Gas-lighting Alberta

Canada's Oil and Gas Methane Emissions Regulations

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Cover Image - Alberta lake with swampy marshland – Image licensed from Adobe Stock. Natural sources such as wetlands account for about 40% of methane emissions.

GAS-LIGHTING ALBERTA

CANADA'S OIL AND GAS METHANE REGULATIONS

EXECUTIVE SUMMARY

On December 5, 2023, during the COP28 international climate conference, the Government of Canada announced draft regulations to reduce oil and natural gas methane emissions by at least 75 percent below 2012 levels by 2030.

Methane (CH_4) is a colourless, odourless, flammable gas present in the Earth's atmosphere at low concentrations. It acts as a greenhouse gas (GHG). Water vapor is the main GHG, with a concentration in the atmosphere of 6,400 parts per million (ppmv). Carbon dioxide's (CO_2) concentration is 420 ppmv. Methane (CH_4) has a concentration of about 1.9 ppmv, or less than one two-hundredths of that of carbon dioxide.

According to the International Energy Agency, in 2022 global methane emissions were around 580 million tonnes. Natural sources such as wetlands account for about 40% of the emissions, and the remaining 60% is from human activity. The emissions from human activity in turn are divided among agriculture (40-50%); coal mining (10-15%); oil production (10%); natural gas production (10-15%); waste water (7-10%); and solid waste (7-10%). Methane emissions from oil and gas thus account for about (60x25%=) 16 % of total annual methane emissions, including natural sources.

The Intergovernmental Panel on Climate Change (IPCC) has indicated a global warming potential (GWP) for methane between 84 and 87 times that of CO_2 when considering its impact over a 20-year period and between 28 and 36 times when considering its impact over a 100-year timeframe.

In 2020, Canada's methane emissions amounted to 92 million tonnes of carbon dioxide equivalent ($MtCO_2e$). That equates to about 3.7 million tonnes of CH_4. That is 13.6% of Canada's total GHG emissions in 2020 or 0.2% (two one thousandths) of global GHG emissions in 2020. The emissions were largely from fugitive sources in oil and natural gas systems (32.5 $MtCO_2e$, or 34% of Canadian CH_4 emissions); agriculture (30% of total Canada CH_4 emissions); and municipal landfills and industrial wood waste landfills (27% of total Canadian CH_4 emissions).

China, India, Russia,and Iran, four of the 10 highest methane emitters, have not signed the Global Methane Pledge.

As is typical of global and national commitments to reduce greenhouse gas emissions, there has been no published estimate of the costs and benefits of the actions involved. The federal government estimates that the proposed new regulations will cost Canadian industry about $15 billion between 2027 and 2040.

One is left asking questions about the priority being placed on efforts globally and in Canada to reduce methane emissions. Fundamentally, why would Canada, a country whose methane emissions constitute 0.2% of the global

total, decide to far exceed the methane emission reduction pledges made by other countries and to incur proportionately far more of the costs?

Canadians should demand answers.

GASLIGHTING ALBERTA

CANADA'S OIL AND GAS METHANE REGULATIONS

On December 5, 2023, during the COP28 international climate conference, the Government of Canada announced draft regulations to reduce oil and natural gas methane emissions by at least 75 percent below 2012 levels by 2030. The existing regulations target a 40 to 45 percent reduction below 2012 levels by 2025.

World

CBC | NEWS

Stricter oilpatch methane rules unveiled by federal government

Alberta premier upset new rules and targets have been 'unilaterally established'

Kyle Bakx · CBC News · Posted: Dec 04, 2023 7:30 AM MST | Last Updated: December 4

Oil producers use flaring to burn methane gases, rather than release them directly into the atmosphere. Venting and flaring accounts for about 42 per cent of emissions in Saskatchewan, significantly higher than in Alberta or B.C. (Kyle Bakx/CBC)

https://www.cbc.ca/news/world/bakx-cop28-methane-oilpatch-emissions-1.7048062

The key part of the regulations will require oil and gas companies to stop flaring methane from their sites. Flaring is the intentional burning of waste methane, which is a byproduct of natural gas and conventional oil production sites.

This action follows Canada's decision, at the 2021 United Nations Climate Change Conference (COP 26) to join 110 other countries in endorsing the Global Methane Pledge, which committed the countries to reduce total methane emissions by at least 30 percent below 2020 levels by 2030. Canada is thus pledging to go farther and faster than the other countries. The purpose of this article is to assess whether such action is justified.

WHAT IS METHANE (CH_4)?

CH_4 is a colourless, odourless, flammable gas. CH_4 is present in the Earth's atmosphere at low concentrations and acts as a greenhouse gas (GHG). CH_4, usually in the form of natural gas, is used as feedstock in the chemical industry (e.g., hydrogen and methanol production), and as fuel for various purposes (e.g., heating homes and operating vehicles). CH_4 is produced naturally during the decomposition of plants or organic matter in the absence of oxygen and is released from wetlands (including rice paddies) and through the digestive processes of certain animals, such as termites, sheep and cattle. CH_4 is also released from industrial processes, fossil fuel extraction, coal mines, incomplete fossil fuel combustion, and waste decomposition in landfills.

Methane's significance as a greenhouse gas is subject to considerable debate. Part of this is due to the contrast between the claims that methane emissions will have disastrous climate effects and the actual magnitudes of greenhouse gases in the atmosphere. **The concentration of water vapor (the main greenhouse gas), is typically 6,400 parts per million (ppmv). Carbon dioxide's (CO2) concentration is 420 ppmv. Methane (CH4) has a concentration of about 1.9 ppmv, or less than one two-hundredths of that of carbon dioxide.**

Image licensed from Adobe Stock

There are wide differences in the estimates of the role that each GHG plays in affecting the Earth's temperature. Water vapor is estimated to cause somewhere between 35% and 70% of the greenhouse effect (not including clouds); carbon dioxide causes 9% to 26%; methane causes 4% to 9%; and ozone causes 3% to 7%.

METHANE EMISSIONS

According to the International Energy Agency, in 2022 global methane emissions were around 580 million tonnes. Natural sources such as wetlands account for about 40% of the emissions, and the remaining 60% is from human activity. The emissions from human activity in turn are divided among agriculture (40-50%); coal mining (10-15%); oil production (10%); natural gas production (10-15%); waste water (7-10%); and solid waste (7-10%). **Methane emissions from oil and gas thus account for about (60x25%=) 16 % of total annual methane emissions, including natural sources.**


Image licensed from Adobe Stock

WARMING POTENTIAL

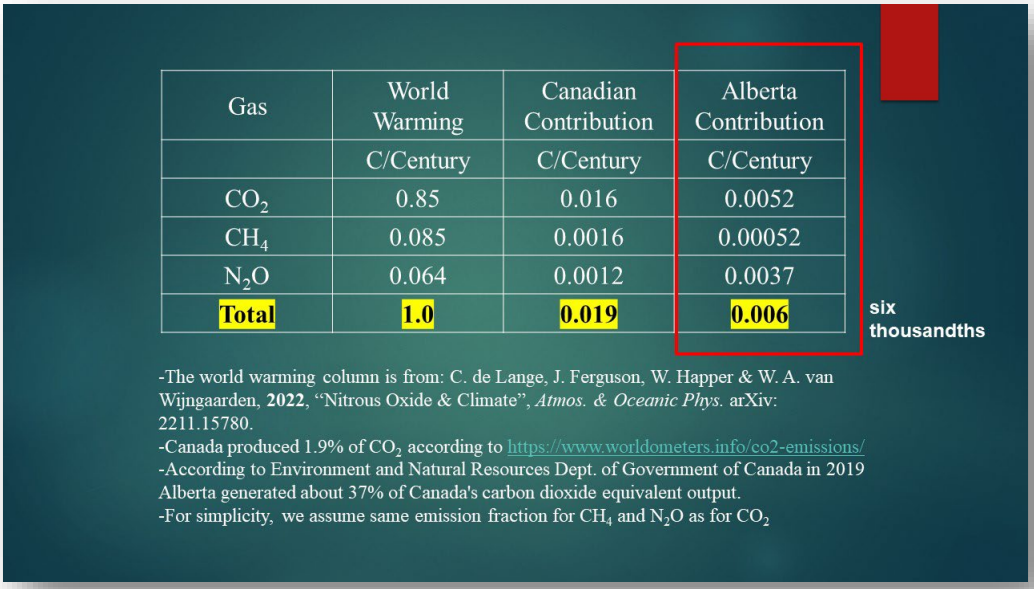
The Intergovernmental Panel on Climate Change (IPCC) and other organizations prominent in the analysis of climate issues focus much of their attention on methane because they consider that it has far more potential for causing warming than does an equivalent weight of carbon dioxide. The IPCC has indicated a global warming potential (GWP) for methane between 84 and 87 times that of CO2 when considering its impact over a 20-year period and between 28 and 36 times when considering its impact over a 100 year timeframe. The UN Framework Convention on Climate Change used a multiplier of 32 over a 100-year period in the 1997 Kyoto Protocol. In preparing Canada's biennial inventory of GHG emissions, Environment and Climate Change Canada treats methane emissions as having an impact 25 times that of CO2 over 100 years.

McClelland Lake and Tundra, Athabasca oil sands
Image licensed from Adobe Stock

"Approximately one-fifth of Alberta's landbase is covered in wetlands. In Alberta, wetlands can be divided into two broad categories: peatlands and non-peatlands. ...The northern part of Alberta, known as the boreal forest, contains more than 100,000 km^2 of bogs and fens, amounting to about 11 percent of Canada's peatlands." https://albertawilderness.ca/issues/wildwater/wetlands/

CANADA'S METHANE EMISSIONS

According to Canada's National GHG 2022 Inventory Report submitted to the United Nations, in 2020 methane emissions amounted to 92 million tonnes of carbon dioxide equivalent (MtCO2e). Using the Environment and Climate Change Canada conversion factor, that equates to about 3.7 million tonnes of CH4. **That is 13.6% of Canada's total GHG emissions in 2020 or 0.2% (two one thousandths) of global GHG emissions in 2020.** The emissions were largely from fugitive sources in oil and natural gas systems (32.5 MtCO2e), or 34% of Canadian CH4 emissions); agriculture (30% of total Canada CH4 emissions); and solid waste disposal (municipal landfills) and industrial wood waste landfills (27% of total Canadian CH4 emissions). Methane emissions in 2020 were at the same level as they were in 1990, having risen to a peak of 126 MtCO2e emissions in 2006 and fallen since.



Gas	World Warming	Canadian Contribution	Alberta Contribution
	C/Century	C/Century	C/Century
CO_2	0.85	0.016	0.0052
CH_4	0.085	0.0016	0.00052
N_2O	0.064	0.0012	0.0037
Total	**1.0**	**0.019**	**0.006**

six thousandths

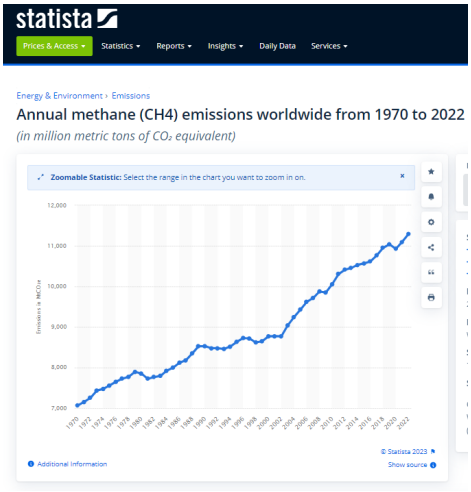
-The world warming column is from: C. de Lange, J. Ferguson, W. Happer & W. A. van Wijngaarden, **2022**, "Nitrous Oxide & Climate", *Atmos. & Oceanic Phys.* arXiv: 2211.15780.
-Canada produced 1.9% of CO_2 according to https://www.worldometers.info/co2-emissions/
-According to Environment and Natural Resources Dept. of Government of Canada in 2019 Alberta generated about 37% of Canada's carbon dioxide equivalent output.
-For simplicity, we assume same emission fraction for CH_4 and N_2O as for CO_2

CALCULATING THE EFFECTS OF MEETING THE 30% REDUCTION GOAL

Global emissions of methane have only been accurately measured since the early 1980's . From 1985 to 2020, the CH4 concentrations rose from about 1600 parts per billion to about 1920 parts per billion, but the rise was not continuous. In fact, it plateaued from 1999 to 2009. The reasons for this are not well understood.

The atmospheric concentration of carbon dioxide as measured at the Mauna Loa Observatory is about 420 ppm and is increasing at 2.8 ppmv yearly. CH4 has a concentration of 1.9 ppmv and is increasing at about 0.014 ppmv yearly.

According to Statista, global methane emissions in 2012 were 10,412 MtCO2e and in 2022 they were 11,294 MtCO2e. A 30 per cent reduction from 2012 levels would reduce global emissions to 7,288 MtCO2e. Such targets, based on percentage-based reductions from historic emissions levels become increasingly difficult to attain as economies grow.



The countries that have signed the Global Methane Pledge represent only 50% of the world's methane production; they do not include China, India, Russia, and Iran, four of the 10 highest methane emitters. Few countries that have signed past UN climate pledges have honoured them, especially where significant costs are involved.

In other words, even if one accepted the claims that human emissions may cause catastrophic climate change, it is highly doubtful that the methane pledge will be honoured or that it will limit global warming.

https://www.statista.com/statistics/1298441/annual-global-methane-emissions/

COSTS

As is typical of global and national commitments to reduce greenhouse gas emissions, **there has been no published estimate of the costs and benefits of the actions involved**, probably because the costs would so far exceed the benefits as to make the entire exercise appear ludicrous to the public.

In announcing the proposed Canadian regulations, Steven Guilbeault published an outline of them that estimated they will cost industry about $15 billion between 2027 and 2040. That cost will fall disproportionately on Alberta and Saskatchewan.

CONCLUSION

One is left asking questions about the priority being placed on efforts globally and in Canada to reduce methane emissions. If oil and gas accounts for only 25% of human-caused emissions, and only 16% of all emissions, why are international efforts, and Canadian policy in particular, so focused on this sector? How will efforts to achieve 75% and eventually higher methane emissions reduction going to be achieved with respect to wetlands and agriculture? What will be the effect in terms of food production in a world with eight billion people and growing?

What will be the costs to the global economy of trying to eliminate all, or even most, methane emissions? Realistically, how much will the global climate and temperatures be affected by these policies? Finally, why would Canada, a country whose methane emissions constitute 0.2% of the global total, decide to far exceed the methane emission reduction pledges made by other countries and to incur proportionately far more of the costs?

Natural gas is essential for the production of anhydrous ammonia fertilizer, which makes it possible to feed the world with prolific crop production.

In the grand theatre in which global climate policy is being played out, it is unlikely that the Canadian government will provide responses to these questions any time soon. So Canadians as individuals and businesses must demand answers, and the provincial governments must act to safeguard their areas of jurisdiction. Too much is at stake to simply accept ever more onerous and expensive methane regulations that have marginal, if any, global environmental benefits.

ABOUT THE AUTHOR

Robert Lyman is an economist with 27 years' experience as an analyst, policy advisor and manager in the Canadian federal government, primarily in the areas of energy, transportation, and environmental policy. He was also a diplomat for 10 years. Subsequently he has worked as a private consultant conducting policy research and analysis on energy and transportation issues as a principal for Entrans Policy Research Group. He is a frequent contributor of articles and reports for Friends of Science, a Calgary-based independent organization concerned about climate change-related issues. He resides in Ottawa, Canada. Full bio.

ABOUT FRIENDS OF SCIENCE SOCIETY

Friends of Science Society is an independent group of earth, atmospheric and solar scientists, engineers, and citizens that is celebrating its 21st year of offering climate science insights. After a thorough review of a broad spectrum of literature on climate change, Friends of Science Society has concluded that the sun is the main driver of climate change, not carbon dioxide (CO_2).

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