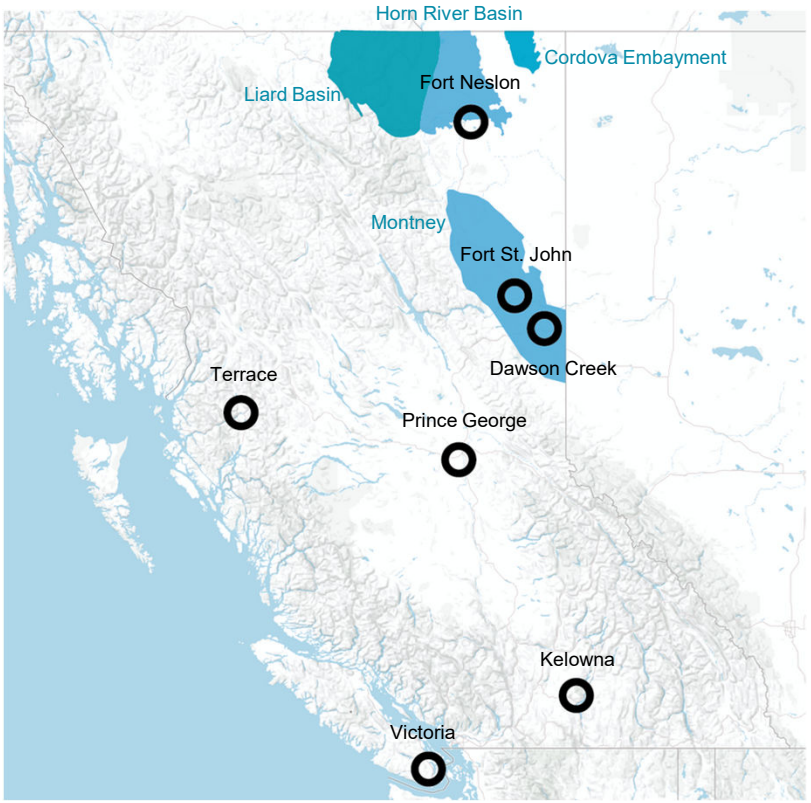
Reducing Methane Emissions from the Oil and Gas Sector

June 2023 Engagement Session

BCER
BRITISH COLUMBIA ENERGY REGULATOR

BCER Office Locations.



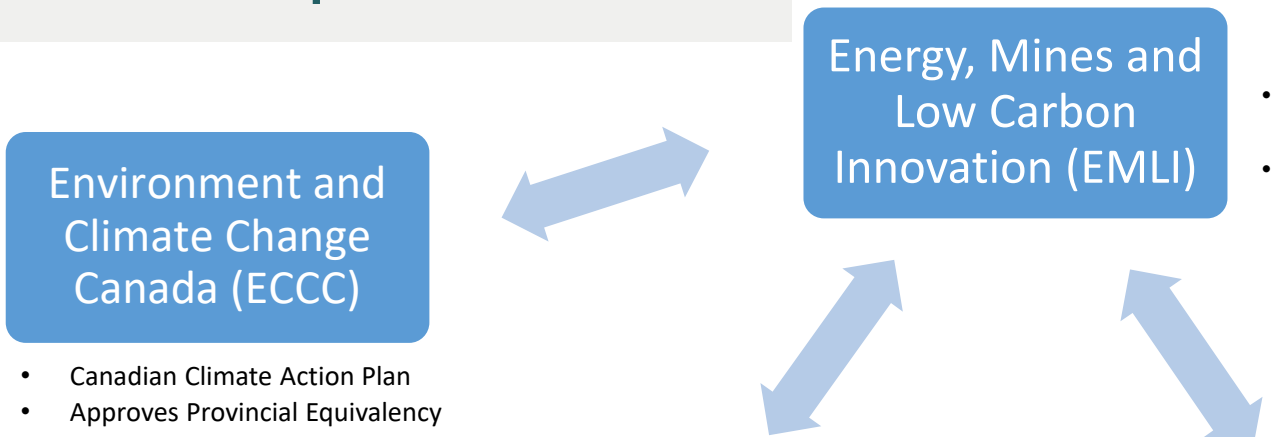
Territorial Acknowledgment

We acknowledge and respect the Coast Salish Lekwungen speaking Peoples on whose traditional territories the office stands and the Songhees, Esquimalt, and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.

Agenda

- Introductions and Objectives
- Provincial Approach
- LDAR Data and Venting Compliance
- BC Methane Emissions Modelling
- Proposed Regulatory Policy
- Regulatory Schedule and Feedback Steps

Government Groups



Presenter:
Michelle Schwab, Executive Director

- Manages methane equivalency agreement with Canada.
- Develops other policy programs to reduce emissions (electrification).

- Canadian Climate Action Plan
- Approves Provincial Equivalency Agreements

Presenter:
Peter Kos, Industrial Methane Lead

- BC greenhouse gas emission reduction targets & climate change adaptation policies.
- GHG inventories and methane modeling.

Presenter:
Kevin Parsonage, Supervisor, Audit & Integrity

- Methane emissions regulation development and implementation.
- Compliance with Regulations.

Objectives

Province's Goal:

- Achieve the provincial target of a 75 per cent reduction in methane emissions from the oil and gas sector by 2030.
- Make progress towards near elimination of methane emission by 2035.
- Achieve equivalent reductions to the proposed federal regulations, as applied to the oil and gas sector in B.C.

Why are you here today? Open and transparent dialogue on ***"HOW" Regulations*** will achieve the goal

LDAR Data and Venting Compliance

Caveat : This is not the final analysis. Final results are expected in December 2023

Presenter: Kevin Parsonage, BCER

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2022 Venting Compliance Assessment

- 19 permit holders

- 2 gas processing plants
- 8 compressor stations
- 10 batteries
- 170 unconventional wells
- 42 conventional wells

- Compressor seal tests
- Pneumatic devices
- Uncontrolled storage tanks

2022 Venting Compliance Assessment

- Compressor seal testing – one non-compliant permit holder

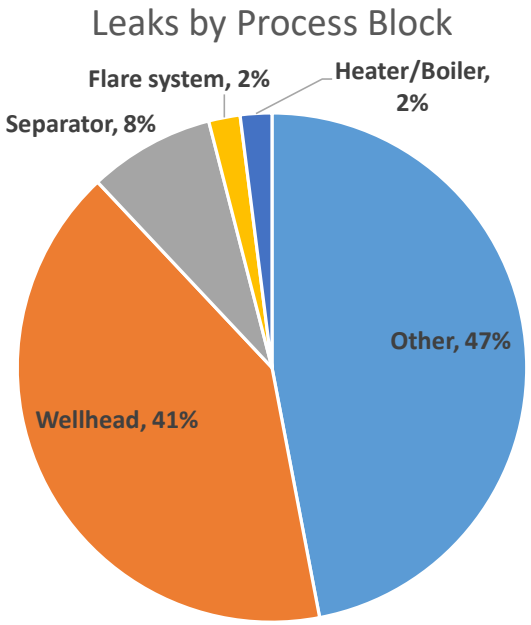
- No uncontrolled storage tanks

- Pneumatic devices -
  - 48 per cent of sites have non-emitting pneumatics
  - 177 low bleed pneumatic devices
  - 5 non-compliant high bleed pneumatic devices
  - No high bleed safety exceptions

LDAR Data – 2022 Wells

	Surveys	# Leaks	Total Leak Volume (m^3/h)	# Leaks / Survey	Leak Volume per Survey	Volume per Leak
Well - Conventional (AVO)	2401	75	13.2	0.03	0.005	0.18
Well - Conventional (OGI)	1104	399	52.5	0.36	0.05	0.13
Well - Unconventional (OGI)	5182	1294	181.5	0.25	0.04	0.14

LDAR Data – 2022 Wells



LDAR Data – 2022 Wells

- 91 per cent of leaks reported as repaired.
- Average 18 days to repair a leak.
- Top performer:
  - 100 per cent of leaks repaired, and
  - 4.8 days average repair timeline.
- 72 per cent of permit holders <30 days average repair timeline.

LDAR Data – 2022 Facilities

Five facility types account for 84 per cent of overall fugitive emissions

- Gas Processing Plants
- Compressor Station / Compressor Dehydrator
- Battery / Processing Battery

Average facility leak is approximately 3.5x the size of the average well leak.

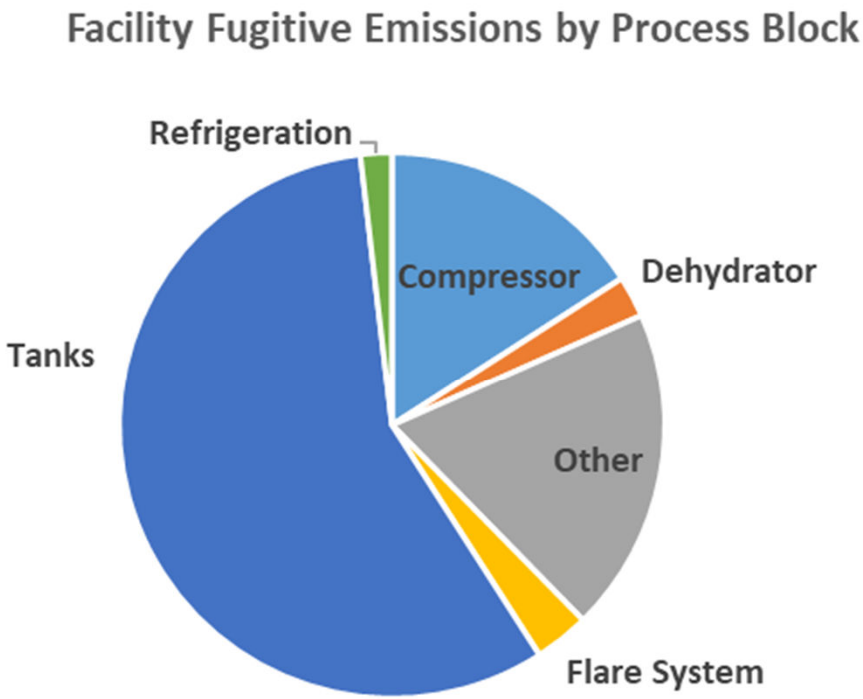
No significant change in leaks / survey from 2021.

LDAR Data – 2022 Facilities

50% of total fugitive emissions are from tanks

16% of total fugitive emissions are from tank thief hatches

12% of total fugitive emissions are from tank Pressure Relief Valves



LDAR Data – 2022 Facilities

Top 10 Permit Holders by Number of Leaks Reported

Operator	% Repaired	Average Days to Repair
A	64%	41
B	80%	79
C	98%	30
D	89%	32
E	99%	18
F	84%	33
G	73%	65
H	52%	111
I	99%	24
J	81%	112

BC Methane Emissions Modelling

Presenter: Peter Kos, CAS

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

BC Oil and Gas Methane Model

- **BC's Model Background and Framework**
- **Modelled Emissions under Current Regulation**
- **Main Methane Sources**

Methane Model Overview

- B.C.’s Modelling Framework created in 2018 to support:
  - Development of B.C.’s methane reduction regulatory framework
  - B.C.’s Federal Equivalency Agreement

- Model Progression
  - Modelling depends on production forecasts, facility/equipment counts and emission factors
  - Largely aligned with ECCC National Inventory Report methodology
    - Prasino 2013
    - Clearstone 2018
    - Cap-Op 2019
  - Integrated recent BC research and data, including:
    - BC Energy Regulator
      - Production Forecast
      - LDAR Reporting Data
    - BC Data
      - Carleton 2021
      - GreenPath 2023

Methane Model Overview

- Model Purpose
  - Continued equivalency with Federal regulation/modelling
  - Provide guidance for regulatory development for 2030 target
  - Track progress toward Provincial targets
  - Provide guidance for policy development for 2035 target

- Uncertainty and Continued Improvement
  - Continue to work with ECCC to align modelling approaches
  - On-going research to further improve model inputs and uncertainty

Methane Model Overview

- B.C.’s Model includes the following sources:
  - Pneumatics
  - Compressor Venting & Combustion Slip
  - Tank Venting
  - Flare Emissions (incl. unit flare)
  - Fugitive Emissions (LDAR)
  - Surface Casing Vent Flow
  - Dehydrator Venting
  - Equipment Blowdowns
  - Liquids Unloading
  - Inactive/Abandoned Wells
  - Distribution System Venting and Fugitives

Methane Model Results

Mt CO_2e	***2014***	*2020*	*2021*	*2022*	*2023*	*2024*	*2025*	*2026*	*2027*	*2028*	*2029*	***2030***
Baseline CH_4 Emissions	**5.1**	4.1	4.0	3.9	3.9	3.9	3.7	3.7	3.6	3.7	3.7	3.7
Current DPR CH_4 Emissions	**5.1**	3.5	3.1	2.8	2.8	2.6	2.4	2.3	2.3	2.2	2.2	2.2
Percent Reduction to 2014	*0%*	*31%*	*39%*	*44%*	*45%*	*50%*	*52%*	*54%*	*55%*	*56%*	*57%*	*57%*

- *Includes recent amendments to DPR*

75% in 2030 requires additional ~0.9 Mt CO2e

Methane Model Results

Mt CO_2e	*2014*	*2021*	*2025*	*2030*
Compressor Exhaust Emissions	1.42	1.10	0.97	0.81
Compressor Venting Emissions	0.79	0.54	0.47	0.42
LDAR Emissions	1.49	0.31	0.28	0.30
Pneumatic Emissions	0.56	0.49	0.32	0.23
Distribution Emissions	0.17	0.12	0.11	0.11
Blowdown Emissions	0.08	0.12	0.09	0.09
SCFV Emissions	0.07	0.07	0.05	0.05
Tanks Emissions	0.10	0.09	0.06	0.05
Flare Emissions	0.32	0.22	0.04	0.05
Abandoned Well Emissions	0.02	0.03	0.03	0.04
Dehy Emissions	0.05	0.02	0.01	0.01
Unloading Emissions	0.00	0.00	0.00	0.00

Proposed Regulatory Policy

Caveat : This is the initial regulatory policy and modeling and more changes are expected in the future with further engagement.

Presenter: Kevin Parsonage, BCER

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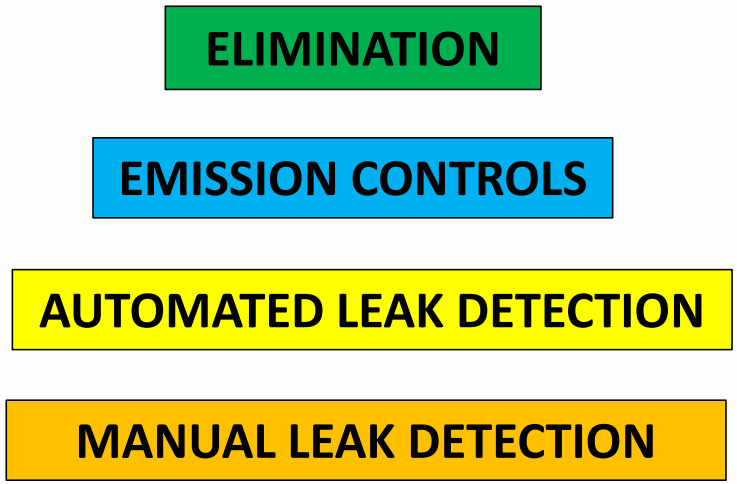
Regulatory Approach

- Distinguish between new and existing facilities.
- Maintain source-based approach.
- Use fleet averages where appropriate.



Emissions Control Options

- Gas Conservation
- Combustion:
  - Fuel
  - Incinerator / Enclosed Combustor
  - Flare
- Design new flare / incinerator / enclosed combustion systems for 98 per cent destruction efficiency.

Decision Tree Approach

- Consideration of:
  - Safety
  - Technical feasibility
  - Economic feasibility
    - Capital / operating costs
    - Net emissions reduction
    - Methane cost based on *provincial carbon price and GWP of methane

**No inference on methane pricing. Assigning a value for calculation purposes only.*

New Facilities and Facility Amendments

- Applies to new facility permits or amendments to increase facility throughput issued after January 1, 2025.

- No routine venting from the following sources:
  - Compressor seals.
  - Pneumatic devices.
  - Pneumatic pumps.
  - Production tanks.
  - Dehydrators.

- Must demonstrate that non-routine venting sources are minimized (maintenance blowdowns, well liquids unloading).

Exceptions

- Intermittent Operation
  - Facilities that operate for less than 60 days per year on a 3-year rolling average.

- Decision tree (safety, technical, economic feasibility).

- Facility amendment to increase throughput - does not apply to well facilities.

Existing Facilities

- Meet requirements for new facilities by Jan 1, 2035.

- No routine venting from the following sources:
  - Compressor seals.
  - Pneumatic devices.
  - Pneumatic pumps.
  - Production tanks.
  - Dehydrators.

- Same exceptions as new facilities:
  - Intermittent operation.
  - Decision tree

Pneumatic Pumps and Devices

- Existing:
  - Reduce emissions from pneumatic devices and pumps by 50 per cent by January 1, 2030, relative to January 1, 2023.
  - Eliminate all emitting devices and pumps by January 1, 2035
- New Facilities:
  - No routine venting
- Exemptions:
  - Emergency Shutdown Devices
  - Decision tree
- Modelling Implications:
  - 0.11 Mt reduction by 2030 compared to current regulation

Compressor Seals

- Existing Facilities (effective January 1, 2025 except where noted):
  - Fleet average 0.3 m^3/throw/hr
  - Maximum 3 m^3/throw/hr
  - No routine venting by January 1, 2035
- New Facilities:
  - No routine venting
- Exemptions:
  - Intermittent operation
  - Decision tree
- Modelling Implications:
  - 0.29 Mt reduction by 2030 compared to current regulation

Compressor Engine Exhaust

- Options to reduce emissions
  - Electrification
  - New installations
  - Rebuilds

- Need to determine appropriate approach (MSAPR, OBPS, DPR)
- Ongoing discussions with vendors

- Modelling Implications:
  - 0.31-0.38 Mt reduction by 2030 compared to current regulation

Glycol Dehydrators

- Existing Facilities:
  - 25 tonnes/year of methane fleet average effective January 1, 2025.
  - No routine venting by January 1, 2035
- New Facilities:
  - No routine venting effective January 1, 2025
- Exemptions:
  - Intermittent operation
  - Decision tree
- Modelling Implications:
  - <0.01 Mt reduction by 2030 compared to current regulation

Uncontrolled Tanks

- Existing Facilities:
  - No routine venting by January 1, 2035
- New Facilities:
  - No routine venting effective January 1, 2025
- Exemptions:
  - Intermittent operation
  - Decision tree
- Modelling Implications:
  - <0.01 Mt reduction by 2030 compared to current regulation

Well Liquids Unloading

- Beginning Jan 1, 2025.
- Control emissions if it is technically feasible.
- Factors to consider for technical feasibility:
  - Safety.
  - Site access for temporary equipment.
  - Site configuration.
- Modelling Implications:
  - <0.01 Mt reduction by 2030 compared to current regulation

Pipeline Blowdowns

- Beginning Jan 1, 2025.
- Control emissions if it is technically feasible.
- Potential factors to consider:
  - Safety.
  - Ability to reduce pressure.
  - Riser configuration.
  - Site access for temporary equipment.
  - Customer supply impacts (for transmission / utilities).
- Applies to planned blowdowns (excludes unplanned non-routine events).
- Modelling Implications:
  - 0.05 Mt reduction by 2030 compared to current regulation

Surface Casing Vent Flows

- Beginning Jan 1, 2025
- Assess for emission control if flow rate ≥ 3m^3/d.
- Must control emissions if:
  - Surface casing is cemented to surface.
  - Surface casing is set below the base of usable groundwater.
  - Buildup pressure does not exceed ½ the formation leak off pressure at the base of the surface casing.
- Control options include:
  - Conservation.
  - Combustion.
  - Burst plate.
- Modelling implications
  - 0.03 Mt reduction by 2030 compared to current regulation

LDAR

- Starting Jan 1, 2025.
- For large facilities (Gas Processing Plants, Compressor Stations, Batteries):
  - 4 times per year OGI (current 3 times per year)
- All other facilities that handle natural gas:
  - 1 time per year OGI (current, there are small subset that can do AVO).
- Inactive wells
  - 1 time per year AVO (new).
- Explicit alt-LDAR language

LDAR

- Starting Jan 1, 2028.
- Controlled storage tanks:
  - Must install a thief hatch leak monitoring system (new).

- Starting Jan 1, 2030.
- All active oil and gas wells:
  - 1 time per year OGI (Current -conventional wells are AVO)

- Modelling Implications:
  - 0.13 Mt (0.09 Mt is tank monitoring) reduction by 2030 compared to current regulation

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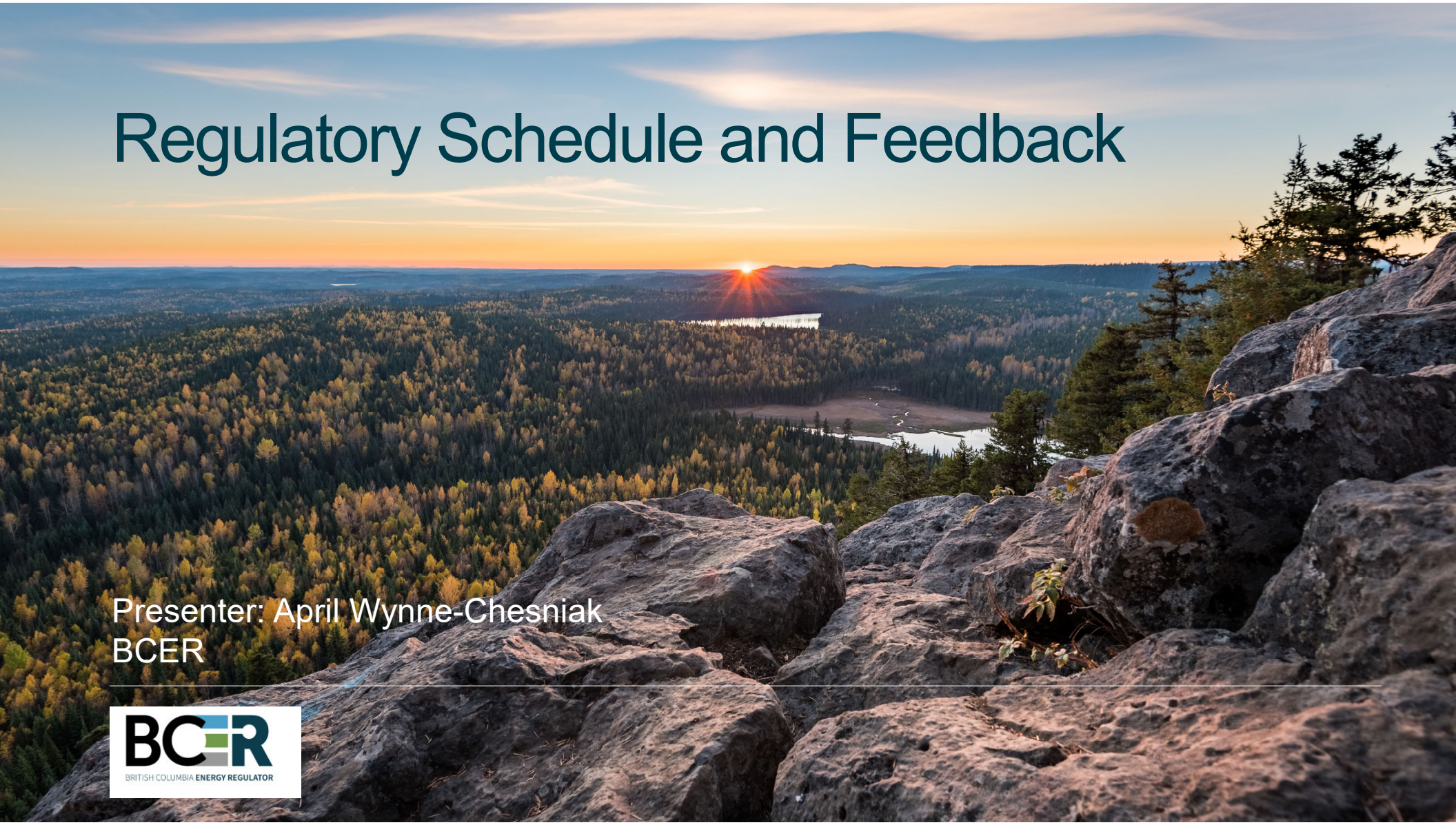
Regulatory Schedule and Feedback



Presenter: April Wynne-Chesniak
BCER

BRITISH COLUMBIA ENERGY REGULATOR

Provincial Methane Regulation

Support 2025 methane emission reduction target of 45%

Changes to strengthen compliance and clarity on reporting

March 2020

Published – New Methane Requirements

2022

Review of 2020 Regulations

Engagement:
NGOs, Industry, INs

2023

Amendments

Jan. 2024

Regulations Effective Date

Support 2030 methane emission reduction target of 75%

Changes to more stringent regulations to reduce emissions

March 2023

Invitation for Submissions

Invite to
NGOs, Industry, INs

Summer- Fall 2023

Initial Policy and Engagement

Engagement:
NGOs, Industry, INs

2024 - 2025

Amendments

Please submit feedback to:

RegulatoryAffairs@bc-er.ca

Thank you!

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QUESTIONS?

RegulatoryAffairs@bcogc.ca

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