PEMBINA institute

The case for raising ambition in curbing methane pollution

by Jan Gorski | August 4, 2021

Summary

- Canada should set a 2030 methane reduction target of at least 75% below 2012 levels.
- This is supported by analysis from the Canadian Energy Research Institute which shows that Canada can reduce methane emissions from the oil and gas sector by 80% from 2012 levels for less than $25/t CO_2e.
- The International Energy Agency agrees that reducing global methane by 75% by 2030 is a key to achieving net-zero and that the economic solutions exist today.
- Globally, making big cuts to methane emissions can slow the rate of global warming by 30%.
- Methane reduction strategies can improve air quality, food security, and labour productivity.
- For oil and gas companies, cutting methane is an opportunity to differentiate themselves, as environmental performance is increasingly becoming important to consumers and investors.
- Canadian products and services that are created using natural gas as a feedstock or energy source would be substantially lower carbon on a life cycle basis if Canada were to adopt improved methane regulations.

What is methane?

Methane is the primary constituent of natural gas. It is also a potent greenhouse gas wi th more than 80 times the climate warming impact of carbon dioxide over a 20-year timespan.

In oil and gas production, methane is often released into the atmosphere, both intentionally, as in the case of venting from equipment or the release of unwanted gas, or unintentionally, because of equipment leaks.

Why does methane matter?

The recent International Energy Agency (IEA) net-zero report highlights the immediate opportunity to drastically cut methane emissions from the oil and gas sector on the path to net-zero emissions. The IEA says that a 75% reduction in methane emissions by 2030 is in line

with a net-zero scenario.[1] Most of these reductions come from using technologies that are available now to capture methane emissions, replace leaky equipment, or find and fix leaks. This is consistent with global best practices which say 75% is achievable.

Cutting methane emissions will not only benefit the climate; globally it can save lives through better air quality, improve food security by preventing agricultural crop losses, and increase labour productivity by reducing heat stress.[2]

Methane packs a powerful punch to the climate in the decade it usually stays in the atmosphere. Averaged over 100 years it is 34 times more potent a greenhouse gas than carbon dioxide. But because methane has a shorter lifespan, when evaluated over 20 years its impact is 86 times higher than that of carbon dioxide.[3]

Recent research confirms that we need to act fast on methane.[4] Cutting global methane emissions from all human sources (including oil and gas, agriculture and others) in half by 2030 would avoid an additional 0.5°C increase in global temperatures by 2100. This is equal to slowing global warming by 30%.

The need to act now is made more urgent by the fact that actual methane emissions are much higher than current government estimates. Studies in Canada consistently show that methane emissions from oil and gas could be twice as high as what government estimates show.[5]

Figure 1 shows the risk that methane poses to Canada's climate goals, which are based on the total emissions of greenhouse gases (GHGs) including methane. These emissions are counted in the National Inventory Report, which shows historical emissions levels up to 2019. Canada's climate goals are based on the total emissions of greenhouse gases (GHGs) including carbon dioxide, methane, and other gases. These emissions are counted in the National Inventory Report, which show historical emissions levels up to 2019. If the short-term impact of methane

[1] International Energy Agency, *Net Zero by 2050: A Roadmap for the Global Energy Sector* (2021), 47. https://www.iea.org/reports/net-zero-by-2050

[2] United Nations Environment Programme and Climate and Clean Air Coalition, *Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions* (2021). https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions

[3] Gunnar Myhre et al., "Anthropogenic and Natural Radiative Forcing," in *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (2013), 714. https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf

[4] Ilissa Ocko, et al. "Acting rapidly to deploy readily available methane mitigation measures by sector can immediately slow global warming," *Environmental Research Letters* 16 n. 5 (2021). https://iopscience.iop.org/article/10.1088/1748-9326/abf9c8

[5] Elton Chan et al., "Eight-Year Estimates of Methane Emissions from Oil and Gas Operations in Western Canada Are Nearly Twice Those Reported in Inventories," *Environmental Science & Technology*, 54, 23, (2020). https://pubs.acs.org/doi/10.1021/acs.est.0c04117

is taken into account, Canada's GHG emissions as reported in 2019 would increase by 33%.[6] If underreporting of methane emissions is also accounted for (by assuming that oil and gas methane emissions are twice as high as in the national inventory), total GHG emissions would be 51% higher.

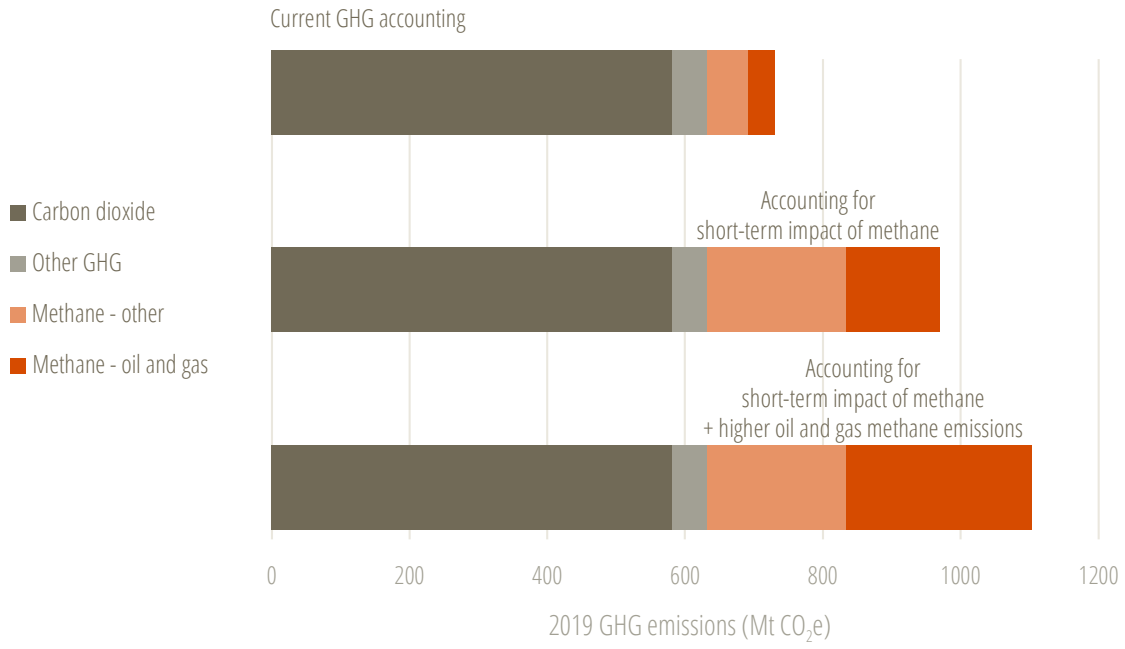

Figure 1. Canada's total GHG emissions accounting for real impact of methane

What can be done?

Canada needs to get as close as possible to eliminating methane emissions by the end of this decade. Federal and provincial governments should set more ambitious targets to reduce methane emissions and implement the policies to achieve them. Collaboration with the U.S. on methane will help accelerate progress and address concerns around the competitiveness of Canada's industry. Canada and the U.S. have identified methane as a shared priority and they recognize the important role of raising ambition on methane in achieving 2030 climate targets.[7]

Why should government act now?

Canada has set an ambitious economy-wide climate target for 2030, calling for reductions of greenhouse gases by 40% to 45% from 2005 levels. Meeting that goal will require more policies across all sectors of the economy. Going farther on methane presents a cost-effective opportunity to close the gap to our 2030 climate targets.

[6] By applying the 20-year global warming potential of 86.

[7] Prime Minister of Canada Justin Trudeau, "Roadmap for a Renewed U.S.-Canada Partnership," February 23, 2021. https://pm.gc.ca/en/news/statements/2021/02/23/roadmap-renewed-us-canada-partnership

While natural gas use will need to decline over time, it will still be needed in some sectors for many decades. As a result, decarbonizing the production of natural gas is critical to achieving Canada's 2050 net-zero commitment. Deeper methane emissions reductions are the first step.

Canada is working to ramp up the production and use of hydrogen, including hydrogen derived from natural gas and renewable electricity via electrolysis. Reducing emissions from the production of natural gas is also needed to minimize the life cycle emissions of hydrogen derived from natural gas. Other products and services provided by natural gas, including building heat, natural gas power, fertilizers and chemicals that are made using natural gas would be lower carbon if methane emissions were reduced.

Setting an ambitious 2030 target

The federal government already has a 2025 target of 40% to 45% below 2012,[8] with major parts of the current regulations coming into force in 2020 and 2023. As Canada seeks to meet its economy-wide 2030 climate target it can maintain global leadership on methane by also setting an ambitious 2030 methane reduction target.

The Global Methane Alliance calls for global methane reduction of 60% to 75% by 2030.[9] Given that Canada is a wealthy nation that can afford the low-cost mitigation, we should be leading the way by aiming for the high end of the range with a 2030 methane reduction target of 75% (Figure 2).

Also, since most of the technologies needed to achieve this level of ambition are cost effective and available now, there is an opportunity to implement them much earlier than 2030.

[8] Government of Canada, *Pan-Canadian Framework on Clean Growth and Climate Change* (2016), 21. https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework/climate-change-plan.html

[9] "Global Methane Alliance." https://www.ccacoalition.org/en/activity/global-methane-alliance

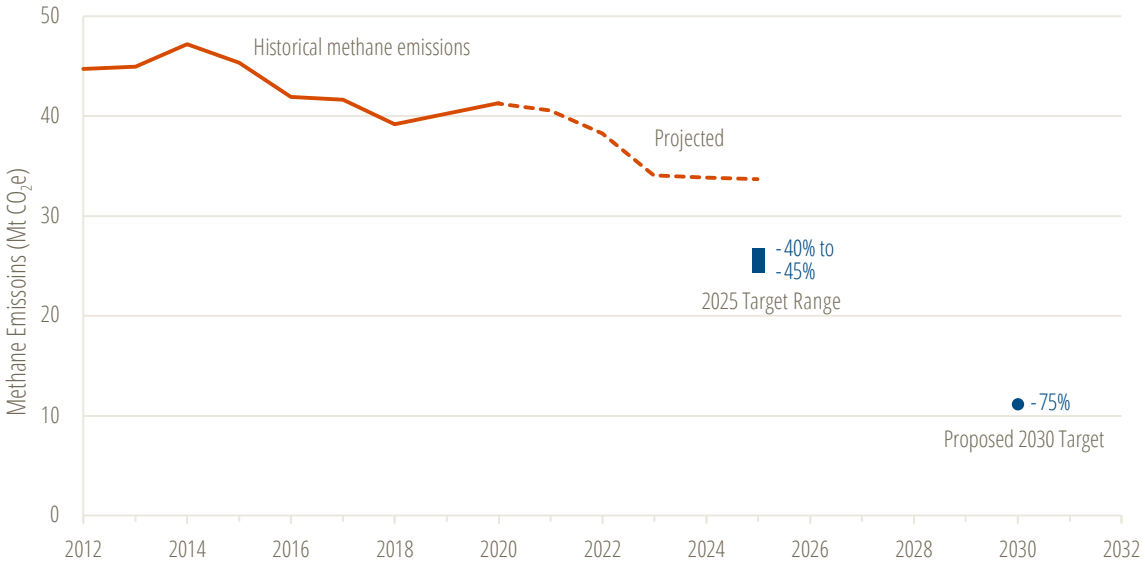

Figure 2. Methane emissions projections and targets

Can it be done?

The technologies to drastically cut emissions of this harmful pollutant are commercially available and economic.

A 2019 study from the Canadian Energy Research Institute (CERI) examined how much methane we could eliminate using existing technology.[10] They included emissions from oil production, transport, and distribution, with the majority of emissions occurring in the production phase. The study found that methane emissions in 2017 could be reduced by 33 Mt CO_2. Based on Pembina Institute analysis of the CERI report (see Appendix), this translates to an 88% reduction from 2012 levels at a cost of less than $25/t CO_2e. If methane emissions from the oilsands are fully included, the reduction potential is 80% from 2012 levels. However, the oilsands are unique to Canada, and technology to reduce methane emitted from oilsands tailings pond and mines is less mature than the solutions to methane from conventional oil and gas.

Analysis from the IEA similarly shows that most methane emissions can be eliminated at a low cost with existing technology.[11]

[10] Canadian Energy Research Institute, *Economic and Environmental Impacts of Methane Emissions Reduction in the Natural Gas Supply Chain* (2019). https://ceri.ca/studies/economic-and-environmental-impacts-of-methane-emissions-reduction-in-the-natural-gas-supply-chain

[11] International Energy Agency, "Methane Tracker Database" (2021). https://www.iea.org/articles/methane-tracker-database

Why should industry act?

Methane is the main component in natural gas, a valuable resource that should be conserved.

Governments around the world are taking action on methane. In 2020 the Biden administration stated it would reinstate aggressive methane regulations, and the European Commission adopted a new methane strategy.

Pressure on the natural gas sector is increasing. The industry is facing many challenges, including low natural gas prices, limited access to capital, and a global shift to zero-emitting energy sources as global action on climate accelerates. And export markets are starting to show constraints as well. In the last year, European companies have rejected North American gas imports twice due to environmental concerns.[12]

At the same time, there is increasing focus on environmental performance among investors and buyers of natural gas. There are signs that a market is developing for natural gas certified to meet a higher level of performance on environment, social, and governance (ESG) metrics. In the last few years there have been more than ten certification projects, and in most of these buyers have paid a premium to purchase natural gas from producers that have certified their operations. This includes the first deal of its kind in Canada between a utility, Énergir, and a producer, Seven Generations.[13]

What can gas producers do?

To stay competitive in this environment, natural gas producers will need to demonstrate their commitment to reducing emissions. Oil and producers in Canada and across the world are starting to recognize this and have made net-zero commitments. As these companies start to act on these commitments, addressing methane is the logical first step. Reducing methane emissions is affordable and can be done with existing technologies. It also presents an opportunity for companies to differentiate themselves as environmental performance is becoming increasingly important to consumers and investors.

[12] Sergio Chapa and Anna Shiryaevskaya, "Europe turns down more U.S. LNG on greenhouse gas concerns," *World Oil,* January 17, 2021. https://www.worldoil.com/news/2021/1/15/europe-turns-down-more-us-lng-on-greenhouse-gas-concerns

[13] Énergir, "New standard achieved in responsible and transparent energy development and procurement," news release, February 10, 2020. https://www.energir.com/en/about/media/news/developpement-et-approvisionnement-energetique-responsables-et-transparents/

What can natural gas buyers do?

Large industrial consumers and buyers of natural gas including gas and power utilities and chemical and fertilizer manufacturers can purchase natural gas certified to have higher performance on ESG metrics including low methane emissions intensity. North American buyers of natural gas are seeking certified gas as a way to ensure higher performance, driven by growing demand from investors, shareholders and domestic and international customers.

Appendix: Analysis of CERI report

The maximum achievable reduction that could be achieved with the mitigation measures considered in the CERI study was calculated to be 88% in 2017 from 2012 levels (maximum reduction scenario). This does not include oilsands methane emissions. Oilsands mining and upgrading accounted for 4.9 Mt of methane emissions in 2018.[14] Including oilsands methane, the reduction potential was calculated to be 80%. The values used in this calculation are shown in Table 11.

Table 11: CERI emissions reductions from maximum scenario

	Original CERI data	CERI data adjusted to include oilsands methane
Oilsands methane (Mt CO_2e)		4.9
Baseline emissions, 2012 (Mt CO_2e)	56.0	60.9
Baseline emissions, 2017 (Mt CO_2e)	40.4	45.3
Maximum reductions, 2017 (Mt CO_2e)	33.4	33.4
Calculated reduction from 2012 baseline	88%	80%

The cost of reductions in the maximum scenario were determined to be \$24/t CO_2e. This was based on the high cost estimate for this scenario of \$5,464 million. This value represents the total cost of abatement over the lifetime of the technologies deployed. The CERI report assumes a lifetime of 10 years for most technologies except for a few which need to replaced every three years, and leak detection and repair (LDAR) which is an annual cost. A simplifying assumption of 10 years for all technologies except LDAR was used because the technologies with a three-year lifetime only accounted for a small fraction of reductions.

The cost was adjusted for the current price of natural gas (\$2.10/GJ based on 2020 AECO-C data vs \$2.25/GJ in the CERI study).[15] This adjustment only increased the abatement cost by \$1/t CO_2e.

[14] Matthew R. Johnson and David R. Tyner, "A case study in competing methane regulations: Will Canada's and Alberta's contrasting regulations achieve equivalent reductions?" *Elementa: Science of the Anthropocene* 8, no. 7 (2020). https://online.ucpress.edu/elementa/article/doi/10.1525/elementa.403/112749/A-case-study-in-competing-methane-regulations-Will

[15] Alberta Energy Regulator, "AECO-C Price" https://www.aer.ca/providing-information/data-and-reports/statistical-reports/st98/prices-and-capital-expenditure/natural-gas-prices/aeco-c-price