Instructions
  - Appendix D – Conversion Factors
  - Appendix E – Additional Information for the Alberta Gas Processing Index

- Facilities may submit deviation requests to the department to propose alternative method
  - Department will provide a time limited approval letter to facility if deviation request is accepted.
AQM Updates

• Chapter 2 Flaring
  – Draft chapter will be posted soon, but will not be mandatory until 2022

• Chapter 3 Fugitives
  – Draft chapter anticipated for posting later 2021

• Chapter 10 Formation CO₂
  – Removed as individual source category for TIER
  – Report emissions under the respective categories
Emissions by Source Category and Emission Type

**Key Point**
SFC emissions represent the majority of emissions emitted by regulated facilities.
Emissions by Sector and Source Category

% emissions by sector by source category [2019]
Emissions by Sector and Emission Type

% emissions by sector by source category [2019]
Level Classifications

• Levels for TIER regulated facilities are provided in the *Standard for Completing Greenhouse Gas Compliance and Forecasting Reports*

<table>
<thead>
<tr>
<th></th>
<th>Carbon Dioxide</th>
<th>Methane</th>
<th>Nitrous Oxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary Fuel Combustion</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Flaring</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

• Levels for SGRR regulated facilities are provided in the *Specified Gas Reporting Standard*
Level Classifications for Carbon Dioxide

- Alberta Greenhouse Gas Quantification Methodologies (AQM) (2020 & beyond)

<table>
<thead>
<tr>
<th>Fuel Types</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 3A(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Variable</td>
<td>Method 1-1</td>
<td></td>
<td>Method 1-5</td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>Method 1-2</td>
<td>Method 1-3 or Method 1-4</td>
<td>Method 1-5</td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Method 1-3 or Method 1-4</td>
<td>Method 1-5</td>
<td>Method 1-5</td>
<td></td>
</tr>
</tbody>
</table>

- Quantification Methodologies for the CCIR and SGRR (2018 & 2019)
CO₂ - Method 1-1 Non-Variable Fuels

• Applicable for:
  – Non-variable fuels
  – Levels 1 to 3

• Requirements:
  – Emission factors
  – Fuel property or third party data (e.g. HHV) is available
  – Missing data procedures
  – Invoices
  – Data consistency
  – Reconciliations with source data
  – Volumes at standard conditions

\[
CO₂_p = v_{\text{fuel}p} \times \text{HHV} \times EF_{\text{ene}}
\]

\[
CO₂_p = v_{\text{fuel}p} \times E_{\text{vol}} \text{ or } E_{\text{ENEfuel}p} \times EF_{\text{ene}}
\]
CO₂ - Method 1-2 High Heating Value Correlation

- **Applicable for:**
  - Natural gas
  - Levels 1 and 2
  - Regulated facilities under SGRR (not TIER)

- **Requirements:**
  - Emission factors
  - Fuel properties or third party data (e.g. HHV)
  - Missing data procedures
  - Invoices
  - Data consistency
  - Reconciliations with source data
  - Volumes at standard conditions

\[
CO_{2,p} = v_{fuel,p} \times (60.554 \times HHV_p - 404.15) \times 10^{-6}
\]  
Equation 1-2

Level of deficiencies identified in verifications:
- RED → HIGH
- ORANGE → MEDIUM
- BLACK → LOW
**CO₂ - Method 1-3 Variable Fuels**

- **Applicable for:**
  - Level 3
  - Variable fuels (including natural gas)
  - Regulated facilities under TIER

- **Requirements:**
  - Carbon content (cc) and HHV calculations
  - Factors, parameters, and constants
  - Invoices
  - Missing data procedures
  - Weighted averages
  - Data consistency
  - Reconciliations with source data
  - Volumes at standard conditions

\[
CO₂_{p} = v_{fuel(gas),p} \times CC_{gas,p} \times 3.664 \times 0.001 \\
CO₂_{p} = \frac{EN_{fuel(gas),p} \times CC_{gas,p} \times 3.664 \times 0.001}{HHV} \\
CO₂_{p} = v_{fuel(liq),p} \times CC_{liq,p} \times 3.664 \\
CO₂_{p} = m_{fuel(sol),p} \times CC_{sol,p} \times 3.664
\]

Equation 1-3a
Equation 1-3b
Equation 1-3c
Equation 1-3d

Level of deficiencies identified in verifications:
- RED → HIGH
- ORANGE → MEDIUM
- BLACK → LOW
**CO₂ - Method 1-4 Mass Balance**

- **Applicable for:**
  - Level 3
  - Variable fuels
  - One source with unknown quantity of fuel/emissions

- **Requirements:**
  - Known sources using Methods 1-1 and 1-3
  - Total mass of carbon

---

\[
CM_{source,i,p} = CM_{facility,p} - \sum_n CM_{known\ source,n,p}
\]

\[
CM_{facility,p} = v_{fuel, facility,p} \times CC_{gas, facility,p} \times 0.001 \quad \text{or}
\]

\[
CM_{known\ source,n,p} = v_{fuel, known\ source,n,p} \times CC_{gas, known\ source,n,p} \times 0.001
\]

\[
CO_{2,p} = CM_{source,i,p} \times 3.664
\]

---

**Level of deficiencies identified in verifications:**
- RED $\rightarrow$ HIGH
- ORANGE $\rightarrow$ MEDIUM
- BLACK $\rightarrow$ LOW
CO$_2$ - Method 1-5 Continuous Emissions Monitoring System (CEMS)

• **Applicable to:**
  – Level 3A
  – Only available when facility is unable to apply a level 3 method

• **Requirements:**
  – Operating CEMS for another regulatory requirement (i.e. EPEA approval)
  – O$_2$ monitor could be used for specific fuels, and installed before January 1, 2012
  – AB CEMS code is being updated
Level Classifications for Methane and Nitrous Oxide

• Alberta Greenhouse Gas Quantification Methodologies (2020 & beyond)
  – Methods applicable for any level

• Quantification Methodologies for the CCIR and SGRR (2018 & 2019)
CH$_4$ and N$_2$O – Method 1-6 Default Emission Factors

- **Applicable for:**
  - Fuels listed in Tables 1-2 to 1-7

- **Requirements:**
  - Emission factors
  - Fuel property or third party data (e.g. HHV)
  - Missing data procedures
  - Invoices
  - Data consistency
  - Reconciliations with source data
  - Volumes at standard conditions
  - Steam, boiler efficiency

\[
\begin{align*}
CH_4 & \text{ or } N_2O = Fuel_p \times HHV \times EF_{ene} \\
CH_4 & \text{ or } N_2O = Fuel_p \times EF_{vol} \text{ or } EF_{ene} \\
CH_4 & \text{ or } N_2O = Steam \times B \times EF
\end{align*}
\]
CH₄ and N₂O – Method 1-6 Default Emission Factors

- Table 1-2: Sector based default CH₄ and N₂O emission factors for natural gas
- Table 1-3: Technology based default CH₄ and N₂O emission factors for natural gas
- Table 1-4: Default CH₄ and N₂O for liquid fuels
- Table 1-5: Default CH₄ and N₂O emission factors for solid fuels
- Table 1-6: Default CH₄ and N₂O emission factors for biomass fuels
- Table 1-7: Default CH₄ and N₂O emission factors for gaseous fuels
CH₄ and N₂O - Method 1-7 CEMS

• Applicable for:
  – Level 3

• Requirements:
  – Operating CEMS for another regulatory requirement (i.e. EPEA approval)
  – AB CEMS code is being updated
Venting Emissions

• Venting emissions represent smaller % of regulated emissions. Emissions are predominantly in the upstream oil and gas sector (UOG) and pipeline transmission sector.

• Venting emissions consist mainly of CH₄ and CO₂ emissions
  – Level classification for CH₄ is 2
  – Level classification for CO₂ is 3

• Venting methods for CH₄ and CO₂ are typically the same so acceptable for use under levels 2 and 3.

• CO₂ entrained in fuel was previously classified as formation CO₂. These emissions should now be reported under venting.
# Venting Quantification Methodologies

## Process Operations with Venting Emissions

<table>
<thead>
<tr>
<th>Operation</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produced Gas and UOG Facilities</td>
<td>Acid Gas Removal and Sulphur Recover Units</td>
</tr>
<tr>
<td>Solid Desiccant Dehydrators</td>
<td>Hydrocarbon Liquid Loading/Unloading</td>
</tr>
<tr>
<td>Pigging and Purges</td>
<td>Oil Water Separators</td>
</tr>
<tr>
<td>Atmospheric Liquid Storage Tanks</td>
<td>Produced Water Venting</td>
</tr>
<tr>
<td>Pneumatic Controls</td>
<td>Well Tests, Completion, and Workovers</td>
</tr>
<tr>
<td>Pneumatic Pumps</td>
<td>Process System Blowdowns</td>
</tr>
<tr>
<td>Compressor Seals</td>
<td>Gas well Liquids Unloading</td>
</tr>
<tr>
<td>Glycol Dehydrator</td>
<td>Engine and Turbine Startups</td>
</tr>
<tr>
<td>Glycol Refrigeriation</td>
<td></td>
</tr>
</tbody>
</table>
Venting

- **Requirements:**
  - Gas compositions must be measured using:
    - A method prescribed by AER Directives for UOG facilities;
    - An analytical method prescribed in Section 17.3 of Chapter 17.
  - Quarterly sampling frequency (if not prescribed for a method)
  - Facilities may use fuel gas composition if representative of the vented gas.
  - Facilities should follow meter installation, calibrations, vent rate measurement and vapor composition sampling frequencies required by AER Directives. Non-UOG facilities may follow industry best practices.
  - Volume measurements must be adjusted to standard conditions as defined in Appendix C.
On-Site Transportation

Chapter 5
Onsite Transportation (OST) Emissions

• Generally, same methods and equations applied as for stationary fuel combustion
  – CO₂ emissions based on gas composition or for non-variable fuels such as gasoline or diesel, default emission factors may be used
  – CH₄ and N₂O emission factors are based on 2018 National Inventory Report (NIR)

• TIER does not intend to double price fuels. If fuels have already been subject to levy, these emissions do not need to be reported or included in TRE.

• Facility may apply an alternative and conservative methodology to estimate emissions if considered to be negligible.
Industrial Process Emissions

Chapter 8
Chapter 17
Appendices A, B, and C
# Industrial Process Emissions by Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Industrial Process Emissions (2019 Reporting Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tonnes CO₂e</td>
</tr>
<tr>
<td>Agroindustry</td>
<td>-</td>
</tr>
<tr>
<td>Chemical</td>
<td>1,578,263</td>
</tr>
<tr>
<td>Coal Mines</td>
<td>-</td>
</tr>
<tr>
<td>Distilling</td>
<td>-</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>1,344,185</td>
</tr>
<tr>
<td>Food Processing</td>
<td>2,496</td>
</tr>
<tr>
<td>Forest Products</td>
<td>3,208</td>
</tr>
<tr>
<td>Gas Plant</td>
<td>-</td>
</tr>
<tr>
<td>In Situ</td>
<td>-</td>
</tr>
<tr>
<td>Landfill</td>
<td>-</td>
</tr>
<tr>
<td>Metals</td>
<td>89,930</td>
</tr>
<tr>
<td>Mineral</td>
<td>1,437,573</td>
</tr>
<tr>
<td>Oil Sands</td>
<td>3,812,614</td>
</tr>
<tr>
<td>Pipeline</td>
<td>-</td>
</tr>
<tr>
<td>Power Generation</td>
<td>-</td>
</tr>
</tbody>
</table>
Industrial Process CO$_2$ Methods

Hydrogen Production Methods

- Direct feed oxidation

\[
CO_{2p} = \sum_{i=1}^{N} (v_{\text{Feed,}i} \times EF_{CO_2, i}) \times 0.001
\]

Equation 8-1

\[
EF_{CO_2, i} = \sum_{k=1}^{K} (MF_{k, i} \times NC_k) \times \rho_{CO_2}
\]

Equation 8-1a

- CO$_2$ mass balance

\[
CO_2 = CO_2 \text{ in Raw Unpurified H}_2 \text{ stream} - CO_2 \text{ in feed}
\]

\[
CO_{2, p} = \sum_{i=1}^{N} (v_{\text{RawH}_2, i} \times MF_{CO_2, \text{RawH}_2, i} - v_{\text{Feed,}i} \times MF_{CO_2, \text{Feed,}i}) \times \rho_{CO_2} \times 0.001
\]

Equation 8-2
Industrial Process CO$_2$ Methods

Hydrogen Production Methods

• Hydrogen feed calculation

\[
CO_{2p} = \sum_{i=1}^{N} \left( \frac{v_{H_2,i}}{\sum_{k=1}^{N} (SR_{H_2/CO_2,k} \times MF_{k,i})} \right) \times p_{CO_2} \times 0.001
\]

Equation 8-3

• CO$_2$ emissions from mass balance

\[
CO_{2p} = (v_{total,p} - v_{SFC,p}) \times CC_{gasp} \times 3.664 \times 0.001
\]

Equation 8-4a

\[
CO_{2p} = \frac{ENE_{total,p} - ENE_{SFC,p}}{HHV} \times CC_{gasp,p} \times 3.664 \times 0.001
\]

Equation 8-4b

Table 8-1: Stoichiometric Molar Ratios of Hydrogen to CO$_2$

<table>
<thead>
<tr>
<th>Feed Component</th>
<th>Overall Reaction Equation</th>
<th>SR: H$_2$/CO$_2$ Molar Ratio (mol/molCO$_2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>CH$_4$ + 2H$_2$O $\rightarrow$ CO$_2$ + 4H$_2$</td>
<td>4/1 = 4.000</td>
</tr>
<tr>
<td>Ethylene</td>
<td>C$_2$H$_4$ + 4H$_2$O $\rightarrow$ 2CO$_2$ + 6H$_2$</td>
<td>6/2 = 3.000</td>
</tr>
<tr>
<td>Ethane</td>
<td>C$_2$H$_6$ + 4H$_2$O $\rightarrow$ 2CO$_2$ + 7H$_2$</td>
<td>7/2 = 3.500</td>
</tr>
<tr>
<td>Propylene</td>
<td>C$_3$H$_6$ + 6H$_2$O $\rightarrow$ 3CO$_2$ + 8H$_2$</td>
<td>9/3 = 3.000</td>
</tr>
<tr>
<td>Propane</td>
<td>C$_3$H$_8$ + 8H$_2$O $\rightarrow$ 3CO$_2$ + 10H$_2$</td>
<td>10/3 = 3.333</td>
</tr>
<tr>
<td>Butylmes</td>
<td>C$<em>4$H$</em>{10}$ + 8H$_2$O $\rightarrow$ 4CO$_2$ + 12H$_2$</td>
<td>12/4 = 3.000</td>
</tr>
<tr>
<td>Butanes</td>
<td>C$_4$H$_8$ + 8H$_2$O $\rightarrow$ 4CO$_2$ + 13H$_2$</td>
<td>13/4 = 3.250</td>
</tr>
<tr>
<td>Pentenes</td>
<td>C$<em>5$H$</em>{12}$ + 10H$_2$O $\rightarrow$ 5CO$_2$ + 15H$_2$</td>
<td>15/5 = 3.000</td>
</tr>
<tr>
<td>Pentanes</td>
<td>C$<em>5$H$</em>{10}$ + 10H$_2$O $\rightarrow$ 5CO$_2$ + 16H$_2$</td>
<td>16/5 = 3.200</td>
</tr>
<tr>
<td>Hexanes</td>
<td>C$<em>6$H$</em>{14}$ + 12H$_2$O $\rightarrow$ 6CO$_2$ + 19H$_2$</td>
<td>19/6 = 3.167</td>
</tr>
<tr>
<td>Heptanes</td>
<td>C$<em>7$H$</em>{16}$ + 14H$_2$O $\rightarrow$ 7CO$_2$ + 22H$_2$</td>
<td>22/7 = 3.143</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO + 0.5H$_2$O $\rightarrow$ CO$_2$ + H$_2$</td>
<td>1/1 = 1.000</td>
</tr>
</tbody>
</table>
Industrial Process CO₂ Methods

CO₂ Consumption in Urea Production

• CO₂ generated from ammonia production (i.e. SMR) is then consumed in urea production
• CO₂ consumption in urea production:

\[
CO_{2,\text{Urea}} = m_{\text{Urea}} \times \frac{MW_{\text{CO₂}}}{MW_{\text{Urea}}} \times 0.001
\]

Equation 8-5

• Needed for consistency with methodology in benchmark setting for ammonia and other fertilizer products.
Industrial Process CO$_2$ Methods

CO$_2$ from Calcining Carbonates

• CO$_2$ from calcining calcium and magnesium carbonates

\[
CO_{2-IP,p} = \sum_{i=1}^{I} (m_{p,i} \times EF_{P,i}) + \sum_{j=1}^{N} (m_{w,j} \times EF_{W,j})
\]

Equation 8-8

\[
EF_{P,i} = (CaO_{P,i} - CaO_{FP,i}) \times 0.785 + (MgO_{P,i} - MgO_{FP,i}) \times 1.092
\]

Equation 8-8a

\[
EF_{W,j} = (CaO_{W,j} - CaO_{FW,j}) \times 0.785 + (MgO_{W,j} - MgO_{FW,j}) \times 1.09
\]

Equation 8-8b

\[
CO_{2,p} = m \times TOC \times 3.664
\]

Equation 8-9

• CO$_2$ from calcining carbonates in pulp mills

\[
CO_{2,p} = \sum_{i=1}^{N} (m_{i} \times EF_{i} \times F_{i})
\]

Equation 8-10
Industrial Process $\text{CO}_2$ Methods

$\text{CO}_2$ from Use of Carbonates

• Level 1 – Carbonate Consumption method
  – As per $\text{CO}_2$ from calcining carbonates in pulp mills.

• Level 3 – Carbonate mass balance method

\[
\text{CO}_2,p = \sum_{i=1}^{N} (m_{in} - m_{out}) \times EF_i
\]

Equation 8-11

Table 8-2: Default carbonate $\text{CO}_2$ emission factors

<table>
<thead>
<tr>
<th>Mineral Name</th>
<th>Formula</th>
<th>$\text{CO}_2$ Emission Factor ( tonnes $\text{CO}_2$/tonnes Carbonate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limestone</td>
<td>$\text{CaCO}_3$</td>
<td>0.43971</td>
</tr>
<tr>
<td>Magnesite</td>
<td>$\text{MgCO}_3$</td>
<td>0.52197</td>
</tr>
<tr>
<td>Dolomite</td>
<td>$\text{CaMg(CO}_3\text{)}_2$</td>
<td>0.47732</td>
</tr>
<tr>
<td>Siderite</td>
<td>$\text{FeCO}_3$</td>
<td>0.57087</td>
</tr>
<tr>
<td>Ankerite</td>
<td>$\text{Ca(Fe,Mg,Mn)(CO}_3\text{)}_2$</td>
<td>0.47572</td>
</tr>
<tr>
<td>Rhodochrosite</td>
<td>$\text{MnCO}_3$</td>
<td>0.38286</td>
</tr>
<tr>
<td>Sodium Carbonate/Soda</td>
<td>$\text{Na}_2\text{CO}_3$</td>
<td>0.41492</td>
</tr>
<tr>
<td>Ashi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Industrial Process CO₂ Methods

CO₂ from Use of Carbonates
- Level 4 – Measured CO₂ emission factor method

\[ CO_{2,p} = \sum_{i=1}^{N} (m_i \times EF_i) \]

Equation 8-12

\[ EF_i = \frac{ME_{CO₂}}{AL} \]

Equation 8-13
Industrial Process CO$_2$ Methods

- CO$_2$ from ethylene oxide production

\[
CO_{2p} = \left( \sum_{i=1}^{N} \left[ m_{C2H4\text{ feed},i} - m_{C2H4\text{ loss},i} - \left( m_{EO,i} \times \frac{78.06}{44.05} \right) \right] \right) / 2 \times 44.01 \quad \text{Equation 8-14}
\]

\[
m_{C2H4\text{ loss}} = Q_{\text{vent}} \times C_{C2H4} / 1000 \quad \text{Equation 8-14a}
\]

\[
m_{EO,p,i} = m_{\text{MEG}} \times 0.710 + m_{\text{DEG}} \times 0.830 + m_{\text{TEG}} \times 0.880 + m_{\text{HG}} \times a + m_{\text{GW}} \times b \quad \text{Equation 8-14b}
\]

- CO$_2$ from use of carbon as reductant

\[
CO_{2p} = m_{c} \times 3.664 \quad \text{Equation 8-15}
\]
Industrial Process N$_2$O Methods

Nitric Acid Production

• Level 1 – Method 8-1: N2O emission factor method for systems with abatement downtime

\[
N_2O_p = m_{FNA} \times EF_{N2O,NAO} \times (1 - (DF_{N2O} \times AF_{N2O})) \times 0.001 \quad \text{Equation 8-16}
\]

\[
DF_{N2O} = \frac{(CN_{2O,N2O,N2O} - CN_{2O,N2O,N2O} - CN_{2O,N2O,N2O})}{CN_{2O,N2O,N2O}} \times 100\% \quad \text{Equation 8-16a}
\]

\[
EF_{N2O,NAO} = \frac{\sum_{i=1}^{N} \frac{Q_{NAO,i} \times CN_{2O,N2O,NAO,i}}{PR_{NA,i}}}{N} \times 1.861 \times 10^{-6} \quad \text{Equation 8-16b}
\]

\[
AF_{N2O} = \frac{PR_{NA,Abate}}{PR_{NA,Total}} \quad \text{Equation 8-16c}
\]
Industrial Process N₂O Methods

Nitric Acid Production

• Level 2 – Method 8-2: N₂O emission factor method for direct stack test

  \[
  N_2O_p = m_{PNA} \times EF_{N2O,NAS} \times 0.001
  \]
  \[
  EF_{N2O,NAS} = \frac{\sum_{i=1}^{N} \frac{Q_{NAS,i} \times C_{N2O,NAS,i}}{T_{NA,i}} \times 1.861 \times 10^{-6}}{N}
  \]

  Equation 8-17
  Equation 8-17a

  \[
  N_2O_p = \sum_{i=1}^{T} \left[ V e l_{i} \times A r e a_{\alpha} \times C_{N2O,i} \times \left( \frac{P_{ext} \times 288.15}{191.325 \times T_{ext}} \right) \right] \times \frac{MW_{N2O}}{28.015} \times 0.001
  \]

  Equation 8-18

• Level 3 - CEMS
Industrial Process Methods

• Requirements:
  – Fuel property calculations (e.g. cc, HHV, SR)
  – Factors, parameters, constants
  – Invoices
  – Missing data procedures
  – Weighted averages
  – Data consistency
  – Reconciliations with source data
  – Volumes at standard conditions
Break 10 minutes
Production

Chapter 13
Production

- Products under TIER have a facility-specific benchmark (FSBs) and/or high performance benchmark (HPBs)
  - TIER requires facilities to use the higher benchmark
  - TIER provides HPBs for products (Schedule 2)
  - AQM provides further description some of these products
  - Products with only FSBs are not provided in TIER or AQM
  - Not all FSBs are based on products sold (i.e. intermediate products)

- Products regulated by another organization
  - Electricity – Alberta Electric System Operator (AESO)
  - Mining bitumen – Alberta Energy Regulator (AER) (ST39 and Petrinex)
  - In Situ bitumen - AER (ST53 and Petrinex)
  - ABGPI – AER (fuels consumed and produced is reported in Petrinex)
# Production

## Products with Facility-Specific Benchmarks and/or High Performance Benchmarks (2019)

<table>
<thead>
<tr>
<th>*ABGPI (natural gas processing)</th>
<th>*Hydrogen</th>
<th>Polyethylene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>Hydrogen Peroxide</td>
<td>Propane\Butane Mix</td>
</tr>
<tr>
<td>Ammonium Nitrate</td>
<td>*Industrial Heat</td>
<td>Quicklime</td>
</tr>
<tr>
<td>Ammonium Sulphate</td>
<td>Isooctane</td>
<td>Refine Bleach Deodorize</td>
</tr>
<tr>
<td>Biodiesel</td>
<td>Pipeline Transmission</td>
<td>Refined Vegetable Oil</td>
</tr>
<tr>
<td>Bituminous Coal</td>
<td>Linear Alpha Olefins</td>
<td>*Refining AB-CWB</td>
</tr>
<tr>
<td>Carbon Black</td>
<td>Live Weight of Cattle</td>
<td>*Softwood Kraft pulp</td>
</tr>
<tr>
<td>Cement</td>
<td>Magnesia</td>
<td>Styrene</td>
</tr>
<tr>
<td>Crude Vegetable</td>
<td>Methane</td>
<td>Sub-Bituminous Coal</td>
</tr>
<tr>
<td>Crude Super Degum</td>
<td>Mono Ammonium Phosphate</td>
<td>Sugar</td>
</tr>
<tr>
<td>*Electricity</td>
<td>Natural Gas Liquids</td>
<td>Super Degummed Oil</td>
</tr>
<tr>
<td>Ethanol</td>
<td>Nickel + Cobalt</td>
<td>Sulphuric Acid</td>
</tr>
<tr>
<td>Ethylene Glycol</td>
<td>*In-Situ Bitumen</td>
<td>Unrefined Oil</td>
</tr>
<tr>
<td>Fertilizer Products</td>
<td>*Mining Bitumen</td>
<td>*Upgrading AB-CWB</td>
</tr>
<tr>
<td>Hardwood Kraft Pulp</td>
<td>Partially Calcined By-Product</td>
<td>Urea</td>
</tr>
<tr>
<td>High Value Chemicals</td>
<td>Phosphoric acid</td>
<td></td>
</tr>
</tbody>
</table>

*Products that are regulated by another organization (i.e. AESO, AER).
# High Performance Benchmarks

<table>
<thead>
<tr>
<th>Products with High Performance Benchmarks</th>
<th>Unit</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>Tonnes</td>
<td>Specified at least 99% of ammonia by mass</td>
</tr>
<tr>
<td>Ammonium Nitrate</td>
<td>Tonnes</td>
<td>Specified at least 99% of ammonium nitrate by mass</td>
</tr>
<tr>
<td>Bituminous Coal</td>
<td>Tonnes</td>
<td>Clean Coal as per facility sales specification</td>
</tr>
<tr>
<td>Cement</td>
<td>Tonnes</td>
<td>Cement and additives without specification</td>
</tr>
<tr>
<td>Electricity</td>
<td>Megawatt hours (MWh)</td>
<td>AESO requirements for electricity export to grid or to another facility</td>
</tr>
<tr>
<td>Ethylene Glycol</td>
<td>Tonnes</td>
<td>Per regulation</td>
</tr>
<tr>
<td>Hardwood Kraft Pulp</td>
<td>Air Dried Metric tonnes (ADMt)</td>
<td>Air Dry Metric Tonnes – 10% moisture by mass of hardwood pulp</td>
</tr>
<tr>
<td>High Value Chemicals (HVC)</td>
<td>Tonnes</td>
<td>Per regulation</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Tonnes</td>
<td>Mass of hydrogen excluding impurities.</td>
</tr>
<tr>
<td>Industrial Heat</td>
<td>Gigajoules (GJ)</td>
<td>Heat exported to a third party per regulation.</td>
</tr>
<tr>
<td>Oil Sands In Situ Oil Bitumen</td>
<td>Cubic meter of bitumen</td>
<td>As per AER ST39</td>
</tr>
<tr>
<td>Oil Sands Mining Bitumen</td>
<td>Cubic meter of bitumen</td>
<td>As per AER ST39</td>
</tr>
<tr>
<td>Refining and Upgrading</td>
<td>Alberta Complexity-Weighted Barrel</td>
<td>Adapted from CAN-CWB</td>
</tr>
<tr>
<td>Softwood Kraft Pulp</td>
<td>Air Dried Metric tonnes (ADMt)</td>
<td>Air Dry Metric Tonnes – 10% moisture by mass of softwood pulp</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>Alberta Gas Processing Index</td>
<td>Benchmarking based on a modular approach for different processes.</td>
</tr>
</tbody>
</table>
Production Quantification Methodologies

- General approach for quantification of production (unless otherwise specified)
  - Production data
    - Direct measurements
    - Accounting and/or third party sales records (excluding refining, in-situ, oil sands, ABGPI)
  - Accounting / sales data with an inventory adjustment
Verification of Production

• Evaluation of evidence of production is critical
  – What is the source of the evidence or documentation?
  – Is the documentation based on the facility data management system?
  – If so, what is the source of the data?
  – Have facility controls been tested adequately?
  – Are there accounting records or third party documentation to confirm quantities sold?
  – Be careful of “Black Box” production accounting
Alberta Complexity Weighted Barrel (AB-CWB)

- AB-CWB has three components:

  \[ \text{AB-CWB} = \frac{(\text{CWB}_\text{pro} + \text{CWB}_\text{off} + \text{CWB}_\text{non}) \times \text{Days}}{1000} \]  
  \[ \text{Equation 13.14-18} \]

  1. CWBpro

  \[ \text{CWB}_\text{pro} = \sum_{u=1}^{U} \text{Daily Throughput Barrel}_u \times \text{CWB Factor}_u \]  
  \[ \text{Equation 13.14-17} \]

  2. CWBoff

  Total Input Barrels are defined as all raw material inputs to the refinery less transfers of raw materials from the refinery.

  \[ \text{CWBoff [bbl/cd]} = 0.327 \times \text{Total Input Barrels} + 0.0085 \times \text{CWBpro} \]

  3. CWBnon

  Non-crude input barrels includes the total input raw material processed by the refinery other than crude or other materials entering the atmospheric distillation unit.

  \[ \text{CWBnon [bbl/cd]} = 0.44 \times \text{Non-Crude Input Barrels} \]
Alberta Complexity Weighted Barrel (AB-CWB) – CWBpro

- **CWBpro:** \[ CWB_{pro} = \sum_{u=1}^{U} \text{Daily Throughput Barrel}_u \times \text{CWB Factor}_u \]

  - Largest contributor, when present, to the CWBpro is the FCCU, where the %vol factor based on the Grace-Davison method.
%Volume of Coke on Catalyst

- Simple math (Section 13.14.3), but with +20 important variables that require measurements and calculations.

- Calculation principles
  - Gas analysis from the flue gas (CO$_2$, CO, O$_2$, NO, NO$_2$, O$_2$)
  - Air feed and properties to calculate dry air
  - Flue gas flow is calculated from flue gas and mass balance pivoted on N$_2$, Ar and a few negligible components.
  - Coke is calculated, then coke yield having fresh feed volume.

- In addition, the method allows you to calculate CO$_2$ emissions from the FCCU
Alberta Gas Processing Index (ABGPI)

• Method 13-1:
  – Based on calculated material balance instead of direct measured flows due to the lack of instrumentation.

• Method 13-2:
  – Based on actual metering.
### Alberta Gas Processing Index (ABGPI)

<table>
<thead>
<tr>
<th>Module</th>
<th>Stream</th>
<th>Weighting Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
<td>Unit</td>
</tr>
<tr>
<td>1</td>
<td>Inlet Compression</td>
<td>Throughput</td>
</tr>
<tr>
<td>2</td>
<td>Dehydration</td>
<td>Throughput</td>
</tr>
<tr>
<td>3</td>
<td>Gas Sweetening</td>
<td>Throughput</td>
</tr>
<tr>
<td>4</td>
<td>Total Refrigeration</td>
<td>Throughput</td>
</tr>
<tr>
<td>5</td>
<td>Fractionation</td>
<td>Production</td>
</tr>
<tr>
<td>6</td>
<td>Stabilization</td>
<td>Production</td>
</tr>
<tr>
<td>7</td>
<td>Sales Compression</td>
<td>Throughput</td>
</tr>
<tr>
<td>8</td>
<td>Sulphur Plant</td>
<td>Production</td>
</tr>
<tr>
<td>9</td>
<td>Acid Gas Injection</td>
<td>Throughput</td>
</tr>
<tr>
<td>10</td>
<td>Ethane Extraction</td>
<td>Production</td>
</tr>
<tr>
<td>12</td>
<td>CO₂ Plant</td>
<td>Throughput</td>
</tr>
<tr>
<td>13</td>
<td>Flaring, Venting, Fugitives</td>
<td>Production</td>
</tr>
</tbody>
</table>

Note: Throughputs are based on Petrinex data.

\[ ABGPI = \sum_{u=1}^{U} Throughput \times Factor_u \]
Production

• Requirement:
  – Third party data
  – Throughput and product property calculations, additives, moisture
  – Factors, parameters, constants
  – Invoices
  – Missing data procedures
  – Weighted averages
  – Data consistency
  – Reconciliations
  – Volumes at standard conditions

Level of deficiencies identified in verifications:
- RED → HIGH
- ORANGE → MEDIUM
- BLACK → LOW
Questions?
Methods of True-up
Purchase Emission Offset and/or EPC

Emitter A

Excess GHG Emissions (compliance owed)

Benchmark

Bank or Sell EPC

Reduced GHG Emissions (EPC)

Non-regulated, Unpriced Reduction (Emission Offset)

Pay into the Fund

and/or Purchase Emission Offset and/or EPC

Carbon Market

Emitter B

Emitters

Pay into the Fund and/or Purchase Emission Offset and/or EPC

Excess GHG Emissions (compliance owed)
TEIR Compliance Requirements

Total Regulated Emissions

\[ TRE = DE - ICO_2 + ECO_2 + UCO_2 \]

- ECO2 excludes any carbon dioxide removed from raw gas and disposed of, as an acid gas stream, to an underground formation through a Class III well.
Allowable Emissions

\[ AE = \text{Product Allocations} - \text{Scope Adjustment} \]

\[ AE = \sum (\max(FSB_i_{-y}, HPB_i) \times P_i) - [(HPB_{E-y} \times I_E) + (HPB_{H-y} \times I_H) + (HPB_{HE-y} \times I_{HE})] \]

- AEs cannot be below 0.
- Scope Adjustment for the refining and upgrading sectors does not include hydrogen imports.
- Any exported Electricity, Heat, or Hydrogen would be accounted for as a product in the Production term.
- Cost containment allocation benchmarks would be added to the HPB and FSB benchmarks when reporting.
Net Emissions and True-up Obligation

Net Emissions

- The person responsible for a facility must ensure the net emissions (NE) do not exceed the Allowable Emissions for the facility by truing up
  
  \[ NE = TRE - (EO + EPC + FC) \]
  
  \[ TRE - (EO + EPC + FC) = AE \]

- EO is the quantity of emission offsets in tonnes on a CO\(_2\)e basis,
- EPC is the quantity of emission performance credits in tonnes on a CO\(_2\)e basis,
- FC is the quantity of fund credits in tonnes on a CO\(_2\)e basis, represented by the fund credits

True-up Obligation

\[ True \ up \ Obligation = TRE - AE \]
Contents of Compliance Submission Package

- Completed Compliance Form (Excel workbook)
- Signed Statement of Certification (SoC)
- Verification Report, including
  - Signed Statement of Verification (SoV)
  - Signed Statement of Qualifications (SoQ)
  - Signed Conflict Of Interest Checklist (COI)
- Updated Quantification Methodology Document
- Area Fugitives Report (as required)
- Emissions reduction plan report for facilities with cost containment designation
- Confidentiality request for specified parts of the submission (optional)
Compliance Submission

• Send to AEP.GHG@gov.ab.ca by June 30, 2021
• Payment by cheque
  – Submit a cheque payable to “Government of Alberta” along with the fund credit purchase form:
    Government of Alberta
    Finance and Administration Branch
    Alberta Environment and Parks
    6th floor, South Petroleum Plaza
    9915 108 Street NW
    Edmonton, Alberta
    T5K 2G8
Compliance Submission

- Electronic payment
  - Submit payment by electronic fund transfer and provide the fund credit purchase form at least three business days in advance of the electronic funds transfer

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<th>PA Technology Innovation &amp; Emission</th>
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<tr>
<td>Bank Name</td>
<td>CIBC</td>
</tr>
<tr>
<td>Bank Address</td>
<td>10102 Jasper Avenue Edmonton</td>
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<td>E-mail</td>
<td><a href="mailto:AEP.revenue@gov.ab.ca">AEP.revenue@gov.ab.ca</a></td>
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Using Credits for Compliance

EPCs/Emission Offsets

• Credits must be in a pending retirement state on the registry prior to submission.

• Action on the registry should be submitted 10 business days in advance.

• EPCs must be retired to the facility that are using them to true-up.
  – If you are new to TIER and want to use EPCs for compliance create account and facility on registry.
Forms Walkthrough
Final Question Period

Contact: AEP.GHG@gov.ab.ca