Comparison of Methane Regulations in Different Jurisdictions in North America

Methane Emissions in the Canadian Oil and Gas Sector – Current Science and Policy Implications

Drew Nelson

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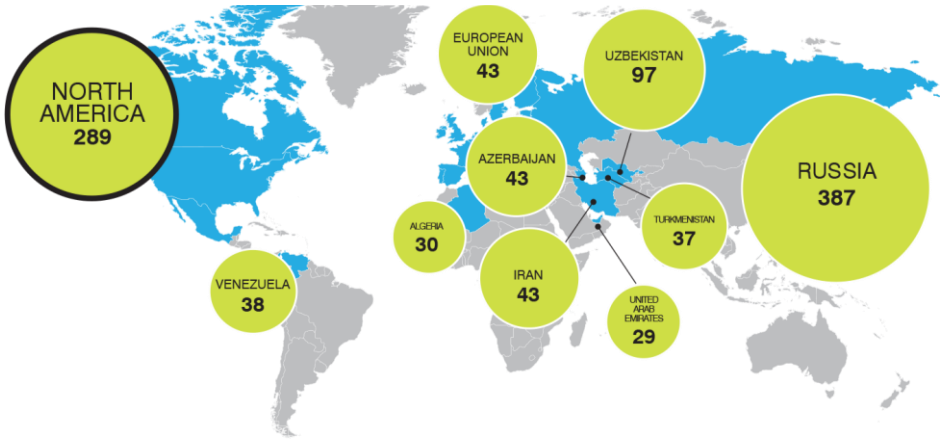
Finding the ways that work

Overview

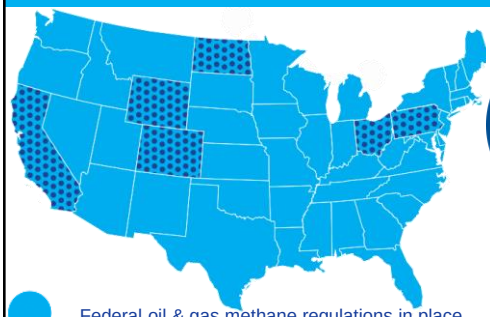
- Many jurisdictions are focused on regulating oil and gas methane emissions.
- Common elements across these regulatory and company-specific actions.
- Reducing methane:
  - Clear climate benefits
  - Significant co-benefits for improved air quality
  - Reduces investment risk
  - Can help ensure a growing gas market

Top O&G Emitters Globally



IEA: Just no net cost reductions will have same climate impact in 2100 as immediately closing all China's coal plants.

Methane Regulations: Significant Coverage



Federal oil & gas methane regulations in place.

Federal Action + States taking additional regulatory actions

US State Regs Cover more than Canada

25% more oil and gas is produced in U.S. states that have implemented/are developing regulations than will be regulated by the ECCC.

Global Action

Countries with methane regulations produce over 25% of global oil and gas.

Industry Acting Too

10 companies, over 20% of global oil and gas, just agreed to "near zero methane" emissions.

Best Practices Across Leading Jurisdictions

Across jurisdictions, key areas of best practices are emerging:

1. Prioritize gas capture and minimize flaring
2. Comprehensive, frequent LDAR
3. Eliminate or minimize venting
4. Monitoring, reporting, and enforcement

Innovation!

1. Gas Capture and Flare Minimization

- **Norway:** Routine flaring not permitted. Operators required to meter and report daily gas flared
- **US Bureau of Land Management:** Operators must capture and use or route to pipeline a percentage of what they produce; Declines over time, 2026 must capture 98% of gas produced.
- **North Dakota:** Gas Capture targets were set as an increasing percentage over several years: as much as 95% by 2020.
- **California:** (Tank, pneumatic & compressor requirements)

2. Comprehensive, Frequent LDAR

Jurisdictions that require LDAR 4 times a year in some capacity:

- **BLM**
- **California**
- **Colorado**
- **OH**
- **PA**
- **UT**
- **Wyoming**

Canada is proposing 3 times a year due to winter conditions.

3. Eliminate *or* Minimize Venting

BLM: No bleed pneumatic controllers and pumps at gas processing plants. Minimize venting and the need for venting; must consider alternatives to manual venting and determine they are infeasible.

California: New zero bleed pneumatics and pumps. Route compressor emissions to vapor recovery or measure and rep

Colorado: STEM. Zero bleed pneumatics where grid electricity.

Canada: Zero bleed pneumatics and pumps at compressor stations and processing plants. No venting from new compressors

4. Monitoring, reporting, and enforcement

CO/CA/Canada: Continuous monitoring or incentives for continuous monitoring.

CO/BLM: Certification of design and operation.

CO/CA/BLM: Annual reporting accompanied by certification of compliance.

Rules are Highly Cost Effective

California: $19-$21 per MT CO2e reduced

Canada: Net benefits of $11.7 billion/Total costs of $3.3 billion. ICF: $6.78 CAD/ton CO2

Colorado: 42.4 million in net costs annually

BLM: $46 - $204 net benefits annually

IEA: 75% globally, up to 2/3rd no net cost