Pipeline Promises, Climate Risks

Assessing the lifetime climate impacts of the proposed Pacific Link oil pipeline



November 2026

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PEMBINA Institute

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These acknowledgements are part of the start of a journey of several generations. We share them in the spirit of truth, justice and reconciliation, and to contribute to a more equitable and inclusive future for all.

Contents

Executive summary 1
1. Introduction 3
    1.1 Bargaining via MOUs 4
2. Emissions 6
    2.1 Construction 6
    2.2 Operations 6
    2.3 Marine transport 7
    2.4 Upstream production 8
    2.5 Total lifetime emissions 10
3. Oilsands emissions scenarios 12
    3.1 Scenario results 13
    3.2 Social cost of carbon by scenario 15
4. Impact on Canada's climate commitments 17
5. Conclusion 19
Appendix A. Emissions modelling 20
Appendix B. Marine transport emissions 23

Figures

Figure 1. TMX Scope 1 and Scope 2 emissions 7
Figure 2. Annual emissions impacts by scenario 13
Figure 3. Incremental cumulative emissions by scenario 14
Figure 4. Estimated incremental social cost incurred or avoided for each scenario relative to the CER's Current Measures scenario 16
Figure 5. Canada's net national emissions and targets 18
Figure 6. Emissions intensities from McGaughy 21

Tables

Table 1. Climate commitments before and after MOUs 5
Table 2. Lifetime emissions of the Pacific Link pipeline 11
Table 3. Structure of scenarios 12
Table 7. Average emissions intensity from facilities modelled in McGaughy (kg CO_2e/bbl) 22
Table 4. Summary of marine transport emissions 23
Table 5. VLCC combustion parameters 24
Table 6. Tugboat combustion parameters 24

Executive summary

The proposed Pacific Link pipeline, formerly known as the West Coast Oil Pipeline, is being advanced as a major export project that could carry up to one million barrels of bitumen per day from Alberta's oilsands to the west coast. This project was recently designated a Project of National Interest by the federal Major Projects Office, despite the requirement that projects receiving this designation contribute to clean growth and Canada's climate objectives.

To date, little has been made of the impact this project would have on Canada's greenhouse gas emissions. This report assesses greenhouse gas emissions from Pacific Link construction and operations, associated marine transport and the upstream production required to fill the pipeline and compares it to estimates in the official submission by the Government of Alberta to the Major Projects Office. It also compares four upstream scenarios, estimates lifetime emissions over a 30-year operating period, and applies the Government of Canada's social cost of carbon. This analysis is intended to be an illustrative examination of what an additional 1 million barrels per day in oilsands production might do to greenhouse gas emissions trends, a scenario which is aligned with the Government of Alberta's stated goal of doubling oilsands production by 2035. The analysis finds:

- **Upstream production dominates the project's climate impact.** Filling the Pacific Link with one million barrels per day of additional oilsands production would generate approximately 24.81–28.75 Mt CO_2e of upstream emissions each year. Pipeline operations and marine transport would generate 0.8 Mt CO_2e annually, while construction would generate an estimated 1.4–1.5 Mt CO_2e. These increases would offset 10% of the emissions reductions Canada needs to hit its 2035 emissions reduction target of 45–50% below 2005 levels.
- **The Government of Alberta's Major Projects Office submission likely understates upstream emissions.** Its estimate of 15.6–18.2 Mt CO_2e per year relies on emissions intensity declining at a rate approximately four times faster than historical trends.
- **If built, Pathways reductions do not offset pipeline-enabled growth.** Annual oilsands emissions rise significantly after the Pacific Link is built even when the Pathways emissions reduction project, as laid out in the Canada-Alberta MOU, is fully implemented. By 2050, emissions are 50–66 Mt CO_2e higher than under a Pre-MOUs scenario, which assumes no new pipeline and stronger, earlier emissions reductions.

- **The Pacific Link pipeline would lock in significant lifetime emissions and costs.** Over a 30-year operating life, the project is estimated to add 676–900 Mt CO_2e, almost entirely from upstream production. The Pathways project would only offset 18% to 53%, depending on the future scale of the project. Combined, these projects stand to cost over $65 billion predominantly funded with taxpayer dollars.
- **The resulting climate damages are economically material.** Applying the Government of Canada's social cost of carbon, the Pacific Link's lifetime emissions represent an estimated $219–253 billion in climate damages. These costs are not reflected in the GDP, employment and government-revenue benefits emphasized by project proponents.

Based on the evidence presented in this report, the Pacific Link as currently proposed could increase Canada's emissions by 676–900 Mt CO_2e over the life of the project, more than Canada emitted in 2024. This would exceed the emissions reductions Canada has pledged to make as part of its 2035 and 2050 climate commitments. Before tens of billions of public dollars are allocated to this project, further information regarding the impacts on Canada's ability to meet its climate goals and mitigation pathways should be provided to Canadians.

1. Introduction

The prospect of a new bitumen export pipeline to Canada's west coast, which is now referred to as the Pacific Link pipeline, has emerged as a major component of recent discussions about Canada's energy and economic future.[1] While much of the discussion has revolved around the potential for enabling increased oil production from Canada's oilsands, the greenhouse gas emissions impacts of the proposed pipeline are significant and merit attention. The central concern is not pipeline infrastructure or oilsands development in isolation, but the prospect of enabling substantial production growth without corresponding emissions reductions.

Once built, the Pacific Link pipeline would operate for decades, influencing production levels from Alberta's oilsands and associated emissions from the sector, which have continued to grow despite industry pledges to reduce them.[2] Meanwhile, the federal government's decision to weaken industrial carbon pricing further reduces the likelihood that promised reductions will occur.[3] The proposed trade-off — public support and streamlined assessment for a new pipeline in exchange for future emissions reductions — therefore rests on commitments that have not yet been fulfilled and may now be less likely to materialize. The Major Projects Office (MPO) has itself acknowledged the imbalance, noting that emissions associated with the proposed pipeline would exceed the reductions delivered by the Pathways carbon capture project.[4]

While the construction and operation of pipelines generate emissions, the largest impact on emissions comes from additional production of what is being shipped. Canada's oil and gas sector is the country's largest source of greenhouse gas emissions, accounting for approximately 30% of national emissions in 2024.[5] In particular, oilsands production in Alberta generates approximately 47% of oil and gas emissions. This reflects the energy-intensive nature of oilsands extraction, particularly in situ methods that rely on natural gas combustion to produce steam.

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[1] Prime Minister of Canada, "Prime Minister Carney Lists the West Coast Oil Pipeline, Now Known as Pacific Link, as a Project of National Interest to Unlock Canada's Full Potential as a Global Energy Superpower," media release, October 1, 2026. https://www.pm.gc.ca/en/news/news-releases/2026/10/01/prime-minister-carney-lists-west-coast-oil-pipeline-now-known-pacific

[2] Kyle Bakx, "Oilsands Companies Have an Emissions Problem and a Plan to Fix It — But Who's Listening?," *CBC News*, April 29, 2022. https://www.cbc.ca/news/business/bakx-pathways-oilsands-ghg-ccs-ccus-1.6431428

[3] Pembina Institute, "Weakened industrial carbon price harms Canada's economic future, abandons international commitments," media release, May 15, 2026. https://www.pembina.org/media-release/weakened-industrial-carbon-price-harms-canadas-economic-future-abandons

[4] Nick Murray, "Ottawa Will Need Other Ways to Cut Emissions to Compensate for Oil Pipeline: Farrell," *CTV News*, October 28, 2026. https://www.ctvnews.ca/politics/article/ottawa-will-need-other-ways-to-cut-emissions-to-compensate-for-oil-pipeline-farrell/

[5] Harrison Mar, "Fuelling Canada's Oil and Gas Emissions," *Pembina Institute*, September 2, 2026. https://www.pembina.org/blog/fuelling-canadas-oil-gas-emissions

Against this backdrop, the project's emissions impact must be analyzed in terms of not only emissions associated with the building and operation of the pipeline, but also production associated with filling the pipeline. This report assesses upstream production impacts in different scenarios, the social cost of carbon associated with Pacific Link, and how emissions impact Canada's ability to achieve its climate commitments. This analysis is intended to be an illustrative examination of what an additional 1 million barrels per day in oilsands production might do to greenhouse gas emissions trends, a scenario which is aligned with the Government of Alberta's stated goal of doubling oilsands production by 2035. Global price dynamics, provincial royalty incentives, and pipeline shipper contract details will all have an impact on the extent to which the Pacific Link pipeline is utilized, and how much of that utilization comes from existing or new facilities.

1.1 Bargaining via MOUs

In 2026, the federal and Alberta governments advanced a series of memorandums of understanding (MOUs) that linked support for the proposed pipeline with a weakening of industrial carbon pricing in exchange for future emissions reduction commitments[6] from the Oil Sands Alliance.[7] It is important to note that before these MOUs were signed, the Oil Sands Alliance had already made commitments to reduce emissions that were more ambitious and did not depend on a new pipeline. The MOUs reduced the Alliance's previous commitment for the Pathways carbon capture and storage (CCS) project and overall emissions reductions from 22 Mt CO_2e by 2030 to 16 Mt CO_2e by 2045 (Table 1).

[6] Prime Minister of Canada, "Implementation Agreement: Canada-Alberta Memorandum of Understanding," backgrounder, May 15, 2026. https://www.pm.gc.ca/en/news/backgrounders/2026/05/15/implementation-agreement-canada-alberta-memorandum-understanding

Government of Canada, "Memorandum of Understanding," July 2, 2026. https://www.canada.ca/en/privy-council/major-projects-office/projects/other/referred/pathways-plus/memorandum-understanding.html

[7] The Oil Sands Alliance (formerly known as the Pathways Alliance) comprises five oilsands producers: Canadian Natural, Cenovus Energy, ConocoPhillips Canada, Imperial Oil, and Suncor Energy (MEG Energy was an original member but was later acquired by Cenovus). Collectively, these companies represent approximately 95% of Canadian oilsands production. Oil Sands Alliance, "Who we are." https://oilsandsalliance.ca/who-we-are/

Table 1. Climate commitments before and after MOUs

Commitment	Pre-MOUs	Post-MOUs
Industrial carbon price	$170/t CO_2e by 2030	$105/t CO_2e by 2030 Increasing by $5 per year to $140/t by 2040
Pathways Project to 2035	22 Mt CO_2e by 2030[8] • 10–12 Mt with CCS • 10 Mt with other emissions reductions	6 Mt CO_2e with CCS by 2035
Pathways Project 2035–2050	Net-zero by 2050	10 Mt CO_2e of other emissions reductions by 2045

A central concern with these agreements is that governments are offering taxpayer support for a new pipeline and weakened industrial carbon pricing in the near term in exchange for CCS emissions reductions that are smaller, delayed, and partly unspecified. These policy changes weaken both the incentive and the commitment to reduce oilsands emissions: the carbon-price signal for large emitters is lower, while industry's decarbonization commitments are smaller and delayed. Because the promised reductions depend on future projects and measures that are not yet fully defined, there is substantial uncertainty about whether they will be delivered on schedule and at the stated scale.

[8] Deborah Jaremko, "Inside the Pathways Alliance, Canada's Oil Sands Pledge to Reach Net Zero by 2050," *EnergyNow*, November 21, 2022. https://energynow.ca/2022/11/inside-the-pathways-alliance-canadas-oil-sands-pledge-to-reach-net-zero-by-2050/

2. Emissions

This section assesses the greenhouse gas emissions associated with the Pacific Link pipeline, including emissions from pipeline construction and operation, marine transport from the proposed terminal, and upstream oilsands production growth required to fill the pipeline. Where possible, we compare our estimates with those provided in the Government of Alberta's West Coast Oil Pipeline Project submission to the Major Projects Office (the MPO submission)[9] and from the Trans Mountain Pipeline Expansion Project (TMX) which was completed in 2024. This comparison highlights both the scale of emissions associated with the project and key differences in assumptions made between reports, particularly around upstream production growth and future emissions intensity.

2.1 Construction

Pacific Link's construction phase will generate emissions from activities such as earthworks, pipeline welding, heavy equipment operation, steel manufacturing, temporary power generation and workforce accommodation. During the construction of TMX, land-clearing accounted for 90% of the project's total greenhouse gas emissions.[10] The MPO submission estimates emissions for the Pacific Link pipeline to be approximately 1.4 to 1.5 Mt CO_2e, roughly 40 to 50% higher than the 0.985 Mt CO_2e estimated for the Trans Mountain Expansion Project during its own review.[11] Given that the pipeline follows a similar route and is of larger scale, we use the MPO submission's estimate of construction emissions.

2.2 Operations

Emissions from the operation of a pipeline come from pump stations, associated terminal facilities and other supporting infrastructure. These emissions can be broken down into Scope 1 and Scope 2 emissions. Scope 1 includes direct emissions from fuel combustion at pump stations, where applicable, as well as fugitive emissions from pipeline infrastructure such as

[9] Government of Alberta, *West Coast Oil Pipeline Project: Submission by the Government of Alberta to the Major Projects Office for Listing Under the Building Canada Act* (2026), 59. https://open.alberta.ca/dataset/a529e3da-6368-43d7-af43-74b1773be517/resource/6e43e4b4-3dfe-4c28-b723-116b6cab19ea/download/west-coast-oil-pipeline-project-submission-to-mpo.pdf

[10] National Energy Board, *National Energy Board Report: Trans Mountain Expansion Project* (2016), 172. https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2969696/2969867/A77045-1_NEB_-Report-Trans_Mountain-_Expansion_Project-_OH-001-2014.pdf?nodeid=2969681&vernum=-2

[11] *West Coast Oil Pipeline Project*, 59.

valves, flanges, pumps and storage equipment. Scope 2 consists of indirect emissions from purchased electricity used to power pump stations and terminal operations.

For TMX, 87% of operating emissions are Scope 2 from electricity consumption in Alberta, where electricity generation is largely natural gas (Figure 1). Scope 1 emissions are dominated by the vapour combustion unit at TMX's Westridge Marine Terminal, which accounts for 84% of these emissions.[12] Other notable direct emission sources include fleet vehicles and stationary combustion equipment such as backup generators and fire pumps.

The MPO submission estimates emissions of 0.2 Mt CO_2e per year, based on TMX's 2025 emissions of 0.157 Mt CO_2e and scaled by capacity. Given the larger scale of the proposed project and the associated increase in pumping requirements, the MPO estimate is considered reasonable and is used here.

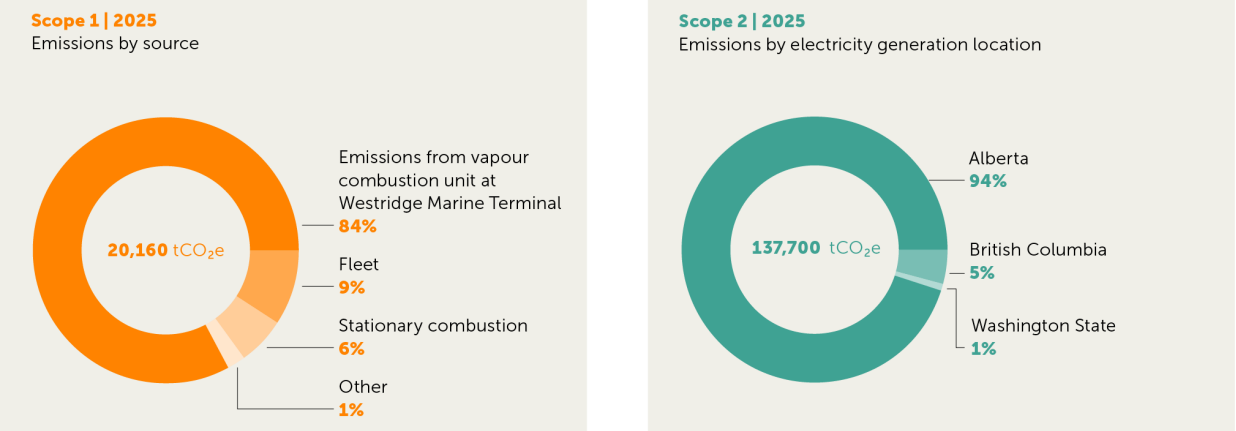


Figure 1. TMX Scope 1 and Scope 2 emissions

Source: Trans Mountain Corporation[13]

2.3 Marine transport

Emissions associated with shipping oil by tankers (marine transport) come from two principal sources: combustion emissions, generated by tanker main and auxiliary engines, tanker boilers, and tug escort engines during both transit and berthing; and fugitive emissions, arising from product loading activities at the marine terminal and venting during transit.

The proposed Roberts Bank terminal would include two berths capable of accommodating very large crude carriers with capacities of up to 2 million barrels, compared to the smaller Aframax

[12] A vapour combustion unit is an enclosed flare-like system that combusts hydrocarbon vapours generated during tanker loading to control emissions and odours.

[13] Trans Mountain Corporation, *2025 Sustainability Report* (2025), 20. https://docs.transmountain.com/Sustainability-Report/Trans-Mountain-2025-Sustainability-Report.pdf

tankers currently loaded at the Westridge Marine Terminal, which typically carry approximately 750,000 barrels. The use of larger vessels reduces the number of tanker trips required to move the same volume of product, while the shipping route also requires fewer tugboat escorts and assist operations. Together, these factors result in lower marine transportation emissions when compared to TMX, estimated at 0.058 Mt CO_2e annually versus TMX range from 0.068 to 0.076 Mt CO_2e per year (see Appendix A for methodology).[14] Notably, the MPO submission does not take into account any emissions from to marine transport.

2.4 Upstream production

The scale of the Pacific Link pipeline project's upstream emissions ultimately rests on whether it changes crude oil production decisions, rather than simply how barrels reach market. If the oil carried by the pipeline would have been produced in any case and is simply reallocated from existing export routes, the project will have little or no incremental effect on Canadian upstream greenhouse gas emissions. Given that current pipeline capacity is already sufficient to carry existing production, however, we assume that the Pacific Link project is intended to allow expanded crude oil production.[15]

The primary driver of crude oil production in the Western Canada Sedimentary Basin is projected to be the oilsands, according to both the Alberta Energy Regulator's 2025–2034 outlook and the Canada Energy Regulator's Energy Futures framework.[16,17]

Estimating emissions associated with straightforward increases in upstream production requires an estimate of emissions intensity, or the amount of CO_2e per barrel produced. The emissions intensity estimates used in this report are derived from McGaughy et al., a comprehensive life-cycle assessment of greenhouse gas emissions from Canadian oilsands production (see Appendix A for references and analysis details). The study is useful as it combines two widely used and publicly available life-cycle assessment models and incorporates direct operational emissions, indirect emissions associated with fuel and electricity consumption, flaring and fugitive emissions, land-use change impacts, refining emissions, transportation, and end-use combustion. The underlying study models facility-specific pathways representing approximately 75% of Canadian oilsands bitumen production based on 2018–2019 operating conditions.

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[14] Marine vessel emissions calculated using the methodology set out in Environment and Climate Change Canada's 2010 National Marine Emissions Inventory.

[15] Canada Energy Regulator, *Canada's Energy Future 2026: Energy Supply and Demand* (2026), 103. https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2026/canada-energy-futures-2026.pdf

[16] Alberta Energy Regulator, *Alberta Energy Outlook 2026* (2026). https://static.aer.ca/prd/documents/sts/ST98/2026/st98-2026-alberta-energy-outlook.pdf

[17] *Canada's Energy Future 2026,* 54.

Although industry production has increased since then, growth has largely occurred within existing mining and in situ operations, suggesting the study remains broadly representative of the sector's major producing assets.

The McGaughy study provides a useful range of potential future emissions intensities. The business-as-usual case assumes current extraction and upgrading technologies remain in operation through 2050, while the low-emissions technology case assumes broad deployment of the emissions reduction technologies evaluated in the study. As a result, the latter can be viewed as a practical lower-bound estimate of future upstream emissions intensity based on currently identified technology pathways.[18] Upstream emissions intensity in 2032 ranges from 67.99 to 78.77 kg CO_2e/bbl. This is broadly in line with estimates of emissions intensity using current market data.[19] At these intensities, 1 million bbl/d of incremental oilsands production would result in 24.81–28.75 Mt CO_2e of upstream emissions per year. For comparison, recent testimony from the MPO cited internal government estimates that found that the Pacific Link pipeline would increase emissions by 27.7 Mt CO_2e, a figure similar in magnitude to our annual upstream estimate.[20]

Contrast with the MPO submission

For comparison, the MPO submission estimates the upstream emissions of the additional production to be 15.5–18.2 Mt CO_2e per year between 2032 and 2041.[21] This relatively low estimate is driven by an assumed weighted-average well-to-refinery (WTR)[22] emissions intensity of approximately 46–50 kg CO_2e/bbl in 2032, declining to approximately 42–46 kg CO_2e/bbl by 2041. This decline is solely attributed to declines in emissions intensity associated with in situ production. These values are materially lower than other industry estimates cited above.

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[18] Additional reductions could be possible through technologies that were outside the scope of their analysis or technologies not yet developed.

[19] Using emissions data from the oilsands sector in Alberta from the National Inventory Report and production data from the Canada Energy Regulator's Current Measures scenario, average emissions intensity for 2024 is estimated to be 66.18 kg CO_2e/bbl. Environment and Climate Change Canada, *National Inventory Report 1990–2024: Greenhouse Gas Sources and Sinks in Canada* (2026). https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html; *Canada's Energy Future 2026*.

The Government of Alberta calculates an intensity of 67.62 kg CO_2e/bbl across the sector. Government of Alberta, "Alberta Oil Sands Greenhouse Gas Emission Intensity Analysis." https://open.alberta.ca/opendata/alberta-oil-sands-greenhouse-gas-emission-intensity-analysis

[20] Murray, "Ottawa Will Need Other Ways to Cut Emissions."

[21] *West Coast Oil Pipeline Project*, 62.

[22] Well-to-refinery emissions cover production and processing emissions, including flaring, fugitive and venting emissions; energy used in production, including industrial processes, combustion, and imported or exported electricity; transportation of marketable crude to the project's origin point; and life-cycle emissions associated with diluent up to the point of blending.

This assumption is problematic for two reasons. First, WTR emissions intensity should generally be higher than facility-level emissions intensity because it includes a broader set of emissions sources. Yet the MPO submission assumes WTR emissions intensity from in-situ production that is approximately 27% lower than the average facility-level intensity reported by Alberta for 2024. Second, the MPO submission does not clearly explain how these reductions would be achieved. It refers to technologies such as carbon capture, utilization and storage, steam displacement, and solvent-assisted extraction, but does not specify when these technologies would be deployed, at what scale, or how much each would contribute to the projected decline. To reach the intensity levels assumed in the MPO submission, emissions intensity would need to decline by close to 4% per year — roughly four times faster than the rate observed over the past five years.[23]

Recent analysis by Clean Prosperity suggests that cheaper efficiency improvements have already been implemented by the sector and that carbon prices on the TIER market of $130/t CO_2e are required before significant reductions in emissions are likely.[24] The weakening of TIER under the Canada-Alberta MOU directly undermines additional reductions and is likely to add further delays to incremental investment in emissions reductions.[25] There is also the distinct possibility that capital that would have been invested in further emissions reductions is instead used to fund the Pathways CCS project, further stalling emissions reductions until the time it is operational.

2.5 Total lifetime emissions

Table 2 shows a summary of the lifetime emissions associated with the construction and operation of Pacific Link. Based on a 30-year operating life, the Pacific Link adds between 676 and 900 Mt CO_2e to Canada's national emissions. This is driven almost exclusively by emissions associated with upstream production increasing by 1 million bbl/d to fill the new pipeline. This assumption reflects how the pipeline has been marketed — to facilitate additional oilsands production — and aligns with the Government of Alberta's commitments to double oil production by 2035 and the assumption of full pipeline utilization made in the MPO

[23] Ian Sanderson and Janetta McKenzie, *A Not-so-Grand Bargain: The Quest for "Decarbonized Barrels" in the Oilsands* (Pembina Institute, 2025), 7. https://www.pembina.org/sites/default/files/2025-10/A_Not-so-Grand_Bargain.pdf

[24] Brendan Frank and Chloe McElhone, *Top TIER: Federal-Alberta Memorandum of Understanding Opens Up New Opportunities for Low-Carbon Growth in Alberta* (Clean Prosperity, 2025), 20. https://cleanprosperity.ca/wp-content/uploads/2025/12/Top-TIER-December-2025.pdf

[25] Dave Sawyer, "New Analysis Finds Canada-Alberta MOU Leaves Emissions Largely Unchanged," 440 Megatonnes, June 4, 2026. https://440megatonnes.ca/insight/canada-alberta-mou-leaves-emissions-largely-unchanged/

submission.[26,27] Some existing production could, however, be diverted to the new pipeline rather than representing additional output. While the Oil Sands Alliance has pledged to reduce emissions with its Pathways project, this would result in reductions of 162–357 Mt CO_2e, less than half of the total emissions added.

Table 2. Lifetime emissions of the Pacific Link pipeline

Source	Emissions (Mt CO_2e)
Construction	1.5
Terminal	6.0
Shipping	2.0
Upstream	667–891
Total	**676–900**
Potential Pathways reductions	**162–357**

[26] Government of Alberta, *Mandate Letter: Minister of Energy and Minerals* (2025). https://open.alberta.ca/dataset/b0769b96-7a45-40b5-b57c-415ff82aca49/resource/9a01983c-8c76-45e0-9313-91a21eb32f9e/download/em-mandate-letter-energy-and-minerals-2025.pdf

[27] *West Coast Oil Pipeline Project*, 62.

3. Oilsands emissions scenarios

This section assesses how annual and cumulative emissions in the oilsands sector could evolve with the building of the Pacific Link pipeline and different implementations of the Pathways Plus MOU. We analyzed four different scenarios: Pacific Link Only, Pathways CCS only, Pathways Plus, and Pre-MOU, outlined in Table 3.

We include a Pathways CCS Only scenario where only the first phase of the Pathways project is pursued (6 Mt CO_2e of carbon capture by 2035), as it is unclear how the sector intends to achieve the additional 10 Mt CO_2e by 2045 and how that commitment would be enforced, particularly if the pipeline would be operational by 2035.

Additionally, we include a Pre-MOUs scenario where the Pathways CCS project is built in 2030 and captures 12 Mt CO_2e without the construction of a pipeline. This reflects the initial commitments made by the Oil Sands Alliance before Pathways was linked with the Pacific Link pipeline, although no meaningful progress had been made on fulfilling those commitments by the Alliance.

Table 3. Structure of scenarios

Scenario name	Description			Emissions intensity
	Pipeline?	Pathways CCS?	Other	
Pacific Link Only	Pipeline built	None	None	Business-as-usual case
Pathways CCS Only	Pipeline built	Completed in 2035 Captures 6 Mt CO_2e annually	No further material emissions reductions	Business-as-usual case
Pathways Plus	Pipeline built	Completed in 2035 Captures 6 Mt CO_2e annually	Additional 10 Mt CO_2e of annual emissions reductions assumed to occur gradually by 1 Mt per annum between 2035–2045	Business-as-usual case
Pre-MOU	No pipeline	Completed in 2030 Captures 12 Mt CO_2e[28] annually	From the low-emissions technology case	Low-emissions technology case

[28] Jaremko, "Inside the Pathways Alliance."

The analysis uses the Canada Energy Regulator's (CER's) Current Measures scenario for Alberta mined and in situ bitumen production as the baseline for production out to 2050.[29] We then assume production increases by 0.33 million bbl/d starting in 2030, reaching 1 million bbl/d of additional oilsands production by 2032 when the pipeline is assumed to be completed.

Emissions intensity for the pipeline scenarios is assumed to follow the business-as-usual case outlined in Section 2.4, given the extent of capital spending that would be required to achieve both production increases and building of the Pathways CSS project. The MPO submission suggests upstream production increases would require approximately $30 billion, while the Pathways CCS project alone is estimated to cost at least $20 billion.

The Pre-MOUs scenario uses the low-emissions technology case, which assumes the sector will direct capital towards making the emissions reductions they have committed to.

3.1 Scenario results

Annual upstream emissions rise following construction of the Pacific Link pipeline, even when the Pathways Plus project is fully implemented (Figure 2).

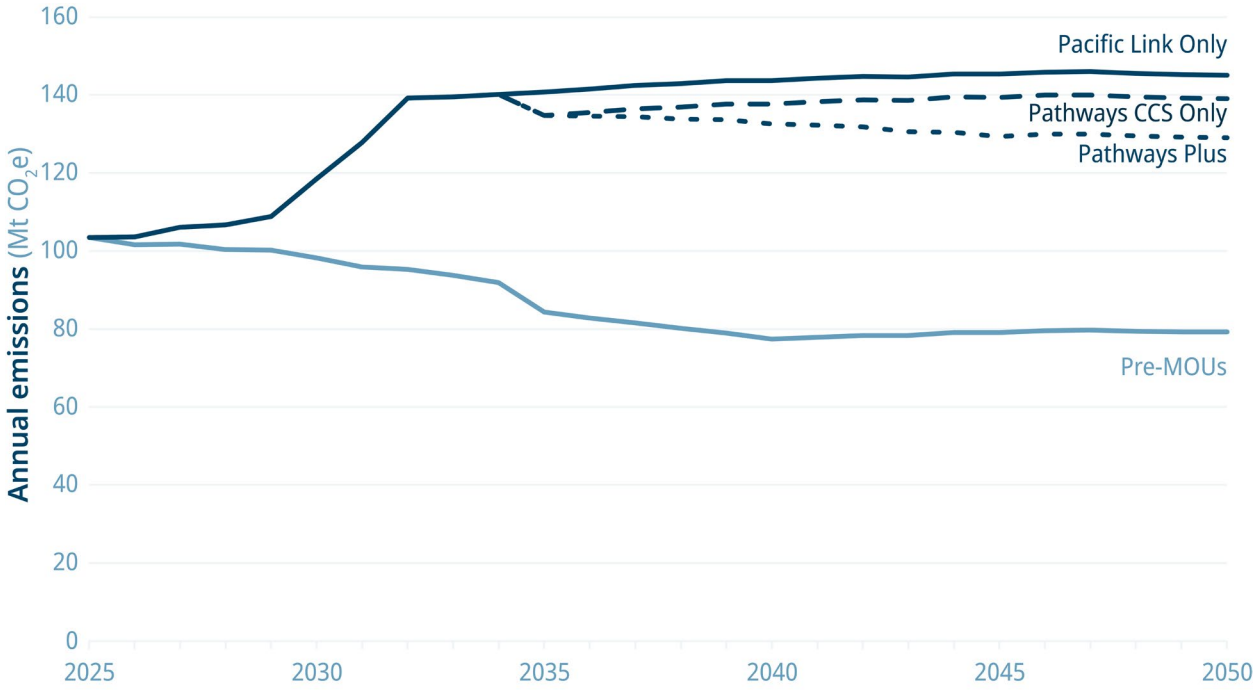


Figure 2. Annual emissions impacts by scenario

As production begins to increase in 2031 to fill Pacific Link, emissions rise from 109 Mt CO_2e to 139 Mt CO_2e. The start of the Pathways CCS project reduces emissions by only about 5% in the

[29] *Canada's Energy Future 2026.*

two Pathways scenarios, indicating that the pledged reductions are small relative to the emissions generated by higher production. By 2050, emissions reach 145 Mt CO_2e under the Pacific Link only scenario, and remain only marginally lower under the Pathways scenarios. In contrast, emissions in the Pre-MOUs scenario are 50–66 Mt CO_2e lower than in the other scenarios by 2050, illustrating the combined effect of avoiding pipeline-induced production growth and pursuing the stronger emissions reductions contemplated before the MOUs.

While the annual results show the level of emissions in each year, the cumulative results clearly show how differences between scenarios add up over the full analysis period. Reductions achieved in later years can slow the accumulation of emissions, but they do not negate the emissions released in earlier years. This distinction matters because a project's climate impact depends on the total emissions it adds over its lifetime, rather than its emissions in any single year. Considering both measures therefore shows not only whether the Pathways commitments reduce annual emissions, but also whether those reductions are sufficiently large and timely to offset the emissions associated with increased production. To isolate each scenario's incremental impact, Figure 3 shows cumulative emissions relative to a baseline emissions scenario based on the CER's Current Measures production scenario.



Figure 3. Incremental cumulative emissions by scenario

The Pacific Link only scenario adds nearly 550 Mt CO_2e between 2032 and 2050, representing approximately 25% more cumulative emissions than the baseline. Even under the more ambitious Pathways Plus scenario, cumulative emissions increase by 347 Mt CO_2e over the same period. This reflects a fundamental timing and scale mismatch between the production growth

enabled by the pipeline and the emissions reductions promised under the MOU. While the pledged reductions slow the growth in emissions, they are insufficient to offset the additional upstream emissions associated with filling the pipeline. As a result, cumulative emissions remain substantially higher than the baseline throughout the analysis period, further increasing the challenge of achieving Canada's climate commitments (see Section 4). Conversely, the Pre-MOUs scenario generates more than 600 Mt fewer emissions than the baseline scenario.

3.2 Social cost of carbon by scenario

The social cost of carbon estimates the monetary value of the damages caused by emitting one additional tonne of CO_2e. It is commonly used in cost-benefit analysis to account for climate damages that would otherwise be excluded from market prices or project financial assessments. The social cost of carbon captures the long-term costs of climate change, including impacts on human health, infrastructure, agriculture, ecosystems, and climate-related disasters. Applying this value to the Pacific Link's lifetime emissions helps translate the project's climate impact from tonnes of emissions into an estimate of the broader costs imposed on society.

Using the Government of Canada's base social cost of carbon, the costs or benefits associated with each scenario are estimated relative to the CER's Current Measures scenario (Figure 4).[30] On this basis, the Pacific Link's cumulative emissions would represent approximately $253 billion (in 2025 dollars) in climate damages over the life of the project. The Pathways Plus scenario would still result in approximately $144 billion in climate damages because emissions associated with upstream production outweigh the projected emissions reductions. In contrast, the Pre-MOUs scenario would have avoided $297 billion in climate damages relative to the Current Measures scenario.

[30] Environment and Climate Change Canada, "Social Cost of Greenhouse Gas Emissions: Social Cost of Greenhouse Gas Estimates – Interim Updated Guidance for the Government of Canada." Table 1. https://www.canada.ca/en/environment-climate-change/services/climate-change/science-research-data/social-cost-ghg.html

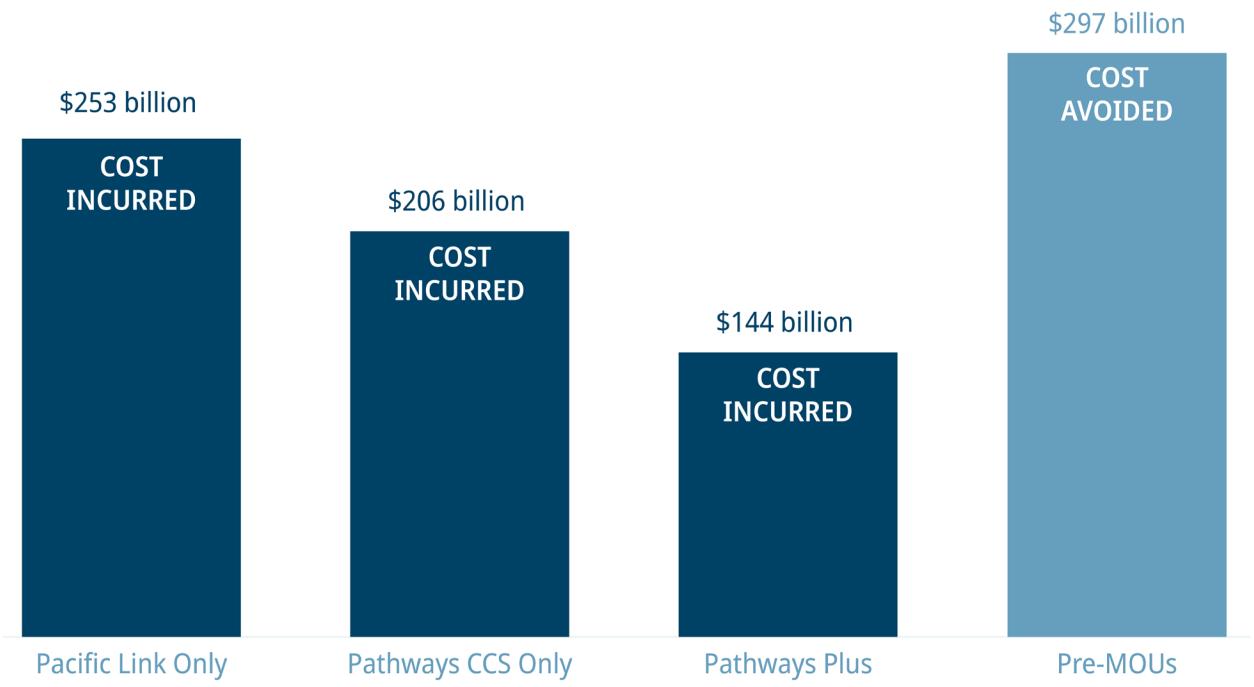


Figure 4. Estimated incremental social cost incurred or avoided for each scenario relative to the CER's Current Measures scenario

These estimated costs are large enough to be considered a material economic impact in their own right and would offset a significant portion of the economic benefits claimed by project proponents. While the MPO submission emphasizes increases in GDP, employment, and government revenues, these estimates do not internalize the costs of climate change associated with the project's additional emissions. A report from the Canadian Climate Institute reinforces the importance of looking beyond GDP when assessing economic benefits.[31] Spending to repair climate-damaged infrastructure diverts resources from productive investment, while households face reduced incomes and higher costs. These findings underscore why an assessment of Pacific Link's economic benefits should also account for the climate damages associated with its additional emissions. The social cost of carbon estimates highlight that a substantial portion of the project's economic gains could be offset by climate-related damages borne by governments, households, businesses, and ecosystems over time.

[31] Canadian Climate Institute, *Damage Control: Reducing the Costs of Climate Impacts in Canada* (2022). https://climateinstitute.ca/wp-content/uploads/2022/09/Damage-Control_-EN_0927.pdf

4. Impact on Canada's climate commitments

Canada's climate commitments are anchored in its obligations under the Paris Agreement and the Canadian Net-Zero Emissions Accountability Act.[32] Canada's current nationally determined contribution commits the country to reducing greenhouse gas emissions by 40 to 45% below 2005 levels by 2030, followed by a 2035 target of 45 to 50% below 2005 levels, and net-zero emissions by 2050.[33] Achieving these goals depends heavily on reducing emissions from the oil and gas sector, which accounts for roughly 30% of national emissions, and on maintaining strong policies such as industrial carbon pricing, identified by the Canadian Climate Institute as the single largest driver of emissions reductions.[34]

Recent federal reporting indicates that Canada is not on track to meet these commitments. The 2025 Progress Report projects that Canada will remain well above its 2035 target, achieving just 24% reduction in emissions below 2005 levels.[35] Recent analysis that accounted for the changes in the Canada-Alberta MOU and emissions added by the Pacific Link suggests Canada is even further off track and is unlikely hit its 2030 climate targets by 2050 (Figure 5). In this context, the emissions associated with the Pacific Link would add to an already significant national emissions gap. The 6 to 16 Mt CO_2e of emissions reductions pledged by the Oil Sands Alliance is insufficient to offset even the upstream emissions associated with Pacific Link. As a result, the project would make Canada's climate commitments more difficult to achieve.

[32] Government of Canada, "Canadian Net-Zero Emissions Accountability Act," modified March 29, 2022. https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050/canadian-net-zero-emissions-accountability-act.html

[33] Government of Canada, "Climate Change: Our Plan," modified November 3, 2025. https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan.html

[34] Canadian Climate Institute, "Industrial Carbon Pricing the Top Driver of Emissions Reductions, New Analysis Shows," March 21, 2024. https://climateinstitute.ca/news/industrial-carbon-pricing-the-top-driver-of-emissions-reductions-new-analysis-shows/

[35] Environment and Climate Change Canada, *2025 Progress Report on the 2030 Emissions Reduction Plan* (2025). https://publications.gc.ca/site/eng/9.954865/publication.html

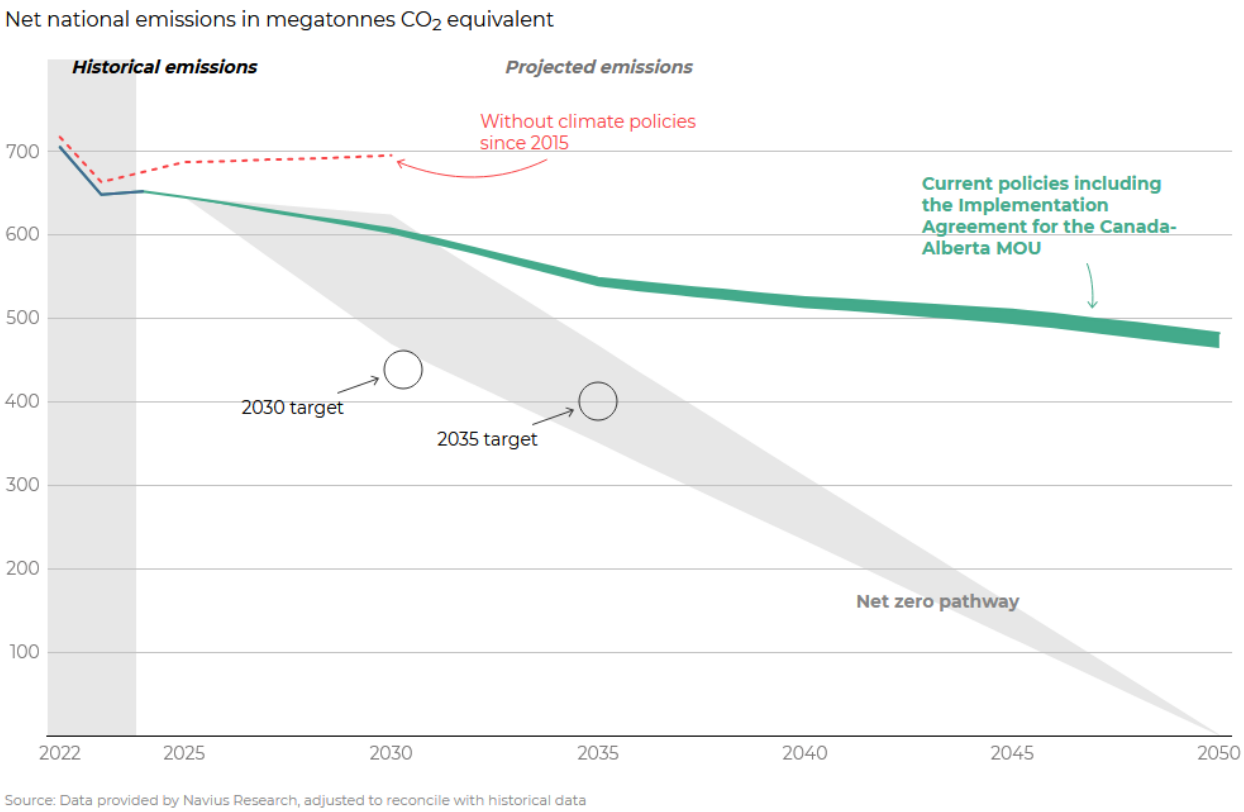


Figure 5. Canada's net national emissions and targets

Source: The Canadian Climate Institute[36]

[36] Ross Linden-Fraser, Alison Bailie, and Rick Smith, "2030 Target and Net Zero: Canada Is 20 Years Behind," *440 Megatonnes*, September 11, 2026. https://440megatonnes.ca/insight/net-zero-canada-more-than-20-years-behind-2030-target/

5. Conclusion

This analysis highlighted the significant emissions risks associated with the Pacific Link. Over a 30-year operating life, the project is estimated to add between 676 and 900 Mt CO_2e to Canada's emissions, driven overwhelmingly by the additional oilsands production required to fill the pipeline. The emissions reductions pledged by the Oil Sands Alliance would offset at most half of this increase and would be insufficient to reverse the broader rise in sector emissions. The Pacific Link would therefore widen Canada's emissions gap and make its climate commitments more difficult and costly to achieve.

With the evidence presented in this report, the Pacific Link does not satisfy the criteria of the *Building Canada Act* for contributing to clean growth and meeting Canada's climate change objectives.[37] Despite this, the Pacific Link project has been deemed a Project of National Interest, with little to no mention of the associated emissions and climate related risks[38] These must be considered thoroughly as the project moves through the regulatory process.

Other analyses have identified the financial risks of committing public funds to the pipeline; this report estimates that the project's additional emissions could impose approximately $219 billion to $253 billion in climate damages. The Pacific Link pipeline is therefore a high-risk public investment that would lock in emissions for decades while shifting substantial costs to governments, households, businesses, and ecosystems.

[37] Government of Canada, "Building Canada Act – Projects of National Interest," modified June 2, 2026. https://www.canada.ca/en/one-canadian-economy/services/building-canada-act-projects-national-interest.html

[38] "Prime Minister Carney Lists the West Coast Oil Pipeline, Now Known as Pacific Link."

Appendix A. Emissions modelling

A.1 Emissions intensity

The emissions intensity estimates used in this report are derived from McGaughy et al. (2025), a comprehensive life-cycle assessment of Canadian oilsands production that evaluates greenhouse gas emissions across the full well-to-wheel supply chain.[39] The study combines upstream oilsands production modelling using the Oil Production Greenhouse Gas Emissions Estimator (OPGEE) with downstream refining analysis using the Petroleum Refinery Life Cycle Inventory Model (PRELIM) in collaboration with eleven major oilsands producers accounting for roughly 75% of production from the sector.

The upstream emissions intensities reported in this analysis are based on a well-to-refinery life-cycle boundary that includes direct operational emissions as well as indirect emissions associated with energy supply, electricity consumption, flaring, fugitives, land-use change, and material inputs. This is a broader definition than facility-reported emissions, such as those reported in the Government of Alberta's Oilsands Greenhouse Gas Intensity Analysis or the emissions associated with oilsands in the National Inventory Report.[40,41]

The study outlines two cases. The business-as-usual case assumes no improvements are made to extraction and upgrading technologies to reduce emissions. The low-emissions technology case assumes a linear rollout of advanced extraction, upgrading, and emissions reduction technologies from 2025 to 2040. By 2040, all extraction pathways and approximately 50% of upgraded bitumen production are assumed to have adopted the modelled technologies, with additional reductions from cogeneration, improved water management, and carbon capture and storage at upgrading and refining facilities. This scenario represents an estimate of the upper bound of emissions intensity reduction potential of the technologies assessed in the study.

A.2 Projected emissions intensity

Figure 6 shows the well-to-refinery emissions intensities used in this report. These estimates are derived from the McGaughy study's well-to-tank emissions intensities, adjusted for refining and refinery product transport to reflect a well-to-refinery boundary. The study provides projections

[39] Kyle McGaughy, Tinu Abraham, Joule A. Bergerson, Mohammad S. Masnadi, "Canadian oil sands industry GHG emissions intensity and mitigation potential of some key emerging technologies towards fulfilling its 2050 net-zero commitment," *Resources, Conservation and Recycling* 281 (2025). https://doi.org/10.1016/j.resconrec.2025.108230

[40] "Alberta Oil Sands Greenhouse Gas Emission Intensity Analysis."

[41] *National Inventory Report 1990–2024.*

for both cases through 2050. To estimate lifetime emissions for pipeline operation through 2062, we assume that emissions intensity in each case remains constant at its 2050 level thereafter.

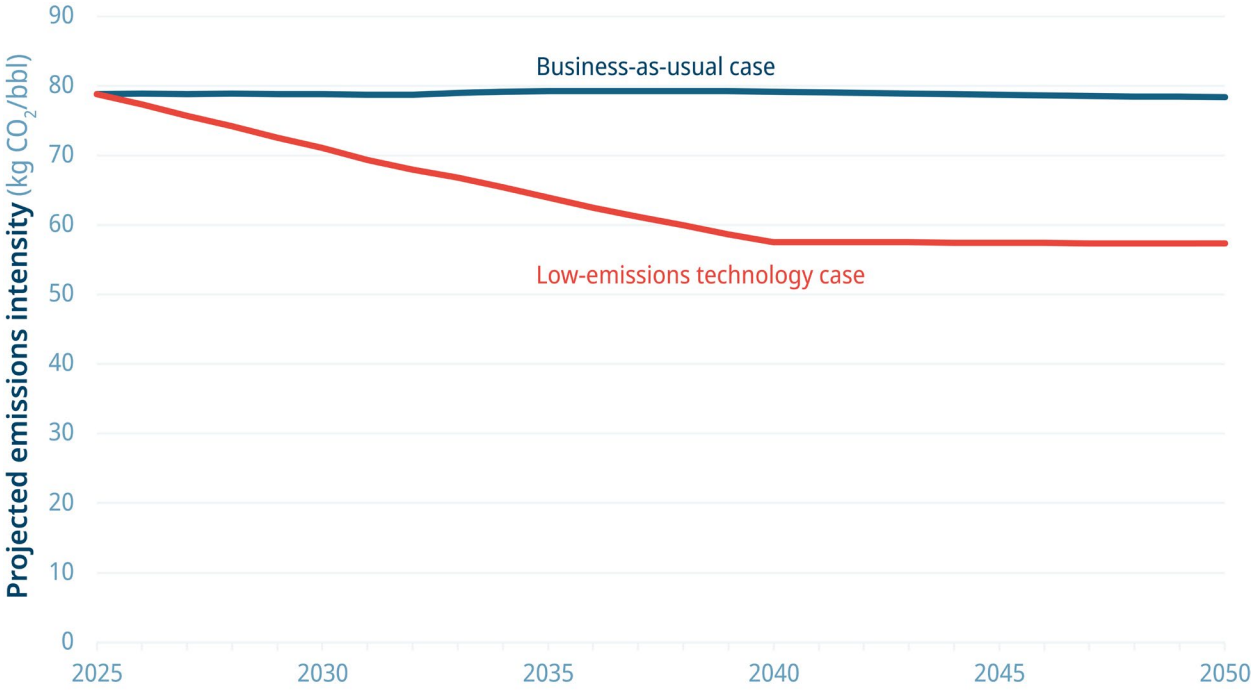


Figure 6. Emissions intensities from McGaughy

A.3 Average emissions intensity from modelled facilities

Table 7 illustrates the breakdown of carbon intensities by crude and extraction type across facilities covered in the McGaughy study. This table represents only the upstream component of the full well-to-wheel analysis conducted.

This analysis does not identify which specific facilities would expand production to fill the pipeline. Those decisions would be made by individual firms in response to commercial conditions, including global oil prices, operating costs, and the policy environment. Instead, we assume that additional production reflects today's mix of extraction methods and crude types, and use the sector-average emissions intensity to estimate the associated emissions.

Table 4. Average emissions intensity from facilities modelled in McGaughy (kg CO_2e/bbl)

Crude type	**SCO**	**Dilbit**		
Extraction method	**Mining/SAGD**	**SAGD**	**CSS**	**Mining**
Drilling & development	7.80	5.51	6.21	9.41
Production/extraction	25.93	50.15	89.16	23.67
Surface processing	38.69	0.37	0.03	5.10
Tailings ponds	2.26	0.00	0.00	3.56
Offsite	11.20	8.58	2.82	11.40
Total upstream	**85.89**	**64.61**	**98.22**	**53.14**

Appendix B. Marine transport emissions

Marine transport emissions include round-trip combustion from very large crude carrier (VLCC) engines, tugboat engines, and boiler combustion for cargo heating onboard VLCCs. The VLCC tankers are assumed to spend 36 hours idling in port while loading the vessel, then travel 235 km from Roberts Bank to international waters 12 nautical miles off the west end of the Juan de Fuca Strait. One tugboat escort is assumed to accompany the VLCC which returns once the VLCC reaches international waters. We estimate a total of 165 shipments per year along this route. Table 4 presents a summary of emissions from each source, and detailed information on calculations is below.

Table 5. Summary of marine transport emissions

Emissions source	Emissions (t CO_2e/yr)
VLCC engines	44,291
Tugboat engines	8,751
VLCC boilers	5,107
Total	**58,149**

B.1 Engine emissions

Combustion emissions are calculated using a vessel's total engine propulsion power, engine efficiency, engine load factors, trip distance and speed, following the approach taken by Nie et al. and Abrahams et al. to calculate shipping emissions from LNG carriers.[42]

The main parameters used to calculate VLCC combustion emissions are found in Table 5, and those used to calculate tugboat combustion emissions are found in Table 6.

[42] Yuhao Nie et al., "Greenhouse-Gas Emissions of Canadian Liquefied Natural Gas for Use in China: Comparison and Synthesis of Three Independent Life Cycle Assessments," *Journal of Cleaner Production* 263 (2020). https://doi.org/10.1016/j.jclepro.2020.120701

Leslie S. Abrahams, Constantine Samaras, W. Michael Griffin, and H. Scott Matthews, "Life Cycle Greenhouse Gas Emissions From U.S. Liquefied Natural Gas Exports: Implications for End Uses," *Environmental Science & Technology* 49, no. 5 (2015). https://doi.org/10.1021/es505617p

Table 6. VLCC combustion parameters

Parameter	Value
Engine propulsion power	29.4 MW[a]
Engine efficiency	50.6%[43]
Weighted average engine load in transit	74%
Engine load in port	2%[44]
Average speed	13 knots[b]

[a] Based on propulsion power of the VLCC New Prosperity.

[b] Based on observed speed of oil tankers in the Salish Sea using Marine Traffic.

Table 7. Tugboat combustion parameters

Parameter	Value
Engine propulsion power	4.2 MW[45]
Engine efficiency	40%[46]
Weighted average engine load in transit	85%
Average speed	13 knots[a]

[a] Assumed tugboat keeps pace with VLCCs.

The total megajoule demand for a vessel's trip is then multiplied by an emissions factor for "tank-to-wake" medium speed heavy fuel oil of 0.085 kg CO_2e / MJ of diesel, provided by the International Council on Clean Transportation.[47]

[43] MAN B&W Diesel A/S, *S80MC-C Project Guide* (n.d.). Available at https://www.scribd.com/document/299233744/S80mcc

[44] Nie et al., "Greenhouse-Gas Emissions of Canadian Liquefied Natural Gas."

[45] Ömer Emre Karaçay and Osman Azmi Özsoysal, "Techno-Economic Investigation of Alternative Propulsion Systems for Tugboats," *Energy Conversion and Management: X* 12 (2021). https://doi.org/10.1016/j.ecmx.2021.100140

[46] Diesel Pro Power, "Efficiency in Diesel Engines," February 13, 2020. https://dieselpro.com/blog/efficiency-in-diesel-engines/

[47] Bryan Comer and Liudmila Osipova, *Update: Accounting for Well-to-Wake Carbon Dioxide Equivalent Emissions in Maritime Transportation Climate Policies* (International Council on Clean Transportation, 2021). https://theicct.org/publication/update-accounting-for-well-to-wake-carbon-dioxide-equivalent-emissions-in-maritime-transportation-climate-policies/

B.2 Boiler emissions

Boiler emissions are estimated based on the amount of fuel per hour consumed by the boiler, and an associated emissions factor. Due to difficulties finding VLCC boiler information, we assumed that the amount of fuel consumed by the boiler is similar to that of a Suezmax tanker, and the emissions factor is comparable to that of a boiler on a Panamax tanker.[48] Based on these assumptions, we estimated that 9.76 tonnes of fuel is consumed by the boiler during one round trip; an emission factor of 3,171 g CO_2e / kg of fuel is then applied to this fuel amount.

[48] Vassilios Dimoulas, *Optimizing Cargo Heating for Tankers*, presentation delivered at the ELINT Annual Meeting, December 13, 2017. https://www.elintconference.gr/2017/BV_ELINT_Cargo_heating.pdf

Wayne Miller, Kent Johnson, Cavan McCaffery, Tom Eckel, and Qi Li, *Emissions Evaluation of an Auxiliary Boiler on a Modern Panamax Tanker: Final Report* (prepared for the California Air Resources Board, 2020). https://ww2.arb.ca.gov/sites/default/files/2021-01/UCR%20Tanker%20Boiler_v05%20Final_ADA.pdf



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