

THE KINDER MORGAN PIPELINE AND CANADA'S CHANCES OF CUTTING TOTAL EMISSIONS BY 2030

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In Canada, now, we are committed to two major policy pathways:

1. A commitment to cut the annual level of Canada's total emissions 30% by 2030 below the 2005 level. The target is 524 million tonnes (Mt) of CO₂eq.¹ Because Canada's total emissions are still increasing every year, any reductions will likely not begin until about 2020 at the earliest.²
2. To expand Canada's oil and gas industry, and specifically to double oil sands production between 2014 and 2040, from 2.4 million barrels per day (bpd) in 2014 to 4.8 million bpd in 2040.³ The Government of Canada's data shows that oil and gas sector emissions are going to continue increasing until 2030 at least.

The core question behind all of the discussions about pipelines, oil sands, climate policy, and emissions trends is whether the two major policy pathways are consistent, or compatible. The question can be put this way:

Can we achieve a 30% cut in Canada's total emissions by 2030, down to 524 Mt, if emissions from expanding oil sands production keep rising?

That question is not impossible to answer. But it has not been answered.

We are being invited to add another 2.4 million bpd of oil sands production between 2014 and 2040. We know that it will take about three new pipelines (one of them is Kinder Morgan) to ship that increased amount of production to markets. Kinder Morgan alone will carry about 25% of the planned expansion.

Approval of the Kinder Morgan pipeline is at the heart of this discussion because, apart from the pipeline approval process, no other agency or review process either in the Province of Alberta or at the Federal Government level imposes any limits on the total amount of emissions that the oil sands industry is allowed to release into the atmosphere.

Oil sands emissions 2005-2020

CO₂ and other greenhouse gas emissions from oil sands facilities increase more or less proportionately with the expanding level of bitumen production. The annual level of oil sands emissions has been increasing about 4 Mt on average every year since 2005 – doubling from 34 Mt in 2005 to 68 Mt in 2014.⁴

The increase of oil sands emissions during the past nine years has been by far the largest source of emissions growth in the Canadian economy. In comparison, the only economic sector in Canada that demonstrated any *substantial emissions reductions* over the period 2005-2014 is the electricity sector. But reductions in the electricity sector (a net cut of 40 Mt over nine years, mainly due to Ontario's shut down of all of its coal-fired electricity plants) were almost entirely offset by the 34 Mt rise in oil sands emissions. Oil sands emissions growth (combined with some smaller-scale increases in other sectors) has consistently outweighed our successful cuts.⁵

Between 2015 and 2020 the annual level of oil sands emissions will rise again, by another 22 Mt, from 68 Mt in 2014 to 90 Mt in 2020 (see Figure A below).

In the same period, from 2015 to 2020, total emissions from all economic activities in Canada are projected to rise from 732 Mt to 768 Mt, an increase of 36 Mt. Two thirds of the growth will be driven by oil sands emissions.

The emissions situation in Canada: looking ahead to 2030

Total emissions from all sources in Canada were 732 Mt in 2014. The projected increase is to 768 Mt in 2020. The Government of Canada's current estimate is an annual level of 815 Mt by 2030.⁶

Canada's commitment is a 30% cut by 2030, below the 2005 level – down to 524 Mt

No reductions are expected between now and 2020 – so all of our cuts, if we make them, must happen in 2020-2030.

Can we get to 524 Mt? The problem is the “emissions gap”. We will need to cut about 250 Mt or more by 2030, an average of about 25 Mt per year.

But we will not be able to take any share of the cuts from the oil and gas sector, because its emissions will still be growing after 2020 if we continue to expand oil sands production.

The Government of Canada's most recent official emissions projections show that emissions from expanding oil sands production will continue to increase between 2020 and 2030:

Figure A: Oil sands emissions (Mt CO₂eq)

2005	2013	2020	2030	Change 2005-2030
32	62	90	116	+84

Source: *Canada's Second Biennial Report on Climate, Environment and Climate Change Canada* (February 2016), Table A6, p. 23.

Oil sands emissions are only one part of Canada's total oil and gas emissions, which include natural gas production and processing, conventional oil production, and oil refining. If we count the emissions from all of these activities, total oil and gas sector emissions are projected to grow to 2030 as follows:

Figure B: Total oil and gas sector emissions (Mt CO₂eq)

2005	2013	2020	2030	Change 2005-2030
157	179	210	242	+85

Source: *Canada's Second Biennial Report on Climate, Environment and Climate Change Canada* (February 2016), Table A6, p. 23.

This emissions growth in the oil and gas sector is driven almost entirely by the expansion of oil sands production. If the province of B.C. fulfills its ambition to develop a liquefied natural gas (LNG) industry, total oil and gas sector emissions by 2030 will substantially exceed the currently projected 242 Mt number.

Oil and gas sector emissions already account for more than 25% of our total emissions. And that proportion will continue to increase during the 2020s.

If we want to cut Canada's total emissions between 2020 and 2030 (to get to our 524 Mt target) without impeding the growth of the oil sands industry, *all of the emissions cuts would have to come from the non-oil and gas sectors* (i.e., from transportation, electricity generation, buildings, industry, agriculture, and waste).

Figure C explains the problem we face. The top line in Figure C shows the government's current emissions projections to 2020 and 2030 for the oil and gas sector. The second line shows the balance of our emissions (from the non-oil and gas sectors), which will need to decline from the currently expected level of 558 Mt in 2020 down to about 282 Mt by 2030 – if we want to ensure that our total emissions by 2030 do not exceed 524 Mt:

Figure C: Cuts needed to meet the 30% reduction target

	2020	2030	Change 2020-2030
Oil and gas sector emissions	210	242	+32
All other economic activities	558	282	-276
Total emissions in 2020	768		
Total emissions in 2030 (if target achieved)		524	

Source: all of the emissions projections shown in Table C for 2020 and 2030 are taken from *Canada's Second Biennial Report on Climate Change*, with the exception of the 282 Mt number which represents the notional emissions by 2030 for “all other economic activities”. The 282 Mt number represents the maximum amount of emissions that could be released by all the other sectors, if oil and gas sector emissions by 2030 increase to 242 Mt – and if total emissions do not exceed the target amount of 524 Mt. The higher the oil and gas emissions by 2030, the lower all other emissions must be to meet the target.

That outcome would require a 49% reduction of emissions from the non-oil and gas sectors of the Canadian economy, all within about ten years, if oil and gas sector emissions continue to grow as projected. The entire burden of cuts will be shifted to the non-oil and gas parts of the Canadian economy.⁷

Cuts on that massive scale within that short time frame will likely be beyond our ability. There are lengthy time lags between the implementation of new carbon reduction policies and the results. Excessively rapid cuts affecting certain industries or regions will cause undue economic dislocation, and will be resisted.

The Province of Alberta announced in November 2015 that it will implement a “cap” on oil sands emissions, promising that it will limit oil sands emissions to a maximum annual level of 100 Mt – a limit that could be reached around 2023 or soon after – instead of 116 Mt, the currently projected level for 2030. But that measure, if implemented, will only reduce the expected annual level of oil and gas sector emissions in 2030 by 16 Mt. That does not change the outcome very much. The burden of deep emissions cuts would still rest on the non-oil and gas sectors, which – even with the oil sands cap – would still need to cut more than 45% of their total emissions within ten years to meet the target.

The Government of Canada has provided no evidence or analysis to demonstrate that we have the potential to abruptly begin deep and rapid emissions cuts of that kind by the early 2020s.

The fundamental question remains whether the planned expansion of oil sands production is consistent with our commitment to cut emissions to 524 Mt by 2030.

Processes

In Canada, we have now completed two separate processes that were supposed to be examining the Kinder Morgan pipeline expansion. Neither process has answered the fundamental question, or even attempted to do so.

The first process was the National Energy Board. But the NEB has repeatedly refused to consider the impact of rising emissions in its own environmental approval process.⁸

The second process is the so-called “upstream emissions assessment” for the Kinder Morgan pipeline expansion (also known as the Trans Mountain pipeline), the process officially called the *Review of Related Greenhouse Gas Emissions Estimates for the Trans Mountain Expansion Project*. The Liberal Government promised eight months ago that it would introduce a procedure to assess the impact of increased emissions from expanding oil sands production. The new emissions assessment procedure was briefly described in a January 2016 announcement, in these few words:

Assess the upstream greenhouse gas emissions associated with this project and make this information public.

— *Interim Measures for Pipeline Reviews*, January 27, 2016

On March 19, 2016, the Liberal Government quietly published details of the emissions assessment procedure. A notice published in the *Canada Gazette* explained the new procedure:

The assessment of upstream GHGs will consist of two parts: (A) a quantitative estimation of the GHG emissions released as a result of upstream production associated with the project, and (B) a discussion of the project's potential impact on Canadian and global emissions.

— “Estimating upstream GHG emissions”, *Canada Gazette*, March 19, 2016.
<http://www.gazette.gc.ca/rp-pr/p1/2016/2016-03-19/html/notice-avis-eng.php#n14>

About two months later, on May 19, 2016 the Liberal Government released the Kinder Morgan emissions assessment report. It is 35 pages in length.

The Kinder Morgan emissions assessment report⁹

Unfortunately, the report does not answer the important question, which is whether Canada can successfully reduce our total emissions by 2030 if emissions from expanding oil sands production keep growing.

Here is a summary of the main findings of the Kinder Morgan assessment, and a list of what the report does not discuss:

The report unequivocally endorses the expansion of oil sands production to 2040

1. The report affirms that oil sands production will continue to grow between now and 2040. It has adopted the NEB's view that global oil consumption, especially in Asia, will remain strong for at least another twenty-five years. Based on that forecast of growing global oil demand, the report adopts the NEB's forecast that *oil sands production will increase from the 2014 level of 2.4 million bpd to 4.8 million bpd by 2040* – a doubling of production over the next twenty-five years: see *Report*, section B.2.1 at p. 15, “Canada’s Oil Supply Growth.”
2. The Kinder Morgan pipeline expansion, if built, will have the capacity to transport an additional 590,000 bpd, which is 25% of the proposed total expansion of oil sands production increase between now and 2040. The project will increase the capacity of the existing line from 300,000 to 890,000 bpd. If we approve the Energy East and Line 3 projects, the total new capacity will be over 2.0 million bpd. Those three pipelines together will furnish 80% of the additional shipping capacity needed to double oil sands production between 2014 and 2040.

The report confirms that oil sands emissions will continue to grow to 2030

3. The report finds that the volume of new production shipped by the Kinder Morgan expansion will add 13.5 to 17 Mt of new emissions to Canada’s annual total (adding 20%-25% more to Canada’s annual oil sands emissions): *Report*, section A.3, “Estimated Upstream Emissions”, pp. 11-12
4. If Canada approves just two of the proposed pipeline projects, by sometime in the mid-2020s we will have added between 1 million and 1.5 million bpd of new capacity, depending on which two projects are built. The Kinder Morgan and the Line 3 projects will together add 1 million bpd of new shipping capacity. The volume of new production represented by the combined capacity of just those two projects will generate between 23 Mt and 30 Mt of GHG emissions per year.
5. The Kinder Morgan report concedes that oil sands emissions will continue to increase, and they will be the main driver of growth in Canada’s total emissions:

The growth in emissions to 2030 is driven largely by growth in the upstream oil and gas sector and, in particular, from the oil sands. ECCC projections indicate that GHG emissions from the oil sands could increase from 62 Mt in 2013, to 90 Mt in 2020 and up to 116 Mt in 2030.

— *Report*, section B.2.1, p.17

The report does not address Canada’s 2030 emissions target

6. The report does not answer how oil sands emissions growth of that kind can be reconciled with our commitment to reduce Canada’s total emissions to 524 Mt by 2030. It is silent about whether we can make large enough reductions from other economic sectors to obtain the deep cuts we need – and to offset the continued

increases in oil sands emissions. The Kinder Morgan report provides no data or analysis to demonstrate that we can obtain the needed emissions reductions from other sectors, to get to 524 Mt by 2030.

7. The Kinder Morgan report acknowledges that the Government of Canada's most recent official projections, released February 2016 in the *Second Biennial Report*, show that total emissions will rise to 815 Mt by 2030. The only answer the report provides to that evidence – which shows continued growth of Canada's total emissions to 2030 – is to claim that “recently announced provincial government policies”, which refers to measures promised since September 2015, will be able to improve the outcome by 2030: the report says that these new provincial government policies “*will have an impact* on Canadian GHG emissions” (i.e., will lower the projected number below 815 Mt). The report says the impact of these new provincial policies “were not reflected in *Canada's Second Biennial Report* as the details of these policies were not available at the time of publication” (*Report*, B.2.1.1, p 16-17).
8. Beyond the vague assertion that new provincial policies “will have an impact”, the report offers no quantified estimates to substantiate its claim that the recently announced provincial policies will be able to substantially reduce emissions below the 815 Mt level by 2030. We may expect that new policies will eventually reduce emissions in some provinces, to some degree. But the question is, by how much? The only two provinces that the report mentions at all are Alberta and British Columbia.
9. In the case of Alberta, the report points to the province's new plan to “cap” oil sands emissions at a maximum annual level of 100 Mt, which will be 16 Mt lower than the currently projected level for 2030. It also refers to Alberta's declared new policy to reduce methane emissions from oil and gas operations, and to set new standards for large industrial emitters. But the report offers no analysis or projections to demonstrate whether, or by how much, these new measures can contribute to lowering Alberta's emissions level by 2030, below the current level. In fact, if we look at the Alberta government's own documents (in particular *Climate Leadership: Report to Minister*, November 20, 2015) we find that the new Alberta policies, if fully implemented, are expected during the next decade to bring Alberta's total emissions down to about 270 Mt by 2030, which is more or less what they are now. They will still be well above Alberta's 2005 level (234 Mt).¹⁰

All the expected emissions reductions from Alberta's recently announced policies will be offset by continued emissions increases between 2015 and 2030 from expanding oil sands production. Alberta will contribute nothing to the cuts we need to make below the 2005 level.

10. In the case of British Columbia, the report says “*British Columbia has announced that it will be updating its Climate Change Plan and has recently concluded public consultation*” (*Report*, B.2.1.1, p.17). But beyond that one-sentence promise of future action, the report identifies no new policies in B.C. to cut emissions and says nothing about the prospect of any future reductions. In fact, the Government of Canada's data confirms that B.C. is on track to miss its own 2020 reduction target. Figure D shows

the current projections for B.C., taken from the *Second Biennial Report*. B.C.’s legislated emissions target for 2020, established by the *Greenhouse Gas Reduction Targets Act* enacted in 2007, is 43.5 Mt.

Figure D: Province of British Columbia – emissions projections to 2020 and 2030 (Mt CO₂eq)

	2005	2013	2020	2030
British Columbia	64	63	72	83

Source: *Canada’s Second Biennial Report on Climate, Environment and Climate Change Canada* (February 2016), Table A24, p. 29.

In the case of B.C., the report offers no evidence to support its claim that new carbon-reduction policies by provinces will contribute anything to reverse the current trend of rising emissions. The assessment does not mention that the B.C. government is currently making enormous efforts to develop a liquefied natural gas (LNG) industry on the west coast, a highly carbon-intensive industry. Even one or two LNG plants, if approved, will substantially *increase* B.C.’s annual emissions level.¹¹

11. The report is completely silent about the feasibility of meeting the 2030 target.

The Kinder Morgan report stonewalls Canadians on the only important question. It tells us that oil sands production is going to double between 2014 and 2040, but it refuses to tell us whether that expansion can possibly be consistent with Canada’s emissions reduction target for 2030.

Growth of emissions to 2040 is not discussed

12. The report provides Canadians with no estimates of what the annual level of oil sands emissions will be by 2040, when production reaches 4.8 million bpd. It includes projections of emissions up to 2030 (116 Mt), but provides no data about the expected growth of oil sands emissions during the ten years between 2030 and 2040.

The report says it is unable to answer whether Canada’s projected expansion of oil sands to 2040 is compatible the 2°C threshold

13. Most astonishing, the Kinder Morgan report acknowledges that the continued growth of oil sands production as projected up to an annual production level of 4.8 million bpd by 2040 *may not be consistent* with a 2°C world. It admits that the planned expansion of Canada’s oil sands and global efforts to keep warming below the 2°C threshold may be incompatible goals. The Kinder Morgan report says that the evidence is “not clear” whether the two goals are compatible or not: see Section B.2.5, at page 22-23. If we know that the evidence is “not clear” the decision to adopt the NEB’s 2040 growth projection for the oil sands can only be described as irresponsible. We are being invited to acquiesce in a path of oil sands expansion that

promises only a chance – and maybe no chance at all – that it will turn out to be compatible with our long-term 2°C goal.

14. Canada has made two commitments about emissions. One is our specific commitment to cut total emissions 30% by 2030. The second commitment is our acknowledgment, under the terms of the Cancun Agreements that “deep cuts in global emissions are required” to keep global surface temperature from increasing more than 2°C above the pre-industrial level, and our agreement “to take action” to meet that objective. If we read the Kinder Morgan report, it is clear that Canada is embracing a plan to expand its oil sands production up to 2040, while admitting that we do not know if this expansion plan is consistent with our 2°C commitment.
15. The International Energy Agency (IEA) has developed a well-known mitigation scenario – known as the 450 Scenario – that focuses on how rapidly global consumption of crude oil must decline. The 450 Scenario proposes that global oil production start to decline in 2020. While the reduction is relatively gradual, the IEA has made it absolutely clear that total oil consumption must start to decline by 2020 if we are going to have a chance of staying within the 2°C threshold.¹² The Kinder Morgan report mentions the IEA’s 450 Scenario. Here is how the report summarizes the IEA’s proposed reduction in global oil use:

In the IEA’s 450 Scenario, in which the world has a 50% chance of limiting the long-term increase in average global temperature to no more than 2°C, global oil demand peaks by 2020 at 93.7 MMbbl/d and declines 18% from 2014 levels to 74.1 MMbbl/d in 2040.

— *Report*, section B.2.2 “Global Crude Oil Outlook”, p. 17.

The assessment report does not expressly agree – or disagree – with the IEA’s conclusion that an 18% cut in the annual level of crude oil production is required between 2020 and 2040. The Kinder Morgan report is noncommittal. But it endorses the NEB’s plan that Canada’s oil sands production will continue to expand until 2040. Canada is the world’s fifth largest oil supplier. We hold the world’s second largest reserves of crude oil, some 170 billion barrels, second only to Saudi Arabia (third largest if we count Venezuela’s heavy oil deposits).

The report does not discuss how Canada’s ambition to double its oil sands production by 2040 can be reconciled with a world that must take action to reduce total oil consumption after 2020 in order to curb emissions.

The time frame for cutting emissions: crucial scientific evidence is not discussed

16. The assessment does not consider, or explain to Canadians, the narrowing time frame that remains to arrest the accumulation of carbon dioxide (CO₂) and other gases in the atmosphere. 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 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. Once we ultimately stop massive fossil fuel burning, the incremental increases in the atmospheric concentration will cease. It will decline slowly – but only over decades and centuries – so that from the perspective of the time frame that concerns us, the accumulated level by 2030 will be irreversible.

The accumulating concentration of CO₂ is measured in parts per million (ppm), indicating the number of CO₂ molecules per million molecules of other gases in the atmosphere. An atmospheric carbon concentration level of 450 ppm is broadly equivalent to a 2°C increase in global average temperature (hence the name given by the IEA to its “450 Scenario”). That conclusion is based on the correlation, supported by the scientific evidence, between increases in the CO₂ concentration level and warming of the earth.¹³

A comprehensive review of the long-term record of atmospheric carbon levels is found in *Climate Change 2013: The Physical Science Basis*, which is the first part of the Fifth Assessment Report (AR5) prepared by the Intergovernmental Panel on Climate Change (IPCC). The study was prepared by a group of scientists who assessed the most recent available findings about physical changes in the global climate system, including measurements of atmospheric gases.

The atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years. Carbon dioxide concentrations have increased by 40% since pre-industrial times, primarily from fossil-fuel emissions and secondarily from net land use change emissions. The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification.

— IPCC, 2013: *Summary for Policymakers*, B.5 at page 11 (# 3)

Since before the beginning of human life on earth and up to the start of industrialization in about 1780, the CO₂ concentration level was never *higher* than 300 ppm. During the past 12,000 years, from the end of the last Ice Age until the advent of the industrial age, it was stable at about 280 ppm. In our lifetime the rate of increase has been accelerating. Since 1958 the level has risen by 84 ppm. Half of all human-caused carbon emissions have occurred since 1970: IPCC, 2014, *Summary for Policymakers*, SPM.3, p.7.

The carbon concentration level was 399.4 ppm in 2015. The annual rise in the past four years has averaged slightly above 2.4 ppm. The annual mean global rise in 2015 was 2.92 ppm.

The third part of the IPCC’s Fifth Assessment Report, *Mitigation of Climate Change* (published in 2014), includes an examination of the most recent research about the expected increase of atmospheric carbon levels over the next few decades and up to 2100. If we are thinking about the short-term goals to manage climate disruption, the

paramount question is *how long do we have* before the atmospheric concentration of carbon dioxide and other GHGs drive warming above the 2°C threshold.

In examining that issue, scientists add together the warming effect of all the GHGs, principally carbon dioxide, methane, and nitrous oxide. The combined concentration is measured as “CO₂ equivalent” (CO₂eq). The most recent comprehensive studies indicate that if we do nothing the combined concentration level will exceed 450 ppm CO₂eq by 2030:

Baseline scenarios (scenarios without explicit additional efforts to constrain emissions) exceed 450 parts per million (ppm) CO₂eq by 2030 and reach CO₂eq concentrations between 750 and more than 1300 ppm CO₂eq in 2100.

— IPCC, 2014, *Summary for Policymakers*, SPM 3, p. 8 (emphasis added)

Baseline scenarios (“business-as-usual” scenarios) are studies that calculate future levels of accumulated GHGs in the atmosphere, based on the assumption that countries around the world *do not act to substantially reduce current patterns of coal, oil, and natural gas consumption*. If we continue on the present path, we will likely exceed the 450 CO₂eq level by 2030.

The above quotes are taken from the *Summary for Policymakers* that is included in each volume of the IPCC report. The Government of Canada approved the language of both documents, in late 2013 and April 2014, respectively. The above statements therefore summarize the key findings of science that have already been acknowledged by our government – and they indicate the nature of the scientific evidence that we would expect to see addressed in any proper environmental assessment that concerns the proposed expansion of oil sands production over decades.

No honest discussion about Canada’s options for oil and gas development can take place without acknowledging the scientific evidence on this issue. It is an essential part of understanding the implications of what we decide to do. It sets the time frame.

What we do in the next fifteen years is of enormous importance. We have to move very quickly to diminish those incremental increases in the atmospheric concentration of CO₂ and other GHGs. Canada’s leading climate scientists could have been called to testify to the Kinder Morgan assessment about the rapidity of the rising level of atmospheric carbon and the implications of failing to meet our emissions reduction target by 2030 – but there is no record of their evidence. The report is silent about the narrowing time frame we have to arrest the rapid accumulation of CO₂ and other gases in the atmosphere.

Technology: the report fails to substantiate its assertion that “new technologies” will eventually solve the oil sands emissions problem

17. The Kinder Morgan report uses vague terms to assure Canadians that, despite continued production increases over the next twenty-five years, oil sands emissions will somehow be brought under control. Section B.2.5 is the only portion of the entire

report that touches on the important question of whether *technology* might enable the oil sands industry to reduce emissions, even if production continues to expand. But it tells us nothing, beyond this bare assertion:

Over time, new technologies and policies will be developed that will change the emissions intensity and economic feasibility of oil production in Canada and globally, as well as act to change the attractiveness of alternatives to oil.

—Report, section B.2.5, at p.23

The availability of these unspecified “new technologies” is conveniently set in the indefinite future. There is no discussion about *when*, or by how much, these technologies will be able to reduce the emissions intensity of oil sands production. The truth appears to be that the efficacy, cost, and potential availability of these new technologies is so uncertain that the report is unable to offer Canadians any estimate of when, or by what amount, they might in future reduce oil sands emissions.¹⁴

Carbon capture and storage (CCS) is the only emissions reduction technology identified in the assessment report, where it is mentioned in the discussion about whether an oil sands production level of 4.8 million bpd by 2040 can be consistent with a 2°C world. The report summarizes four studies, which developed scenarios examining the likely outcome. Three of the scenarios assume there will be large-scale adoption of CCS technology by 2020 or 2025. One study (McGlade and Ekins 2015) found that even with widespread adoption of CCS technology starting by 2025, Canadian oil sands production would have to be seriously curtailed and that, *without CCS, all bitumen production in Canada would have to cease by 2040* (section B.2.5, p. 23). A second study (Bataille, C., Sawyer, D., Melton, N. *Pathways to deep decarbonization in Canada*, SDSN and IDDRI, 2015) found that continued long-term growth of production might be feasible with acceptable levels of emissions, but would require large-scale adoption of CCS technology and “significant innovation of currently unknown technologies”. The outcome is uncertain, even with CCS.

Based on the studies cited by the assessment, large-scale deployment of CCS technology by 2020 or 2025 appears to be an essential precondition for *any* prolongation of the oil sands industry at substantial levels of production – *if* the industry is going to substantially reduce its emissions.

But the report completely fails to address whether CCS is an economically viable technology for the industry. If CCS is too costly, it will never be adopted. The report does not mention that in 2014 the Province of Alberta, under Premier Jim Prentice, completely abandoned any further plans to support large-scale deployment of CCS in the oil sands industry – a strategy originally adopted by the Alberta government in 2008 when it selected CCS as the principal technology it claimed would allow the province by 2020 to substantially curb oil sands emissions. Prentice declared that CCS was “not capable of achieving the reductions in emissions that are required”, that it was “expensive”, “quite unproven”, and “a failed science experiment”. Only two CCS installations were ever built in Alberta, paid for mainly by taxpayers, and no

more are planned. The current NDP government in Alberta, elected in 2015, campaigned on a promise to end the “costly and ineffective CCS experiment”.

The methodology for assessing the impact of rising emissions from expanded oil sands production is misleading

18. The original promise by the Liberal Government to Canadians was that the Kinder Morgan assessment would examine the pipeline’s “potential impact on Canadian and global emissions”.

We know that oil sands emissions are projected to increase from 68 Mt to 116 Mt within the next fifteen years – a total increase of 48 Mt. The Kinder Morgan pipeline expansion will be responsible for about one third of that growth (13.5 Mt to 17.0 Mt, according to the report). Despite that, the report claims that the amount of additional emissions caused by the Kinder Morgan pipeline will be “minimal”, provided long-term oil prices in 2020-2040 are above US\$80 (see *Report*, Table 6, p. 32).

The explanation for that extraordinary claim is that the assessment uses a special formula (called the “methodology”) to calculate the impact of a new pipeline on our total emissions. The methodology is described in the notice published by the Liberal Government on March 19, 2016. It directs that the assessment should not count the increased amount of emissions that will be released during production of the expanded output that will be shipped by the new pipeline, *if the increased production could be economically transported by “an alternate mode of transport”*.

If rail transport could be an economically viable alternative, then the assessment is obliged to decide that the increased production that will be carried in the proposed pipeline *will be produced anyway, even if the pipeline were not built*. In that case, the new pipeline will not make emissions any worse – because the increased production would still occur even if the new pipeline were not approved.

The Kinder Morgan assessment calculated that as long as long-term oil prices (looking ahead to 2020-2040) are above US\$80 per barrel, rail would be an economically viable way to ship bitumen. Shipping oil by rail costs US\$10 more per barrel. Conveniently, the NEB in January 2016 produced a forecast that long-term oil prices will increase to about US\$78 per barrel by 2020 and will continue to rise gradually to US\$102 by 2040.

Following this formula, the Kinder Morgan assessment decided that if long-term oil prices are about US\$80 (as the NEB forecasts they will be) approval of the Kinder Morgan pipeline will only cause “minimal” increases in Canada’s total emissions.

The rationale is that Canada’s total GHG emissions will not increase if Kinder Morgan is built because the same amount of oil would still be extracted (and shipped by rail) if the pipeline were not built. By this reasoning, the pipeline is not “enabling” any increased oil production. The increased production would happen anyway.

In truth, the accumulating concentration of CO₂ emissions in the atmosphere is the problem we are trying to solve. If we are trying to solve that problem, the distinction between pipelines and rail transport is meaningless: the amount of emissions released into the atmosphere from expanding oil sands production in Alberta will be the same – whether the additional output is shipped by pipeline or shipped by rail. It is the rising level of production that we need to control.

In any case, the additional bitumen will not actually be moved by rail. Under the assessment methodology, once there is a finding that the proposed pipeline will not cause an increase in emissions (because it *could* be moved by rail) the pipeline will be approved.

Following the same rationale, the Energy East and Line 3 pipelines will also be justified by the approval process. By 2040 production will have doubled to 4.8 million bpd. It will all be moved by pipeline. In 2015, crude-by-rail exports averaged 105,000 bpd, less than 3% of Canada's total production. Rail transport is costly. In the Liberal Government's assessment routine, the railways are mainly imaginary – like straw dogs in an ancient ritual, in this case a ritual to persuade Canadians that emissions will not increase if we build more pipelines. It is a game of language.

The “methodology” has nothing to do with an emissions-reduction strategy. It is a communications strategy.

Conclusion

No amount of public consultation or input can fix this broken assessment report.

The assessment was a closed process. It was not a public inquiry, providing an opportunity for questioning of the evidence. There was no public access. There were no witnesses on the stand, just written reports, many of them prepared by the government's own agencies – most importantly by the NEB itself, the same agency that in July 2014 excluded all evidence about the climate impact of emissions at its own inquiry into the Kinder Morgan project.

We can have no confidence or trust in a report tainted by so many failures to ask probing questions, and so many failures to bring forward crucial evidence.

If the Liberal Government honestly believes that there is a way to reconcile the continued growth of oil and gas sector emissions for another fifteen years while simultaneously cutting Canada's total GHG emissions to an annual level of 524 Mt by 2030, the ethical burden is on the government to demonstrate the feasibility of that. The performance of that duty requires absolute candour on the part of the government.

Before the Liberal Government contemplates giving final approval to the Kinder Morgan project – or to any proposed pipeline – a science-based review must answer the basic question: *is the currently projected expansion of oil sands production compatible with Canada's commitment to reduce our total annual emissions 30% by 2030?*

NOTES

1. Commitments by the Government of Canada

In our attempt to look candidly at our emissions situation, it is helpful to clarify exactly what Canada's commitments are, and how they are related.

On December 2010, when it signed the Cancun Agreements, the Conservative Government acknowledged in writing that there is an upper safe limit for the earth's surface temperature, and agreed that the 2°C warming threshold is based on scientific evidence. Here is the wording of the key decision approved at the Conference:

The Conference of the Parties ... recognizes that deep cuts in global greenhouse gas emissions are required according to science, and as documented in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, with a view to reducing global greenhouse gas emissions so as to hold the increase in global temperature below 2°C above pre-industrial levels, and that the Parties should take urgent action to meet this long-term goal, consistent with science and on the basis of equity. (emphasis added)

In the Cancun Agreements, Canada committed to limit the increase in average global temperature below 2°C. The commitment went further: Canada and other countries agreed that "deep cuts in global emissions are required" in order to meet that goal. When the Cancun Agreements were signed in 2010, they did not specify the size of the "deep cuts" that each country would be obliged to make. But previously, under the Copenhagen Accord signed in 2009, Canada had already agreed to reduce its annual emission 17% by 2020, below the 2005 level (a target we are now on track to miss completely: see Note 2).

Canada has now agreed that we will reduce our national emissions (that is, *all* emissions caused by activities within our borders) by 30% by 2030, below the 2005 level. That pledge was formally made by the Conservative Government on May 15, 2015, and was re-affirmed by the Liberal Government at the climate conference in Paris in December 2015. That is the second part of our commitment. The 2005 level was 747 Mt. The target is 524 Mt.

The two commitments are inextricably linked. In the first, we pledged to make "deep cuts", without any specified size or deadline; in the second we voluntarily agreed on the reduction percentage and we agreed to a deadline for achieving that.

There is one more feature that explains the link between the two-part commitment: there is broad agreement that a 30% cut of emissions on a global scale by about 2030 would bring the world onto a path that will allow us to keep warming under 2°C. There is some uncertainty, expressed by some leading scientists, whether those reductions are deep enough and rapid enough. Put another way, the 30% reduction by 2030 is probably the minimum of what we need to do. But accepting the broad view, Canada's 30% target, if we meet it, will be a fulfillment of our original commitment under the Cancun

Agreements, to make deep cuts that keep us under 2°C. Further cuts of that kind, and likely deeper cuts, would have to continue for another twenty years after that to reach a safe outcome.

All parties to the United Nations Framework Convention on Climate Change (UNFCCC) were obligated to submit their reductions targets in advance of the Paris Conference scheduled for December 2015. The May 2015 target submitted by Canada was described as our “Nationally Determined Contribution” under the terms of the Convention, which means it is our formal commitment to make reductions between now and 2030. Under the Paris Agreement, Canada has now committed to “*holding the increase in global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C*”.

2. No significant emissions reductions expected until after 2020

Canada’s previous emissions reduction commitment, announced by the Conservative Government in 2009, promised a 17% of Canada’s total emissions by 2020, below the 2005 level. That target was 622 Mt. On October 7, 2014 the Office of the Auditor General of Canada released the *2014 Fall Report of the Commissioner of the Environment and Sustainable Development*. See Chapter 1 of that report, entitled “Mitigating Climate Change”, which concluded that “*the growth in emissions will not be reversed in time and the target will be missed*”: http://www.oag-bvg.gc.ca/internet/English/parl_cesd_201410_e_39845.html.

Canada’s Second Biennial report on Climate, published in February 2016, shows that the expected emissions level by 2020 will be 768 Mt. There is little likelihood that any policy changes now can significantly lower that number within the next five years.

3. Expansion of oil sands production to 2040

The National Energy Board’s (NEB) report *Canada’s Energy Future 2016: Energy Supply and Demand Projections to 2040*, published on January 27, 2016, forecasts that oil sands production will double from 2.4 million bpd in 2014 to 4.8 million bpd by 2040. The projected output level for 2020 is 3.3 million bpd: <https://www.neb-one.gc.ca/nrg/ntgrtd/ftr/2016/2016nrgftr-eng.pdf>

The Kinder Morgan assessment report released on May 19, 2016 adopted the NEB’s forecast of future oil sands production: see *Report*, section B.2.1, “Canadian Oil Supply Growth” at p. 15.

4. Increase of oil sands emissions 2005-2014

The Government of Canada’s *National Inventory Report 1990-2014: Greenhouse Gas Sources and Sinks in Canada*, published on April 14, 2016, provides emissions data up to 2014. Data for 2015 has not yet been released. Emissions are divided into seven main economic sectors, with detailed breakdowns for specific industries and types of activity

in each sector. Figure I shows a breakdown of oil and gas sector emissions. It can be seen that the oil sands industry sub-sector is the source of most of the growth of oil and gas emissions:

Figure I: Oil and Gas sector emissions up to 2014 (in Mt of CO₂)

	2005	2009	2010	2011	2012	2013	2014
Oil Sands	34	48	53	55	60	64	68
Natural Gas	58	52	51	50	53	57	57
Conventional Oil	31	29	29	30	32	35	36
Oil & Gas Transmission	12	8	7	7	8	8	10
Downstream	22	22	21	20	23	22	21
Total	159	160	162	164	176	187	192

Sources: all data taken from the *National Inventory Report 1990-2014*, Table 2-12, at p. 65.

5. Government of Canada data on Canada's total emissions 2005-2014

This Table, based on data taken from the *National Inventory Report 1990-2014: Greenhouse Gas Sources and Sinks in Canada*, published on April 14, 2016, shows Canada's total annual emissions over the period 2005-2014. Data for 2015 has not yet been released. The column on the far right shows the changes since 2009.

Figure II: Canada's GHG Emissions by Economic Sector 2005-2014 (Mt CO₂eq)

	2005	2009	2010	2011	2012	2013	2014	Change 2009-2014
Oil and Gas	159	160	162	164	176	187	192	+32
Electricity	118	94	95	87	83	80	78	-16
Transportation	171	168	173	170	171	174	171	+3
Emissions Intensive & Trade Exposed Industries	88	72	74	79	79	77	76	+4

Buildings	85	83	81	86	84	85	87	+4
Agriculture	70	67	68	69	70	73	73	+6
Waste & Others	56	52	54	55	55	55	54	+2
National GHG Total	747	696	706	710	718	731	732	+ 35

Source of data: *National Inventory Report 1990-2014*, April 14, 2016, Table 2-12, p. 65

6. Government of Canada oil and gas emissions projections to 2030

Canada's Second Biennial Report on Climate Change was released in February 2016 by Environment and Climate Change Canada. It provides emissions projection up to 2020 and 2030. Oil and gas sector emissions are shown at the top. They account for 25% of Canada's total emissions.

Figure III: Emissions projections to 2020 and 2030 (Mt CO₂eq)

	2005	2013	2020	2030	Change 2005-2020	Change 2005-2030
Oil and Gas	157	179	210	242	+54	+85
Electricity	121	85	74	58	-48	-64
Transportation	169	170	169	164	0	-5
EITE	89	76	90	107	+1	+18
Buildings	87	86	96	109	+9	+21
Agriculture	71	75	74	76	+3	+5
Waste and Others	54	54	54	59	0	+5
Total	749	726	768	815	+18	+66

Source: *Canada's Second Biennial Report on Climate*, Environment and Climate Change Canada (February 2016), Table A5, p. 22. The data for 2005 and 2013 was subsequently revised; see Figure II.

7. The emissions situation in Canada: looking ahead to 2030

See David Hughes, *Can Canada Expand Oil and Gas Production, Build Pipelines and Keep its Climate Change Commitments?* (June 2016, Canadian Centre for Policy Alternatives: <https://www.policyalternatives.ca/authors/david-hughes>). Hughes explains that if we expand oil and gas production in Canada in line with current forecasts (causing the associated emissions increases projected for that expansion), non-oil and gas sectors will be required to reduce their emissions between 47% and 59% below 2014 levels by 2030 to meet our commitment to cut total emissions to 524 Mt by that year.

On the assumption that Canada continues to expand its oil sands production as envisioned in the NEB's recent forecast (adopted by the Kinder Morgan report), Hughes identifies three scenarios. In the best-case outcome, Hughes assumes that Alberta imposes its 100 Mt oil sands emissions cap and that B.C. limits its LNG industry to only one export terminal: in that case he estimates that non-oil and gas sector emissions across Canada would have to contract by 47 % from 2014 levels by 2030, in order to meet Canada's 30% reduction target. The required cuts to non-oil and gas sectors will have to be even more severe if B.C.'s proposed LNG industry is developed to include multiple plants or if Alberta does not implement its promised 100 Mt cap on oil sand emissions.

8. Processes

About two years ago, in a ruling by the NEB on July 24, 2014 during the Kinder Morgan pipeline inquiry, the NEB refused to consider evidence about what the government and industry refer to as "upstream emissions". Upstream emissions are the CO₂ and other GHGs released into the atmosphere during extraction and processing in Alberta, before the oil sands bitumen is shipped by pipeline.

During the Federal election campaign in the fall of 2015, the Liberal Party made a promise that it would "include an analysis of upstream impacts and greenhouse gas emissions" for any project that fell under a federal environmental assessment.

On January 27, 2016, the new government announced a modification of the existing pipeline approval process. The government declared that in the case of the two major pending pipeline applications – Energy East and the Kinder Morgan project – the "project reviews will continue within the current legislative framework." That decision by the Liberal Government meant that in making recommendations whether to approve the two current projects, the NEB would be allowed to continue to exclude evidence about greenhouse gas emissions, as it had already done in the Northern Gateway case and in the Kinder Morgan case by its July 2014 decision.

9. The Kinder Morgan emissions assessment report

The emissions assessment for the Kinder Morgan pipeline (also known as the Trans Mountain pipeline) expansion, formally titled the *Review of Related Greenhouse Gas Emissions Estimates for the Trans Mountain Expansion Project*, was released on May 19,

2016. The calculation of the estimated additional emissions resulting from the capacity expansion (13.5 Mt to 17 Mt) is found in Part A of the document. The important part of the analysis entitled “Impacts on Canadian and Global Upstream GHG Emissions” is found in Part B, starting at page 14. The discussion of the economics of rail transport covers five pages, at pp.25-30. The only reference to Canada’s commitment to cut its total GHG emissions 30% by 2030 is found in section B.2.5, at pp. 22-23. The full document is 35 pages in length. The report is found at: <http://www.ceaa-acee.gc.ca/050/documents/p80061/114550E.pdf>

10. The report does not show that new provincial policies can substantially reduce emissions below 815 Mt by 2030

The Kinder Morgan report makes the claim that a number of new policies announced since September 2015 by provincial governments, in particular by Alberta and Ontario, “will have an impact” on Canadian GHG emissions (i.e., will significantly reduce the 815 Mt number). But the Kinder Morgan report offers no analysis and provides no new projections to indicate how much the recently announced provincial plans will improve the expected outcome.

The “emissions gap” is the difference between (a) the expected level of Canada’s total emissions by 2030, based on projections taking into account all carbon-reduction policies that have already been adopted in Canada and (b) our commitment to cut total emissions to 524 Mt by 2030. Based on the Government of Canada’s most recent projections published in February 2016, the emissions gap is currently the difference between 815 Mt and 524 Mt, or 291 Mt. The gap represents the cuts we will have to make if we are going to meet Canada’s reduction commitment by 2030.

The Government of Canada’s most recent projection, showing that total emissions will increase to 815 Mt by 2030, was calculated taking into account all carbon-reduction policies already adopted or announced in or before September 2015.

It is true that as new carbon-reduction policies are developed and announced by the Federal Government or by provincial governments – and provided they are stringent and implemented in a timely way – revised projections will hopefully show a significant lowering of the projected 2030 emissions level, below the 815 Mt number.

In order to get a realistic idea of how much the recently announced policies may be able to reduce the future trend of emissions up to 2030, we have to look at other sources. The Kinder Morgan report is completely unhelpful.

A recent study published by the Pembina Institute in June 2016 estimates that the emissions gap is 185 Mt: see *Building a Pan-Canadian Climate Plan: Policy options to meet or exceed Canada’s 2030 emissions target*, a submission by the Pembina Institute to the federal-provincial-territorial climate change working groups:

<http://www.pembina.org/reports/submission-pan-canadian-climate-change-working-groups.pdf>

The Pembina Institute report, in its discussion of the “emissions gap”, cites recent research by David Sawyer and Dr. Chris Bataille indicating that if all of Canada’s current emissions policies, supplemented by all of the additional policies recently announced by provincial governments (including Ontario’s proposed Cap and Trade Regulations, Saskatchewan’s 50% electricity standard for installed renewable capacity, and Alberta’s policies announced November 2015), are fully implemented, they could lower Canada’s projected annual emissions level to 709 Mt by 2030, which would still be 185 Mt above the 524 Mt target (that outcome is found under the “Developing Policies” scenario in that study): see *Still Minding the Gap: An Assessment of Canada’s Greenhouse Gas Reduction Obligations* (Deep Carbonization Pathways Project, April 2016).

Of course, the eventual outcome of the recently announced policies will depend on how they are eventually implemented, and whether they live up to their promise. In the introduction to their study, Bataille and Sawyer explain their approach: “We are generous in our interpretation of these promised policies but also realistic in how we assess the potential”. Their study indicating that Canada can possibly cut its total emissions down to 709 Mt by 2030 is based on the assumption that governments will do what they say, and that all the recently promised policies will be implemented in a timely way.

An emissions gap of 185 Mt is still an enormous challenge for Canada. We can realistically assume that no substantial cuts in Canada’s total emissions will begin before 2020. If as much as 185 Mt of emissions reductions are going to be achieved over the following decade (in addition to other reductions already counted on under existing policies) that would require additional absolute cuts to Canada’s total emissions averaging 18.5 Mt *per year*, sustained for ten years, starting in 2021. We have never done anything like that.

Between 2005 and 2014, Canada reduced its annual emission level by only 15 Mt in total, over the entire nine years. We have experienced *no absolute reductions at all* in any year since 2009. The only reductions since 2005 occurred in 2008 and 2009, during the recession caused by the global financial collapse: see Note 5, Figure II.

The difficulties we face in achieving deep cuts to Canada’s total emissions by 2030 are all the more evident if we look at the trend of Alberta’s emissions. Figure IV reproduces the Government of Canada’s projections for the Province of Alberta’s total emissions, published in the *Second Biennial Report*.

Figure IV: Province of Alberta – emissions projections to 2020 and 2030 (Mt CO₂eq)

	2005	2013	2020	2030
Alberta	234	267	297	320

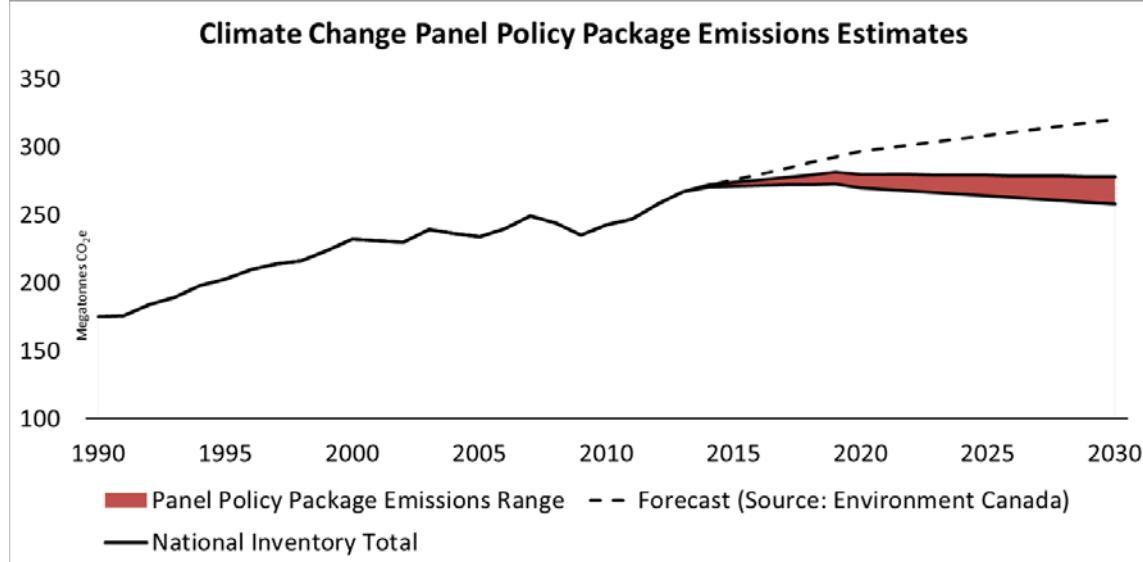
Source: *Canada’s Second Biennial Report on Climate, Environment and Climate Change Canada* (February 2016), Table A24, p. 29.

The projections in Figure IV do not take into account the benefit of emissions reductions promised under the Province of Alberta's new Climate Leadership Plan, published on November 20, 2015. To understand their likely impact, we have to look at the 90-page report entitled *Climate Leadership: Report to Minister*, prepared by an advisory panel of five members, chaired by economist Andrew Leach. It can be accessed at:
<http://www.alberta.ca/documents/climate/climate-leadership-report-to-minister.pdf>.

Alberta's *Climate Leadership Report* provides a summary of the emissions reductions that will be achieved by 2030 if all of Alberta's new policies announced in November 2015 are successfully implemented. First, the province will phase out all coal-fired electricity generation by 2030. By 2030, that transition away from coal-based electricity will reduce the province's emissions by at least 14 Mt below the current projection, depending on the relative share of renewables. If renewables provide a high proportion of the replacement power (the alternative is natural-gas), the emissions reduction will be more than 14 Mt. Secondly, successful implementation of a plan to reduce methane emissions in the oil and gas industry and the adoption of new carbon pricing measures that will apply to oil sands operations are expected to reduce Alberta's total annual emissions in 2030 by another 20 Mt. Thirdly, adoption of a 100 Mt "cap" on oil sands emissions will reduce the amount of expected oil sands emissions by 16 Mt, below the 116 Mt currently projected by the Government of Canada.

According to the *Climate Leadership Report*, by 2030 all of these measures (together with other new initiatives in Alberta) are expected to reduce Alberta's total annual emissions by 50 Mt below the currently projected level – from 320 Mt down to 270 Mt. The outcome is depicted in this graph, which was published in the Alberta document:

Figure V: Emissions Estimate, Alberta Climate Leadership Plan



Source: *Climate Leadership Plan: Report to Minister*, November 20, 2015.

We can see, however, that despite Alberta's promised new measures, by 2030 Alberta's total emissions, about 270 Mt, will be more or less the same as they are now. Between 2013 and 2020, the level of annual emissions will rise by about 30 Mt (mainly as a result

of growing oil sands emissions). Between 2020 and 2030 the level will decline by about the same amount, 30 Mt. The problem is that most of Alberta's promised reductions after 2020 will be offset by the increase of oil sands emissions between 2015 and 2030.

Under the new plan, by 2030 Alberta's emissions will still be well above the 2005 level (which was 234 Mt: see Figure IV). Our national commitment is that Canada's total GHG emissions will be 30% below the 2005 level by 2030. Alberta will contribute nothing to that. Even if Alberta successfully implements its proposed new policies, the burden of making deep cuts below the 2005 level will still fall entirely on the other provinces, and all of the needed reductions will have to come from non-oil and gas sectors.

11. British Columbia and its planned LNG industry

The Kinder Morgan report assured Canadians that B.C. “*will be updating its Climate Change Plan*” – suggesting that B.C. would be able to substantially contribute to efforts to reduce Canada’s total emissions by 2030.

On August 19, 2016, the B.C. Government released its new *Climate Leadership Plan*. It includes no major new carbon reduction policies. The Plan makes no commitment to a reduction target of any kind for 2030 (the consultative committee had urged a target of 40 Mt). It appears that, in the most positive outcome, by 2030 total emissions in B.C. will be about the same as they are today, around 63 Mt, with no absolute cuts beginning until after 2030. The plan lists a set of projected reductions that will eventually cut the annual emissions level by 25 Mt, but they are projected to occur only by 2050 (Appendix, p. 47). The existing legislated target of 43.5 Mt by 2020 has been quietly abandoned.

B.C.’s planned LNG industry is not discussed at all in the Kinder Morgan report. If just two or three LNG plants are built and start up production during the early 2020s in B.C., they would add an additional 20 Mt to 40 Mt in new emissions during the next decade – an average increase of 2 Mt to 4 Mt every year for ten years, a huge number in the context of this discussion. The new industry would be the largest new source of emissions growth in Canada in the next decade – and will have a negative impact on Canada’s ability to reduce our total emissions by 2030.

Canada’s current projections include a nominal provision for a single LNG plant in operation by 2030, releasing a total of 4 Mt of annual emissions by that year (see *Canada’s Second Biennial Report*, Table A6). Anything more than a single small-scale plant will substantially add to Canada’s total oil and gas sector emissions, currently projected to reach 242 Mt by 2030.

One proposed LNG facility that is very close to obtaining final environmental approval from the Federal Government is known as Pacific NorthWest LNG – a \$12 billion dollar facility for liquefaction of natural gas to be built on the coast near Prince Rupert. In February, 2016, the Canadian Environmental Assessment Agency released its assessment report on the Pacific NorthWest project, confirming that this single plant, together with the associated emissions from processing the natural gas to supply the facility, will generate *11.4 Mt to 14.0 Mt of CO₂ every year* – for 30 years. If approved, it will rank

among the top emitters in Canada, equal in magnitude to the two worst emitting facilities in Canada, both of which are in Alberta. This single LNG project will cancel out about 50% of the entire 25 Mt of reductions promised for 2050 under B.C.'s new Climate Plan.

12. The IEA's 450 Scenario

The IEA's 450 Scenario is a mitigation scenario. It assumes a set of policies that will bring about a trajectory of declining GHG emissions from the energy sector consistent with the goal of limiting the long-term rise of average global temperature to 2°C. One of the strategies under the 450 Scenario is to gradually reduce global oil production and consumption, starting in 2020 – in order to achieve a total reduction of about 18% between 2020 and 2040. Here is a comparison of the global oil production figures, given in millions of barrels per day (bpd). The New Policies Scenario is the IEA's "business-as-usual" projection, which represents the expected level of crude oil production if the world economy continues its current patterns of oil use. The New Policies Scenario is not consistent with keeping average global warming below 2°C.

Figure VI: IEA oil production scenario projections (in millions bpd)

	2014	2020	2040
New Policies Scenario	90.6	95.9	103.5
450 Scenario		93.7	74.1

Source: *World Energy Outlook 2015*, Table 3.1, p. 114 and Annex A pp.582-583.

The IEA's 450 Scenario calls for even deeper cuts to world coal demand – a 33% reduction in the annual level between 2020 and 2040. It also counts on achieving other rapid technological changes, such as large-scale adoption of carbon capture and storage (CCS) technology. Even if all that is accomplished, the IEA plan offers only a 50% chance of keeping warming below the 2°C threshold. Therefore, the IEA's proposed 18% reduction in global crude oil production over the next twenty years starting in 2020 can be regarded as the minimum needed to stay within the 2°C threshold.

For background on the 450 Scenario, see the IEA's June 2013 report, *Redrawing the Energy-Climate Map – World Energy Outlook Special Report*. The report explains the urgency of the IEA's call for a halt to any further growth of energy-related CO₂ emissions by 2020, with absolute reductions in global oil and coal consumption starting by that date:

The world is not on track to meet the target agreed by governments to limit the long-term rise in the average global temperature to 2 degrees Celsius (°C).

Global greenhouse emissions are increasing rapidly and, in May 2013, carbon-dioxide CO₂ levels in the atmosphere exceeded 400 parts per million for the first time in several hundred millennia. The weight of scientific analysis tells us that our climate is already changing and that we should expect extreme weather

events (such as storms, floods and heat waves) to become more frequent and intense, as well as increasing global temperatures and rising sea levels. Policies that have been implemented, or are now being pursued, suggest that the long-term average temperature increase is more likely to be between 3.6°C and 5.3°C (compared with pre-industrial levels), with most of the increase occurring this century.

The IEA is unequivocal that total CO₂ emissions from energy use must start to decline by 2020 to have a chance of staying below 2°C:

Despite the insufficiency of global action to date, limiting the global temperature rise to 2°C remains still technically feasible, though it is extremely challenging. To achieve our 450 Scenario, which is consistent with a 50% chance of keeping to 2°C, the growth in global energy-related CO₂ emissions needs to halt and start to reverse within the current decade.

The Kinder Morgan assessment neither accepts nor rejects that proposition. It does not discuss it at all.

13. 2°C global average surface temperature and atmospheric GHG level

By 2012, the global average surface temperature was 0.85°C above the pre-industrial level (IPCC, 2013: *Summary for Policymakers*, B.1). This measure of 0.85 degrees – perhaps at first sight seeming too small to make much difference – *is the average increase for the entire surface of the globe*, including over the surface of the oceans (where air temperature is cooler than over land surfaces in most places). The temperature increases that have already occurred vary in scale, depending on the region. Increases over land areas are more pronounced than over the oceans, with larger absolute increases in northern latitudes. The rate of warming in Canada is more than double the global mean.

Canada's Western and Central Arctic provide a disturbing example of an already profound regional impact. Climate stations in the north have recorded average increases ranging from 0.7 to 1.2°C *per decade* in mean annual temperature between 1981 and 2010 – *a 3°C increase in air temperature* within three decades, an extraordinary change. Most of the Arctic sea ice loss has occurred in a short time, since about 1990. These changes in Canada's north are unprecedented, given their rapidity and scale. On climate change in the Canadian Arctic, see Gary Stern and Ashley Gaden, *From Science to Policy in the Western and Central Canadian Arctic: An Integrated Regional Impact Study (IRIS) of Climate Change and Modernization*, Arctic Net, Quebec City. Temperature increase and sea ice loss are discussed in Chapter 2, Lauren Candlish and David Barber, “Climate Variability and Projections”.

Increases in atmospheric GHG concentration level in 2011-2015, see National Oceanic Atmospheric Administration (NOAA), Earth System Research Laboratory, Global Monitoring Division website, <http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html>. Long term record of GHG levels: see IPCC 2013. *The Physical Science Basis*, Chapter 6 “Carbon and Other Biochemical Cycles”, in particular pp. 465 – 472.

14. Technology: the fate of CCS in the oil sands

Regarding Alberta's decision to abandon government support for CCS technology as a solution to oil sands emissions, see *The Globe and Mail*, "Prentice lets carbon capture go", Kelly Cryderman, July 18, 2014: <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/alberta-leadership-hopeful-prentice-lets-carbon-capture-go/article19668361/>; also, *Calgary Herald*, June 13, 2015: <http://calgaryherald.com/news/politics/ndp-pledge-to-end-carbon-capture-projects-easier-said-than-done>

Not long after Alberta confirmed in 2014 that it was dropping support for carbon capture and storage (CCS), a panel of experts on technological innovation in the oil sands industry completed a major report called *Technological Prospects for reducing the Environmental Footprint of Canadian Oil Sands* (referred to below as "*Technological Prospects*"). The study was originally commissioned by Natural Resources Canada, with the support of Environment Canada. A panel of twelve leading engineers and other experts, the majority of them from Alberta and all experienced in oil sands extraction and processing, were appointed to examine whether technological innovation has the potential to significantly reduce the environmental footprint of oil sands development: see <http://www.scribd.com/doc/266900630/Technological-Prospects-for-Reducing-the-Environmental-Footprint-of-Canadian-Oil-Sands#scribd>

The resulting report, which was released on May 26, 2015, reviews the entire range of carbon reduction technologies currently available or under development, including technologies still at the experimental stage that may become commercially available within the next 15 years. The report deals specifically with CCS. It identifies *the high cost of carbon capture technology* as the principal barrier to any large-scale adoption of the technology in the near future: see sections 6.2.1 – 6.2.5 and 6.3, at pp.123-130.

The panel's overall conclusion is significant: the report explains that if oil sands production continues to expand in line with the industry's growth forecasts outlined in 2014, *it will not be possible to achieve any significant reductions in carbon emissions until sometime after 2025 or 2030*. In other words, if oil sands production levels continue to grow at a substantial rate, so will emissions. According to the panel, none of the existing or emerging technologies (including CCS) have the capability to substantially lower CO₂ emissions per barrel in oil sands production, at least not for another ten or fifteen years.

In the specific case of CCS, the *Technological Prospects* report concludes that CCS technology will have a very limited role in future efforts to reduce emissions in the oil sands. The panel's broad conclusion is that CCS is too expensive to be adopted during the next ten to fifteen years in the oil sands. Due to the huge capital investment needed for a single CCS installation, the technology is most promising for very large industrial sites (e.g., coal-fired electrical generating plants) that generate very high volumes of concentrated CO₂ at a single location. The report explains that, in the oil sands, the most likely future use of CCS will be in applications that capture emissions from *hydrogen production in upgraders* – a specialized high-emitting industrial activity connected to

processing bitumen at open-pit mining operations. But upgraders are a relatively small part of the oil sands emissions problem in Alberta.

In comparison, the fastest expanding area of bitumen production – and therefore the fastest growing source of emissions – is in situ (underground extraction) operations, which are smaller in scale. The panel was not optimistic about the prospects that CCS can ever become an affordable technology at these smaller-scale in situ sites, because they do not offer the needed high volume of emissions to justify the cost:

More expensive would be the capture of CO₂ from in situ projects because these represent smaller and geographically dispersed sources of emissions.

— *Technological Prospects*, p. 130 (emphasis added)

Even after the expensive technology is installed, operating expenses are substantial. The “capture” stage, which involves compressing huge volumes of separated CO₂ gas, is a highly energy-intensive process; that process consumes a lot of natural gas, which adds to costs (and ironically it also adds to carbon emissions at the site).

The panel’s report makes it clear that, mainly for reasons of cost, carbon capture technology is unlikely to have any significant impact on reducing oil sands emissions until after 2025-2030, and even then its future application may be limited to a relatively small portion of the industry’s future emissions. The panel identifies another difficulty that may impede efforts in the future to adopt CCS technology:

... retrofitting an existing facility to capture CO₂ is generally more expensive per tonne of CO₂ sequestered than designing a new one to include CCS from the start ... This is important in a fast-growing industry such as the oil sands where the rapid pace of development may “lock in” existing capital equipment and processes.

— *Technological Prospects*, p. 128 (emphasis added)

Ten or fifteen years from now (by which time CCS may become an affordable technology) it will be too costly to retrofit all the newer facilities that, in the interim, will have already begun production. We will have locked in a growing share of production that will be operating with the older, more carbon intensive methods.

The Kinder Morgan assessment does not mention the *Technological Prospects* report, or any other evidence that addresses the efficacy of CCS technology to reduce oil sands emissions. The report cites a number of studies that expressly count on large-scale adoption of CCS as a necessary requirement to reconcile continued growth of oil sands production with an emissions-constrained world (section B.2.5 at pp. 22-23). It is inexplicable that the report is completely silent about whether CCS has the capability to be an economically viable technology for the industry. It offers no evidence CCS has the potential to significantly reduce oil sands emission within the next ten or fifteen years.

This is an expanded version of a submission August 17, 2016 to the Trans Mountain Pipeline Expansion Project Ministerial Panel. Revised September 23, 2016.

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