

Carbon pricing and other regulatory approaches to methane emissions in Alberta

Initial condition:

The province of Alberta has a long tradition of active and flexible regulatory approaches to air emissions from the oil and gas sector. Important reductions have been achieved in flaring and venting of associated gas, which was at about 2 billion cubic meters annually during the 1990s and had been brought down to below 1 billion cubic meters from 2003 and onwards,¹ largely by bringing the associated gas to markets. On a broader scale, however, venting and fugitive emissions of gas continued to challenge the sector due to the preponderance and spread of small emission sources. In Alberta methane emissions from venting and fugitive sources originate from more than 146,000 operating oil and gas well sites: approximately 21,000 gas facilities and 30,000 oil facilities. These are spread throughout the province, with many wells and facilities in remote sites and low density.

With increased attention to climate change mitigation, and the characteristics of methane as a short-lived climate pollutant, oil and gas sector methane emission reduction has become a priority. In 2014, the upstream conventional oil and gas sector emitted approximately 27 million tonnes CO₂ equivalents of methane, whereas emissions from flaring for the sector for the same year was only 7% of methane's contribution.²

Process and results:

Consequently, the Government of Alberta outlined in 2015 a goal to reduce oil and gas methane emissions by 45 per cent from 2014 levels by 2025. In 2018, Alberta enacted the Methane Emissions Reduction Regulation and Alberta Energy Regulator issued two directives (Directives 017³ and 060⁴) which are designed to reduce methane emissions from the upstream oil and gas industry in order to achieve government's goal and improve emissions reporting.

The Methane Emissions Reduction Regulation is part of a broader set of climate change policies and regulations enacted by the *Environmental Protection and Enhancement Act of 2000*, *Climate Change and Emissions Management Act* and the recently updated *Emissions Management and Climate Resilience Act 2019* which gave Alberta the authority to introduce regulations limiting

¹ <https://www.aer.ca/documents/sts/ST60B-2015.pdf>

² http://data.ec.gc.ca/data/substances/monitor/canada-s-official-greenhouse-gas-inventory/GHG_IPCC_Can_Prov_Terr.csv

³ <https://www.aer.ca/regulating-development/rules-and-directives/directives/directive-017>

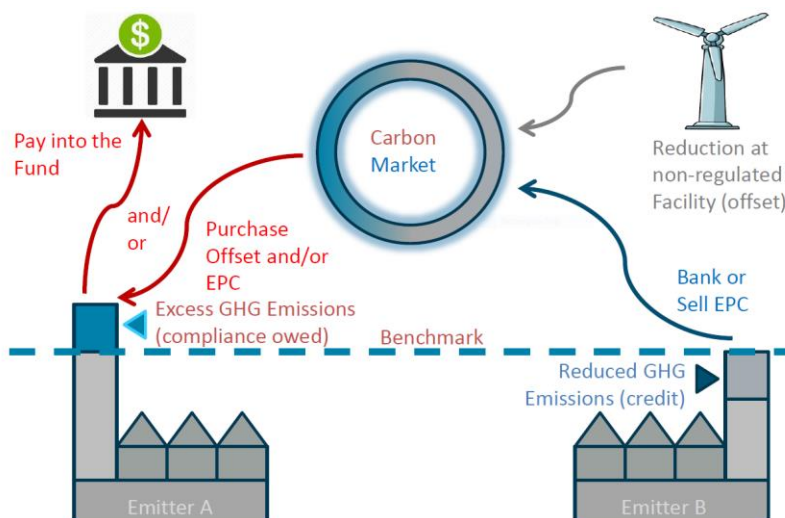
⁴ <https://www.aer.ca/regulating-development/rules-and-directives/directives/directive-060>

GHG emissions from Alberta sources. Important “carbon pricing” regulations with relevance to oil and gas sector methane emissions have been continuously imposed since 2007 (Specified Gas Emitters Regulation from 2007-2017; Carbon Competitiveness Incentive Regulation from 2018-2019; Technology Innovation and Emissions Reduction Regulation in 2020), which have the following key policy details:

- Large industrial emitters (with annual emissions above 100,000 tonnes CO₂ equivalents) would have to comply with facility-specific, or product-specific, benchmarks.
- Entities which are unable to meet the benchmark/target have three alternative options for regulatory compliance: i) they can purchase emission performance credits (“EPC”) from those who over-perform, ii) they can purchase so-called emissions offsets from smaller entities (not covered by the regulation) who then undertake voluntary emission reductions (see further details on the offset scheme below), iii) or they can pay a compliance price (carbon tax) for emissions above the benchmark/allowed emissions level.
- Proceeds from non-complying entities go into a fund⁵ designed to support initiatives targeted at reducing specified gas emissions or improving Alberta’s ability to adapt to climate change.

In essence, Alberta’s “carbon pricing” regulations are a combination of an emissions trading scheme and carbon taxation (see Figure 1). Many entities may find it advantageous to pay into the fund rather than performing trades in EPCs or emissions offsets.

Figure 1: Main components of Alberta’s carbon pricing system



Source: Presentation by Justin Wheler, Alberta Environment and Parks at COP 25 Madrid 2019

⁵ Climate Change and Emissions Management Fund (CCEMF)

Money collected in the regulatory fund is reinvested in emissions reductions and climate change adaptation, with a focus on supporting development and deployment of emissions reduction technologies. Supported projects include methane emissions reductions technologies and other oil and gas sector emission reduction projects, as well as carbon capture and storage, renewable energy and various innovative technologies. A significant portion of funds reinvested to date are managed by Emissions Reduction Alberta.⁶

Industry has also invested in innovation to reduce methane emissions. The Alberta Upstream Petroleum Research Fund (AUPRF) is a unique collaborative platform between the Government of Alberta, the Alberta Energy Regulator, and industry, and it is led by the Canadian Association of Petroleum Producers (CAPP), the Explorers and Producers Association of Canada (EPAC), and managed by Petroleum Technology Alliance Canada (PTAC). AUPRF was launched with the aim to minimize the environmental impact through innovation and collaborative R&D.

Entities regulated emissions benchmarks have covered a large portion of Alberta's emissions since 2007. In 2017, for example, the regulation covered 58 per cent of total provincial emissions but only about 9 per cent of methane emissions, primarily from landfills, large conventional gas processing facilities, and oil sands mine face surfaces and tailing ponds emissions.

To encourage further emissions reductions through broader participation in the market-based system, an Emissions Offset System was also established starting in 2007, whereby facilities which fall outside the large emitters regulation can implement emission reduction projects to generate emission offset credits. The emissions offsets are then purchased and used as compliance instruments by facilities regulated in the large emitters program. Rules and procedures for generation and trade of emissions offsets are set by the Standard for Greenhouse Gas Emission Offset Project Developers and specific Offset Protocols; 24 are currently in use covering a broad range of sectors, emission sources, and activities such as renewable energy, bio-fuels, waste management, energy efficiency and oil and methane.

From 2018 offsets became an important part of compliance, accounting for 36% of total compliance for the two years 2018 and 2019 (see Table 1).

⁶ <https://www.eralberta.ca/>

Table 1: Compliance summary of Alberta's carbon pricing system. 2007-2018

Compliance Year	Offset Credits Submitted (Mt CO2e)	EPCs Submitted (Mt CO2e)	Fund Credits Submitted (Mt CO2e)	Total Compliance (Mt CO2e)	Fund Payment (\$Million)
2007 (half year)	0,9	0,2	3,0	4,1	45,2
2008	2,9	0,6	5,9	9,4	88,3
2009	3,8	1,5	4,4	9,7	66,3
2010	3,9	1,9	5,3	11,1	78,9
2011	5,4	0,8	4,2	10,4	62,9
2012	3	0,7	5,9	9,5	93,7
2013	2,2	1,3	6,3	9,8	94,4
2014	2,3	1,3	5,6	9,3	84,3
2015	0	0,3	9,0	9,3	135,7
2016	0,8	1,0	10,3	12,2	206,5
2017	9,2	6,2	3,1	18,5	94
2018	8,0	3,9	17,8	29,7	533,5
Total	42,4	19,8	80,8	142,9	1583,7

Source: Alberta Environment and Parks

The major part of offset projects is in Agriculture and Electricity while methane originating from the oil and gas sector to date has recorded 40 offset projects with a total 1.4 million tonnes of CO₂ equivalents in emission offsets serialized on the Alberta Emission Offset Registry. Three offset protocols have been developed for oil and gas methane emission reduction projects,⁷ of which the most actively used is the pneumatics offset protocol.⁸ In 2019, the pneumatics offset protocol contributed to an average monthly installation of 1,100 low or no bleed devices, replacing high bleed pneumatics. As of January 1, 2020, over 26,000 of the former were installed. These projects have a potential to generate on an annual basis approximately 2 million tonnes of CO₂ equivalents of methane emission reductions.

These emission offsets, however, are still relatively modest. It is because Alberta, as well as the industry recognized the significance of pneumatic devices as important emissions source only recently. The key offset protocol to support credit generation was released as late as in 2017. Nowadays, however, the industry is moving urgently to implement emission offset projects and generate credits before 2023 when the offset protocol is to be replaced by regulatory requirements. Driving the retrofit of pneumatic devices is important because they account for almost 50% of total oil and gas sector methane emissions in Alberta (see Figure 2).

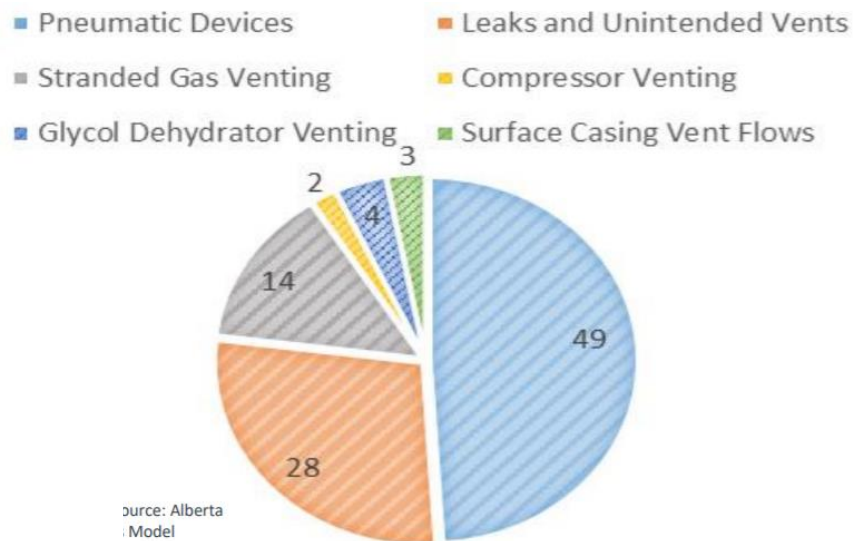
⁷ One for pneumatic equipment, one for engine fuel management and vent gas capture and a third for engine fuel management and vent gas capture projects (now withdrawn). See <https://www.alberta.ca/alberta-emission-offset-system.aspx>

⁸ <https://open.alberta.ca/publications/9781460131633>

The way forward

The majority of upstream conventional oil and gas methane emissions fall outside the regulatory emissions limits (set by benchmarks), but the emission offset system expands the price signal to most of the key methane sources (shown in Figure 2). Fugitive emissions (“leaks and unintended vents”) and a portion of stranded associated gas vents are outside the carbon pricing system and offset system, as these sources present a quantification challenge.

Figure 2: Percentage share of oil and gas sector methane emissions by main sources. Alberta 2015



Source: Alberta Energy Regulator

Therefore, the ambitious target to reduce methane emissions from 27 million tonnes CO₂ equivalents recorded in 2014 to 15 million tonnes CO₂ equivalents by 2025 is not on track to be met by measures of the current carbon pricing system alone. To achieve this goal, a complementary regulatory approach, The Methane Emissions Reduction Regulation, has been put in place in 2018 to target these emissions reductions. The regulation has a broad approach developed through comprehensive input from industry and other stakeholders.

Regulations are driven by the ambition to achieve cost-effective methane emissions reductions by improving measurement and reporting, increasing leak detection and repair, and reducing venting and fugitive emissions through application of commercially available technology to compressors and equipment used on new and existing upstream oil and gas sites and facilities.

Specific regulatory requirements will be phased in from 2020 through 2023, including the following key requirements:

- 2020: enhanced reporting and record keeping; increased fugitive emissions management programs (3 times a year at higher-risk sites) and compressor seal testing;
- 2022: a defined vent gas limit (from routine venting, excluding certain equipment), vent gas limits for crude bitumen batteries, and equipment specific vent gas limits equipment installed on or after 1 January 2022;
- 2023: equipment specific vent gas limits for equipment installed before January 1, 2022.

Alberta's approach has more stringent requirements for new facilities, which have the ability to more efficiently manage costs at the development and planning stage. This enables companies to adopt new or existing technologies that are best-suited for their operations. Alberta's approach includes a review of the requirements in 2022 that would enable adjustments to ensure that Alberta is on track to meet its target.

CONCLUSIONS:

Industrial carbon pricing, with flexible compliance tools, and complementary regulatory approaches have served as an effective policy package that has worked together to incentivize methane reductions in Alberta since 2007.

The resulting policy package reflects a phased-approach, in which parties subjected to regulations consisted initially only of large emitting facilities, while smaller facilities were incentivized to voluntarily participate in the carbon market. Over time, carbon pricing regulations became more stringent, providing the regulated parties with higher financial incentives for reductions, and voluntary market participants with higher value of offset generation.

The announcement of the incoming methane regulations (2020-2023) represents the most recent step in Alberta's complementary policy package. After having provided an opportunity to voluntarily reduce emissions, methane regulations are now to mandate smaller oil and gas facilities to focus on measuring and quantifying emissions, and on their reduction from specific sources. Until the regulations become effective, offset opportunities remain available for oil and gas facilities to incentivize early action.

Key conclusions from the Alberta case-study include the following:

- Alberta's current carbon pricing system offers cost-effective compliance solutions for larger facilities, but does not regulate methane emissions from all conventional oil and gas facilities, leaving beyond its scope, in particular, smaller and remotely located sources.
- Emission offset generation is an opportunity for emissions reductions from the smaller and unregulated methane sources. However, challenges with monitoring, quantification, and voluntary participation, limit the role that offsets can play.

- Forthcoming methane regulations have a greater focus on MRV, emissions and technical standards (including LDARs), vent limits, and equipment specific requirements.
- These regulatory requirements will achieve reductions from fugitive emissions and all vent sources. Financial support through funds obtained from large emitter carbon pricing, which has significantly contributed in the past, will continue to be a notable part of a broader package of instruments necessary for meeting the 2025 target.