Decarbonize Alberta – Really?

Say goodbye to billions in revenues and millions of jobless residents.

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DECARBONIZE ALBERTA – REALLY?

EXECUTIVE SUMMARY

Alberta Premier Danielle Smith was recently quoted as saying that she has become a believer in the goal of "decarbonization" because she has been convinced that "technology" offers a way to achieve it.

Most public commentary and analysis of the decarbonization objective has focused on the feasibility, costs and benefits of the near-term objectives, typically the targets set for 2030, 2035 and 2040. So, it is easy to forget that the true objective, set arbitrarily for 2050, is the complete elimination of all human-caused GHG emissions. That means ending the production, processing, transportation and use of all coal, oil, and natural gas.

Here, I would like to focus on the implications of complete decarbonization on oil and gas. It is the largest single contributor to the Alberta economy, accounting for roughly $88 billion of GDP in 2024, equivalent to 25% of the province's total GDP. It directly accounted for 200,000 jobs, equating to 8% of total employment. Total revenue from oil and gas production to Alberta was $153 billion in 2024, with oil sands ($105 billion) accounting for the lion's share.

In 2020 GHG emissions from Alberta's oil and gas industry broke down as follows: upstream extraction 122.7 MtCO2eq; pipeline transmission 5.2 MtCO2eq; and downstream operations 4.9 MtCO2eq; for a total that year of 132.8 MtCO2eq. There is remarkably little publicly-available analysis of the means by which the oil and gas industry worldwide can reduce its GHG emissions to near-zero.

In a January, 2020 article McKinsey and Company judged that, in the upstream portion of the industry, the options essentially came down to those that tackle fugitive emissions, flaring and extraction. The "extraction" menu of options was especially bare – energy efficiency, electrification and CCUS.

The November, 2025 memorandum of understanding between the governments of Canada and Alberta included a commitment to negotiate a "methane equivalency agreement' with a 2035 target date and a 75% reduction target relative to 2014 emission levels. A 75% reduction is not complete decarbonization. It is reasonable to assume that the cost of completely eliminating methane emissions, if it is feasible at all, would be far higher than that of reaching a 75% reduction.

On July 2, 2026, Canada, Alberta and the Oil Sands Alliance (Canada Natural Resources Limited, Suncor Energy Inc., Cenovus Energy Inc., Imperial Oil Limited and ConocoPhillips Company) entered into a Memorandum of Understanding (MOU) on the Pathways Project to be confirmed in definitive agreements this Fall. The agreement includes "phased capacity targets" concerning the amount of GHG emissions to be captured, transported and stored per year. By 2035, carbon capture and storage (CCS) is to reach at least six million tonnes per year. By 2040, eleven million tonnes per year in total emissions reduction is to be achieved (by CCS and other means). By 2045, 16 million tonnes per year in emissions reductions is to be achieved through expanded CCS or other technology.

So, if the industry's emissions stayed constant in future, the Pathways Project agreement would result in reductions of 3% in 2035, 6% in 2040, and 9% in 2045. That is not even close to zero emissions. In fact, it is likely that, with or without the Pathways Project, oil sands-related emissions are likely to continue increasing[1].

What are the chances of having ten to twenty more CCUS projects built and operating in Alberta by 2050, or even by 2070? What are the costs, and who is prepared to pay them?

Neither CCUS nor other emissions-reducing technologies are likely to be available at acceptable cost in the timeframe to 2050, and probably much longer. If Alberta genuinely supports the goal of complete decarbonization, it must find a way to rapidly phase down and then phase out its most important industry. One can only speculate about the economic impact of this. In simple terms, complete decarbonization of the oil and gas industry alone would mean that millions of people and many billions of dollars would leave Alberta.

[1] Lauren Krugel. *Oilsands emissions on track to outpace reductions from Pathways project: economist*. The Canadian Press. July 14, 2006

DECARBONIZE ALBERTA – REALLY?

Alberta Premier Danielle Smith was recently quoted as saying that she has become a believer in the goal of "decarbonization" because she has been convinced that "technology" offers a way to achieve it.

That statement invites a number of questions. Notably, does the Premier of Alberta really understand what "decarbonization" means, especially for the future of the oil and gas industry?

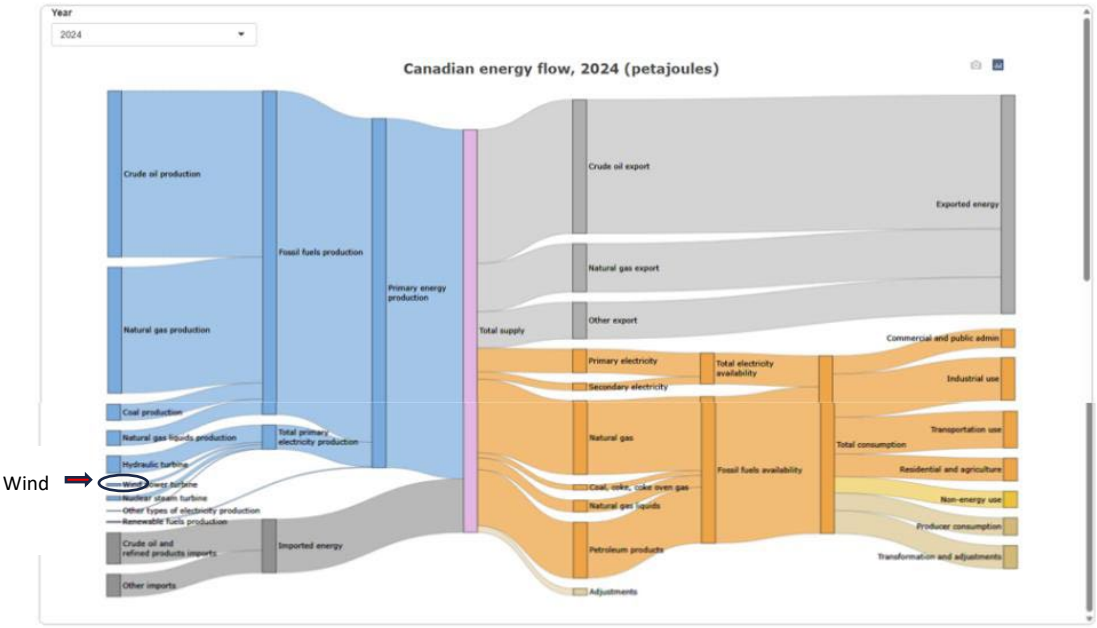
The goal of decarbonization was set by the Canadian federal government in the context of a series of international conferences held under the auspices of the United Nations Framework Convention on Climate Change. In that context, decarbonization is the process of reducing and ultimately completely ending humans' emissions of carbon dioxide and other greenhouse gases (GHG) so as to reduce the theorized risk of adverse effects from human-caused global climate change. Canada, like many other countries, has adopted a series of emissions-reduction targets by date leading to the goal of almost completely eliminating its GHG emissions by 2050.

Most public commentary and analysis of the decarbonization objective has focused on the feasibility, costs and benefits of the near-term objectives, typically the targets set for 2030, 2035 and 2040. **So, it is easy to forget that the true objective, set arbitrarily for 2050, is the complete elimination of all human-caused GHG emissions. That means ending the production, processing, transportation and use of all coal, oil, and natural gas.**

To really understand the consequences of that for Canada and especially for Alberta, one must consider the sources of GHG emissions there today. According to the most recent National Inventory Report submitted to the UN by the federal government, Canada's GHG emissions in 2024 were 685 million tonnes of carbon dioxide equivalent (MtCO2eq). Of this total, Alberta's economy produced 260 MtCO2eq, or 38% of the Canadian total. Upstream oil and gas, mostly in Alberta, emitted 188 MtCO2eq. Oil sands and heavy oil production accounted for 92 MtCO2eq and natural gas production and processing accounted for 52 MtCO2eq.

Completely eliminating hydrocarbons use in Alberta would of course affect every sector of the economy – industry, commerce, agriculture and food production, residential and industrial buildings, and transportation. It is not at all clear that, with present and likely-to-be-available technology, this could even be done by 2050. **Even if that were so, it also is not clear that the Alberta public would be prepared to accept the costs and disruption to their lives that would be entailed.** To pick just one sector, transportation, hydrocarbons now supply about 95% of the energy needed to fuel all modes of transport. In 2025, there were about 10,000 all-electric light-duty vehicles in Alberta, compared to 3.1 million registered ICE vehicles. Nothing short of a dictatorship could force every Alberta driver to

give up his or her internal combustion-powered car, SUV and pickup truck. Nor is it now possible to electrify aviation in that timeframe. **No one has done a serious analysis of the costs of the transition that would be required.**



Wind

One can readily see the outsized impact of oil and natural gas production and exports in Canada's energy mix in this Sankey diagram. Clearly the dream of 'electrify everything' is impossible; most electricity in the world (59%) is generated by fossil fuels though Canada has a much higher ratio of nuclear and hydro generation. However, electricity only accounts for 18% of Canada's overall energy source. The existing power grid took ~100 years to build. See the interactive version of this chart here: https://energy-information.canada.ca/en/resources/canadian-energy-flow-sankey-diagram

Here, however, I would like to focus on the implications of complete decarbonization on one specific sector of the Alberta economy – oil and gas.

THE SIZE AND ECONOMIC IMPACT OF THE INDUSTRY

Alberta accounts for over 90% of Canada's oil production and approximately 60% of its natural gas production. The resource base is immense. The oil sands have the fourth-largest proven oil reserves in the world, after Venezuela, Saudi Arabia and Iran. The proven reserves are equal to about 158.9 billion barrels. In 2024, Alberta's total oil and gas production averaged approximately 6.7 million barrels of oil equivalent per day, up over 50% from 2010 levels. That year, Alberta exported approximately 4.7 million barrels of oil equivalent oil and gas, equating to $133 billion in export revenues.

The economic role of the industry is correspondingly huge. **It is the largest single contributor to the Alberta economy, accounting for roughly $88 billion of GDP in 2024, equivalent to 25% of the province's total GDP. It**

directly accounted for 200,000 jobs, equating to 8% of total employment. Total revenue from oil and gas production to Alberta was $153 billion in 2024, with oil sands ($105 billion) accounting for the lion's share.

Alberta has a long-term goal of seeing total oil output double to 8 million barrels per day by 2035. It is not clear where that goal stands today.

The natural state of the Alberta oil sands; the oil is embedded in the soil and goes through a separation process after mining. Read a fascinating historical account of Charles Mair's first encounter with this natural phenomenon back in 1899.
https://www.gutenberg.org/files/12569/12569-h/12569-h.htm#chap09

GHG EMISSIONS

According to Environment and Climate Change Canada, in 2020 GHG emissions from Alberta's oil and gas industry broke down as follows: upstream extraction 122.7 MtCO2eq; pipeline transmission 5.2 MtCO2eq; and downstream operations 4.9 MtCO2eq; for a total that year of 132.8 MtCO2eq. The emissions intensity of the oil and gas sub-sectors varied considerably, with the production from the oil sands being most intensive (over 70 kg of CO2eq per barrel), and the conventional light, medium and heavy oil production and natural gas production emitting close to 50 kg of CO2eq per barrel.

CAN ONE ELIMINATE GHG EMISSIONS FROM OIL AND GAS PRODUCTION?

There is remarkably little publicly-available analysis of the means by which the oil and gas industry worldwide can reduce its GHG emissions to near-zero. The majority of the analysis and policy debate has instead focused on ways

to promote the production and use of alternatives to hydrocarbons by regulation, taxation, and subsidies, in the apparent hope that the producers and consumers of hydrocarbons will simply be left unable to compete.

The International Energy Agency (IEA), in a special report, stated that:

"*To align with a 1.5-degree C. scenario, these emissions need to be cut by more than 60% by 2030 from today's levels and the emissions intensity of global oil and gas operations must near zero by the early 2040s. These are appropriate benchmarks for industry-wide action on emissions, regardless of the future scenario."*

As how to reduce emissions per barrel, the IEA is vague. The closest it comes to specificity is this:

"*Some 30% of the energy consumed in a net zero rnergy system comes from low emissions fuels and technologies that could benefit from the skills and resources of the oil and gas industry. These include hydrogen and hydrogen-based fuels; carbon capture, utilization and storage; offshore wind; liquid biofuels; biomethane; and geothermal energy…The oil and gas industry is involved in 90% of CCUS capacity in operation around the world. CCUS and direct air capture are important technologies for achieving net zero emissions, especially to tackle or offset emissions in hard-to-abate sectors.*"

Thus, the IEA expects that the oil and gas industry will willingly contribute to measures that will ensure its own demise.

In a January, 2020 article McKinsey and Company came somewhat closer to identifying in general how current technologies can address most of the oil and gas industry's emissions.

In the upstream portion of the industry, the options essentially came down to those that tackle fugitive emissions, flaring and extraction. **The "extraction" menu of options was especially bare – energy efficiency, electrification and CCUS.** For fugitive emissions, the assumption appeared to be that the industry has been doing little up to now and so it really should try improving leak detection and repair at compression stations, and installing vapour recovery units.

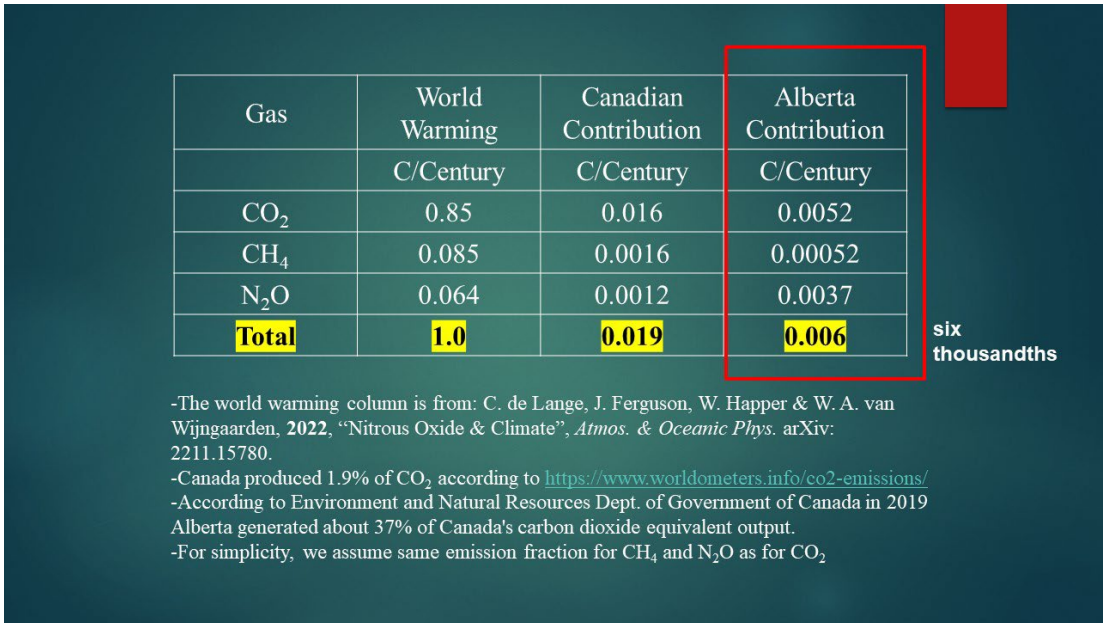
PAST AND PRESENT EFFORTS TO REDUCE EMISSIONS INTENSITY

Environment and Climate Change Canada's own National Emissions Inventory gives a good summary of what actually has been done up to now to reduce the emissions intensity of the Canadian oil and gas industry. From 1990 to 2024, production of crude oil increased by 221%, with most of that growth occurring in the oil sands. **Over**

that timeframe, the emissions intensity of overall oil production in Canada deceased by 15%, from 78 to 66 kg CO2eq per barrel. The intensity of oil sands and thermal heavy oil production operations has steadily declined from 126 kg CO2eq per barrel in 1990 to 75 kg CO2eq in 2024. Emissions vented per barrel extracted at thermal *in situ* bitumen facilities have also decreased due to the impact of Alberta's Directive 60.

METHANE EMISSIONS REDUCTION

Methane intensity reductions have also resulted from Alberta's Directive 60. More recently, the federal regulations to reduce methane from upstream oil and gas and equivalent regulations in Alberta which came into effect in 2020. **These factors collectively contributed to a 63% decrease in methane intensity of total oil and gas production since 2012, even though over that period Canadian oil and gas production increased by 63%.**



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

Analysis by Prof. William van Wijngaarden. In this presentation Prof van Wijngaarden shows there is no human-made climate crisis and net zero will cause serious damage to society.

The November, 2025 memorandum of understanding between the governments of Canada and Alberta included a commitment to negotiate a "methane equivalency agreement' with a 2035 target date and a 75% reduction target relative to 2014 emission levels. As usual, the parties published no estimate of the costs of methane emissions reductions either on a per tonne or total basis. Alberta has directed over $172 million to methane emission technology since 2019, but there are no estimates of the present and projected total cost to industry.

In any case, a 75% reduction is not complete decarbonization. It is reasonable to assume that the cost of completely eliminating methane emissions, if it is feasible at all, would be far higher than that of reaching a 75% reduction.

CARBON DIOXIDE CAPTURE AND STORAGE

Carbon dioxide capture and geological storage receive considerable public attention, especially since the signature of the November 2025 Canada-Alberta-Oil Sands industry agreement to proceed with the Pathways Project. The Pathways project involves the proposed capture, transmission and geological storage of large volumes of carbon dioxide produced mainly as a by-product by the oil sands industry. The projected capital costs are in the range of $16.5 billion to $20 billion, almost three-quarters of which will be paid by taxpayers.

Representative image licensed from Adobe Stock.
A diagram of carbon dioxide storage solutions, including geological sequestration and utilization technologies - By john

On July 2, 2026, Canada, Alberta and the Oil Sands Alliance (Canada Natural Resources Limited, Suncor Energy Inc., Cenovus Energy Inc., Imperial Oil Limited and ConocoPhillips Company) entered into a Memorandum of Understanding (MOU) on the Pathways Project to be confirmed in definitive agreements this Fall. The agreement includes “phased capacity targets” concerning the amount of GHG emissions to be captured, transported and stored per year. By 2035, carbon capture and storage (CCS) is to reach at least six million tonnes per year. By 2040, eleven million tonnes per year in total emissions reduction is to be achieved (by CCS and other means). By 2045, 16 million tonnes per year in emissions reductions is to be achieved through expanded CCS or other technology.

Compare these targets to present Alberta GHG emissions from oil and gas production. As noted previously, in 2024 the oil and gas industry in Alberta produced 188 MtCO2eq. **So, if the industry's emissions stayed constant in future, the Pathways Project agreement would result in reductions of 3% in 2035, 6% in 2040, and 9% in 2045. That is not even close to zero emissions. In fact, it is likely that, with or without the Pathways Project, oil sands-related emissions are likely to continue increasing**[2]

What are the chances of having ten to twenty more CCUS projects built and operating in Alberta by 2050, or even by 2070? What are the costs, and who is prepared to pay them?

CONCLUSION

The answers to those questions are obvious. Neither CCUS nor other emissions-reducing technologies are likely to be available at acceptable cost in the timeframe to 2050, and probably much longer. **If Alberta genuinely supports the goal of complete decarbonization, it must find a way to rapidly phase down and then phase out its most important industry.**

Source: https://decarbonization.thehonestbroker.org/

[2] Lauren Krugel. *Oilsands emissions on track to outpace reductions from Pathways project: economist*. The Canadian Press. July 14, 2006

One can only speculate about the economic impact of this. Economic models tend to be “general equilibrium” models that assume that, even after major shocks to an economy, an “optimal” equilibrium is assured mathematically and economically through flexible price adjustments that clear all interconnected markets simultaneously. They assume that economic activity (e.g. investment, labour, other factors of production) will simply shift over time to take account of the changed economic conditions.

In plain English, complete decarbonization of the oil and gas industry alone would mean that millions of people and many billions of dollars would leave Alberta. It is possible that they would be replaced over time by other economic activity to take advantage of the much lower wages to be paid there, and the lower housing prices. I doubt that many Albertans, including Premier Smith, would welcome the results.

ABOUT THE AUTHOR

Robert Lyman is an economist with 27 years of 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 24th 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 (CO2).

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