LESS IS MORE:

The benefits to Canadians mount as emissions of oil and gas methane decline

Canada is poised to realize great benefits from implementing its regulations to reduce methane emissions from the oil and gas sector – benefits of almost $9 billion, in the form of reduced air pollution and improved human health, lower carbon emissions, and capturing and using natural gas that would have been wasted.[1]

Those benefits are likely to happen quickly, too—experience from other jurisdictions shows that emission reductions, and the associated improvements to public health and job creation, will occur very quickly after the regulations come into force.

However, there is a risk that Alberta will undermine these significant potential benefits. That's because Alberta has released draft regulations are much weaker than the federal ones. Under the Canadian Environmental Protection Act, provinces can apply their own regulations rather than the federal ones—but only if the province's regulations would meet or beat the expected environmental and health benefits of the federal rules for the years 2020 to 2025.

Alberta's draft regulations will not match federal ones. Far from it. The federal government needs to signal clearly to the province that federal regulations will continue to apply.

Given the massive benefits of reducing methane emissions, it actually makes sense for Canada to go further than the federal regulations currently do. Right now, reductions—and the benefits—stagnate from 2024 onward. A strengthened approach in the coming years would allow even more low-cost reductions to occur, and even greater job opportunities and public health improvements.

Photo credit: Clean Air Task Force

Alberta's draft regulations will not match federal ones. Far from it. The federal government needs to signal clearly to the province that federal regulations will continue to apply.

OVERVIEW:

Why Canada should prioritize reducing oil & gas methane

The science is clear: to safeguard our climate, global emissions must begin to rapidly drop by 2020 or keeping temperatures well below a 2 degree Celsius increase will be nearly unattainable.[2] To this end, the world must set a path towards decarbonizing our economies by the middle of this century by transitioning to cleaner sources of energy.

Reducing methane emissions is a way to create a big improvement in the climate over the short-term. Unlike carbon dioxide, which resides in the atmosphere for over a century on average, methane is a short-lived climate pollutant that disappears from the atmosphere more quickly but has a global warming potential that is more than 80 times greater than carbon dioxide. Because of its potency, methane is currently heating our planet more than half as much as carbon dioxide, even though it is emitted in smaller amounts than carbon dioxide.[3]

That's why the methane regulations passed by the Government of Canada are so important. They will lead to a significant reduction in methane emissions from the oil and gas sector, and elevate Canada to a leadership position with respect to addressing these emissions. Few other countries have national regulations that cover both new and existing oil and gas facilities.

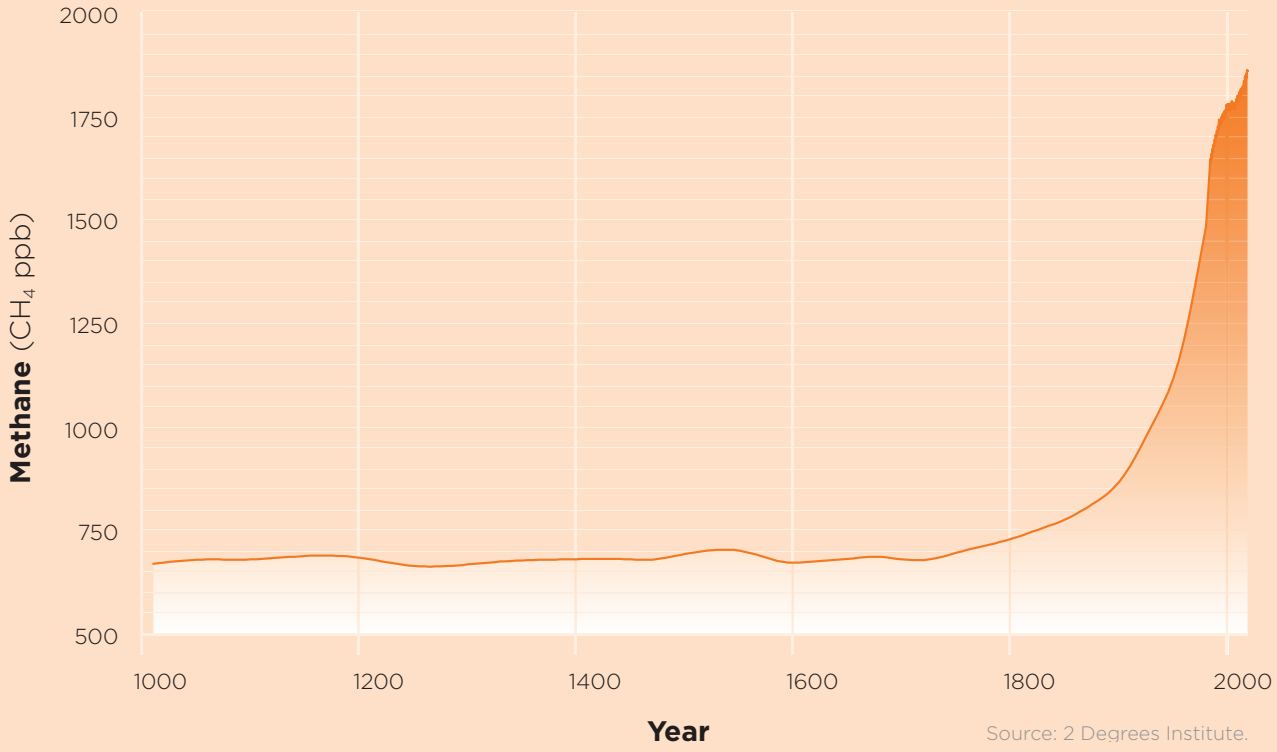
Plugging leaks from oil and gas facilities will also have significant health benefits. Both intentional and unintentional emissions from oil and gas facilities often contain not just methane, but also even more toxic air pollutants such as benzene, formaldehyde, and ethylbenzene.[4] Reducing methane emissions would also reduce the release of these other contaminants that are carcinogenic, cause respiratory diseases, or increase the risk of premature death.[5]

In Canada, methane is primarily released from the production and transport of coal, oil, and natural gas. There are also other sources, such as cattle and landfills. All of these sources together make up about 15% of Canada's overall GHG emissions.[6] Unlike other greenhouse gases, methane is also an energy source – the same natural gas that can be used to produce electricity and heat homes and

Photo credit: Clean Air Task Force

Unlike carbon dioxide, which resides in the atmosphere on average for over a century, methane is a short-lived climate pollutant that disappears from the atmosphere more quickly but has a global warming potential that is more than 80 times greater than carbon dioxide.

Figure 1. Global Historical Atmospheric Methane Concentration



Source: 2 Degrees Institute.

buildings. As such, its release into the atmosphere is not only a wasteful practice that results in environmental damage. It also represents lost economic opportunities from the capture and sale of methane, and the jobs created in finding and plugging leaks and installing zero-emitting technology.[7]

Methane levels in the atmosphere have increased, at a rate never measured before, greatly exceeding the highest levels measured over almost one million years (see Figure 1 for the data for the last thousand years.).[8]

Fortunately, oil and gas methane emissions can be reduced readily, cheaply, and feasibly. The cost of attaining Canada's target of reducing methane emissions by 45% is very low.[10] In fact, for a significant portion of these emissions, companies can make money from investing in emission reductions. There are two reasons why. The first is that feasible, low-cost technologies that reduce or eliminate many of the sources of methane pollution from oil and gas already exist. Secondly, when methane is not wasted, it can be sent to market as natural gas, creating a revenue stream for oil and gas companies and royalties for government.

Fortunately, oil and gas methane emissions can be reduced readily, cheaply, and feasibly. The cost of attaining Canada's target of reducing methane emissions by 45% is very low.[10]

Because methane is so potent, investments to reduce emissions can have very significant benefits. For example, according to the International Energy Agency, undertaking all the global methane emission reductions that have no net cost would have the same climate benefit as immediately shutting down all of China's coal-fired power plants.[11]

Canada's new federal regulations on methane from the oil and gas sector are a great first step. They will result in benefits to the environment and human health, by reducing a potent greenhouse gas and improving air quality.

BENEFITS OF REDUCING METHANE EMISSIONS

Reduced impact on climate change

Reduced air pollution

- Fewer premature deaths
- Improved human health
- Reduced impacts on species and ecosystems

Economic benefits

- Capture and use of gas that would have been wasted
- Increased taxes and royalties paid to governments
- Increased employment in methane leak detection and reductions

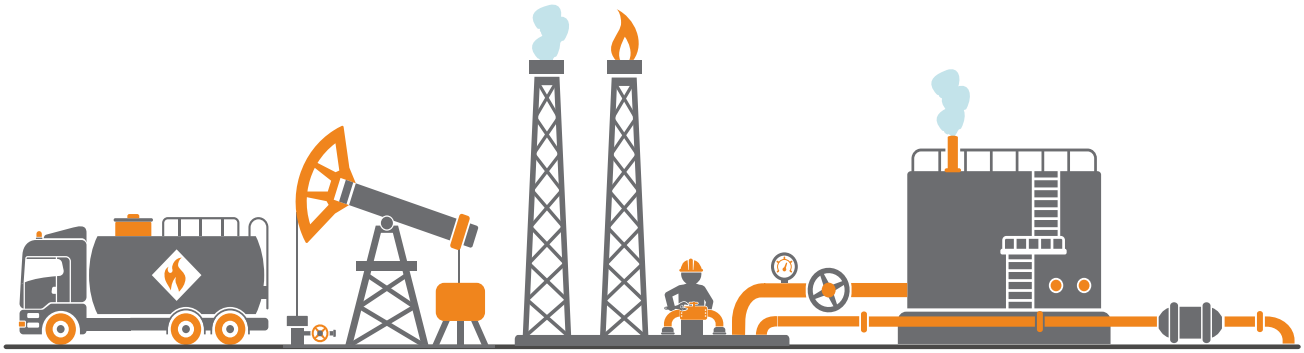
There will also be economic benefits. Reducing methane in the oil and gas sector will create demand for higher quality parts and equipment, which would mean jobs in Alberta and across the country. It would also mean more frequent inspections and with it, high-skill employment opportunities. Finally, it would mean that rather than wasting an energy resource by releasing it into the atmosphere, Canadian oil and gas companies can capture more methane and sell it as a commodity. This is good for the economy and will result in higher taxes and royalties paid to governments by the oil and gas sector.

Canada's and Alberta's Approach to Oil and Gas Methane Emissions

The federal and Alberta governments have set complementary goals with respect to reducing methane emissions from the oil and gas sector. Alberta set a goal of reducing emissions from the upstream oil and gas sector by 45% from 2014 levels by 2025. Canada's goal is 40-45% reductions from 2012 levels by 2025 for both upstream and downstream methane emissions.

However, the two governments have pursued very different approaches to achieving and regulating methane emission reductions from oil and gas facilities. Analysis of Alberta's draft regulations estimated that they would generate less than half the emission reductions of the federal regulations, and would not achieve the province's emission reduction goals.[12]

According to the Canadian Environmental Protection Act (CEPA), if Alberta wants its regulations to apply instead of the federal ones, those regulations have to lead to the same or better environmental benefit, in this case in the total cumulative reductions of methane between 2020 and 2025. If Alberta doesn't significantly strengthen its regulations by the time they are passed, the federal government must deem them not equivalent and insist that federal regulations under CEPA will be applied. The federal government should communicate this clearly in advance of Alberta moving forward with final regulations.



How to stop it	What the Federal regulations say	What the Alberta regulations say
LEAK DETECTION AND REPAIR		
Regular monitoring of oil and gas sites for leaks.	• Operators must inspect well batteries and compressor stations **3x per year.**	• Operators only have to inspect well batteries and wellpads **just once a year.** • At tens of thousands of wellsites, operators would not even have to use instruments to find leaks (they could just "look, listen, and smell" for methane—a colourless, odourless gas).
VENTING NATURAL GAS FROM OIL TANKS AND OIL WELLS		
Limit the deliberate release of natural gas that is not seen as worthwhile to capture.	• Site limit of 1,250 cubic metres per month.	• Site limit allows *12 times higher emissions*, compared to federal regulations, for most wells in Alberta.
VENTING – HEAVY OIL WELLS		
Limit the deliberate release of natural gas that is not seen as worthwhile to capture.	• 1,250 cubic metres per month limit applies to these wells, but sites producing less than 5,000 cubic metres per month of gas are exempt.	• 3,000 cubic meters per month, averaged across all of an operators wells. Because of this averaging, the Alberta rule would at best require very small reductions in venting from these wells.
PNEUMATIC PUMPS		
Limit pollution from devices that pressurize liquids using pressurized natural gas.	• Requires capture of emissions for new and existing larger pneumatic pumps.	• No requirements at all for existing pneumatic pumps.
PNEUMATIC VALVE CONTROLLERS		
Limit pollution from devices that open and close valves using pressurized natural gas**.**	• Requires the use of low-emitting devices.	• Up to 10% of new controllers are exempt, but Alberta regulations should be about as effective as federal regulations.
COMPRESSORS		
Limit pollution from devices that compress natural gas to move or process it.	• Existing compressors must meet limits • New compressors must conserve emissions.	• Alberta regulations will be about as effective as federal regulations.
WELL COMPLETIONS FOR FRACKED WELLS		
When completing a well, capture gas and sell or destroy it rather than venting it.	• For wells with a moderate ratio of gas to oil, flow back gas must be captured and either sold or flared.	• Alberta regulations do cover completion after fracking (the federal regulations defer to Alberta's regulations).

Federal regulations

The Government of Canada's methane regulations for the oil and gas sector, passed in April 2018, prescribe certain activities and technologies.[13] The regulations are expected to meet the 45% reduction target.[14]

The regulations, covering larger facilities, with production or processing capacity of over 60,000 cubic meters of gas per month, would establish a number of standard measures to reduce or eliminate methane emissions:

1. **Leak Detection and Repair (LDAR):** Federal regulations stipulate that LDAR is undertaken three times per year, using infrared cameras or other sophisticated equipment.

   Equipment at oil and gas facilities (pumps, valves, pipes and connectors) can leak methane. Also, problems such as seal or component failure, hatches being left ajar, and equipment failures can lead to large but unpredictable emissions. Without regular monitoring, these problems cause considerable amounts of methane and other pollutants to be released into the atmosphere. Requiring LDAR inexpensively reduces these emissions, helps facilities run more efficiently and can create high-skilled positions for technicians that carry out leak detection or replace faulty equipment.

2. **Venting and flaring:** At many oil and gas facilities in Canada, substantial quantities of gas are vented into the air because operators deem it not worthwhile to capture in a pipeline and get to market. Federal regulations set a limit for how much methane can be deliberately dumped (vented) at each facility at 1,250 cubic metres/month. The captured gas needs to be conserved or flared (burned). Flaring is allowed for some activities, including gases that would have been vented, emissions from pneumatic devices and compressors, and flowback gases during the completion of fracked wells. Flaring can be a better environmental option, though burning needs to be as complete as possible to prevent pollutants, and limited to when it is needed for safety reasons.

   The federal regulations also require operators to use more accurate methodologies to measure gas production from wells; accurate measurements and reports of gas production help ensure that the rules will substantially reduce unnecessary venting from oil and gas sites.

4. **Pneumatic equipment:** Oil and gas operations include pumps and valve controllers that use pressurized natural gas to operate, rather than another energy source such as electricity. These devices vent gas to the atmosphere as they operate, either by design or due to wear and damage to the devices that occurs in real-world operations.

   Federal regulations require large facilities to use modern, non-emitting pneumatic equipment, such as controllers and pumps, and lower-emitting controllers for smaller facilities, which are now on the market.

5. **Compressors:** The regulations set limits for the release of methane from existing compressors, and require new compressors to capture all methane.

   To process and move natural gas, facilities use compressors to pressurize gases during operations so it can be transported through pipelines to market. Methane can be lost through equipment design and from seals. More efficient equipment and regular inspections are necessary both as preventative measures as well as to identify and repair fugitive (unexpected) leaks.

6. **Well completions during hydraulic fracturing:** After a well is completed with hydraulic fracturing, a large volume of a mixture of fossil fuels, chemicals, water and mud flows to the surface for a period of time. Through a process known as "green completion," oil and gas operators can separate the gas during well completion and sell it. Federal regulations now prohibit the venting of flow back gas/methane for oil and gas wells when a reasonable amount of gas is anticipated to come from the well.

Alberta regulations

The Government of Alberta has published its draft regulations,[15] with final regulations expected to be issued in the coming months. Its approach has been much less specific and concrete, setting limits for emissions from entire sites and leaving it up to oil and gas companies to determine whether those are being respected.

Looking at *all* methane emissions from oil and gas facilities in Alberta,research has found that the 45% reduction target can be achieved at a cost of less than $3 per tonne of GHG.[16]

This leniency is not justified by economic concerns. Looking at *all* methane emissions from oil and gas facilities in Alberta, research has found that the 45% reduction target can be achieved at a cost of less than $3 per tonne of GHG.[16] (It should be noted that a drop in the price of natural gas means that the average costs would currently be higher, but still well under $10/tonne.) To put this in perspective, if the sector was not exempted from the federal carbon price, marginal emissions would cost $20 per tonne in 2019, rising to $50 per tonne in 2022. The Carleton research also concluded that the underreporting of methane emissions allows for even greater reductions through each action, which can reduce both the cost of emission reductions and the overall cost of complying with regulations.

This Canadian research is consistent with a major report by the International Energy Agency that found that it is technically feasible to avoid three quarters of global methane emissions in the oil and gas sector.[17] Up to half of those emissions can be eliminated at no net cost.[18]

There are six reasons why the Alberta regulations are weaker than federal ones:

1. **The emission limits per site are very high:** Alberta sets limits on how much methane is deliberately released, or vented, from every oil and gas site. But Alberta's vent limits for most sites are 12 times higher than the federal ones. For the most polluting oil and gas facilities—ones that produce heavy oil—the Alberta rule uses a complex averaging structure. The outcome will be that these rules would hardly reduce venting from these wells. Companies could even increase venting and comply with these provisions indefinitely.

2. **Companies won't be required to check for leaks nearly as often or with adequate equipment:** All jurisdictions that have methane regulations require companies to find and fix their leaks using sophisticated instruments. Research shows that it is very hard to predict where leaks occur, and which sites might be so-called Super-Emitters with large, unpredictable leaks, so regular inspection is important. Alberta's draft regulations require leak inspections only once a year for oil and gas facilities. And for tens of thousands of well sites, the regulations merely require companies to use human senses (sight, hearing, smell) to detect leaks – again, only once a year. Natural gas is invisible and usually odourless at production sites so this approach is completely inadequate compared to instrument-based inspections. Recognizing this, other jurisdictions uniformly require regular inspections with instruments.

3. **Alberta's rules inexplicably exempt some equipment:** For example, they would allow any pneumatic pumps installed before 2022 to continue polluting, unabated, indefinitely, despite the fact that other jurisdictions are cleaning up these pumps now. Alberta also entirely exempts 10 per cent of newly installed pneumatic controllers from the regulations, even though all new pneumatic controllers have been regulated in the U.S. for five years without creating any problems. Neither of these exemptions exists in the federal rules.

4 **The penalties for infractions are so low, there's very little incentive for companies to reduce methane emissions:** In fact, unlike the federal regulations, there would be no minimum penalty for infractions if the Alberta draft regulations are adopted, reducing the incentive for companies to actually follow them. Alberta also allows no mechanism for outsiders to report infractions that then need to be investigated, contrary to federal provisions.

5 **Alberta regulations will not address methane emissions that are currently unreported:** Contrary to the federal regulations, which will help to reduce both reported and unreported methane emissions, Alberta's proposed regulations will not address the "hidden" emissions that are currently unreported. That's because they do not update the problematic provincial rules for measuring gas production that have allowed widespread unreported venting to occur.

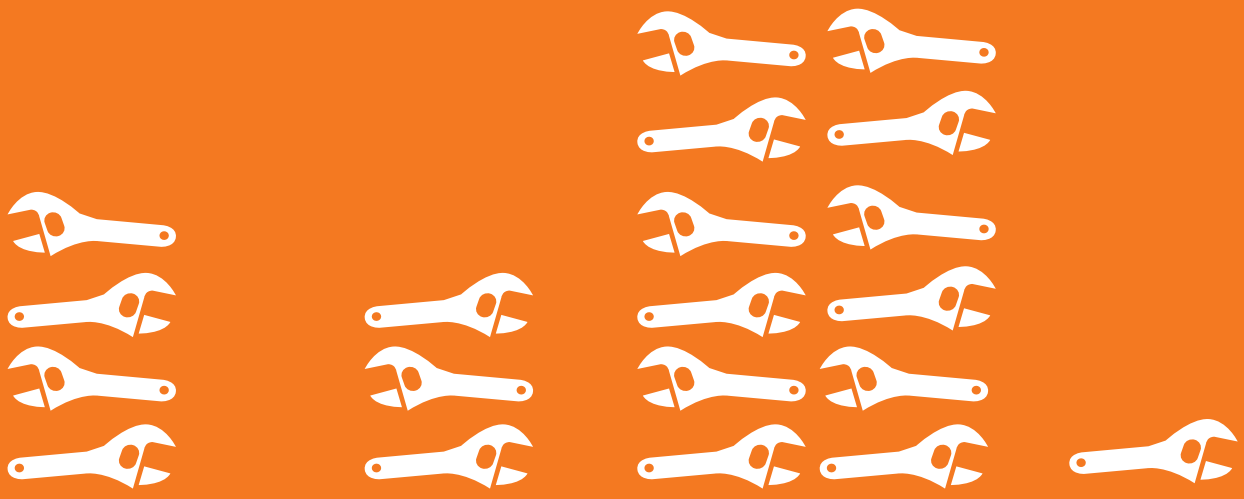
6 **The Alberta regulations let the oil companies police themselves:** Alberta uses a "We Trust You" approach allowing companies to police themselves and report their own emissions. No other country or U.S. state uses this method. The only way this approach could possibly work is if there were strict requirements for measurement, monitoring, and reporting emissions. These don't exist under Alberta's draft regulations.

The only conclusion that the federal government can come to, given all this evidence, is that the Alberta draft regulations will not deliver the same reductions in methane emissions. And that means that the federal government must tell the Alberta government to strengthen the draft regulations before they are finalized.

Photo credit: Clean Air Task Force

The only conclusion that the federal government can come to, given all this evidence, is that the Alberta draft regulations will not deliver the same reductions in methane emissions.

NUMBER OF ANNUAL INSPECTIONS FOR METHANE LEAKS AT OIL AND GAS FACILITIES



4	3	12	1
California	Canada	Colorado	Alberta

* In Colorado, site inspection frequency varies from one-time to monthly, depending on facility size.

Comparison with other jurisdictions

It should be noted that regulations in leading U.S. states have rules more stringent than Canada's federal government. For example, California requires Leak Detection and Repair (LDAR) four times per year compared to three times per year for the federal regulations and at most once a year in Alberta's draft regulations. In Colorado, the frequency depends on the size of the facility, and the largest facilities must be monitored *twelve* times per year.

For venting from tanks, California's emission limits are about the same as the federal regulations, while Colorado's emissions limits are about half the federal limit. At the federal level in the U.S., sites that emit as much gas as Alberta proposes to allow from most production sites are treated by law as "major sources" and are therefore subject to similar permitting rules as oil refineries, power plants, large paper mills, etc.

Colorado's oil and gas industry has not been hampered by the state's rules. A study conducted two years after the most significant regulations went into effect in Colorado showed that oil and gas companies operating there were generally supportive of the state's regulation, finding that the benefits outweigh the costs. The state tightened their rules in the past year with the support of the industry.

Opportunities for further reductions

Clearly it is possible for Canada to go beyond the existing target, with no technical or economic barrier to reducing methane emissions by three-quarters or so by 2030 using existing technology. So how could governments do this?

- **Apply the carbon tax.** Subjecting methane pollution to the pan-Canadian price on carbon—right now, the industry enjoys an exemption for these emissions—would increase the incentive for oil and gas companies to invest in solutions, and support the case for going well beyond the proposed target and regulations. The B.C. government is investigating this approach, which will become more and more feasible as measurement and reporting better reflects the reality of methane emissions.

- **Mandate newer technology and better practices** to reduce venting and improve leak detection. There are many technologies already on the market that can reduce emissions more than required by the federal regulations, such as zero-emitting systems to entirely eliminate pollution from pneumatic controllers and pumps. A research survey of methane emissions from Albertan oil and gas facilities undertaken by an energy services company found that electrified pneumatic devices operated for six years without any incidents or issues.[27] Technology is also rapidly developing, such as systems to continuously monitor production sites for leak

- **Stop wasting gas through flaring.** The federal regulations are expected to result in more than half of the oil and gas facilities flaring methane at oil and gas sites. Although better than venting, flaring wastes a valuable energy commodity and could result in black carbon emissions, another climate pollutant. It is also unclear how Canada intends to allow for flaring under the proposed regulations while at the same time meeting its international commitment to end routine flaring by 2030.[28] Regulations and GHG taxes should be used to push operators to capture and use gas, rather than flare it, whenever possible.

Going Beyond 45% Reductions of Methane in 2025

Analysis by Environment and Climate Change Canada shows that when the federal regulations are implemented, reductions occur from 2020 to 2023, but flatline from 2023 to 2035.[21] There will remain low-cost emission reductions in 2025, even if the federal regulations are fully applied. The Canadian government should look to go beyond the 2025 target and continue to reap increased benefits for Canada.

There are good reasons to do so.

1. As explained, the environmental, health, and economic benefits that come from the first tranche of reductions will be expanded by further reductions.

2. The federal government's analysis shows that proposed climate policies will not allow Canada to meet its 2030 GHG reduction target under the Paris Agreement. A 66 million tonne gap exists between current policies and Canada's target.[22] And that target has been assessed as "highly insufficient."[23] Environment and Climate Change Minster Catherine McKenna has said will it need to be strengthened.[24] So the country will need to find further emission reductions to reach the insufficient, existing target, and do more to go beyond.

3. It is technically feasible and relatively inexpensive to go much further. A significant proportion of methane emissions can be addressed through technologically feasible and economical solutions. For example, research undertaken at Carleton University has found that almost half (44.6%) of methane that was reported as vented from oil sites can be eliminated at no net cost.[25] If emissions that are currently unreported are included, that percentage increases to 71%.[26]

As such, the federal government needs to tell Alberta that its regulations need to be strengthened so they meet or beat the federal ones, or insist that the federal regulations will be applied in the province.

Conclusion

Cutting methane emissions by 45 per cent in the oil and gas sector is a great first step. Federal methane regulations appear to be strong enough to achieve that target.

However, Alberta's draft regulations do not measure up. They do not match the emission reductions that the federal regulations would achieve in Alberta, and they won't allow the province to meet its 45% target. As such, the federal government needs to tell Alberta that its regulations need to be strengthened so they meet or beat the federal ones, or insist that the federal regulations will be applied in the province.

But Canada can go even further than the 45% target at low expense. In the coming years, the federal government can develop even more ambitious methane regulations that will be implemented starting in 2025 and that can allow both reported and unreported methane emissions to be reduced more dramatically.

It starts with a longer-term vision of ending wasteful practices that result in easily avoided methane emissions. The federal government can replicate its policy leadership that supported the phase-out of hydrofluorocarbons, another short-lived climate pollutant, and work towards a longer-term, much more ambitious objective on methane.

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