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Driving Global Heating to 1.7° C and Above

*The New Canada's Energy Future 2023
Report and Canada's Projected Oil
Production to 2050*

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**CENTRE FOR
LAW & THE
ENVIRONMENT**

**WORKING PAPER
NO. 1 / 2023**

OCTOBER 2023

**Series editor:
Stepan Wood**

This working paper series presents new research by researchers affiliated with the Centre for Law and the Environment at the Allard School of Law, University of British Columbia. The papers are available on the Centre's website: <https://allard.ubc.ca/cle>



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The New Canada's Energy Future 2023 Report and Canada's Projected Oil Production to 2050

David Gooderham¹

Abstract

The Canada Energy Regulator on June 20, 2023, released its new report *Canada's Energy Future 2023*. For the first time the Federal Government's energy regulator has directly addressed whether the currently projected growth of oil production in Canada to 2040 and 2050 is compatible with keeping increased warming to 1.5°C. The regulator's analysis is based on three scenarios. Only the CER's first scenario, the "Global Net-zero Scenario" (stated to be based on the International Energy Agency's (IEA) "Net-Zero by 2050 Scenario"), is aligned with limiting warming to 1.5°C. That would require a very dramatic reduction in Canada's existing oil production level which, according to the CER, is currently projected to reach 5.6 million bpd by 2026. Under the Global Net-zero Scenario, starting after 2030 Canada's oil production must decline sharply to 2.8 million bpd by 2040 and fall to 1.2 million bpd by 2050. The CER's second scenario, the "Canada Net-zero Scenario", projects much higher levels of oil and gas production through to 2040 and beyond. The CER acknowledges that its second scenario aligns with warming of 1.7°C. This paper identifies the un-examined assumptions and climate implications that underlie the second scenario, which has been given the comforting and eco-friendly name ("Canada Net-zero") and is presented by the CER as a plausible and acceptable alternative pathway. I argue that in this case, which involves the most complex expert evidence, policy decisions must be informed by an independent public inquiry process, not by discussions behind the "closed doors" of the CER.

Keywords

Global Warming; Energy; Oil Production; 1.5°C; Pathways; Canada Energy Regulator; Net-Zero

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1. Introduction

The Canada Energy Regulator published its new report, *Canada’s Energy Future 2023*, on June 20, 2023.² The document is important because for the first time the Federal Government’s energy regulator has directly addressed whether the currently planned growth of oil production in Canada to 2030 and 2040 is compatible with keeping increased warming to 1.5°C.

For the past nine years no environmental assessment or public inquiry process of any kind in Canada has ever answered that fundamental question.³ The question is highly

² The full *Canada’s Energy Future 2023* report is available here: <https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2023/canada-energy-futures-2023.pdf>

³ Between 2013 and 2016, Canadians had an early opportunity to examine that question during the lengthy inquiry process that preceded the final decision by the Federal cabinet authorizing the construction of the Trans Mountain Pipeline (TMX) Expansion. The Federal Government at that time was also preparing to authorize the construction of a second pipeline expansion, known as “Line 3”. By 2024, when TMX is completed, the two projects together will provide 910,000 barrels per day (bpd) of new shipping capacity. The government based its authorization of the TMX project on a report by the National Energy Board (since re-named the Canada Energy Regulator) which recommended on May 19, 2016, that construction of the pipeline expansion project be approved. The NEB’s report was portrayed to the Canadian public as a thorough environmental review. It did examine the risks of oils spills in B.C.’s tidal waters and the threats to salmon at river crossings, etc., but the NEB Inquiry *did not look* at climate and the emissions implications. The NEB inquiry was a public hearing process and it had full powers to call evidence. However, the NEB took the view that “upstream emissions” released into the atmosphere at oil sands production sites in Alberta did not fall within the scope of the inquiry – and it excluded any consideration of the much larger volume of “downstream emissions” from the exported oil. The inquiry excluded all evidence about GHG emissions from expanding oil sands production in Alberta – and it excluded all scientific evidence about the impact of emissions on the climate system: see NEB Ruling 25, July 23, 2014.

The City of Vancouver, an intervenor in the NEB hearing process, applied to the Federal Court of Appeal challenging the NEB’s decision that it would not consider evidence about climate change. The court in a ruling October 16, 2014, decided that the NEB’s jurisdiction did not require that it examine the emissions implications of the pipeline.

consequential given Canada's role as the world's 4th largest oil producer and the accelerating impacts of global heating.

One recent event that has led to serious questioning of Canada's approach was the publication of the International Energy Agency's (IEA) pathbreaking report in May 2021: *Net-Zero by 2050: A Roadmap for the Global Energy Sector*, May 18, 2021.⁴

On July 8, 2021, a group of twenty-one energy economists and climate scientists sent a letter to the Prime Minister. It cited in detail the findings of the IEA's May 18, 2021 "Net-Zero Emissions by 2050 Scenario" and was copied to the Minister of Natural Resources and others. They wrote: "Specifically, we urge you to mandate that the Canadian Energy Regulator model scenarios consistent with the IEA's Net Zero by 2050 report": i.e., instruct the CER to develop scenarios that will identify the much lower and declining oil production levels in Canada over the next 20 to 30 years that would be safely aligned with an effective global effort to stay within the 1.5°C warming threshold.⁵ On December 9, 2021, the CER published an updated set of oil and gas production projections in *Canada's Energy Outlook 2021*. The CER again entirely ignored the crucial question.⁶

On December 16, 2021, Canada's Minister of Natural Resources, Jonathan Wilkinson, belatedly instructed the CER that it "undertake scenario analysis" relating to Canada's future oil production.⁷ After eighteen months, the CER's new report has now been publicly released.

After assuming power from the Harper Government in October 2015, the Trudeau Government had the full opportunity and the required majority in Parliament to amend the law and require that the NEB look at emissions and relevant expert evidence about climate science before the inquiry ended. The Trudeau Government chose not to do so. The very limited scope of the NEB's environmental examination of the pipeline project (allowing it to exclude climate science) was the deliberate choice of the Trudeau Government.

⁴ IEA's May 21, 2021 report is found at : <https://iea.blob.core.windows.net/assets/4719e321-6d3d-41a2-bd6b-461ad2f850a8/NetZeroBy2050-ARoadmapfortheGlobalEnergySector.pdf> . The International Energy Agency's most recent updated version of its Net-Zero by 2050 Scenario is found in *World Energy Outlook 2022*, October 27, 2022: (<https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf>)

⁵ Letter July 8, 2021, sent by twenty-one energy economists and climate scientists to the Minister of Environment and Climate Change, to the Minister of Natural Resources, and to the Chair and CEO of the Canada Energy Agency: <https://www.linkedin.com/pulse/canadas-energy-regulator-should-develop-net-zero-letter-mark-winfield>

⁶ On December 14, 2021, five days after that CER 2021 report was released, four of Canada's leading experts on climate policy and oil production published an article containing strong criticism of the CER's December 2021 projections: "*Canada's energy regulator turns a blind eye to dangerous global warming*". They stated that the report has "failed to inform looming policy decisions". The authors pointed out that the CER's "Current Policies" forecast for Canadian fossil fuel production published on December 9, 2021, was roughly aligned with the IEA's recently published "Stated Policies Scenario" which, as the authors explain, "anticipates 2.6°C of warming, far beyond the Paris target". See "Canada's energy regulator turns a blind eye to dangerous global warming", December 14, 2021: <https://www.nationalobserver.com/2021/12/14/opinion/canadas-energy-regulator-turns-blind-eye-dangerous-global-warming>

⁷ The letter sent on December 16, 2021 by Minister Wilkinson to the CER is found here: <https://www.cer-rec.gc.ca/en/about/news-room/whats-new/2021/canadas-energy-future-report-minister-letter-to-cer-16-december-2021.pdf> .

2. The IEA’s “Net-Zero by 2050 Scenario”

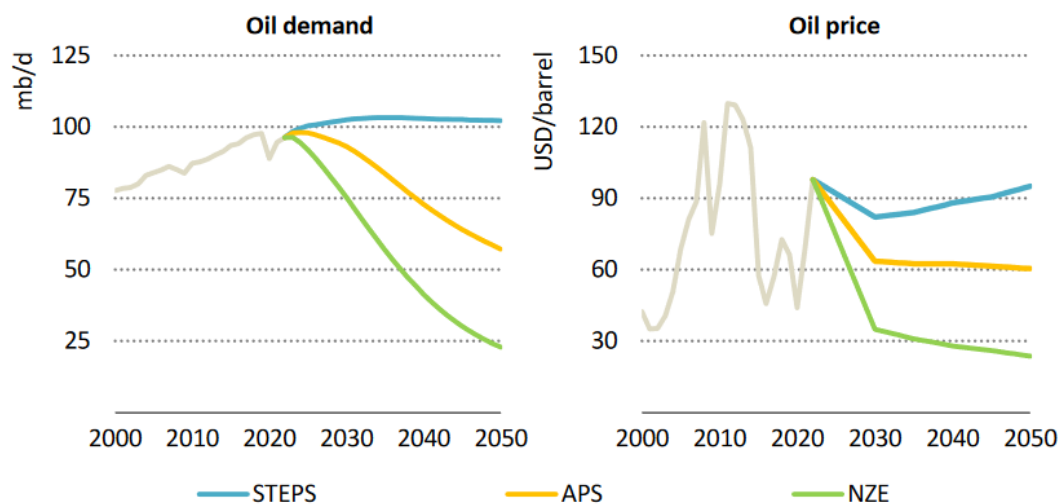
The most significant feature of the International Energy Agency’s (IEA) “Net-Zero by 2050 Scenario” (NZE), which was first published in May 2021, was a blunt and clear warning about the *immediacy* of the need to halt any further *expansion* of oil production, and its detailed findings about the rapid pace and severity of the deep cuts in oil use needed by 2030 and by 2040 to give the world *even a 50-50 chance* to keep the heating of the earth to within the 1.5°C threshold.

The IEA’s Net-Zero Emissions by 2050 Scenario determined that within this decade a 25% reduction in global oil production would be required, down to 72 million barrels per day (bpd) by 2030, and a 50% cut to 44 million bpd by 2040. It concluded that global production must decline to 24 million bpd by 2050 (a 75% reduction) to align with 1.5°C.

Furthermore, to meet that goal, 70% of the remaining 24 million bpd of oil production by 2050 will have to be used in applications where *the fuel is not combusted and so does not result in any direct CO₂ emissions* (i.e., used to produce chemical feedstocks, lubricants, and asphalt). By 2050, oil must have very limited use as a transportation fuel except for aviation. Canada’s current plan is to continue *increasing* our oil production to 2030 and 2040.

The IEA’s NZE scenario was recently updated and re-stated in *World Energy Outlook 2022*, released on October 27, 2022. In the IEA’s updated analysis, global temperature rise in the NZE Scenario peaks under 1.6°C by about 2040 before gradually falling to around 1.4°C by 2100: See WEO 2022 at page 127.

Figure A: Global oil demand and oil prices by scenario



IEA. CC BY 4.0.

Source: IEA *World Energy Outlook 2022*, October 27, 2022, Figure 7.1 p. 330

In the case of oil production, the *World Energy Outlook 2022* report provides the above helpful graph, reproduced here as Figure A, which depicts the rapid decline of global oil production that would be required between now and 2050 to align with the Net-Zero by 2050 Scenario (NZE). It compares two other scenarios which project much higher levels of

continued oil use over the next two decades, neither of which are aligned with staying within the 1.5°C global heating limit.

The bottom green line depicts the NZE Scenario, showing very deep cuts in the near-term by 2030 and 2040. The middle yellow line describes the path of the Announced Pledges Scenario (APS), which projects much smaller reductions in global oil production until after 2040, falling to 57.2 million bpd by 2050. The APS Scenario is discussed in more detail in Parts 4 and 5 below. The top blue line depicts the IEA's Stated Policies Scenario (STEPS), which reflects what countries are now actually doing to reach various targets they have set. It is based on existing climate policies that have already been implemented but also includes some new measures, not yet implemented, but which are under development. It shows that global oil production (94.5 million bpd in 2021) will increase to 103.5 million bpd by 2030 and then remain at that level to 2050.

Since the International Energy Agency's NZE Scenario study first appeared in May 2021, the Federal Government's technique during the past two years has been to consistently omit from its public comments any specific references to the IEA's warning about near-term reductions in global oil production required by 2030 and 2040.

When the government publicly released its *Emissions Reduction Plan* (ERP) on March 29, 2022 (announcing details of Canada's climate policy), it referred to the IEA's Net-Zero by 2050 Scenario, but it omitted any mention of the warning given by the IEA about the need for deep cuts by 2030 and 2040.⁸ Here is the less than candid way Canada's *Emissions Reduction Plan* described the IEA's findings:

The International Energy Agency forecasts that to limit warming to less than 1.5 degrees C, global oil production will have to decline from 100 million barrels per day in 2020 to 24 million barrels by 2050. To remain competitive in a tighter future market, Canadian production will have to reduce its carbon intensity while the sector explores opportunities to transition to non-emitting products and services.

— 2030 Emissions Reduction Plan, p. 48 (emphasis added)

Nowhere in the Ministry of Environment's lengthy and detailed report was there a single mention of the need for deep production cuts by 2030 and 2040. A further misleading description of the IEA's Net-Zero by 2050 Scenario is found in the introductory section to the ERP document:

The International Energy Agency's Net-Zero Scenario sees continued oil and gas use globally, but with demand declining significantly in the coming decades.

The ERP document omitted any reference to the IEA's urgent and detailed warning that very deep cuts in global oil use are required by 2030 and 2040. Less than a week later at a press conference on April 4, 2022, Canada's Minister of Environment Steven Guilbeault confirmed that Canada's new climate plan is "based on" increasing oil production:

⁸ 2030 Emissions Reduction Plan, Environment Canada, March 29, 2022:

<https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/erp/Canada-2030-Emissions-Reduction-Plan-eng.pdf>

...the plan we presented last week, the Emissions Reduction Plan, was based on the Canadian Energy Regulator projections that oil and gas production would increase in Canada between now and 2030...

3. The CER's new "Global Net-zero Scenario"

The CER in its new report released on June 20, 2023, provides details of what it calls its "Global Net-zero Scenario", a new scenario prepared by the CER which, the CER says, is modelled on the IEA's "Net-Zero by 2050 Scenario". The CER's new "Global Net-zero Scenario" if it were adopted to guide Federal and provincial policy in Canada relating to oil production would result in very rapid and deep reductions in Canada's oil production after 2030, falling almost by half by 2040. The oil production data shown in Figure B below is taken from the Data Appendices attached to the new CER report.

Figure B: Canada's Energy Future 2023: oil production scenarios: projections (in millions bpd)

	2019	2022	2027	2030	2040	2050
Global Net-zero Scenario (NZE)	4.889	5.146	5.741	5.592	2.866	1.284
Canada Net-zero Scenario (APS)	4.889	5.146	5.896	6.060	5.197	4.081
Current Measures Scenario	4.889	5.146	5.981	6.286	6.496	6.260

Source: *Canada's Energy Future 2023, Data Appendices*

(<https://apps.cer-rec.gc.ca/ftppndc/dflt.aspx?GoCTemplateCulture=en-CA>)

Under the CER's "Global Net-zero Scenario" (stated to be aligned with the IEA's Net-Zero by 2050 Scenario) Canada's oil production after 2030 declines sharply to 2.866 million bpd by 2040 and falls to 1.284 million bpd by 2050.

Therefore, for the first time, a Federal Government report has now formally acknowledged and appears to accept the accuracy of the IEA's modelling showing the magnitude of the near-term cuts in oil production required by 2030 and 2040 (25% and 50% respectively) to meet the 1.5°C goal and achieve net-zero by 2050. The CER 2023 Report gives details of the rapid decline in *global* oil consumption required under the IEA's Net-Zero Scenario. It recognizes that, if we are guided by that IEA Scenario, very deep and rapid cuts in global oil would occur by 2030 and 2040.

Yet the CER does not propose or even suggest that near-term cuts in Canada or any programme of cuts at all by 2030 or even by 2040 should in fact guide our future oil production policy. The new CER report offers no comment about what pathway Canada should follow. Of course, the CER is careful to state in this new report, as it always does, that its role is not to make policy for government. The CER will say that it is just laying out the "options", and that it is for the Federal Government to choose what path to follow.

4. The CER's second scenario: the "Canada Net-zero Scenario"

The second new scenario offered by the CER is called the "Canada Net-zero Scenario", which the CER claims is modelled on the IEA's Announced Pledges Scenario. The APS Scenario envisions a much slower transition away from oil, natural gas, and coal. The APS models future levels of global oil production on the assumption that countries continue to follow their *currently existing policies* (which offer no early decline in oil and gas use) but it also counts the benefit of multiple "pledges" by countries to reduce their emissions in future (e.g., a promise by India to reach "net-zero" by 2070) including bare promises by many countries which have no basis at all in any developed or existing plans.

In the case of the APS Scenario, the assumption is that all countries will continue to produce and burn comparatively high levels of oil, natural gas, and coal for another 20 years or longer, but that as we approach 2050 and after they will begin to adopt more stringent climate policies which, by 2100, will achieve "net-zero".

Under this "Canada Net-zero Scenario," based on the IEA's APS modelling, global oil use remains at much higher levels to 2050 and through to 2070 and after. In this scenario Canada continues to sell high levels of crude oil (and natural gas) for many more decades: our oil production grows from 5.146 million bpd in 2022 to 6.060 million bpd by 2030, and then slowly declines to 5.197 million by 2040 (which represents no reduction at all below the 2022 level). Production falls to 4.081 million bpd by 2050, which is only about 20% below the 2022 level.

The CER's Canada Net-zero Scenario is based on this assumption of 'delayed' action. Under this APS-aligned scenario, however, it is a mere aspiration or conjecture that all of those promised future actions over the next 50 or 70 years that are counted in the APS scenario will ever actually be implemented, and that they will be effective. Nevertheless, the IEA concludes in its APS Scenario that, on the *assumption* all those promises of future action by dozens of countries are fully implemented, the world could reach "net-zero" by 2100. It also assumes that massive amounts of CCUS will be installed over the rest of this century and that, in addition, vast amounts of CO₂ can eventually be *removed* from the atmosphere by means of direct air removal (DAR) technologies which do not yet exist in any economically viable or scalable form.

Basing its own analysis on the IEA's APS modelling, the CER implies (but does not expressly state) in its new report that its new Canada Net-zero Scenario *could* deliver a safe or acceptable climate outcome by 2100, after an intervening period of about 70 more years between 2030 and 2100 when the annual level of global emissions from continuing high volumes of ongoing oil, natural gas, and coal production will remain elevated. Over that intervening period, from 2030 until sometime after 2050, fossil fuel emissions globally will remain at much higher levels *every year* compared to the sharply declining levels of fossil fuel emissions under the IEA's NZE Scenario. For example, under the APS Scenario by the year 2040 emissions from burning oil, natural gas, and coal will be 15 billion tonnes of CO₂ higher in that single year (see below Figure C on page 9), a significant amount equivalent to about one-third of the world's total fossil fuel emissions in 2021.

Those escalated levels of annual global emissions (driven by sustained high levels of oil and natural gas and coal use between 2030 and 2050) will drive the earth's average surface temperature rise well above 1.5°C by 2050.

Further, under the APS Scenario, in the period after 2050 warming will continue to rise until there is no further substantial combustion of oil, natural gas, or coal in the world – or until all additional CO₂ emissions from continued reliance on fossil fuels are fully captured by CCUS or offset by direct air removal technologies. But based on existing “pledges”, the APS Scenario does not foresee “net-zero” being achieved until 2100.

The Canada Net-zero Scenario (stated to be based on the IEA’s APS Scenario) will give our children and grandchildren massive “overshoot”: it will drive the atmospheric carbon concentration level far above 430 ppm; and it will deliver higher average surface temperatures for the duration of this long intervening period between 2030 to 2100, when under the APS Scenario emissions from fossil fuel energy will finally (i.e., by about 2100) decline to “net-zero”. By then, the accumulated carbon in the atmosphere will have reached very high levels. But we are promised that carbon removals (by means of technologies that do not yet exist in any scalable or viable form) will eventually “remove” enough carbon from the atmosphere to get surface temperature back down to a promised 1.7°C. In the intervening 70 years the irrevocable loss of glacier mass and the escalated melting of the ice sheets and destruction of natural systems, the escalating intensity of extreme weather events, sea level rise, and ocean acidification etc. will continue. Those losses will be irreversible. None of those impacts are assessed or even mentioned in the CER report.

We are being asked to run all these risks and incur terrible additional levels of loss and destruction to natural systems all to extend the life of the oil and gas industry in Canada for another few decades.

The new CER report does not include any analysis or discussion at all (or warnings to Canadians) about the worsening climate impacts that will result from following this so-called “Canada Net-zero Scenario” compared to following the IEA’s Net-Zero by 2050 pathway which requires very deep cuts by 2050. We have no public record of which Canadian climate scientists, if any, participated in developing the CER’s new report, and no access to their analyses and assessments if they did. It was a “closed door” process.

The CER report provides this description of the difference between its APS-aligned scenario and the IEA’s Net-Zero by 2050 Scenario:

The IEA’s Announced Policies Scenario models increasing global climate action but is unlikely to limit the global temperature rise to 1.5°C. According to the IEA, global GHG emissions resulting from this scenario would cause a temperature rise of around 1.7°C by 2100. The premise of the Canada Net-zero Scenario is aligned with the Announced Pledges Scenario, with slower climate action outside of Canada than in the Global Net-zero Scenario.

— *Canada’s Energy Future 2023*, p. 23 (emphasis added)

The CER’s opaque account of the differences between the two scenarios is seriously misleading. It omits essential features of the APS Scenario which explain why it offers no assurance that it will lead to a safe or acceptable outcome, and why the promise that it will limit warming to 1.7°C by 2100 is speculative. The report is also silent about the implications of 1.7°C warming over the long term for human life and for the natural systems that support all life.

5. The CER's new APS-aligned scenario: the missing information

There is no detailed information contained in the CER's report about how much higher global emissions from oil, gas, and coal combustion will be under the APS scenario compared to the NZE scenario. For that kind of information, we must go to the *IEA World Energy Outlook 2022* report (October 27, 2022). At the back of that report, Tables A.4a, A.4b, and A.4c (see pages 439, 444, and 449) show the annual level of global emissions between 2030 and 2050.

Global emissions from combustion of fossil fuels reached 36.6 billion tonnes (GtCO₂) in 2021. That is the current annual level.

According to the IEA's APS Scenario, between 2021 and 2030 total oil, gas, and coal emissions will decline only modestly, down to 31.5 GtCO₂ by 2030. In comparison, under the IEA's more stringent NZE Scenario they fall to 22.8 GtCO₂. By 2030, the difference between the two pathways is already about 9 billion tonnes of CO₂ in that year: see Figure C below.

The differential grows by 2040, as reliance on oil, natural gas, and coal very rapidly falls in the NZE Scenario. By 2040, under the APS Scenario, fossil fuel emissions decline to an annual level of 20.5 GtCO₂, whereas by that year under the NZE scenario they have fallen to 5.7 GtCO₂ (giving a differential of 15 GtCO₂ in that year).

Figure C: Annual global fossil fuel emissions by Scenario: billions of tonnes of CO₂ (GtCO₂)

	2021	2030	2040	2050
Net-Zero by 2050 Scenario (NZE)	36.6	22.8	5.7	-
Announced Pledges Scenario (APS)	36.6	31.5	20.5	12.39
Stated Policies Scenario (STEPS)	36.6	36.2	33.8	31.9

Source: *World Energy Outlook 2022*, October 27, 2022, World CO₂ emissions, Tables A.4a, A.4b, and A.4c at pp. 439, 444, and 449.

By 2050 under the APS Scenario, fossil fuel emissions have declined to about 12.4 GtCO₂, while they have reached "net-zero" under the NZE Scenario. Post-2050, ongoing reliance on fossil fuels under the APS Scenario results in continuing global emissions, gradually declining from about 12 billion tonnes annually in 2050 down to "net-zero" by 2100 – that is, another 50 years of gradually declining emissions, although the actual trajectory of decline is unknown.

By my own count, under the APS scenario between 2021 and 2050 a cumulative total of an additional 250 GtCO₂ (approximately) will have been released into the atmosphere from burning those higher levels of fossil fuels, compared to the outcome if global oil, gas, and coal production were aligned to the much lower NZE pathway. That 250 GtCO₂ amount is equivalent to about six full years of emissions from fossil fuel burning in

the world at current rates. That is the “extra” amount we will add to the atmosphere just by 2050, if we allow ourselves to be guided by the APS scenario, compared to reducing oil, gas, and coal use in line with the IEA’s Net-Zero by 2050 Scenario.

In addition, *after* 2050 (by which time under the NZE scenario fossil fuel burning emissions are “net-zero”) under the APS scenario they will continue for another 50 years, albeit at gradually declining annual levels until they reach “net-zero” in 2100. We can roughly estimate that between 2050 and 2100 under the APS Scenario a further cumulative 250 GtCO₂ will be released into the atmosphere, or possibly much more, depending on precisely how rapidly they decline after 2050.

That would mean over the next seventy-five years we will accumulate about an additional 500 billion tonnes of CO₂ in the atmosphere, compared to the much lower volume that would be released if we follow the path of NZE Scenario. A crucial feature of CO₂, unlike methane for example, is that once the gas is released into the upper atmosphere it does not break down. It remains in the atmosphere for centuries. It is the rising atmospheric carbon concentration that is driving the warming of the earth’s surface.

The IEA in its initial version of the APS Scenario, published in May 2021, concluded that by 2100 surface temperature rise could be limited to 2.1°C (after an interim period of even higher warming levels), based on the higher levels of oil, gas, and coal production given in that scenario. Yet in its most recent October 2022 version of the APS Scenario, the IEA says that by 2100 this anticipated rise in temperature can be reduced to 1.7°C. The IEA’s October report explains that India’s announcement of its new “net-zero by 2070” pledge, and other similar recent soft promises by other countries, allows this more aggressive calculation of limiting future warming. The actual temperature outcome by 2100 depends on the plausibility and timing of future action, much of which lies well after 2050.⁹

Despite that recent revision to the temperature outcome by 2100, the IEA’s updated APS Scenario concludes that by 2050 the rise in temperature will already be around 1.7°C or 1.8°C: (See *World Energy Outlook 2022*, Figure 3.2 at page 127). The IEA report confirms that by 2050 even under its NZE Scenario the temperature rise will be 1.6°C. After 2050, under the APS Scenario, average global surface temperature will continue to rise for as much as another 40 years, moving above 1.7°C by some additional amount, possibly to as much 2°C above the 1850 - 1890 average (which is taken to represent the pre-industrial temperature level). Precisely how much more it rises after 2050 will all depend on the fulfillment of all the “pledges” of future action, on the efficacy of massive carbon “removals”, and the timing and effectiveness of those actions.

In the APS Scenario, which assumes fossil fuel use will be in rapid decline sometime after 2050, the rate of temperature increase will gradually slow but some ongoing temperature rise will still occur until we reach “net-zero” emissions. Under the APS

⁹ In its report published in October 2021, the IEA concluded in its APS Scenario the temperature outcome by 2100 would be warming of 2.1°C, whereas a lower figure of 1.7°C was given in the most recent WEO 2022 report released in October 2022. The different results reflect additional “pledges” of future action made by various countries after the earlier report was released. Many of these pledges are merely notional, and in most cases we will not know for another 20 or 40 years whether they will result in effective action. The IEA in 2021 published a summary of its original findings: *Scenario trajectories and temperature outcomes*: <https://www.iea.org/reports/world-energy-outlook-2021/scenario-trajectories-and-temperature-outcomes#:~:text=In%20the%20APS%2C%20the%20faster,to%20around%202.1%20C>

Scenario, “net-zero” will not be reached until about 2100. The period of rising temperatures will therefore continue for decades after 2050 under the APS Scenario.

The CER’s report completely omits any analysis or discussion of the impacts of those escalated emissions levels and higher temperatures on human life and natural systems over the crucial next 70 years, even if eventually those dangerously high temperatures could eventually be brought back down to 1.7°C, a highly conjectural assumption. And 1.7°C itself is a perilous level of heating.

The claim that the APS-aligned scenario (even accepting that all its many assumptions and promises of future action are eventually fulfilled) could achieve an acceptable outcome would require a comprehensive set of analyses by experts on climate science (in addition to the energy economists and the technical experts who are familiar with the oil and gas industry who comprise the CER staff) including, in particular, an assessment by climate scientists of the magnitude of the loss and destruction that will occur between now and 2100 due to the impacts of higher temperatures on the world’s natural systems, and an examination of the capability of future technologies to achieve the promised massive future “removals”.

None of those grave issues are addressed in the CER’s new report.

The IEA in its October 2022 report describes the difference between the lower level of annual emissions under the NZE Scenario and the much higher levels under the APS Scenario as the “ambition gap”:

The gap between the APS and the NZE Scenario is called the “ambition gap” because it reflects those pledges made to date collectively are not ambitious enough to match the goal of a 1.5°C stabilization in global average temperature.

— IEA *World Energy Outlook 2022*, October 27, 2022, p. 107 (emphasis added)

The IEA has never presented or described the APS Scenario as a desired or acceptable pathway for us to follow. It simply offers the APS Scenario as a measure of how far off the track we are, telling us that even if we count all the “pledges” and all promises by all countries that they will in future reduce their reliance on oil, natural gas, and coal use, those pledges are not sufficient to lead us to a safe outcome.

The CER’s new Canada Net-zero Scenario (modelled on the IEA’s APS Scenario) is not a safe pathway. While it offers oil producers in Canada another 20 or 30 years of high production levels, it places the world on a trajectory that by 2050 and through the following decades will see global average surface temperature likely rise into the range 1.8°C - 2°C. That will be an increase of 0.6°C to 0.8°C above the level we are seeing now: we are already living with a temperature rise of 1.15°C, which was reached in 2022. The Canada Net-zero Scenario offers a mere supposition that belated future action (and massive schemes of carbon capture by CCUS and direct air removal) might eventually halt this temperature rise and, by 2100, reduce the escalated level of heating by maybe 0.2°C or 0.3°C, back down to around 1.7°C.

I believe that the Canada Net-zero Scenario is a false promise, telling Canadians there is another pathway to a livable climate outcome - a pathway that allows our oil and gas production to continue expanding for an indefinite period. As the Minister responsible for the CER, Jonathan Wilkinson has allowed a profoundly misleading document to be presented to Canadians.

6. Canada's oil production between 2022 and 2030

Under the IEA's Net-Zero by 2050 Scenario, based on the most recent updated version of that study, it is clear in the very near-term that, by 2030, oil production must decline in absolute terms by about 20%: from 93 million bpd in 2021 down to 74 million bpd by 2030, and down to 24 million bpd by 2050.

The CER claims that its new "Global Net-zero Scenario" is modelled on the IEA's Net-Zero study. If that is so, we would expect to show a substantial decline in Canada's oil production by 2030. Canada's total oil production was 4.9 million bpd in 2021 and reached a new record high of 5.1 million bpd in 2022.

Referring to oil production levels in Canada in this decade, the CER report says that "total crude oil production continues to increase after 2022 in all three scenarios in the near-term, because of high oil prices over that period". In the case of the CER's Global Net-zero Scenario (which is supposed to be aligned with the IEA's NZE Scenario) Canada's total crude oil production peaks in 2026 at 5.748 million bpd and then, according to the CER's report (at page 83), "declines steadily thereafter". But based on the production information published in the Data Appendices attached to the report (see Figure B on page 6), by 2030 that decline is only down to 5.592 million bpd, which is far above the 5.1 million bpd reached in 2022 and less than 3% below the 5.748 million bpd projected for 2026.

Therefore, the CER's supposedly 1.5°C compliant scenario, the one aimed to get us to net-zero by 2050, shows no significant production decline at all before 2030. While there is a slight reduction in conventional oil production in Canada just before 2030, oil sands production (by far the largest share of our production) is higher in 2030 than it was in 2022 (CER 2023, page 84). We are the 4th largest producer in the world. Even under the CER's most ambitious supposedly climate-friendly scenario, we are doing nothing about our oil production before 2030.

Under the Global Net-zero Scenario, after 2030 there is indeed a deep decline in Canada's oil production, which falls rapidly to 2.8 million bpd by 2040 and down to 1.2 million bpd by 2050 (from 5.1 million bpd in 2022, which represents about a 75% reduction). That gives us some indication of the scale of the deep cuts that would be required in Canada to give us a chance to limit warming to 1.5°C.

In comparison, under the CER's Canada Net-zero Scenario (modelled on the IEA's APS Scenario) Canada's oil production continues to rise substantially to 2030 (above 6 million bpd) and then only very gradually declines to about 5.2 million bpd by 2040 and down to about 4.1 million by 2050.

Under the CER's third scenario (called the "Current Measures Scenario), which assumes no new measures at all to limit oil production, in Canada our oil production by 2050 increases to 6.2 million bpd, which is well above the 2022 level and aligned with warming of about 2°C by 2050, and 2.6°C to 2.8°C by the end of the century. That is the outcome in a world that continues to consume very high levels of oil based on existing policies, where no new policies are adopted in future that reduce those demand levels.

7. Leaving it to markets, oil prices, and oil producers to choose a safe pathway

Notwithstanding that the Canada Net-zero Scenario assumes much higher levels of global oil and gas use and that it has very grave and ominous implications in terms of future emissions and climate impacts, the CER in its new report maintains, or assumes, that oil and gas producers in Canada for economic reasons will be left to decide their own future production levels, based on global prices and global demand. Obviously, under the APS Scenario and the Current Measures Scenario, prices will remain relatively high, and as a result Canadian producers will be able to sell more oil.

In other words, according to the CER's approach, government has no role in determining or guiding Canada's oil and gas production levels to 2030 and 2040 and beyond. Canada's future oil, natural gas, and LNG production should be decided solely by market prices and market demand. Based on that approach, producers in Canada will be left to respond to global prices. Oil companies and their shareholders will decide how much oil will be produced in Canada and exported. For as long as prices are high enough, higher levels of crude oil will be produced and exported. That so far has been precisely the position adopted by the Federal Government. It will intervene to 'cap' emissions during the oil extraction process in Canada, but it will not limit oil production levels. Government policy will be to continue to maximize production:

The government will work closely with the provinces and the sector to manage competitiveness challenges, remain attuned to evolving energy security and climate risk considerations, maximize opportunities for ongoing investment in the sector, and minimize the risk of carbon leakage. The intent of the cap is not to bring reductions in production that are not driven by declines in global demand. Mechanisms like the CCUS investment tax credit will help support decarbonization.

— 2030 Emissions Reduction Plan, March 29, 2022, p.53 (emphasis added)

The government's plan is clear: Canada's oil production will continue to increase until – and if – other countries eventually begin to consume less oil. In the meantime, Canada's production levels will be guided solely by "global demand".

Given that the Federal Government's own energy regulator has now conceded that the NZE-aligned Global Net-zero Scenario Global is the only scenario that offers us any remaining chance to keep further warming within the 1.5°C threshold, the question is whether the government is prepared to abandon its approach that leaves these consequential decisions to the oil producers.

8. Why 2030 is an unforgiving deadline to achieve deep cuts in oil production

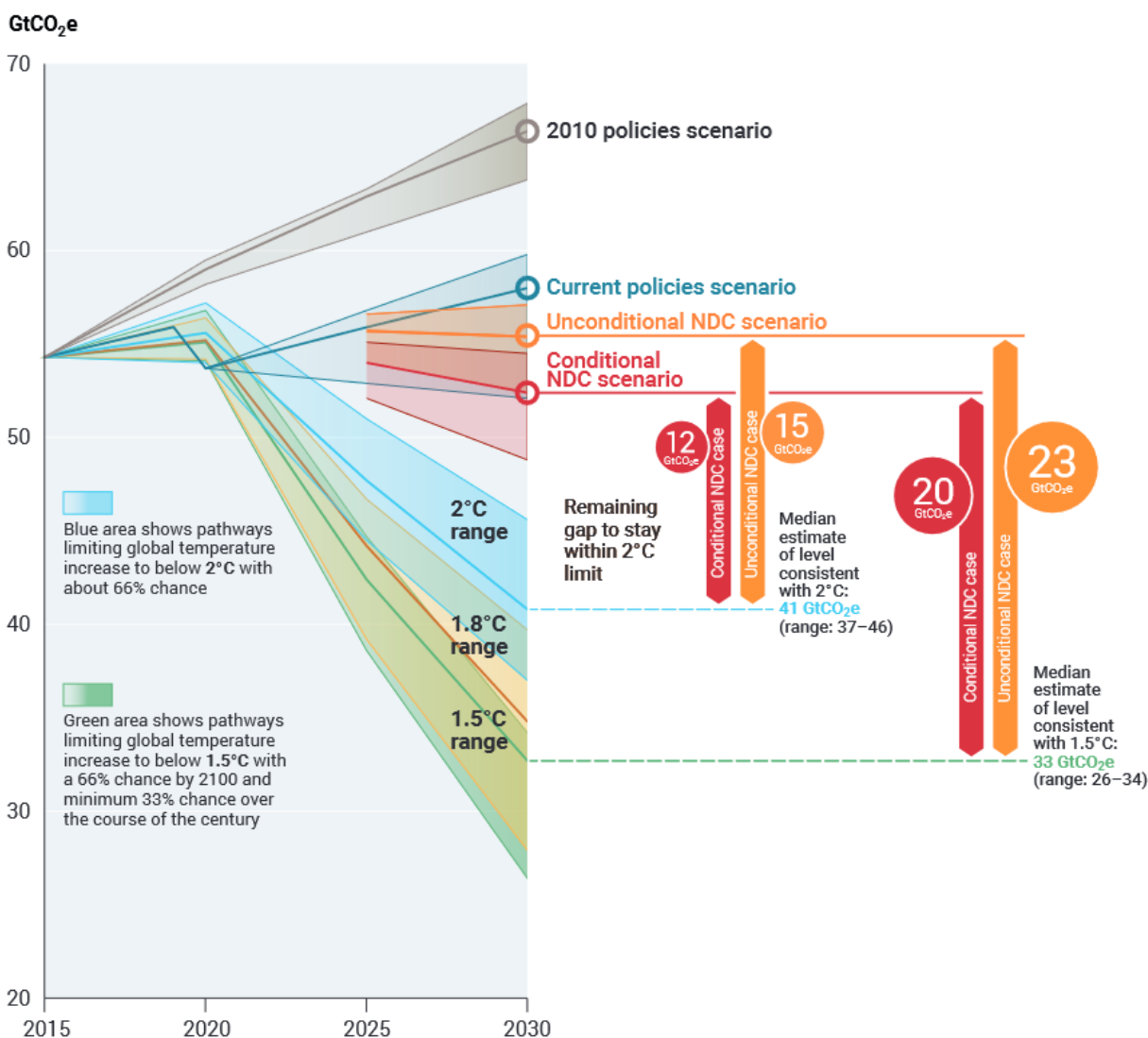
The CER's new report includes virtually no information about the global context that explains why deep cuts in global oil production by 2030 are essential, and the consequences of failing to act.

The *UN Emissions Gap 2022 Report* published October 27, 2022, provides a comprehensive picture explaining the extreme danger of our situation. It includes three crucial findings that define the scale of the problem. The annual level of global GHG

emissions, not including emissions from changes in land use (i.e., land use change including deforestation), reached an estimated 52.8 GtCO₂eq in 2021.

The first crucial finding is that with the benefit of all emissions reduction policies currently in place (that means all policies that have already been implemented by all countries and assuming that no additional action is taken) global emissions are projected to increase to 58 GtCO₂eq by 2030. That emissions pathway (the “Current policies scenario”) will result in warming of 2.8°C during the twenty-first century. That is the pathway we are presently on.

Figure D: Global greenhouse gas emissions scenario and the emissions gap to 2030



Source: UN Emissions Gap Report 2022, October 27, 2022, Figure ES.3

Second, even with the full implementation of all unconditional NDCs (emissions reduction commitments made by individual countries under the 2015 Paris Agreement, referred to as ‘Nationally Determined Contributions’), global emissions are on track to reach 55 GtCO₂eq by 2030. The annual level of global emissions by 2030 will still be higher

than it was in 2019, even if all the NDCs promised so far are fully achieved. That level of global emissions by 2030 will put us on a pathway to a temperature increase of 2.6°C above pre-industrial levels. That outcome is depicted by the orange line (the “Unconditional NDC scenario”) shown in Figure D above.

A third crucial finding set out in the *UN Emissions Gap 2022* report is that to stay on a pathway to limit the warming increase to 1.5°C, global emissions must decline to an annual level of 33 GtCO₂eq between now and 2030 (far below the projected 55 GtCO₂eq, which assumes all the unconditional NDCs so far promised will be fully implemented). That means we must achieve additional reductions of 23 GtCO₂eq all within the next eight years. That is referred to as the “emissions gap” to 1.5°C. Closing the emissions gap would require achieving a 45% reduction of all emissions world-wide within the next eight years.

Canada promises to reduce our domestic emissions 40% by 2030, below the 2005 level. That is our NDC. But even if Canada and all other countries successfully implement and achieve the full amount of their promised unconditional NDC reductions by 2030, that still leaves us on a path to a temperature increase of 2.6°C above pre-industrial levels.

Of the total amount of greenhouse gas emissions which reached an estimated 52.8 GtCO₂eq in 2021, about 70% of that amount were emissions from burning coal, oil, and natural gas – representing about 36.6 GtCO₂.

CO₂ emissions from coal, oil, and natural gas use must be reduced by more than one-third within the next seven years – falling from 36.6 to less than 23 GtCO₂ by 2030: see *World Energy Outlook 2022*, section 3.3 at page 125 and also the detailed emissions data tables appended to that report, summarized in Table C above. Oil use at present continues to increase. Coal use has been slowly declining in the richest advanced industrial economies, but natural gas use is rising. Achieving a reduction in overall global emissions cannot be achieved without deep cuts in oil production, along with equivalent cuts in coal and natural gas, all within the next seven years.

The CER in its new report is completely silent about the “emissions gap”, and why it must be closed within the next seven years.

9. Another crucial indicator: the atmospheric carbon concentration level

The *atmospheric carbon concentration level* is the metric that explains why the timeline to arrest the further expansion of all fossil fuel production – and to achieve deep cuts in our overall consumption of oil, coal, and natural gas – is brief and unforgiving. It records the rising concentration of CO₂ in the upper atmosphere that is driving the heating of the earth’s atmosphere, measured in parts per million (ppm).

An unusual characteristic of CO₂, unlike methane for example, is that once the gas is released into the upper atmosphere it does not break down. It has an effective atmospheric residence time of centuries to millennia (IPCC 2018 Chapter 1 at 1-23). It is only removed from the atmosphere when it is absorbed by the earth’s surface – by dissolving into the upper ocean (and slowly into the deep ocean) or by biological uptake into forests and plants. The problem is that we keep releasing more CO₂ into the atmosphere every year, at a rate that far exceeds the process of natural removal. Once we cease massive fossil fuel burning, the large incremental increases in the atmospheric carbon concentration will stop. After emissions cease, atmospheric CO₂ will begin to decline, albeit very slowly – only over

decades and centuries. From the perspective of the time frame that concerns us and our children, beginning now to reduce the rate of increase in the carbon concentration level is essential, and that can only be achieved by absolute *reductions* in the production and combustion of fossil fuels on a global scale.

The key point is that the additional volumes of CO₂ we release into the atmosphere every year are *cumulative*. It is no solution to say, ‘Canada will defer cutting our oil production until sometime after 2030’. Choosing to delay action is hugely consequential. It means we are continuing to contribute to the rapidly accumulating amount of CO₂ in the atmosphere that is driving the heating of the earth’s surface.

The most recent measurements of the atmospheric carbon concentration level warn us of the unforgiving timeline we face. Each year the atmospheric CO₂ concentration follows a cycle. April and May are the high points of the year, September the low. *But the annual averages are moving up every year.* Ten years ago, in 2013, the annual average was 395.3 ppm CO₂.

The annual average reached in 2022 was 417.2 ppm CO₂. In May 2023, the monthly average recorded at Mauna Loa hit 424 ppm.

The rate of annual increase has been accelerating, reflecting the persistent annual growth in the volume of global emissions from burning coal, oil, and natural gas. In the 1960s, the rate of growth of the atmospheric carbon concentration level was about 0.6 ppm per year. During the past eight years, it has been rising at an average rate of about 2.4 ppm every year. To stay within the 1.5°C warming threshold, the atmospheric carbon concentration level must be kept below 430 ppm. At the present rate of increase the atmospheric carbon concentration level will exceed 430 ppm CO₂ by 2028.

The above kind of information, if it had been presented in basic outline in the CER’s new report, would explain to Canadians why “near-term” reductions in our oil production are essential and why if we fail to meet the near-term goal we cannot meet the longer-term goal, which is achieving net-zero by 2050 and keeping the temperature increase to less than 1.5°C.

10. A false promise: the Canada net-zero by 2050 Scenario

We are often told by Ministers and energy economists that, under the Paris Agreement (and under the terms of the UN Framework Agreement on Climate Change that defines what emissions countries are obliged to count in their national emissions accounting) Canada has no responsibility to “count” the “downstream” emissions from our exported oil as part of our formal national emissions.

But the accounting rules are not an answer to the problem we face. Global emissions from burning fossil fuels are driving the warming of the atmosphere. That includes the massive volume of the downstream emissions released by our exported oil, which we are planning to increase for another 10 or 20 years. There is no existing technology that can “remove” them from the atmosphere once they are released. The fact that the Government of Canada does not “count” them does not halt the warming. The downstream emissions from our oil contribute directly to climate change in Canada – to the same extent as if those emissions were released in Saskatchewan or in Nova Scotia.

In terms of magnitude, downstream emissions from our exported oil are *equivalent to the combined total of all the GHG emissions released every year within Canada’s borders*

from all our industrial activities, transportation (cars, trucks, rail, domestic air, and marine), all buildings, agriculture, electricity generation, and all oil and gas extraction and processing operations within Canada, etc. They will continue to increase in line with our expanding oil exports.¹⁰

The amount of CO₂ released every year into the atmosphere from the combustion of our exported oil is equivalent to another Canada, an emitting twin for which we take no responsibility and do not talk about.

The Supreme Court of Canada in its decision on March 25, 2021, in the *Greenhouse Gas Pollution Pricing Act* case, relying on the scientific evidence presented to the Court, clearly and precisely acknowledges the *borderless* way emissions released in one jurisdiction will affect (and drive climate change) in all other jurisdictions. In the Carbon Pricing case, the Court was required to examine the scientific evidence which explains why GHG emissions released within one province in Canada will impact all the other provinces:

"It is also an uncontested fact that the effects of climate change do not have a direct connection to the source of GHG emissions; every province's emissions contribute to climate change, the consequences of which will be borne extra-provincially across Canada and around the world"

¹⁰ Over 85% of the total life-cycle emissions released by the oil we produce occurs after the extraction process is completed. See *The oilsands in a carbon-constrained Canada*, Pembina Institute, Benjamin Israel et al., February 2020: <https://www.pembina.org/reports/the-oilsands-in-a-carbon-constrained-canada-march-2020.pdf>. The Pembina report shows that "well-to-wheels" emissions for all types of oil range from a low of about 450 kg CO₂ per barrel up to a high end of about 650 kg CO₂ per barrel. The emissions intensity of Canadian oil sands is at the higher end of that range, about 550 kg CO₂ per barrel and above that. Oil sands emissions from extraction and production operations within Canada average about 80 kg CO₂ per barrel. They account for less than 15% of the total life-cycle emissions released by each barrel of oil Canada produces. The other 85% of the emissions from every barrel we produce occurs after we export our oil, when it is combusted as fuel in vehicle engines in the U.S and in other foreign markets and released into the atmosphere as tailpipe emissions.

Multiple other studies have confirmed those findings. More than a decade ago, the U.S. government completed its *Final Supplemental Environmental Impact Statement* (SEIS) relating to the proposed Keystone XL pipeline, designed to carry 830,000 bpd of oil sands crude to the U.S. market. Chapter 4 of the U.S. study in 2012 examined the carbon intensity of Canada's oil sands production compared to four other global sources, including a "U.S. Average" (the emissions per barrel data is found in Table 4.14-3 of that report). In the U.S. study, extraction emissions intensity for Canada's oil sands was found to be 74 -105 kg CO₂ per barrel and overall well-to-wheels emissions were 533 - 568 CO₂ per barrel.

While oil sands extraction emissions are now in the lower range of 80 kg CO₂ per barrel, the downstream emissions per barrel (which mainly are released during combustion of the fuel in vehicle engines) remain around 470 kg CO₂ per barrel. The basic point is that the emissions from the production process (the upstream emissions) in Alberta are only about 15% or less of the total emissions from each barrel of oil we produce and export.

Canada's national emissions accounting (the emissions data reported annually by the government to Canadians) does not include that 85%. While the Federal government does not normally publish that information, data obtained in 2021 by Ecojustice Canada from the government revealed that the downstream emissions from our exported oil in 2016 totalled 577 million tonnes (Mt) and increased to 704 Mt in 2019, reflecting the substantial growth in our oil production and exports over that four-year period. Canada's entire domestic emissions in 2019 amounted to 738 Mt: see Fraser Thompson, Ecojustice, June 30, 2021, <https://ecojustice.ca/to-avoid-climate-catastrophe-canada-must-account-for-its-hidden-emissions/>

— References re: *Greenhouse Gas Pollution Pricing Act*, para. 187 (emphasis added)

In the same way, whether they are released by cars and trucks in New York or Shanghai, emissions from our exported oil are contributing directly to climate breakdown in B.C. and Northern Quebec, and they are driving the escalating heat in India and all South Asia, and the horrific drought in the Horn of Africa and across the Sahel, the retreat of glaciers in the Himalayas and Central Asia, and the acidification of the world's oceans. This catastrophic outcome, which crosses all national borders, is being driven by the physics of climate change. Nothing in the national emissions accounting rules will slow that down or protect us or the world from the consequences of the downstream emissions from our oil exports.

The CER's new report provides Canadians with this description of its two main scenarios:

In the Global Net-zero Scenario, we assume Canada achieves net-zero emissions by 2050. We also assume the rest of the world reduces emissions enough to limit global warming to 1.5 Celsius (°C). In the Canada Net-zero Scenario, Canada also achieves net-zero emissions by 2050, but the rest of the world moves more slowly to reduce GHG emissions.

— *Canada's Energy Future 2023*, p. 5

It is true that the CER's new Global Net-zero Scenario outlines a pathway for Canada's future oil production that allows us to achieve "net-zero emissions by 2050". That scenario is modelled on the IEA's Net-Zero by 2050 Scenario, which gives us a realistic chance to keep warming within the 1.5°C limit.

However, an important omission in the CER's adaptation of the IEA's Net-Zero by 2050 Scenario is that it ignores the IEA's clear warning that any pathway to limit warming to 1.5°C will require deep cuts in global oil production beginning well before 2030.

The alternate pathway offered, the CER's claim that Canada can achieve "net-zero emissions by 2050" if we follow the Canada Net-zero Scenario, is an empty promise. Under that APS-aligned scenario, which assumes much higher levels of oil production in Canada (and higher levels of global oil consumption), even if we achieve that statistical goal in Canada by 2050 (reducing our domestic emissions down to "net-zero" which means down to a level where the remaining amount is fully offset by carbon removal technologies) we will already, by 2050, be living with elevated levels of heating (a global average of about 1.7°C or 1.8°C) and we will be experiencing severe climate breakdown inside Canada and around the world that will be irreversible and will continue to worsen over the following 50 years. Achieving "net-zero emissions in Canada" under the CER's Canada Net-Zero scenario does nothing to avert that outcome.

The promise that we can achieve a safe or acceptable climate outcome if we reduce our domestic emissions to net-zero by 2050 while we continue to maintain high levels of oil production in Canada for another 20 or 30 years is a deception.