Submission to the National Energy Board Review Panel

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Executive Summary

1. The purpose of this report is to evaluate the NEB process for reviewing pipeline applications and make recommendations for improving the process.
2. The evaluation uses ten best practices criteria and assesses the degree to which these criteria are met in the NEB review process. The evaluation is based on a review of relevant documents and a comprehensive survey of intervenors in the two NEB hearings.
3. The evaluation concludes that the NEB process does not fully meet any of the best practices and has the following deficiencies:
    a. Failure to scope reviews to include all significant adverse effects (e.g. GHG emissions and marine shipping impacts)
    b. Failure to accurately assess adverse effects (e.g. oil spills, excess pipeline capacity)
    c. Failure to assess adequately the need for and alternatives to the pipeline being reviewed
    d. Failure to compare costs and benefits of proposed pipelines in any systematic way to determine the public interest
    e. Failure to include provision for compensating those made worse off by pipelines
    f. Failure to adequately engage stakeholders and First Nations in the pipeline review process
    g. Failure of the process to command the confidence of stakeholders.
4. The following recommendations are made for improving the NEB review process. Based on the survey results of intervenors, all these recommendations have strong support.
    a. require the project proponent to accept full liability for adverse impacts from the project
    b. use independent scientists to assess project impacts instead of the project proponent and its consultants
    c. require comprehensive compensation plans
    d. require benefit-cost analysis of the project to determine the public interest
    e. provide more resources to stakeholders and First Nations to participate in the review process
    f. provide comprehensive, obligatory guidelines on how to undertake consultation and evaluate project impacts
    g. involve other levels of government and stakeholders in the appointment of review panels

h. require approval of impacted First Nations as part of the project approval process
i. require consensus based negotiations among the project proponent, stakeholders, and First Nations in an attempt to reach agreement prior to commencing the NEB hearing process
j. undertake a comprehensive assessment of all proposed oil transportation projects instead of reviewing each project separately and
k. undertake the environmental impact assessment review under CEAA separately from the NEB review under the NEBA.

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About the authors

Dr. Thomas Gunton is the Director of the Resource and Environmental Planning Program at Simon Fraser University. He has been involved in assessing major projects for over three decades in his capacity as an ADM of Energy and Mines for the Government of Manitoba, Deputy Minister of Finance and Environment, Lands and Parks for the Government of BC, a university professor and researcher, and as an expert witness appearing before many tribunals including the National Energy Board. He has spent the last 10 years assessing major oil pipeline projects including the TMEP proposal.

Katherine Zmuda has a Bachelor's of Agriculture and Environmental Sciences from McGill University and is Masters' student in the Resource and Environmental Planning Program at Simon Fraser University. Her Masters' thesis is an evaluation of the regulatory review process for the Trans Mountain Expansion Project. She has been a research associate for projects assessing approval and review processes of major energy projects, designing socioeconomic agreements and formulating best practices for environmental assessments in Canada.

A. Introduction

The purpose of this report is to evaluate NEB process for reviewing pipeline applications and make recommendations for improving the process.

The evaluation is based on research completed by a team in the School Resource and Environmental Management at Simon Fraser University that has been engaged in evaluating the National Energy Board processes for reviewing pipeline applications for over ten years. The results of the research are provided in several publications (Van Hinte, Gunton and Day, 2007, Broadbent, 2014; and Roggenbuck, 2015; Joseph, Gunton and Rutherfored 2015), and more recent results will be provided in forthcoming publications.

The research method includes developing best practices criteria for major project assessments and then using the criteria to evaluate the NEB pipeline review process. The evaluations are based on a comprehensive review of NEB documents and legislation, and surveys of experts and stakeholders who have been involved in two recent NEB hearings: the Northern Gateway Pipeline Review and the Trans Mountain Pipeline Review. Only the Trans Mountain Pipeline survey results are provided in this report, but they are similar to the Northern Gateway results. Northern Gateway results are available upon request.

B. Best Practices Criteria for Project Review

The best practices criteria used in this evaluation are based on research by Van Hinte, Gunton and Day (2007), Roggenbuck (2015) and Joseph, Gunton and Rutherford (2015). The best practices criteria are as follows:

1. The review process should be clearly defined, efficient, and adequately resourced.
2. The NEB Review Panels and federal government should be impartial.
3. The scope of issues addressed in the review should cover all potential impacts and relevant considerations including cumulative impacts.

4. The project application and evaluation should be based on adequate, objective information, and the methods of analysis should be clearly defined and sound.
5. The decision-making structure should be clear and decision making criteria should be transparent and rigorously applied.
6. Stakeholders, First Nations, and the public should have sufficient resources and opportunity to participate in the project review.
7. The process should mitigate project impacts, compensate those made worse off, and ensure that the benefits and costs are equitably distributed.
8. The process should be based on a comprehensive legislative framework to provide certainty and transparency.
9. There should be mechanisms available to appeal decisions of the review process.
10. Stakeholders should have confidence in the integrity of the review process.

We assess the degree to which the NEB pipeline review process meets these best practice criteria based on a review of the NEB report on the TMEP (NEB, 2016), a review of other relevant documents, and a comprehensive survey of intervenors in the NEB TMEP hearings (provided in Appendix1) and the Northern Gateway hearings (Roggenbuck, 2015).

Our conclusion is that the NEB process for pipeline reviews is deficient and that the process needs to be revised to better meet best practices criteria and to fulfill the NEB mandate to protect the public interest.

The major deficiencies in the NEB's pipeline assessment process include:

1. Failure to scope reviews to include all significant adverse effects (e.g. GHG emissions and marine shipping impacts)
2. Failure to accurately assess adverse effects (e.g. oil spills, excess pipeline capacity)
3. Failure to assess adequately the need for and alternatives to the pipeline being reviewed
4. Failure to compare costs and benefits of proposed pipelines in any systematic way to determine the public interest
5. Failure to include provision for compensating those made worse off by pipelines
6. Failure to adequately engage stakeholders and First Nations in the pipeline review process

7. Failure of the process to command the confidence of stakeholders.

We discuss these deficiencies in the process in more detail under each best practice heading below.

C. Evaluation of NEB Pipeline Review Process

1. Clearly Defined, Efficient and Adequately Resourced Process

The NEB review process for pipeline reviews is outlined in relevant legislation (National Energy Board Act (NEBA), Canadian Environmental Assessment Act (CEAA)) and publications posted on the NEB website. Efforts are made to communicate this information to interested parties and to make the pipeline review process efficient by harmonizing separate review requirements under CEAA, NEBA and provincial environmental impact legislation into one integrated review process managed by the NEB and providing the NEB with the resources it requires to conduct the review.

Despite these efforts, intervenors expressed a number of reservations relevant to this criterion (Appendix 1)[1]. Only 30% agreed that publicly available documentation on the NEB process provides all parties with a clear description of the process and clear instructions on how to participate and only 16% agreed that the government bodies had adequate resources to conduct the reviews. Also, the majority of intervenors (69%) are opposed to the decision to harmonize the review processes into a single review. A common concern expressed about harmonization is that the environmental impact concerns addressed under CEAA do not receive adequate attention under a NEB led process.

2. Impartiality of NEB and Government

The integrity of the review process depends on impartiality of the reviewers. However, neither the NEB nor federal government are perceived by intervenors as being impartial. Only 15% of intervenors feel that the NEB was impartial, while 63% felt that the NEB had made up its mind before the process commenced. Only 10% of intervenors feel that the federal government fully considered all the evidence and made an unbiased decision.

[1] All survey data based on the survey in Appendix 1 unless otherwise stated.

3. Adequate Scoping of Issues

The NEB provides the list of issues that will be assessed in each pipeline review process. A concern expressed by participants in the NEB reviews is that the list does not include all the key issues that need to be addressed. For example, in the TMEP review, only 11% of intervenors were satisfied with the scope of the project as defined by the NEB Panel (i.e. the physical components of the TMEP that were included in the assessment) and only 11% were satisfied with the list of issues and the process used to determine the list of issues. Intervenors identified sixteen issues that they thought were not adequately addressed in the TMEP review (Table 1).

Table 1: Issues omitted from the TMEP review

Issue	Count
Upstream and Downstream effects	20
Climate Change	14
Effect of increased tanker traffic	9
Risk of oil spills	8
Cumulative impacts	8
Rights of First Nations	8
Alternatives	5
Impact on water (freshwater, stream-crossings, ocean)	4
Proponent's business plan (i.e. corporate structure, tax avoidance, cost-benefit analysis)	4
Health impacts	3
Diluted bitumen (content of oil?)	3
Greenhouse gas emissions	3
Local and residential property devaluation	3
Community engagement	2
Sustainable energy economy	1
Local government cost implications	1

One major omission in the NEB review of the TMEP is upstream and downstream GHG emissions. The NEB included only GHG emissions from the construction (1,020,000 tonnes) and operation of the Project (407,000 tonnes/year). These GHG emissions generated by transportation of the oil represent approximately one percent of the total emissions generated by the upstream production and downstream consumption (HIS CERA, 2010). Therefore the decision to omit the

upstream and downstream omissions has a major impact on the estimate of adverse effects of pipeline projects.

In the TMEP process, the NEB justified its exclusion of upstream and downstream GHG impacts as follows:

> The Project does not include upstream production and is not dependent on any particular upstream development; therefore, any link to environmental changes caused by such upstream production is indirect and is not necessarily incidental to Project approval. In addition, no particular upstream development is dependent on the Project.
> The Project does not include downstream use and is not tied to, or dependent on, any particular use in any particular destination... The effects of end use are not directly linked or necessarily incidental to the Board's regulatory process regarding the Project. (NEB, 2016, p. 160).

The problem is that the NEB rational for excluding upstream and downstream is inconsistent with other findings in the NEB report. For example, the NEB states in its TMEP report that no particular upstream production is dependent on the TMEP, but recommends approval of the TMEP on the grounds that it is needed to accommodate the transportation needs of the Canadian oil sector. If the NEB concludes that the Project is needed (NEB 2016, p.3), then the Project will contribute to upstream production because the upstream production could not occur if the pipeline was not built.

Another inconsistency in the NEB's analysis is that the NEB states that one of the major benefits of the TMEP is that it is likely to increase returns to Canadian oil producers by market diversification (NEB, 2016, p. 15). Therefore, the NEB is again displaying inconsistency by including upstream benefits to the oil sector that will result in increased production while omitting upstream costs, such as GHG emissions. Including upstream benefits while omitting upstream costs is methodologically unsound and results in an inaccurate assessment of pipeline effects.

The Canadian government recently acknowledged this deficiency in the NEB pipeline review processes and now requires estimates of upstream GHG emissions for all new Canadian pipelines, including the TMEP subsequent to the completion of the NEB evaluation (Canada, 2016). While this is a step forward, the method used to estimate upstream GHG impacts is flawed because it incorrectly assumes

that there are virtually no upstream emissions generated by pipeline construction. The federal government makes this error by assuming that if one pipeline such as the TMEP is not built, other transportation facilities will be built to replace it and therefore Canadian oil production and the upstream emissions will be the same with and without the TMEP. By following this logic for each separate pipeline assessment, the government's analysis reaches the illogical conclusion that the aggregate impact of all pipelines on Canadian oil production is nil, when in fact the aggregate impact is significant. Without transportation facilities to ship the oil to market, there would be no oil production and no GHG emissions. The method ignores the cumulative impacts of all the pipelines combined despite a legislative requirement in CEAA 2012 to assess cumulative effects.

To correctly estimate GHG impacts of pipelines, the evaluation needs to undertake a cumulative impact assessment of all pipelines and the associated expansion in oil production and determine if this expansion is consistent with Canadian GHG objectives. These flaws in the Canadian government's method for estimating GHG emissions and suggested reforms to the method to correct the error are elaborated on in Appendix 2.

4. Objective Information and Methods of Analysis

The NEB pipeline review process relies on the project proponent to submit information on project impacts. The problem is that the project proponent has bias towards approving the project that can lead to the proponent overestimating benefits and underestimating costs. This problem is made worse by the lack of clear guidelines on the methods of analysis that should be used to assess project impacts and public interest considerations.

Intervenors are highly critical of the quality and objectivity of the information provided by the project proponent. Only 11% of intervenors agreed that the information and analysis submitted by Trans Mountain Pipelines (TM) is based on good science and that the NEB Panel obtained all the information necessary to make an informed decision on the TMEP. Just 10% agreed that the evidence was adequately evaluated and tested during the NEB hearings. A key concern was the failure to test the evidence through cross examination in the TMEP review. Further, 75% of intervenors were not satisfied with the methods used by TM to evaluate and assess the impacts of the TMEP and only 16% thought that the NEB provides clear guidance on the methods that should be used.

One important example of inadequate information and analysis is the assessment of oil spill risk. In the TMEP review, the NEB concluded that the adverse impact of a large pipeline or tanker spill would be significant (NEB, 2016, p. 236, p. 405). The NEB then dismissed the concern about the significant adverse consequences of spills by stating that large pipeline spills and marine tanker spills are unlikely to occur (NEB, 2016, p. 405). The NEB did state that small pipeline spills are likely but it concluded that small spills will not have significant adverse effects (NEB, 2016, p. 397).

The problem is that the NEB did not clearly define what constitutes a large versus small spill, did not cite evidence to show that the impacts of small pipeline spills are insignificant, did not define what a low versus high likelihood is, and did not present any probabilities of occurrence on which to base its conclusion that the likelihood for large pipeline spills and marine spills is low. ***Therefore the NEB provided no evidentiary foundation for its conclusion in the TMEP report that there is a low likelihood of significant adverse effects resulting from oil spills.***

The NEB also ignored evidence presented by intervenors and Trans Mountain showing that the likelihood of oil spills is high. The evidence shows the following spill probabilities:

- 99% probability of a pipeline spill (an average of at least one spill every two years),
- 77% for a terminal spill and,
- between 58 to 99% probability for a marine tanker spill over the 50 year operating life for the project.

The NEB did not review or discuss this evidence in its report and instead incorrectly concluded that "there are no proposed or widely accepted risk acceptance criteria for marine spills" (NEB, 2016, p. 377). By failing to accurately assess the likelihood of spills, the NEB reached the mistaken conclusion that oil spills are not a likely significant adverse effect and therefore exonerated the decision makers from having to show, as required by CEAA, that accepting the risk of oil spills is justified in the circumstances. Another example of deficient information relates to estimates of economic impacts of pipelines. The NEB Filing Manual requires applicants to estimate economic effects but does not provide any guidelines for doing this and for interpreting the findings (NEB, 2016). As table 2

shows, there is wide variation in economic impact estimates of pipelines. Several issues are worth noting. First, the employment estimates per billion dollars of investment for the Northern Gateway Project (NGP) are over eight times higher than for the TMEP and Energy East. The wide difference in estimates is the result of different methodological assumptions. Second, there is a large difference in the direct operating employment estimates and the total employment estimates. The reasons for this is that the total estimates use high multipliers varying from 5.2 in the case of TMEP to 11.0 for the NGP, and define jobs in person years, which means that one person working 25 years on the pipeline is counted as 25 person years of employment. A third problem is that all the studies imply that the employment impacts are net employment gains to the Canadian economy when in fact much if not all of the employment growth involves reallocation of employment from one sector to another with little to no net increase in Canadian employment. Further, economic impacts are defined by applicants and the NEB as benefits, when in fact they are costs of building the pipeline. Without providing clearer methodological guidelines on economic impact assessment, applicants are able to generate inconsistent and misleading evidence that overstates the alleged benefits of the pipeline and undermines the integrity of the review process.

Table 2: Economic Impacts: Pipeline Projects

	Cost $ billion	Jobs (direct op)	Jobs (total person years)	Jobs per billion $ of investment	Multiplier (total op/ direct op)
Energy East	$16	891	261,000	16,000	7.3
Enbridge NGP	$ 8	104	907,000	113,000	11.0
Kinder Morgan	$7	443	123,000	18,000	5.2

Source: Based on information provided in pipeline applications to the NEB

5. Clear Decision Making Structure and Criteria

The decision making structure and criteria for pipeline reviews are provided in the relevant legislation. Under the NEBA, the NEB is required to determine whether the project is needed and in the public interest and under CEAA, the NEB is required to determine whether there is a likelihood of significant adverse effects after mitigation.

A problem with these criteria is that they are not clearly defined. For example, only 19% of intervenors considered the evaluation criteria used by the NEB to be appropriate and only 14% considered the criteria to be clear and transparent. The lack of clarity in the criteria allows wide discretion and subjectivity on the part of the NEB in determining whether the criteria are met.

Determination of Project Need

The determination of project need is normally based on the existence of commercial contracts with shippers to utilize the capacity of the proposed pipeline and on an analysis of the current and forecast supply and demand for pipeline capacity. In the TMEP review, TM presented evidence to the NEB showing that shippers had signed long term 15-20 year contracts to utilize about 80% of the TMEP (NEB, 2016, p.310). However, TM did not provide an analysis of forecast supply and demand for pipeline space to show that the TMEP is needed. Northern Gateway did not have any long term shippers contracts to document the need for the NGP.

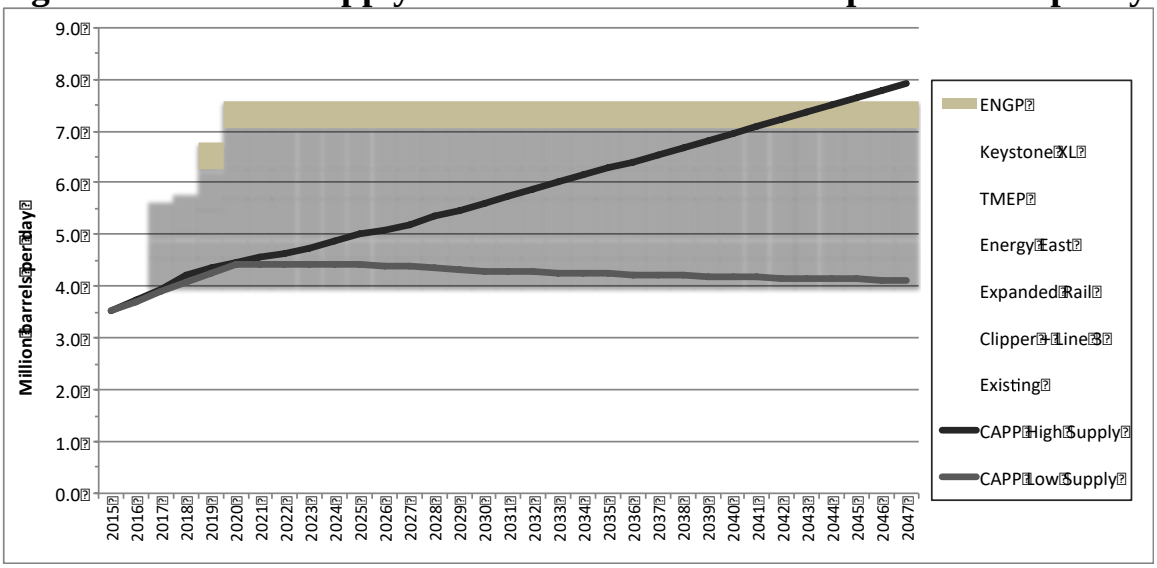
Evidence submitted to the NEB summarized in Appendix 5 and Figure 1 below provides an analysis of pipeline supply and demand that indicates that the construction of the TMEP along with other proposed projects (excluding Keystone XL and Northern Gateway) would result in unused capacity of approximately 1.6 million bpd by 2020. This is equivalent to almost 3 TMEPs worth of empty pipeline space. Under CAPP's oil production forecast, there will be empty pipeline capacity until 2034. Under CAPP's lower growth forecast (based on existing and under construction projects), there will be surplus capacity of over 1.6 million bpd until the end of the forecast period (2047). If Keystone and Northern Gateway (both of which have been approved by the NEB) are included, the unused capacity would rise to about 3 million bpd in 2020 and there would be surplus capacity under CAPP's higher growth scenario to 2044.

In response to the evidence on surplus capacity, the NEB states in its report that "the Board is not convinced by the evidence in the Gunton Evaluation that the pipeline is not needed, and that the Project would result in a significant net cost to Canada" and that there is "no reliable evidence demonstrating that any excess capacity would be unmanageable" (NEB, 2016, p. 310).

The NEB concluded that any excess capacity was manageable but did not provide any estimates of potential surplus capacity or any definition of what it defined manageable to be. ***Therefore the NEB's conclusion that the surplus capacity generated by the TMEP is manageable is unsupported by any evidence.*** The failure to require estimates of the supply/demand balance for pipeline capacity and surplus capacity estimates to demonstrate the need for a pipeline is a major deficiency in the NEB review process.

In the case of the NGP, no commercial contracts demonstrating the need for the pipeline existed and the NEB did not require a supply/demand analysis to document need. In the case of the TMEP, the NEB relied on the existence of commercial contracts that obligate shippers to use the TMEP as proof that the TMEP is needed. The problem with relying on commercial contracts as evidence of need is that commercial contracts may not reflect the aggregate need for new pipeline capacity. In the case of TMEP, for example, the commercial contracts were signed before the recent downturn in oil markets. Even though the downturn and emergence of other new pipeline options will result in excess capacity, the TMEP may still be built even though it is not needed. The reason for this is that shippers are contractually obligated to use the TMEP and it can therefore generate a profit sufficient to cover the costs of the pipeline while shifting the cost of surplus capacity to other existing pipelines that do not have long term contracts. By examining each project separately and not assessing overall supply and demand to determine need, the NEB does not identify these potential surplus capacity costs incurred by other pipelines and does not assess feasible alternatives to proposed pipelines that could generate the same economic benefits at lower cost.

Figure 1: Forecast Supply and Demand for Oil Transportation Capacity



Source: see Appendix 5

Determination of Public Interest

The NEB's mandate is to assess the public interest by weighing a project's various impacts and determining whether the project achieves an overall public good. The NEB defines the public interest as follows:

> The public interest is inclusive of all Canadians and refers to a balance of economic, environmental, and social interests that change as society's values and preferences evolve over time. The Board estimates the overall public good a project may create and its potential negative aspects, weighs its various impacts, and makes a decision (NEB 2010a).

As the NEB states in its report on the TMEP: "the Board must balance the benefits against the residual burdens to come to its final determination under section 52 of the NEB Act as to whether the Project is in the public interest. This task of balancing the benefits versus the burdens of the Project was a difficult one" (NEB, 2016, p.17).

The NEB then concludes that:

> On the whole, taking into account all of the evidence in this hearing, considering all relevant factors, and given that there are considerable

> benefits nationally, regionally and, to some degree, locally, the Board finds that the benefits of this Project outweigh the residual burdens. Accordingly, the Board concludes that the Project is in the present and future public convenience and necessity, and in the Canadian public interest (NEB, 2016, p. 18).

The problem with the NEB's analysis of the public interest in the TMEP case is that:

- it omitted a number of costs such as GHG emissions and unused pipeline capacity

- it mistakenly construed a number of impacts such as construction costs and economic impacts as benefits, and

- it failed to compare costs and benefits using any systematic method such as benefit-cost analysis to determine if the benefits outweigh the costs.

Therefore, the NEB provided no transparent basis for its conclusions that the TMEP is in the public interest.

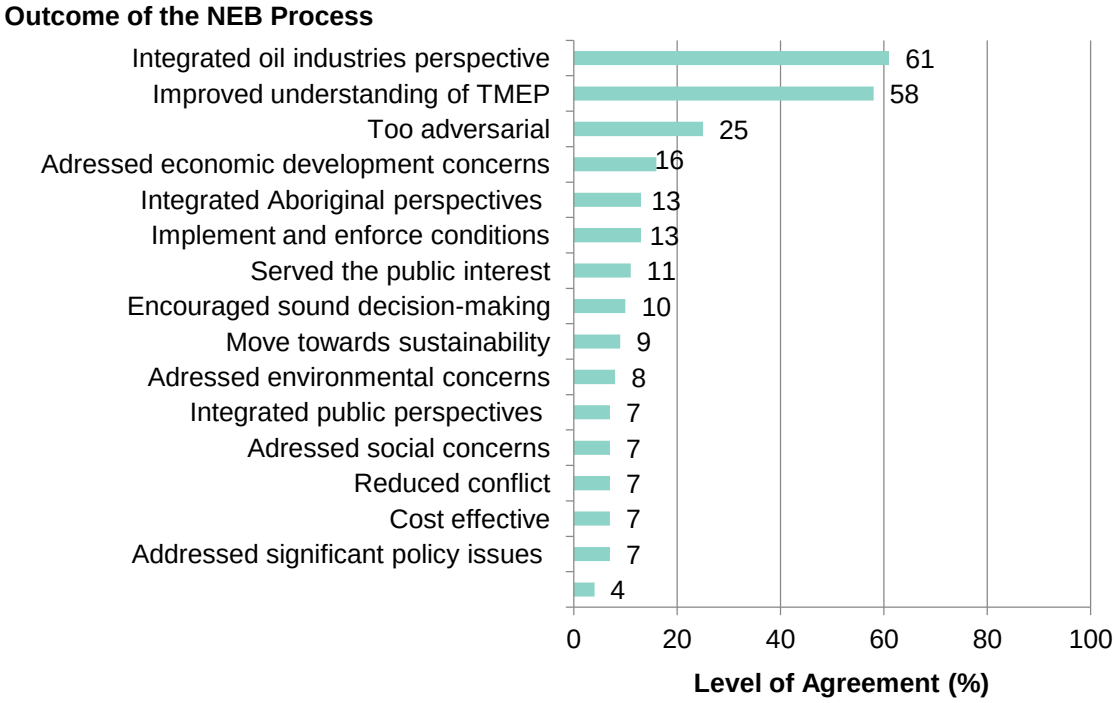
Evidence presented to the NEB and summarized in Appendix 4 shows that if the NEB accurately estimated and compared costs and benefits using a systematic widely accepted method such as benefit-cost analysis, it would have found that under all likely scenarios, the costs of the TMEP will exceed the benefits by between $4.6 and $23 billion dollars and therefore the TMEP is **not** in Canada's public interest.

While measuring the costs and benefits is challenging and is highly sensitive to the assumptions made, the failure to make any effort to compare benefits and costs in any systematic way to determine if a pipeline is in the public interest is a major deficiency in the NEB process.

Intervenors are highly critical of the NEB's determination of the public interest. Intervenors were asked to rate the degree to which the NEB TMEP process met a number of desirable public interest objectives. While the majority agreed that the goals of meeting oil industry objectives and improving the understanding of the

TMEP were met, a large majority felt that all other public interest objectives were not met (Figure 2).

Figure 2: Intervenors' Rating that Outcome Objectives are Met



6. Effective Participation of Stakeholders and First Nations

There is consensus agreement that a good process requires the full participation of the public and First Nations. Stakeholders and First Nations are provided with opportunities for participation in NEB hearings. In the TMEP review, stakeholders and First Nations were provided with the opportunity to participate in the TMEP review process by participating in workshops and open houses organized by TM and in NEB hearings. However, participation in the NEB hearings was limited to those deemed to be directly affected by the TMEP or having specialized knowledge useful to the hearings. A large number of applicants were therefore not granted intervenor status because they were deemed by the NEB to not meet the criteria for inclusion. There were also additional consultations with First Nations by both TM and the government and funding was provided to stakeholders and First Nations by the NEB and TM to support their participation (NEB 2016, pp 25-52).

Despite these opportunities, only 18% of intervenors agreed that all parties potentially affected by the TMEP were given adequate opportunity to participate in the review process and only 8% agreed that stakeholders and First Nations had adequate resources to participate. Moreover, only 13% believed the NEB Panel adequately integrated Aboriginal perspectives into decision-making and only 7% believed the public's perspectives were adequately integrated.

7. Equity and Compensation

A well accepted principle of good public policy is the need to assess the distribution of costs and benefits by stakeholder group and to ensure that parties that cause adverse effects are fully responsible for compensating those negatively impacted. To achieve this objective, the review process needs to: 1. identify all costs and benefits of the project; 2. analyze the distribution of costs and benefits by major stakeholder groups; and 3. identify mitigation measures to compensate stakeholder groups made worse off as a result of the project.

Both TM and the NEB identified mitigation measures to reduce adverse impacts. However, neither TM nor the NEB assessed the distribution of costs and benefits by stakeholder group and consequently did not identify whether mitigation measures adequately protected parties made worse off by the TMEP.

One compensation issue particular relevant to pipeline projects is the need to cover the costs of accidents such as oil spills with a preapproved compensation plan that confirms that sufficient funds are available for compensation and indicates who and what will be compensated and how the amount of compensation will be determined.

The NEB addressed this to some degree. For example, in the case of pipeline spills, the NEB assessed the issue of financial capacity to provide compensation for credible worst case pipeline spills by requiring TM to have $1.1 billion in financial resources to cover the NEB's estimate of a worst case spill cost (NEB, 2016, p.319). A deficiency is that the NEB did not require a compensation plan that identifies important parameters of compensation including who and what types of damages get compensated, how compensation values will be determined, and what dispute resolution mechanisms will be used to resolve disagreements between TM and parties seeking compensation. A comprehensive compensation policy is needed to address these issues.

In the case of marine tanker spills, the NEB acknowledged that it is possible that damages may exceed available compensation. Undisputed evidence before the NEB, for example, demonstrated that the damages from a tanker spill could exceed available compensation by more than $2.9 billion (Appendix 3). Nonetheless, the NEB did not propose any measures to address this issue.

The NEB rationalized its omission of consideration of compensation for marine tanker spills by stating that compensation for marine spills is the responsibility of other levels of government to address and is beyond the jurisdiction of the NEB (NEB, 2016, p. 407). To date, this issue has not been adequately addressed and is a major failing of the review process for the TMEP. The NEB review process should require applicants to have comprehensive compensation plans that fully cover all damages from both pipeline and marine tanker accidents and malfunctions.

8. Legislative Framework

It is important for the NEB review and decision making process to be specified in legislation to ensure transparency and certainty. The pipeline review process is founded on the NEBA, CEAA and case law, which outline the process, responsibilities, and decision criteria. As discussed in other sections, key components of the review process, such as methods of analysis and process for assessing the public interest and need, are not specified in any legally enforceable documents and other components such as decision criteria are vaguely worded and do not provide clear direction to decision makers. Only 5% of intervenors in the NEB TMEP process felt that existing legislation provided adequate certainty and clarity.

9. Appeal Mechanisms

A good review process should provide opportunities for participants to appeal decisions on both process and substance. As the large number of recent judicial challenges of the NEB Northern Gateway and TMEP hearings demonstrate, there are opportunities to appeal NEB decisions on various grounds. However, while it is possible to appeal NEB and government pipeline decisions on both procedural and substantive grounds, the courts have been reluctant to review the substantive components of the decision such as whether the decision is in the public interest. Therefore the appeal process needs to be strengthened.

10. Failure to earn confidence of stakeholders

An essential characteristic of any sound decision making process is that stakeholders should be confident in the integrity of the process. They should view the process as fair, objective, evidence based, and comprehensive. As discussed in previous sections and as documented in Appendix 1, participants did not have confidence in the TMEP process. Overall, only 8% of intervenors rated the process as good, only 11% thought that the process would protect the public interest, and only 15% felt that the NEB was impartial. The lack of confidence in the NEB is shared by the general public. In one recent survey, only 10% of Canadians have a lot of confidence in the NEB, 33% have some confidence, and 50% have little to no confidence (EKOS, 2016, p. 16).

C. Reforming the Process

The NEB TMEP review process does not fully meet any of the best practices and contains a number of deficiencies that require mitigation. As part of the our research, we asked intervenors in the NEB process to evaluate potential reforms. The results show strong support for a number of reforms including (Table 3):

- requiring the project proponent to accept full liability for adverse impacts from the project
- using independent scientists to assess project impacts instead of the project proponent and its consultants
- require comprehensive compensation plans
- require comprehensive benefit-cost analysis of the project to determine the public interest
- provide more resources to stakeholders and First Nations to participate
- provide comprehensive, obligatory guidelines on how to undertake consultation and evaluate project impacts
- involve other levels of government and stakeholders in the appointment of review panels
- require approval of impacted First Nations as part of the project approval process
- require consensus based negotiations among the project proponent, stakeholders, and First Nations in an attempt to reach agreement prior to commencing the NEB review process

- undertake a comprehensive assessment of all proposed oil transportation projects instead of reviewing each project separately and
- undertake the environmental impact assessment review under CEAA separately from the NEB review under the NEBA.

Two proposed reforms that receive the least amount of support are restricting the number of intervenors and setting time limits on the process.

One of the most potentially far reaching reforms in this list is the switch from the current adversarial, quasi-judicial approach for project review under the NEB to a collaborative or "share decision making" approach. Collaborative planning seeks to resolve differences and reach decisions by engaging stakeholders in face-to-face dialogue and joint fact finding to reach consensus agreement.

This approach has been used with great success in a number of complex, conflict oriented cases including the resolution of the "war in the woods" conflict in British Columbia where it was used to reach consensus based land use agreements for most of the province's land base, including the recent Great Bear Rain Forest (Frame, Gunton and Day, 2004; Morton, Gunton, and Day, 2011; Gunton, 2016) and in resolving energy disputes (Busenberg, 1999). The benefit of this approach is that it seeks to reduce differences by developing common facts and dialogue instead of accentuating differences in an adversarial process in which participants attack each other and provide conflicting evidence.

In the case of pipeline reviews, collaborative planning could be implemented by having the government appoint a panel comprised of representatives of Aboriginal groups, small business, industry, labour, non-governmental organizations, government (municipal, provincial and federal) and other stakeholders that would engage in joint fact finding and analysis to reach consensus based recommendations. Panels could be created at both the national level to prepare an overall policy framework for energy transportation and for each project application. The role of government would be to support and facilitate the activities of the stakeholder panel. The recommendations from the stakeholder panels could then be submitted the NEB and government for review and ratification.

Table 3 : Support for Proposed Reforms

Suggested reform	Level of Agreement
As a condition for project approval require the applicant to accept full liability for any damages caused by the project and document ability to pay off any damages.	94%
Have government review agencies hire independent scientists to conduct impact assessment analysis rather than using experts that are employed by, or hired by the project applicant. (The costs of the independent analysis would be financed by a levy applied to the applicant).	89%
Require the applicant to have a comprehensive compensation plan approved by the review panel that specifies what types of damages would be eligible for compensation, what parties would be compensated, and how damage costs would be determined.	88%
Include a requirement for comprehensive benefit-cost studies for all major projects reviews.	87%
Provide more resources for intervenors to participate in the process.	87%
Require the applicant to complete an extensive public consultation process in accordance with detailed public consultation guidelines prior to submitting an application.	84%
Have government prepare more detailed technical guidelines on methodologies that should be used to assess the project's economic, social and environmental impacts and risks.	84%
The appointment of a review panel for major energy projects should be made jointly by the federal government, impacted provincial governments, and impacted stakeholders instead of just by the federal government.	78%
The appointment of a review panel for major energy projects should be made jointly by the federal government and impacted provincial governments instead of just by the federal government.	74%
Require the approval of impacted First Nations governments before projects can be built.	72%
Require the applicant to engage in consensus-based negotiations with stakeholders and attempt to reach stakeholder agreement on major project issues prior to submitting an application (if agreement is not reached despite the best efforts of the applicant the project could still be submitted for review).	71%

Complete an integrated evaluation of all alternative transportation projects for shipping oil instead of evaluating each project separately.	68%
Require the NEB to consider comments from any interested party.	62%
The environmental assessment process under the Canadian Environmental Assessment Act and the pipeline approval process under the National Energy Board Act should be conducted as two separate review processes under separate review panels instead of being combined into one hearing process.	61%
The environmental assessment process of the federal government and impacted provinces should be conducted as two separate processes instead of being combined into a single hearing process.	56%
Restrict the number of intervenors in the hearing to only those deemed by the NEB to be directly affected by the project and/or have relevant expertise.	23%
Impose legislated limits specifying the maximum time for project review.	23%

D. Conclusions and Recommendations

Two key conclusions emerge from this evaluation of the NEB process. First, the NEB process does not meet any of the best practice criteria and has serious deficiencies that need to be addressed (Table 4). Second, there is widespread agreement on how to improve the process (Table 3). Specifically, this evaluation shows that:

1. There is a lack of confidence in the current pipeline review process.
2. The NEB TMEP review did not generate critical information necessary for an informed decision on the TMEP. Key information gaps include:
    a. failure to assess climate change impacts and to determine whether the potential impacts are consistent with Canada's climate change and GHG emission objectives
    b. failure to provide a pipeline supply and demand analysis assessing the need for the TMEP
    c. omission of significant costs in the assessment such as surplus capacity costs and misrepresentation of economic impacts as benefits

d. failure to assess accurately the likelihood and impacts of significant adverse effects such as oil spills
e. failure to compare costs and benefits in any systematic way to determine the public interest
f. failure to assess the distribution of costs and benefits by region and stakeholder group
g. failure to develop a compensation plan for stakeholders who may be made worse off by the project.

Table 4: Summary of NEB Evaluation

Best Practice	Assessment	Comments
Clearly defined process	Not met	Most intervenors felt that the process was not clearly defined
Impartial Decision Maker	Not met	Most intervenors felt NEB and government were biased
Proper Scoping of Issues	Not Met	Left out major issues such as upstream and downstream GHG emissions
Adequate information and Analysis	Not Met	Most intervenors felt information was inadequate. Examples include: failure to estimate spill risk, need for pipeline (supply/demand analysis)
Clear Decision Making Criteria	Not met	Criteria such as public interest, need and significant adverse effect are too vague and allow NEB too much discretion to assert conclusion without providing sufficient justification
Effective Public and First Nations Participation	Partially met	Process provides for public participation but majority of participants did not feel they had adequate resources and opportunity to participate and many were excluded from the hearing process
Equity and Compensation	Partially met	Attempt to mitigate adverse impacts but no analysis of

		distribution of impacts and no compensation plans for major impacts such as oil spills
Comprehensive Legislative Foundation for Process	Largely met	Process based in legislation but some components (e.g. decision making criteria, methods of analysis) have no or insufficient legislative basis
Appeal Mechanism	Partially met	Appeal to courts but process is costly and largely restricted to procedural and not substantive concerns
Public Confidence in Process	Not met	Participants and public have low confidence in process

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Appendix One

Survey Results of Intervenors in the NEB Review Process for the Trans Mountain Expansion Project

by

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September 2016

Submission to the Trans Mountain Expansion Project Ministerial Panel tasked by the Minister of Natural Resources to engage local communities and First Nations to identify information gaps in the NEB review process of the TMEP

Table of Contents

List of Acronyms

BP	Best Practice
CEAA	Canadian Environmental Assessment Agency
CEAA	*Canadian Environmental Assessment Act 2012*
EA	Environmental Assessment
GIC	Governor in Council (federal government cabinet)
JRP	Joint Review Panel
NEB	National Energy Board
NEBA	*National Energy Board Act*
NEB Panel	Trans Mountain Expansion Project's National Energy Board Panel
TM	Trans Mountain Pipelines (the proponent)
TMEP	Trans Mountain Expansion Project
TOR	Terms of Reference

Notes

[1] The term Joint Review Panel (JRP) was used in the survey to refer to the NEB Panel reviewing the TMEP. This term was used since the NEB Panel conducted a joint review of the TMEP under both the *NEBA* and the *CEAA 2012*.

1.1. Introduction

This report summarizes results from a survey on intervenors participating in the National Energy Board's (NEB) Trans Mountain Expansion Project's (TMEP or the Project) review process. The survey is organized around nine best practice criteria themes (BP) and the survey was administered to all intervenors in the process. This report includes a description of the survey method (1.2), the characteristics of the respondents (1.3), the limitations of this research and analysis (1.4), a summary of survey findings grouped by theme (1.5 to 1.12), an evaluation of the review process in terms of meeting the public interest (1.13), a description of the relationship between the assessment of the process and of respondents' views on the TMEP (1.14) and recommendations for improving the process (1.15).

1.2. Survey Method

Best practice criteria and themes

The survey asked respondents to rate the NEB TMEP process's performance in meeting a number of best practices (BP). The BPs are based on a study by Roggenbuck (2015), which in turn are based on studies by Joseph (2013) and Van Hinte et al. (2007).

The BPs and survey questions are discussed under nine best practice themes: structure and efficiency; impartiality of NEB Panel and participants; scoping and list of issues; methods of analysis; stakeholder and First Nations participation; decision-making structure and accountability; quality of information; legislative framework; and the outcome of the process.

Confidentiality

The survey was distributed by email invitation through FluidSurveys, a secure Canadian online survey server. FluidSurveys guarantees confidentiality by securing all information in data centers residing in Canada.

Survey Participants

All 412 registered intervenors participating in the NEB TMEP process were contacted, as well as the proponent, Trans Mountain Pipelines (referred to as TM in this report). Each individual intervenor and group received an email invitation to participate in the survey. Email addresses and phone numbers were obtained from the intervenor's "Application of Participation" form, publicly available on the NEB online registry (NEB, 2013a). Intervenors listed a primary contact, and could also provide additional contacts. Only the primary contact received the invitation so as to avoid multiple responses from any one intervenor group. When the primary contact did not respond to email invitations, they were contacted by phone. Secondary and additional contacts were invited to participate if the primary contact did not respond to any communications. If the additional contacts did not respond, the intervenor's website or online registries were searched to find any representative who may be familiar with the review process.

The survey email invitation was sent to primary contacts on March 29th, 2016. Participants received two reminders, one week and one day prior to the first deadline of April 15th, 2016. An email extending the deadline to April 30th followed, after which phone calls began and secondary contacts received email invitations. The data collection for this report closed on August 24th, for a total of five months of data collection. Most respondents (97%) completed the survey before the NEB released their recommendation on May 19th, 2016. The survey's deadline (May 18th) was set prior to the release of the recommendation to reduce potential bias in participant responses resulting from disagreement with the NEB's decision.

Survey Design

The first page of the survey was the consent form, requiring participants to agree to the terms and conditions before commencing the survey. Survey questions were a mixture of multiple choice and Likert-scale questions. The multiple choice questions asked participants' background (e.g. the intervenor group they are associated with, the province they reside in, their experience with the oil and gas industry, etc.) and their views regarding certain statements about the quality of the TMEP review process. Likert-scale questions asked respondents to state whether they strongly agree, agree, feel neutral, disagree or strongly disagree with statements describing the NEB process. Open-ended questions were also asked to allow participants to elaborate on their views. All questions were optional and the survey took between 20 to 60 minutes to complete.

Survey Results

The data produced by the survey is both quantitative and qualitative. Answers to Likert-scale and multiple choice questions were analyzed using statistical summaries reported as percentages of respondents who agree or disagree with statements describing the process. The comments to open-ended questions were reviewed to find patterns and identify frequency of responses. Responses were directly quoted in the final report to support conclusions from the statistical summaries, while keeping the participants anonymous. The results were also supplemented with information from the research team's observations and from the literature review. Throughout the analysis, answers stated as "strongly agree" were grouped with "agree" to demonstrate levels of support and agreement, and "strongly disagree" and "disagree" were combined for levels of disagreement. Information contained in submitted evidence and final arguments was reviewed and is included in the analysis where appropriate.

Response Rate

Of the 412 intervenors contacts, 69 responded to the survey yielding a response rate of 16.7%. The confidence interval for the survey sample is +/- 10.8% at a 95% confidence level. After the April 15th deadline, a focus was put on contacting the 98 intervenors who submitted written evidence and/or final arguments during hearings due to their higher familiarity and engagement with the review process. Among these 98 intervenors, 34 responded to the survey, a response rate of 34.7%.

1.3. Characteristics of the Respondents

Intervenors in the NEB TMEP hearings and survey respondents were categorized into 9 groups. As illustrated in Table 1.1, the respondents are generally representative of the intervenors, albeit with a slightly higher proportion of respondents from non-governmental organizations and a lower proportion from residents/landowners.

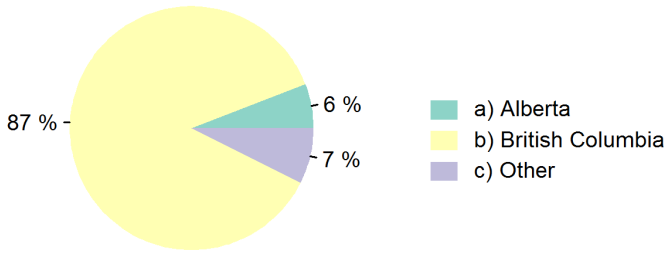
Table 1.1 Percentage of Population and Survey Respondents by Category

Background	% Intervenors	% Survey respondents
Resident/landowner	52%	33%
Environmental Organization	5%	18%
Aboriginal Group	17%	14%
Local Government	6%	10%
Academia	3%	6%
Oil and Gas Industry	8%	11%
Community group	2%	4%
Federal government	2%	3%
Other (i.e. local realtor, health authority, labour union, education centre, consultant)	4%	11%

Residence

Most respondents reside in British Columbia (87%), 6% in Alberta and 7% in other jurisdictions (Figure 1.1).

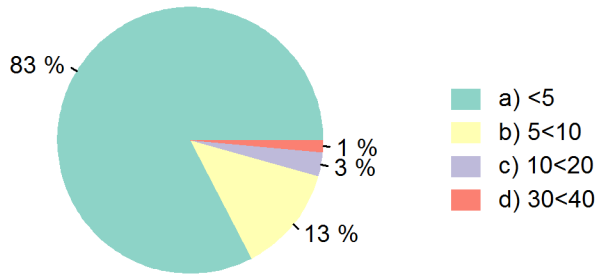
Figure 1.1 Respondents' Place of residence



Experience

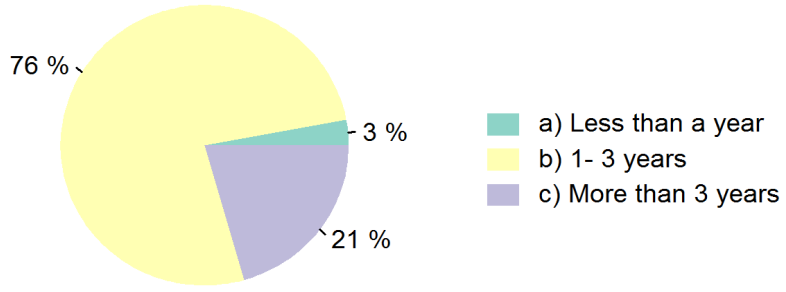
The majority of respondents have less than 5 years of experience with the Canadian pipeline review process (83%) (Figure 1.2). Respondents declaring higher years of experience (around 6 to 10 years) had previously worked for the oil and gas industry or for energy project reviewers, both at federal and provincial levels. Moreover, nine respondents were legal counsels (10%).

Figure 1.2 Respondents' Years of Experience with Pipeline Reviews



Most respondents were involved in the TMEP review process for about one to three years (76%), while 21% have been involved for more than 3 years (Figure 1.3).

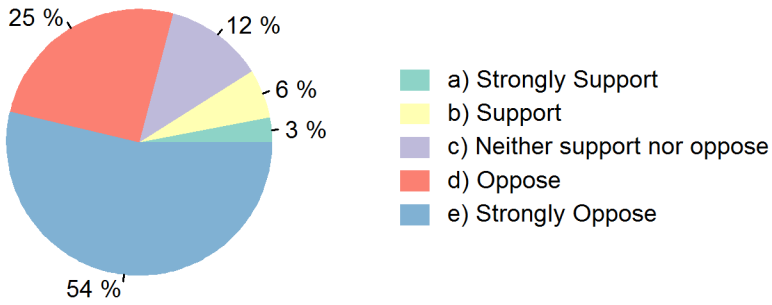
Figure 1.3 Respondents' Years of Experience with TMEP review



Participants standing/opinion about the Project

Only 9% of respondents support the TMEP, while 79% oppose it, with 54% strongly opposing it (Figure 1.4). Moreover, 54% of respondents believed there should be a moratorium on oil sands development, 32% believed oil sands development should be slowed down, and 12% believed the current rate is about right. Only 2% believed the development is not fast enough.

Figure 1.4 Respondents' Position/Perspective on the TMEP



Respondents supporting the Project cited its economic benefits to Canada. As one respondent stated that Canada is a "resource based economy and getting its resources to the market is essential for our national economic prosperity". Another respondent argued that a pipeline is a safer mode of transportation than shipping by rail or trucks.

A common reason among intervenors for opposing the Project is that it will make it more difficult to meet the global and Canadian goal of reducing greenhouse gas emissions. As one respondent remarked:

> As a country we should be moving in the direction of sustainable energy - the constant expansion and focus on oil is detrimental to the environment and the long term economics of our country. If anything, being involved in this process has strengthened my opinion that government policy is biased toward the oil companies and short sited in respect to transitioning to renewable energy sources.
>
> Further, by selling our resources in a raw state, we are limiting the potential for Canadian processing jobs, the ability for Canada to be self sufficient in its own energy needs, and the revenue from selling value added product around the world. Refining our bitumen in Canada would also make us more responsible for our greenhouse gas emissions, leading to improvements in methods to refine and use hydrocarbon based fuels.

1.4. Limitations

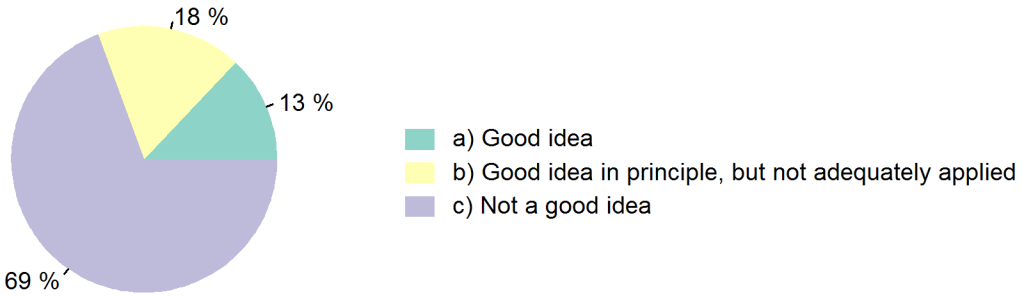
This research faced several limitations. First, the survey results are based on responses from 69 of 412 intervenors in the NEB TMEP hearings. Although the characteristics of the respondents are generally representative of the entire group of intervenors, it is important to keep in mind that the responses of the subset may not accurately reflect the views of all intervenors. Second, a number of intervenor groups withdrew from the process because they thought the process was deficient. For example, the Canadian Press reported the NEB's loss of 35 participants over an 'unbalanced, ill-informed' process' (2015), including Wilderness Committee and the Canadian Parks and Wilderness Society. Hence, the responses in this report understate the criticisms of the process because the findings do not include the responses from those who dropped out because they were critical of the process.

It is also important to acknowledge that the responses reflect views and perceptions of intervenors that are shaped by many factors such as the views on oil sands development and the TMEP process. Whether this is a limitation or not is unclear. On the one hand, the views of intervenors may not accurately or fairly depict the NEB process. On the other hand, the perceptions of intervenors are a critical factor in determining the effectiveness of the process; a good process should command the confidence of the participants. Further, the impact of the NEB decision on respondents' evaluation of the process was minimized by having them complete the survey prior to the NEB decision and thus not having the outcome of the process bias the perceptions of the process' quality.

1.5. Structure and Efficiency of the NEB Panel

The TMEP review process consolidated the mandates and review processes of the NEB, CEAA, and BC and Alberta provinces into a single (also referred to as joint) review process undertaken by the NEB Panel. The rational for consolidation is to improve the efficiency of the process by reducing duplication. The majority of respondents (69%) believed that the harmonization into a single review process is not a good idea (Figure 1.5). Thirteen percent agreed that harmonization was a good idea and 18% agreed with harmonization in principle, but they claimed that it was not properly applied to the TMEP review.

Figure 1.5 Agreement about Harmonization into a Single Review Process



Respondents opposed to harmonization (69%) expressed concerns that harmonization under the NEB would weaken consideration of CEAA's mandate of assessing environmental impacts and regional concerns of provinces such as BC. It could also increase the risk of the NEB Panel missing important information or contributions due to time restrictions and to the higher number of documents it must review, as stated by several intervenors:

> The NEB does not have the expertise or capacity to do a rigorous CEAA review.

> Environmental assessment should be conducted by people competent to do the job objectively, thoroughly, and impartially. The NEB lack the expertise and are much too close to the fossil fuel industry to conduct a fair and adequate environmental assessment.

> Different mandates and different stakeholders require multiple reviews.

Many intervenors advocated for multiple reviews. Three intervenors mentioned the benefits of having a BC specific review in order to fully and accurately represent the concerns and opinions of BC residents. They added that a BC environmental assessment review process would be easier to follow, as the NEB process proved "complex and cumbersome".

Similar sentiments were expressed by respondents who believe that consolidation is a good idea in principle, but was not adequately applied to the TMEP (18%). A local government official commented:

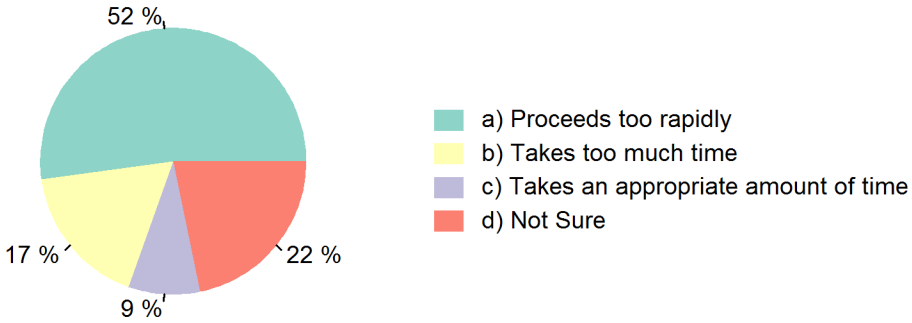
> I think it's important to find efficiency in the process through harmonization, as it's important to respect the time and resources of the proponent. That being said, harmonization should not come at the cost of an adequate review, which arguably has been the case with NEB reviews under CEAA 2012.

Intervenors expressed concerns with the NEB's inadequate management of the review. One respondent explicitly stated:

> You can't put the fox in charge of the chicken coop. The agency responsible for promoting Canadian energy exports cannot be the agency reviewing and passing judgment on the environmental impacts of energy export projects.

There was also concern that the process did not allow for sufficient time to review and assess the evidence. Only 9% of respondents said the review took the appropriate amount of time (Figure 1.6). Fifty-two percent (52%) believed the TMEP's review proceeded too rapidly, 17% that it took too much time and 22% were not sure.

Figure 1.6 Agreement about TMEP Review Process Duration



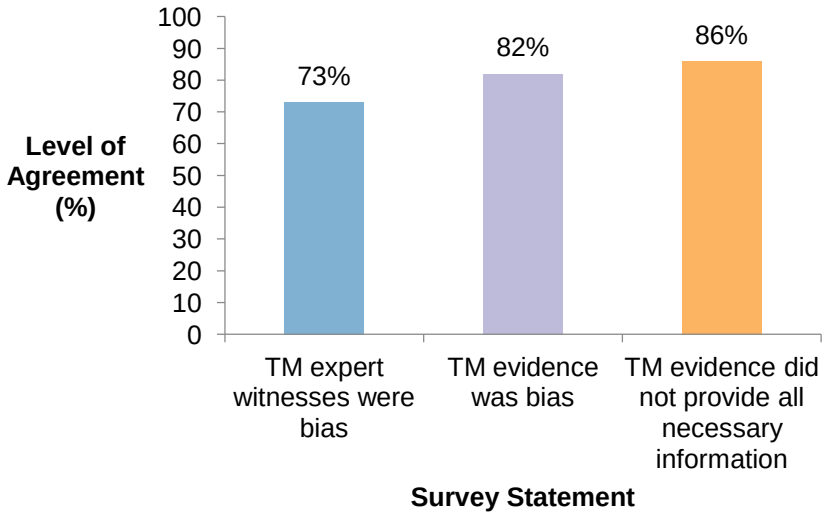
1.6. Impartiality of the NEB, intervenors and the federal government

The formation of a NEB Panel under the *CEAA* and the *NEBA* for mega-energy projects aims to create an impartial consolidated review process managed by an independent review body. However, only 10% of respondents thought the NEB Panel will fully consider all the evidence and make an unbiased recommendation on the TMEP and only 15% of respondents viewed the NEB as unbiased (Figure 1.7). Almost two-thirds (55%) of respondents stated that the NEB exhibited bias against intervenors opposed to the TMEP and 9% stated that the bias was against the applicant (TM) and/or intervenors in support of the TMEP.

Figure 1.7 Agreement about NEB TMEP Bias

Having impartial, objective evidence that is accepted by all the participants is also an essential component of a good review process. However, over three-quarters (73%) of respondent felt that TM's expert witnesses showed bias in favor of the TMEP and 82% of respondents felt that the evidence submitted by TM was biased to exaggerate the benefits and understate the risks of the TMEP. Moreover, 86% did not believe that TM's evidence provided all the necessary information to make a decision on the TMEP (Figure 1.8). The perception of bias in the evidence submitted by other intervenors was much lower. Only 37% agreed the intervenors' witnesses displayed bias towards their clients, while 41% agreed that the evidence submitted by the intervenors was biased in favor of the intervenors' interests.

Figure 1.8 Agreement that TM and their Evidence were Bias



The federal government's impartiality during decision-making is also essential for the integrity of the review and approval process. The Governor in Council (GIC) must consider all evidence

equally, account for the potential bias within the process, and finally make a decision representing Canada's interest. Even though the government has not yet announced their decision, only 10% of respondents agreed that the federal government will fully consider all the evidence and make an unbiased decision on the TMEP. Similarly, government agencies that participated in the review process should not exhibit any bias. However, only 16% of respondents believed the federal agencies exhibited no bias.

Almost two-thirds of respondents (63%) agreed that the NEB Panel had already made up its mind on the TMEP before the review process commenced (Figure 1.9) and 55% agreed that the federal government has made up its mind in advance (Figure 1.10).

Figure 1.9 Agreement that NEB Panel Already Made up its Mind about the TMEP

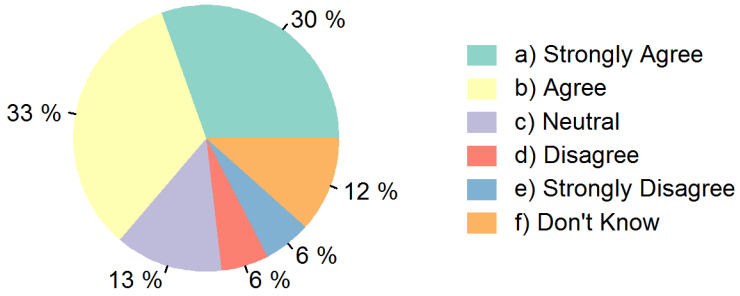
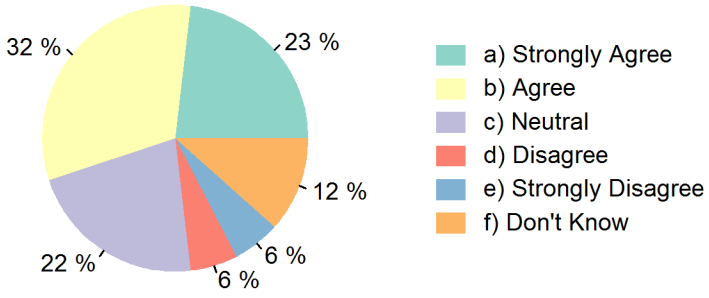


Figure 1.10 Agreement that Federal Government Already Made up its Mind about the TMEP



1.7. Scoping and List of Issues

The scoping phase of a project is an important step in the review process that identifies the project components (i.e. land-based components and tanker routes), their geographical location, and issues that will be addressed in the review. In the TMEP review, the NEB Panel consulted the proponent, stakeholders and governments about potential environmental issues that may arise during the project's construction and operation. The Panel then incorporated their feedback and finalized the following list of key issues: (1) project need, (2) economic feasibility, (3) potential commercial impacts, (4) potential environmental and socio-economic effects, including cumulative effects and (5) those of marine shipping activities, (6) appropriateness of the general route and land requirements, (7) suitability of the design, (8) NEB's terms and conditions, (9) potential impacts on Aboriginal interests and (10) on landowners and land use, (11) contingency planning for spills, accidents or malfunctions, and finally (12) safety and security, including emergency response planning and third-party damage prevention, during all stages of the project (NEB, 2014b).

Only 11% of respondents were satisfied with the scope of the project as defined by the NEB Panel for the hearings (i.e. the physical components of the TMEP that were included in the assessment) and only 11% were satisfied with the list of issues. Moreover, only 12% of respondents were satisfied with the process used to determine these issues. Respondents identified sixteen issues that they thought should have been included in the TMEP review (Table 1.2).[1]

Upstream and downstream effects, particularly those related to GHG emissions, were mentioned most frequently. A respondent noted that if the Panel would not consider them, then it should also omit upstream economic benefits when considering the need of the project. As one respondent stated:

> It's ridiculous to conduct a review of major new fossil fuel infrastructure without considering the most important impact of that infrastructure. Without considering climate change the process is a sham.

The failure to fully consider cumulative impacts was also identified. As one resident stated:

> The NEB insisted on separating assessment of the proposed new pipeline from the existing pipeline, despite the well known risk issues of a project expansion - for example financial and environmental risks, for which established insurance assessment procedures invariably require the total structure, not just the new component, be considered in total.

[1] Subsequent to the completion of the NEB TMEP review, the federal government has added consideration of upstream effects from pipeline construction to the review of TMEP and other proposed pipelines (Government of Canada, 2016).

Several other respondents mentioned the Project's impact on other affected countries, such as on US tribes and communities, and risks outside the territorial sea of Canada.

When asked how the process for determining the list of issues could have been improved, respondents focused on better communication with intervenors prior to deciding upon the List of Issues, and broadening the number of intervenors allowed to participate. Several respondents believed they were not "given the opportunity to comment and provide input on what should be included in the List of Issues before the List was finalized".

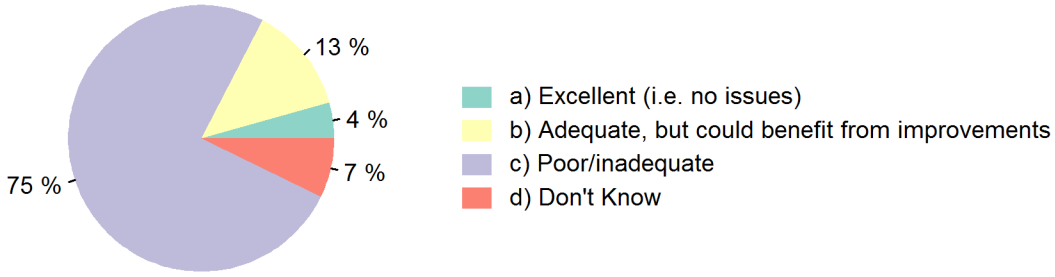
Table 1.2 Issues omitted from the TMEP review

Issue	Count
Upstream and Downstream effects	20
Climate Change	14
Effect of increased tanker traffic	9
Risk of oil spills	8
Cumulative impacts	8
Rights of First Nations	8
Alternatives	5
Impact on water (freshwater, stream-crossings, ocean)	4
Proponent's business plan (i.e. corporate structure, tax avoidance, cost-benefit analysis)	4
Health impacts	3
Diluted bitumen (content of oil?)	3
Greenhouse gas emissions	3
Local and residential property devaluation	3
Community engagement	2
Sustainable energy economy	1
Local government cost implications	1

1.8. Methods of Analysis

Overall, 75% of respondents were not satisfied with the methods used by TM to evaluate and assess the impacts of the TMEP. Only 4% rated the methods as excellent, while 13% rated the methods to be adequate but could benefit from improvements (Figure 1.11). Moreover, only 16% of respondents believed that the NEB provided clear guidance on the methods that should have been used to assess the impacts of the TMEP (56% disagreed).

Figure 1.11 Agreement that TM's Methods of Impact Assessment were Adequate



The most common suggestion on how TM could improve their assessment methods was to have unbiased third party scientists and/or consultants assess impacts instead of TM and its consultants (11 respondents). The second most common suggestion (9 respondents) was provision of more detailed evaluations, especially with respect to local impacts and low probability/high impact events. One local government official answered:

> Documents provided on impacts, including environmental and emergency management, were cursory in nature, providing few local details. Intervenors were expected to search the entire volume of submitted documentation to find materials that affected them locally.

Another local government official commented:

> Additionally, TM's risks assessment methods did not reflect best practices and over emphasized on the probability and ignored the potential harm when probability seems low.

1.9. Stakeholder and First Nation Participation

Effective stakeholder and First Nation involvement is a key best practice for review processes. The NEB is mandated to consult the public, groups and First Nations to gather insights about potential impacts to ensure the Project is in the public's best interest. Therefore, mechanisms providing stakeholders with the genuine capacity to influence outcomes are important. Trans Mountain Pipelines organized six phases of engagement, permitting stakeholders to give feedback in public open houses, workshops, one-on-one meetings, public presentations, online discussion forums, comment forms, and directly through email and telephone contact (TM, 2014b). Some stakeholder groups and governments were also given the opportunity to participate in the NEB hearings.

Just 18% of respondents agreed that all parties potentially affected by the TMEP were given adequate opportunity to participate in the review process (Figure 1.12), and only 13% agreed that

stakeholders were given sufficient opportunities to learn and become informed of the issues raised by TM's application (Figure 1.13). One issue raised by respondents is that the NEB restricts intervenor participation to only those directly affected by the pipeline or who have expertise about the Project. Respondents commented that intervenor status should be extended to all concerned citizens to fully represent Canada's standing on the TMEP.

Figure 1.12 Agreement that Public Participation was Adequate

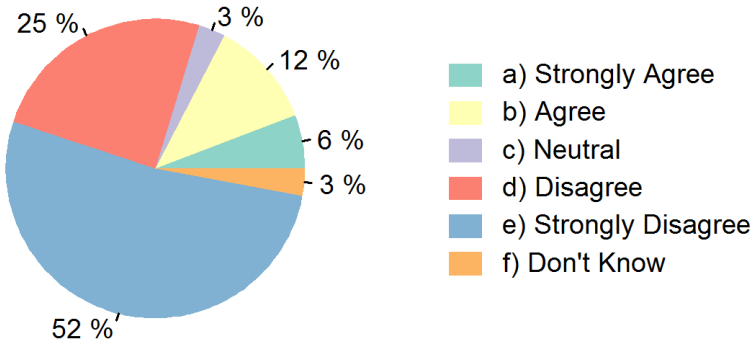
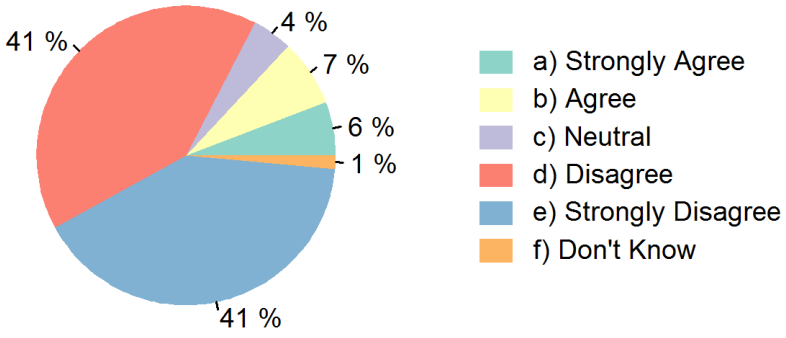
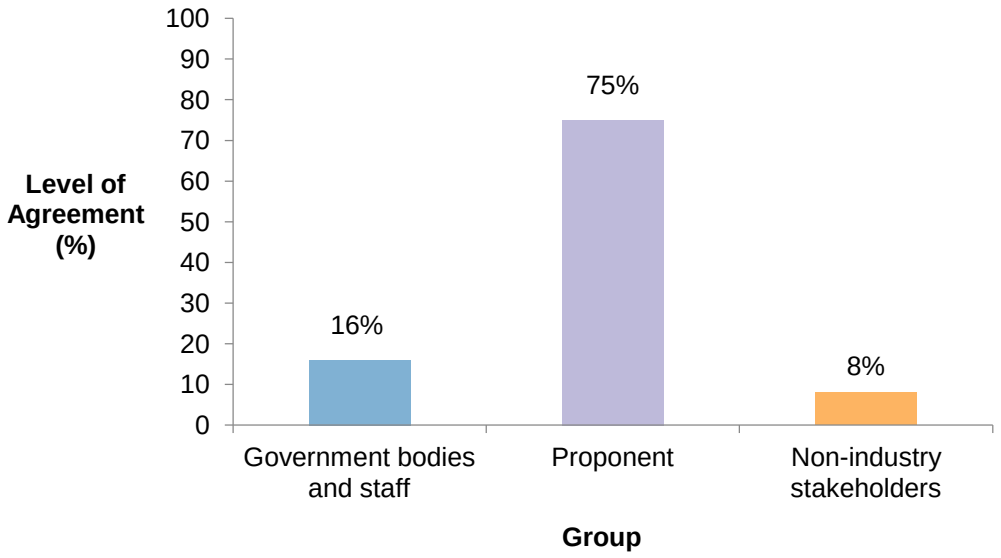


Figure 1.13 Agreement that Opportunity to Learn about TMEP was Adequate



Public participation was also constrained by lack of information on the process and lack of resources to participate. Only 30% of intervenors agreed that the publicly available documentation on the NEB process provided all parties with a clear description of the process and clear instructions on how to participate. Only 8% of respondents answered that non-industry participants including First Nations, environmental and community groups, had adequate resources to participate (Figure 1.14). Only 16% believed government bodies had adequate resources. Three-quarters of respondents (75%) thought that the proponent had adequate resources. Moreover, only 13% believed the NEB Panel adequately integrated Aboriginal perspectives into decision-making and only 7% believed the public's perspectives were adequately integrated.

Figure 1.14 Agreement that Stakeholder Groups had Adequate Resources to Participate



1.10. Decision-making Structure and Accountability

Clear decision-making criteria

The NEB Panel's decision to recommend approval or rejection of the Project should follow structured decision procedures, with clearly defined and transparent decision-making criteria. The decision-making criteria for the TMEP are provided in the relevant legislation (*NEBA* and *CEAA*) and include determining whether the Project is needed, feasible, in the public interest and whether it will generate significant adverse environmental effects and whether these significant effects can be justified in the circumstances (CEAA, 2015; NEB, 2016).

As shown in Table 1.3, only 16% of respondents considered the evaluation criteria used by the NEB and CEAA to be appropriate and only 19% considered the criteria to be clear and transparent, while 58% considered the evaluation criteria too vague.

Table 1.3 Agreement about Appropriateness of Evaluation Criteria

Survey statement	Level of Agreement
Evaluation criteria provided clear guidance to decision-makers.	19%
Evaluation criteria were appropriate for the scope.	16%
Evaluation criteria were too vague.	58%

Accountable decision-maker

The final decision on the TMEP will be made by the GIC based on recommendations from the NEB. Respondents were asked to rate this decision making structure along with another four options (Table 1.4). The current process is supported by only 9% of respondents. The most popular option (45%) is a consensus agreement among all key stakeholders and First Nations impacted by the pipeline. Other options received between 3% and 16% of support.

Table 1.4 Agreement about Final Decision-making Authorities

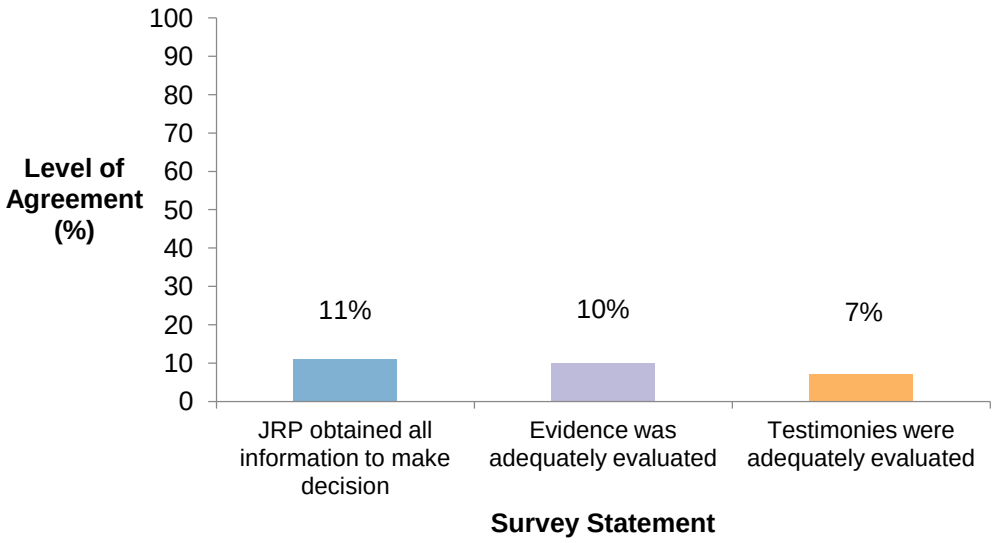
Final Decision-Making Authority	Level of Agreement
Governor in Council (elected politicians in the federal government cabinet) based on recommendations from the NEB/CEAA Panel (current process)	9%
The NEB/CEAA Joint Review Panel (JRP)	6%
Elected politicians in the federal and affected provincial governments based on recommendations from the NEB/CEAA JRPs	3%
Elected politicians in the federal, affected provincial governments, and First Nations governments based on recommendations from the NEB/CEAA JRPs	16%
Consensus agreement among all key stakeholders and First Nations impacted by the pipeline	45%
Other, specify	22%

1.11. Quality of Information that Addresses Decision-Making Criteria

The information gathered during the project review should address all key decision-making criteria and provide the deciding authority with the information necessary to make sound decisions. The information must be accurate, comprehensive and address the decision making

criteria. Only 11% of respondents agreed that the NEB Panel obtained all the information necessary to make an informed decision on the TMEP (Figure 1.15). Only 11% of respondents agreed that TM's submitted evidence was based on good science, while 43% agreed that intervenors' evidence was based on good science. Moreover, only 10% agreed that the evidence was adequately evaluated and tested during the NEB hearing (Figure 1.15).

Figure 1.15 Agreement about Adequate Information and of its Evaluation



Respondents' perception of the adequacy of evidence varied depending on the type of evidence presented. As seen in Table 1.5, the respondents who agreed that specific categories of evidence were adequate ranged from 6% to 43%, with a median of 12%. The highest rating was for economic feasibility of the Project (43%), while the lowest ratings were for public interest and alternatives to the TMEP (6%). These low ratings demonstrate that a large majority of respondents did not agree that the review process provided the necessary information on the key issues associated with the decision-making criteria.

Table 1.5 Agreement about "Application and Evidence" Survey Statements

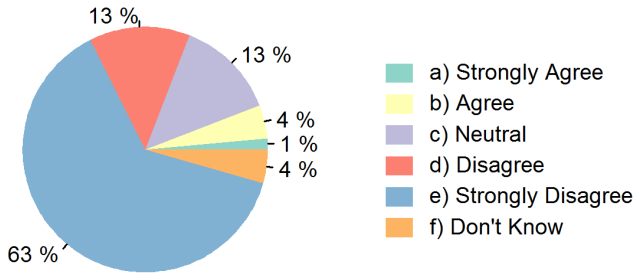
Survey Statement **The application and evidence adequately assessed:**	**Level of Agreement**
Economic feasibility	43%
Alternatives means (e.g. alternative transportation options) of meeting the objectives of the TMEP	30%
Availability of oil and condensate to be shipped	28%
Benefits of the TMEP	26%
The need for the TMEP	22%

Existence of markets	22%
Costs of the TMEP	18%
Stakeholders negatively impacted by the TMEP	12%
Cumulative impacts	10%
Adverse environmental impacts of the TMEP	8%
Likelihood of significant adverse impacts of the TMEP	8%
Compensation and mitigation measures to address negative impacts of the TMEP	8%
The public interest	6%
Alternative means (e.g. design, location) of carrying out the TMEP	6%
Alternatives to the TMEP	6%

1.12. Legislative Framework

A best practice is to have the EA process defined in legislation to provide certainty and clarity on how the process operates. As shown in Figure 1.16, only 5% of respondents agreed that the legislative framework for the NEB Panel provides adequate clarity and certainty.

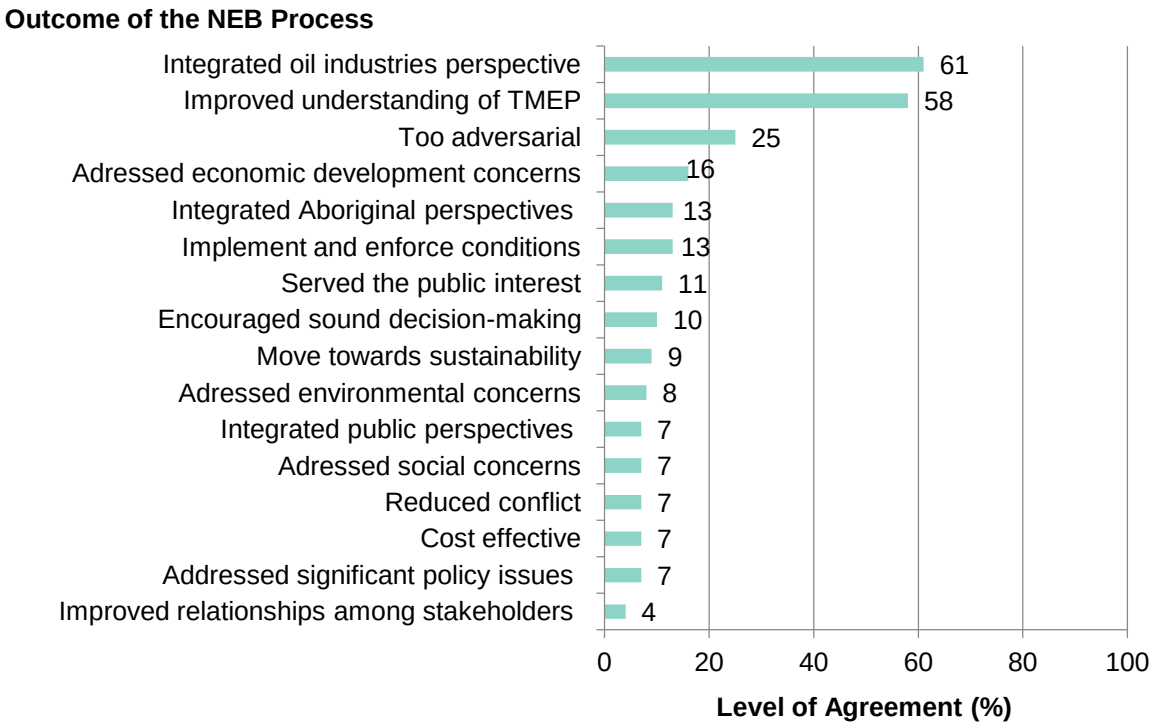
Figure 1.16 Agreement that Legislative Framework is Adequate



1.13. Evaluating Outcomes of the Process

Respondents were asked to rate whether the NEB process achieved various desirable outcomes (Figure 1.17). For 13 of 16 outcomes, the level of agreement that the outcome was achieved ranged from only 4% to 16%. The two outcomes with the highest ratings were integrating the oil industry's perspective in the decision (61%) and improving the understanding of the TMEP (58%).

Figure 1.17 Agreement that Outcomes of the Process were Met



Overall, only 11% of respondents rated the NEB process as good, while 86% rated it as poor (Figure 1.18). Furthermore, very few respondents (7%) would recommend a future project evaluation to follow the same review process (Figure 1.19). Interestingly, while 79% would not recommend using a similar process again, 26% agreed that they would participate in a similar process again while 23% stated they would not (Figure 1.20).

Figure 1.18 Agreement about NEB Panel's Performance

Overall how would you rate the NEB TMEP Panel as:

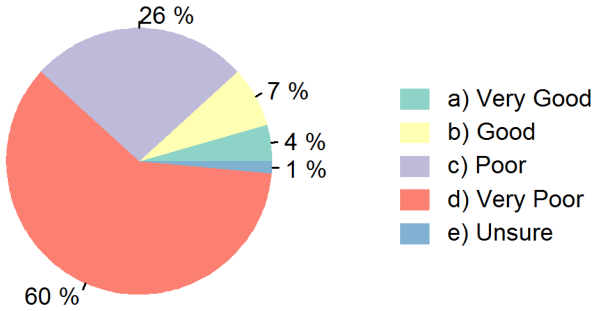


Figure 1.19 Agreement about Modeling Future Review Processes after the TMEP's NEB Process

I would recommend that future pipeline projects are evaluated through review panel processes modeled after NEB TMEP process:

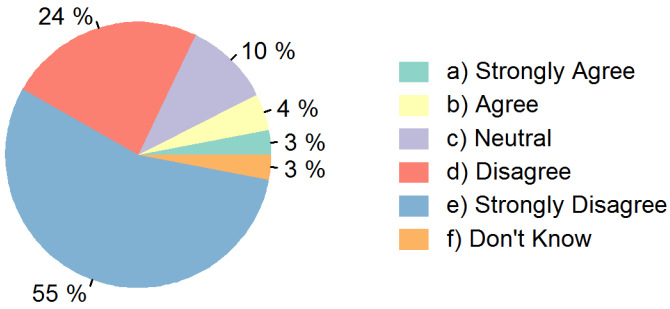
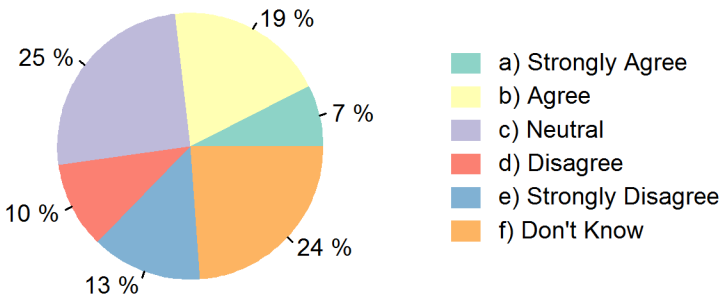


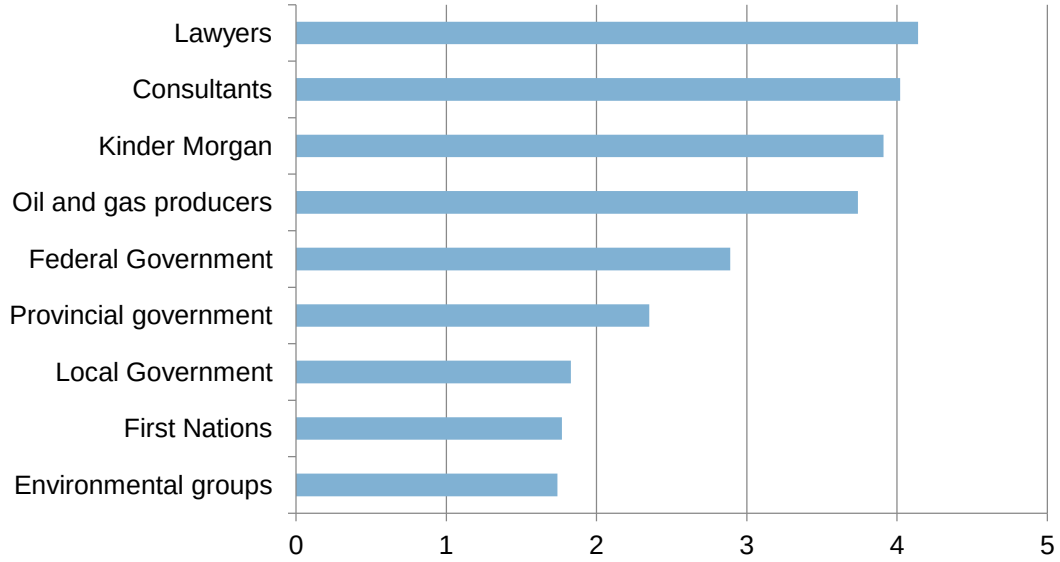
Figure 1.20 Respondents' Level of Interest in Participating in another NEB process



Respondents believed lawyers, the proponent (TM), consultants and oil and gas producers were among the groups that benefited the most out of the process (Figure 1.21). The groups with the lowest level of benefit were First Nations, environmental groups and local governments.

Figure 1.21 Level of Benefit Received by Type of Participant from NEB Panel

Each group is rated on a scale of one to five by survey respondents, represented by their average score below. A score of 1 indicates the participating group received the least benefit, whereas a score of 5 indicates the group received the most benefit.



1.14. Relationship between Assessment of the Process and Views on TMEP

It is interesting to examine the relationship between respondents' evaluation of the process and the attitudes towards the TMEP (Table 1.6). Almost all (94%) of the respondents who oppose the Project also believed the NEB process was a poor review process, while respondents who supported the Project were almost evenly split between those who rated the process as good (60%) and those rating it as poor (40%). The majority (88%) of respondents who neither supported nor opposed rated the project as poor. Clearly, those who supported the project were more likely to be supportive of the process (60%).

Table 1.6 Cross Table of Respondents' Preferences for the TMEP and the NEB Panel

		Preference for NEB Panel		
		Good Process	Unsure about Process	Poor Process
Preference for TMEP	Support	60%	0%	40%
	Neither support nor oppose	0%	12%	88%
	Oppose	6%	0%	94%

1.15. Improving the process

Respondents were asked to rate seventeen potential reforms to the pipeline project review process as well as to suggest any other reforms they think should be considered (Table 1.7). Most of the proposed reforms (11) are supported by over two-thirds of respondents. Almost all of the respondents (94%) agreed that Trans Mountain Pipelines should have full liability for any damages caused by the TMEP. Respondents also strongly support the following reforms: having potential impacts assessed by independent scientists rather than experts hired by TM (89%); requiring the applicant to have a comprehensive compensation plan approved by the Panel (that specifies the types of damages eligible for compensation, what parties would be compensated, and how damage costs would be determined) (88%); requiring cost-benefit analysis (87%); providing more resources for intervenor participation (87%); requiring the proponent to perform an extensive public consultation process following public consultation guidelines (84%); and having government provide more detailed technical guidelines on methodologies to assess the project's impacts and risks (84%).

There was also strong support for involving stakeholders and both levels of government in the appointment of panel members conducting the reviews (74-78%), providing First Nations with a veto over projects impacting their interests (72%), and implementing a consensus based stakeholder negotiation process to review the project (71%).

Two proposed reforms asked intervenors their views on conducting separate review processes instead of having a single review. One possible reform would be to keep the reviews under the *NEBA* and the *CEAA* separate - a reform which received 61% of support. Another potential reform would be to have the province and the federal government conduct separate EA reviews instead of having a single review. This received agreement of 56% of respondents.

Interestingly, the two reforms that were implemented in the 2012 changes to the *NEBA* received very little support: imposing legislative time limits (23%) and restricting the number of stakeholders allowed to participate in NEB hearings (23%)

Table 1.7 Respondents' Opinion of the Suggested Reforms

Suggested reform	Level of Agreement
As a condition for project approval require the applicant to accept full liability for any damages caused by the project and document ability to pay off any damages.	94%
Have government review agencies hire independent scientists to conduct impact assessment analysis rather than using experts that are employed by, or hired by the project applicant. (The costs of the independent analysis would be financed by a levy applied to the applicant).	89%
Require the applicant to have a comprehensive compensation plan approved by the review panel that specifies what types of damages would be eligible for compensation, what parties would be compensated, and how damage costs would be determined.	88%
Include a requirement for comprehensive benefit-cost studies for all major projects reviews.	87%
Provide more resources for intervenors to participate in the process.	87%
Require the applicant to complete an extensive public consultation process in accordance with detailed public consultation guidelines prior to submitting an application.	84%
Have government prepare more detailed technical guidelines on methodologies that should be used to assess the project's economic, social and environmental impacts and risks.	84%
The appointment of a review panel for major energy projects should be made jointly by the federal government, impacted provincial governments, and impacted stakeholders instead of just by the federal government.	78%
The appointment of a review panel for major energy projects should be made jointly by the federal government and impacted provincial governments instead of just by the federal government.	74%
Require the approval of impacted First Nations governments before projects can be built.	72%
Require the applicant to engage in consensus-based negotiations with stakeholders and attempt to reach stakeholder agreement on major project issues prior to submitting an application (if agreement is not reached despite the best efforts of the applicant the project could still be submitted for review).	71%
Complete an integrated evaluation of all alternative transportation projects for shipping oil instead of evaluating each project separately.	68%
Require the NEB to consider comments from any interested party.	62%
The environmental assessment process under the Canadian Environmental Assessment Act and the pipeline approval process under the National Energy Board Act should be conducted as two separate review processes under separate review panels instead of being combined into one hearing process.	61%
The environmental assessment process of the federal government and impacted provinces should be	56%

conducted as two separate processes instead of being combined into a single hearing process.	
Restrict the number of intervenors in the hearing to only those deemed by the NEB to be directly affected by the project and/or have relevant expertise.	23%
Impose legislated limits specifying the maximum time for project review.	23%

1.16. Conclusion

Two conclusions emerge from the survey. First, the respondent in the NEB TMEP review process give the process a very low rating. They are highly critical of the way the process was structured and managed. Second, and on a more positive note, there is a high degree of agreement on how to improve the process. These results provide government with a clear idea of what the problems are and how to fix them.

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Appendix Two

Evaluation of Proposed Department of Environment and Climate Change Methodology for Estimating Upstream GHG Emissions

Prepared by Dr. Thomas Gunton
April 18, 2016

On March 19, 2016, the Canada Department of Environment and Climate Change (DECC) released its proposed methodology for estimating upstream GHG impacts for major oil and gas projects. The purpose of this review is to provide comments on the proposed methodology.

This evaluation concludes that while the proposed methodology for including upstream GHG impact assessment in project reviews is an improvement in the review process, the proposed methodology has serious deficiencies that need to be addressed. Further, the analysis of GHG impacts of proposed projects must include a broader assessment of the cumulative impacts of proposed projects on Canada's GHG emission targets and global climate change objectives.

The evaluation is organized under the following two components of the proposed methodology: a. methodology for estimating upstream GHG emissions; b. discussion of the impacts on Canadian and global GHG emissions.

Methodology for Estimating Upstream GHG Emissions

The DECC methodology proposes estimating upstream GHG emissions by product type to reflect the different product GHG emission intensities per unit of product shipped. The methodology proposes testing alternative scenarios to reflect the range of uncertainty in potential product shipments. It is important that these scenarios be cross checked against upstream production forecasts by product type to ensure consistency. Shippers have discretion which products to ship based on aggregate product availability and product economics. Therefore, the aggregate production forecasts are a better indicator of what will be shipped than specific forecasts provided by individual project proponents.

The proposed methodology states that emissions associated with the manufacture of equipment, land use changes, grid electricity and fuels that are produced elsewhere will be omitted from the analysis. No rationale is provided for this in the documentation and the case for excluding GHG emissions from these associated upstream impacts is unjustified. All incremental impacts resulting from the production of upstream activities should be included in the estimates. For

example, GHG emissions generated by incremental grid power consumed by upstream production is clearly a result of the upstream production and will generate incremental GHG emissions that should be included (by the same token energy produced by the activity that is sold back into the grid should be excluded as an impact of the project). This is the approach used by the pipeline applicants in estimating GHG impacts of pipelines, which include all the GHG emissions generated by power supplied by the grid to the pipeline (TM 2013). This is also the approach used in the GHGenius model that was developed by S&T Squared Consultants Inc. under contract to Natural Resources Canada and used by the Pembina Institute in their estimate of upstream GHG emissions generated by Energy East (Flanagan and Demerse 2014).

Discussion of the Impacts on Canadian and Global Upstream Emissions

The second component of the DECC methodology assesses the Canadian and global GHG impacts of the project. The proposed method identifies three steps in this analysis: a. examine resource production scenarios with and without the project; b. identify alternative transportation projects that may be built in the absence of the project and; c. assess impacts of a and b on Canadian and global GHG emissions.

Assessing impacts on Canadian and global GHG emissions from upstream production is the most controversial and problematic part of the impact analysis. As the following Table 1 summarizing alternative estimates of GHG from the Northern Gateway, Keystone XL and Energy East Pipelines illustrates, different assumptions can have dramatic impacts on the results, with estimated impacts ranging from very large to almost nil for the same project. Alternative estimates of annual GHG impacts of Energy East, for example, range from .7 to 32 MT/year and the Northern Gateway range from 3.7 to 76.3 MT/year. Three key issues account for the wide variation in results: estimating the impact of the project on Canadian production, estimating the impact of the project on global production, and treatment of downstream impacts.

Table 1. GHG Emission Estimates of Pipelines

Pipeline	**GHG Estimates Range MT/year**	**Studies**
Northern Gateway	3.7 to 76.3	Gunton and Broadbent (2012)
Keystone XL	1.3 to 27.4	USDS (2014)
Keystone XL	100 to 110	Erickson and Lazarus (2014)
Energy East	30-32	Flanagan and Demerse (2014)
Energy East	.7 to 17	Navius (2015)

Impact of Project on Canadian Production

A key issue is the assumption of what will happen to Canadian oil production if the project is not built. Low estimates of GHG impacts are based on the assumption that if the project is not built, other pipeline and/or rail projects will be constructed that will transport the product to market and therefore production will be the same or close to the same with and without the project. This is the approach used by the US State Department (2014) and Forest and Brady (2013) in their

analysis of Keystone XL and by Navius (2015) in their analysis of Energy East. These lower estimates sometimes include some adjustment for transportation cost differences that can have small impacts on production forecasts. For example, the US State Department analysis of Keystone XL assumes that in the absence of Keystone XL, rail shipments will be used to transport the oil to market (USDS 2014). But because the analysis assumes that rail shipments can be more expensive than pipeline shipments, the higher cost of rail could constrain high cost marginal production of oil, especially if oil prices are weak. The State Department conclusion is that building Keystone XL could therefore result in a slight increase in Canadian production and GHG emissions.

Other studies are based on the assumption that if the project is not built, the oil that would have been shipped on the project cannot be shipped on economically viable alternative transportation projects. Rail may be too expensive or capacity constrained and alternative pipeline projects may not be built. Pembina Institute uses this assumption in their analysis of the impacts of Energy East (Flanagan and Demerse 2014). Based on this assumption, all the oil shipped on Energy East is assumed to be incremental production and the GHG impacts of the project are therefore significantly higher than those forecast by Navius (2015).

As the range in estimates of the impacts of Energy East illustrate, the decision on the viability of alternative energy transportation projects is a key methodological decision that has a large impact on the GHG impact estimate. Unfortunately the proposed DECC methodology does not provide clear guidance on this issue. The DECC methodology appears to favour the approach that assumes no to little change in production by referencing the need to assess the impact of alternative transportation projects that will be built if the project under review is not constructed.

Assuming that alternative transportation projects could be built in the absence of the project being assessed is a reasonable assumption. **However, the conclusion that this means that the upstream impacts of the project are small to nil is not reasonable**. The logical conclusion of this approach is that no transportation project will ever result in incremental production because there is always an alternative means of transportation available. Therefore each individual project impact assessment will assume no upstream effects because it effectively transfers the effect to other projects under consideration. The aggregate result from all the individual assessments is that there is no increase in Canadian production and no increase in GHG emissions from building transportation projects. This conclusion is however clearly false because if **none** of the projects are built, it is not possible to transport the product to market and without being able to transport the product, Canadian production and GHG emissions will be lower. This fallacy of composition error is based on analyzing each project independently and not assessing the overall cumulative effects of the projects collectively.

There are several ways of avoiding this error. One approach is to use a cumulative impact assessment methodology that estimates the collective impact of all potential transportation projects on Canadian production, compared with a scenario in which no new projects are constructed. There are different approaches to conducting this type of cumulative impact assessment. For example, several different scenarios of potential projects can be used to reflect uncertainty regarding the actual mix of projects that may be built. The incremental production resulting from these incremental transportation options would be similar to current forecasts of

Canadian oil production in an unconstrained transportation system. If no new projects are built, oil production would be capped at current transportation capacity. If estimates are required for individual projects, the incremental oil production forecast could be allocated based on the capacity of individual projects. Further adjustments could be made in allocation among projects to reflect differences in costs and markets.

Another and simpler approach would be to compare two scenarios: scenario one would cap upstream production at existing transportation capacity and scenario two would cap upstream production at existing capacity plus the capacity of the new project being assessed[2]. Capacity constraints could then be compared to production forecasts and all production that is in excess of existing capacity would be incremental production induced by the new project. If, for example, existing transportation capacity was being fully utilized, all shipments on the new project would be incremental production attributed to the new project. This type of approach is used, for example, in the Pembina study of Energy East (Flanagan and Demerse 2014), which assumes that all shipments would be incremental production.

Although more work would be helpful to define the specific structure of a cumulative impact assessment approach, using this approach is essential to correctly assess the upstream GHG impacts of transportation projects. If this approach is not used and it is assumed that the project being reviewed will have little to no impact on Canadian production because it will be replaced by alternative projects, the upstream GHG impacts of the oil production will be incorrectly assumed to be nil or close to nil.

Impacts of Project on Global Oil Production

The DECC proposed methodology references the need to assess global impacts of proposed projects and suggests that the primary impact on global GHG emissions will be the difference in upstream emissions intensity between Canadian and non-Canadian crude oil.

Estimating the impact of a proposed project on global GHG emissions is perhaps the most problematic component of the analysis due to the complexities of world oil market dynamics. One assumption is that lower production in Canada resulting from the project not being built will be replaced by increased production elsewhere in the world, with little to no change in global production. Under this assumption, the change in GHG emissions is the difference in emission intensity of Canadian production relative to the substitute production. This is the approach used by the US State Department in its analysis of Keystone XL in which they assume that if Keystone XL is built, incremental Canadian oil imports to the US would displace oil imported from other jurisdictions and the GHG impacts would be the product of the difference in emission intensity of the Canadian oil relative to the substitutes times the quantity displaced by Canadian imports (USDS 2014). As stated above, this is the approach referenced in the DECC methodology.

Other studies (Navius 2015; Erickson and Lazarus 2014) incorporate the impact of the proposed project on world oil prices, production and consumption. In this approach, incremental Canadian

[2] Capacity should be based on operational capacity, which may vary from nameplate capacity.

production resulting from the project increases supply which in turn reduces price. The reduced price increases global consumption and global GHG emissions. This method of incorporating price impacts is more methodologically sound than the assumption that Canadian production and non-Canadian production are substituted for each other with no impact on global price, production or consumption. Therefore the estimate of GHG emissions should incorporate potential price impacts as well as policy constraints such as GHG emission caps in the analysis and not assume that incremental Canadian production has no impact on global oil markets. Further, given that oil is a non-renewable resource with a fixed supply, the assumption that foregone Canadian production can always be replaced by production elsewhere is dubious. Over the long run the world's oil will become increasingly expensive as supply is used up and it will become increasingly difficult to replace foregone Canadian production.

Upstream and Downstream Impacts

The major proportion of GHG impacts from oil are generated by end use consumption, not extraction. Estimates for Canadian SAGD, for example, conclude that upstream activities account for about only 10% of total GHG emissions (IHS CERA 2010). The GHG impact assessment by Navius (2015) estimates that upstream emissions account for only 13-26% of the total GHG emissions from Energy East. Therefore the decision on whether to include the full life cycle GHG emissions from oil production or restrict the analysis to just the extraction emissions will have a significant impact on the GHG estimates.

The general principle in International Panel on Climate Change (IPCC) analytical framework is to assign GHG emissions to the country in which the emissions are generated. Under this approach, all downstream end use emissions from consumption of Canadian oil are attributed to the country in which the consumption occurs. The logic of this approach is that the country in which the emissions are generated has the authority and responsibility for controlling emissions, while the country exporting the oil has no control over how the oil is used and what GHG emissions are generated. The proposed DECC methodology follows this convention by proposing to estimate only upstream GHG emission impacts.

While the IPCC logic makes sense for assigning national accountability for GHG emissions, any analysis of GHG impacts of a project should consider the full life cycle GHG impacts of oil production, which include end use consumption. The downstream impacts of oil consumption could not occur without production and are therefore an impact of production that needs to be included in the analysis. This is the approach used by Navius in their assessment of the GHG impacts of Energy East. Therefore the proposed DECC methodology should be amended to include full life cycle impacts of Canadian oil production in its assessment of GHG impacts. Otherwise the analysis will significantly underestimate GHG impacts from Canadian production. Again, it should noted that estimating full life cycle impacts is problematic because of the challenges in estimating the impact of Canadian production on world oil consumption and world GHG emissions.

Impact on GHG Targets and Climate Change Objectives

An essential component of impact assessment is to analyze impacts relative to goals, targets, and thresholds for valued environmental components to determine if the impacts are significant. Consistent with this principle, GHG impacts need to be assessed in terms of Canada's GHG targets and global climate change objectives. The question is whether the proposed project is consistent with climate change objectives. Put another way, the question is what policies and actions are required to ensure that Canada and the world meet their climate change objectives set in Paris to limit the average global temperature increase to 1.5 degrees.

There is a global consensus that meeting these targets requires a dramatic reduction in GHG emissions. The previous Canadian government committed to GHG reductions of 17% by 2020 and a 65% reduction by 2050. According to some recent studies, meeting these national objectives will likely require limiting the growth of Canadian oilsands production (Hoffele 2015).

Different studies and assumptions will lead to different estimates of what quantity of oil production is consistent with Canadian and global climate change objectives. But the key issue that must be addressed is whether the approval of a new project is consistent with Canada meeting its national targets.

The proposed DECC method does not address the need for assessing cumulative impacts of project approvals on Canada's GHG objectives and targets. Without putting the impacts in this larger context, the impact assessment will not provide the necessary information for decision makers. The impact assessments for each individual project may appear small relative to Canadian and global GHG emissions, but the cumulative impact of proposed projects will be large and inconsistent with Canadian and global climate change objectives. Therefore, it is essential that the GHG impact assessment include a cumulative effects analysis that assesses the impact of the project relative to Canadian and global objectives.

Conclusion

The proposed DECC methodology of including upstream GHG project impacts is an improvement on the current approach that excludes upstream impacts from consideration. However, there are a number of deficiencies in the proposed methodology that need to be addressed. We propose the following guidelines for the impact assessment method.

1. Indirect emissions including those generated by the manufacture of equipment, land use changes, consumption of power from the grid and production of other fuels off-site should be included.
2. The method that assumes that the project being assessed would be replaced by an alternative project and therefore there is little to no incremental production **should not** be used to estimate GHG emissions. This approach incorrectly assumes that there is little to no incremental production resulting from expansion of transportation capacity. Instead, the impact assessment should use either: i. a cumulative impact assessment method that incorporates the combined effect of all proposed transportation projects and compares

production under a no new projects scenario to a likely new projects scenarios and apportions the incremental production by project based on project capacity and economics or; ii. a comparison of a no new projects scenario to a one new project (project being assessed) scenario.

3. The analysis should incorporate the impact of incremental production on global prices and consumption and should not assume that incremental Canadian production has no impact on global prices, global supply and global demand.
4. The analysis should include the full life cycle GHG impacts of incremental Canadian production.
5. The GHG assessment should include an analysis of the impacts of the project on Canada's GHG emission targets and determine if approval of the project is consistent with Canadian and global GHG targets.
6. Overall, the proposed DECC method is vague and unclear on a number of key issues that have a significant effect on the GHG impact assessment. These issues need to be resolved and the methodology needs to be refined prior to undertaking any impact assessments. It is suggested that an expert based stakeholder process be convened to further develop the methodology to address deficiencies to ensure that all stakeholders will have confidence in the methodology and the impact assessment.

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About the Author

Dr. Thomas Gunton is Professor and Director of the Resource and Environmental Planning Program at Simon Fraser University. Dr. Gunton has been an expert witness before the National Energy Board providing evidence on impacts of energy projects and oil and gas markets and has worked as an Assistant Deputy Minister of Energy and Mines and Deputy Minister of Environment. He has published over 80 peer reviewed articles and has been researching impacts of oil and gas pipelines for several decades.

Appendix 3

An Assessment of Spill Risk for the Trans Mountain Expansion Project

by

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May 2015

Submission to the NEB TMEP Hearings on behalf of Upper Nicola Band, Tsawout First Nation, and Tsleil-Waututh Nation

Executive Summary

1. The objectives of this report are to evaluate Trans Mountain's (TM) oil spill risk assessments contained in the regulatory application for the Trans Mountain Expansion Project (TMEP), provide estimates of oil spill frequency risk, and estimate potential damage costs of TMEP oil spills.
2. The TMEP consists of two pipelines to ship oil between Edmonton, Alberta and Burnaby, British Columbia. The 1,147-kilometre Line 1 would ship 350 thousand barrels per day of refined products and light crude oils and the 1,180-kilometre Line 2 would have the capability to transport 540 thousand barrels per day of heavy crude. The project proposes to expand the existing Westridge Marine Terminal to three tanker berths that could accommodate an increase in the current number of tankers from 60 per year to 408 tankers per year.
3. The *CEAA 2012* evaluation criterion requires assessment of two components to define risk: the severity of an adverse impact and the likelihood of an adverse impact occurring. This report evaluates the likelihood of an adverse impact resulting from oil spills.
4. TM estimates that any size tanker spill could occur every 46 to 284 years and any size terminal spill could occur every 34 years. For pipeline spills, TM identifies spill frequencies per kilometre per year for separate spill causes but does not estimate the likelihood of a pipeline spill on either Line 1 or Line 2 in the application.
5. This report uses international risk assessment best practices to evaluate TM's methodology for estimating spill rates for the TMEP based on the following rating scale:
    - Fully met: excellent (no weaknesses);
    - Largely met: good (no major weaknesses);
    - Partially met: poor (one major weaknesses); and
    - Not met: very poor (two or more weaknesses).
6. The evaluation of TM's methodology for estimating spill rates concludes that TM's spill risk analysis meets none of the seven best practice criteria (Table ES.1). In total there are 27 major weaknesses in the TM risk analysis for TMEP tanker, terminal and pipeline spills. The results show that TM did not provide the necessary information in the application to enable an accurate assessment of the likelihood of adverse environmental effects resulting from oil spills from the TMEP for decision makers and as required by *CEAA 2012*.

Table ES.1. Results for the Assessment of Risk in the TMEP Application

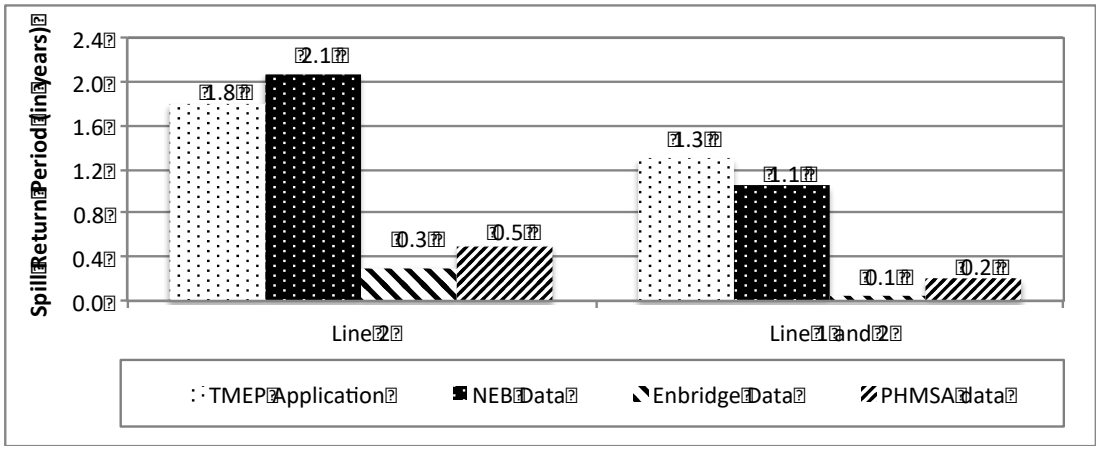
Criterion	Major Weakness	Rating	Result
Transparency *Documentation fully and effectively discloses supporting evidence, assumptions, data gaps and limitations, as well as uncertainty in data and assumptions, and their resulting potential implications to risk*	1. Inadequate description of the model estimating tanker spill return periods 2. Lack of transparency supporting mitigation measures that reduce the likelihood of terminal spills 3. Inadequate evidence supporting the reduction of pipeline spill frequencies	**Very Poor**	**Not Met**
Reproducibility *Documentation provides sufficient information to allow individuals other than those who did the original analysis to replicate that analysis and obtain similar results*	Insufficient proprietary data and information required to replicate: 4. MARCS modelling outputs that estimate tanker incident frequencies and consequences for grounding, collision, foundering, and fire/explosion 5. Mitigation measures that reduce spill risk from marine terminal operations 6. Outputs from the analysis of external and internal corrosion pipeline frequencies	**Very Poor**	**Not Met**
Clarity *Risk estimates are easy to understand and effectively communicate the nature and magnitude of the risk in a manner that is complete, informative, and useful in decision-making*	7. Inefficient presentation of tanker spill risk estimates 8. Ineffective communication of spill probability over the life of the project 9. Lack of clear presentation of spill risk for TMEP pipeline spills 10. No single spill risk estimate provided for the entire project 11. Inadequate assessment of the likelihood of significant adverse environmental effects consistent with existing law	**Very Poor**	**Not Met**
Reasonableness *The analytical approach ensures quality, integrity, and objectivity, and meets high scientific standards in terms of analytical methods, data, assumptions, logic, and judgment*	12. Limited definition of the study area to estimate tanker spill return periods 13. Reliance on tanker incident frequency data that underreport incidents by between 38% and 96% 14. Potential omission of tanker age characteristics in spill likelihood analysis 15. Questionable evidence supporting negligible external and internal corrosion threats to pipeline 16. Inadequate assessment of a worst-case oil pipeline spill 17. Omission of tug traffic that potentially results in an underestimation in spill risk 18. Lack of rigorous analysis supporting revised tanker spill risk estimates	**Very Poor**	**Not Met**

Reliability *Appropriate analytical methods explicitly describe and evaluate limitations, sources of uncertainty and variability that affect risk, and estimate the magnitudes of uncertainties and their effects on estimates of risk by completing sensitivity analysis*	19. Lack of confidence intervals that communicate uncertainty and variability in spill risk estimates 20. Lack of sensitivity analysis that effectively evaluates uncertainties associated with spill estimates 21. Lack of risk factor associated with the effective implementation of risk-reducing measures 22. Inadequate statement of uncertainties, limitations, and qualifications in the analysis	**Very Poor**	**Not Met**
Validity *Independent third-party experts review and validate findings of the risk analysis to ensure credibility, quality, and integrity of the analysis*	23. Inadequate review and validation of spill risk estimates 24. No justification of the use of the MARCS model to estimate tanker spill risk for the TMEP	**Very Poor**	**Not Met**
Stakeholder Participation *Stakeholders participate collaboratively throughout the risk assessment and determine acceptable levels of risk that assess alternative means of meeting project objectives*	25. Lack of stakeholder engagement in a collaborative analysis 26. Failure to define risk acceptability in terms of the needs, issues, and concerns of stakeholders potentially impacted by the project 27. Inadequate assessment and comparison of risks from project alternatives	**Very Poor**	**Not Met**

7. We used several widely accepted spill risk methodologies to estimate potential pipeline, terminal, and tanker spill risk for the TMEP. The results of these methodologies are then compared to spill risk results in the TMEP application.

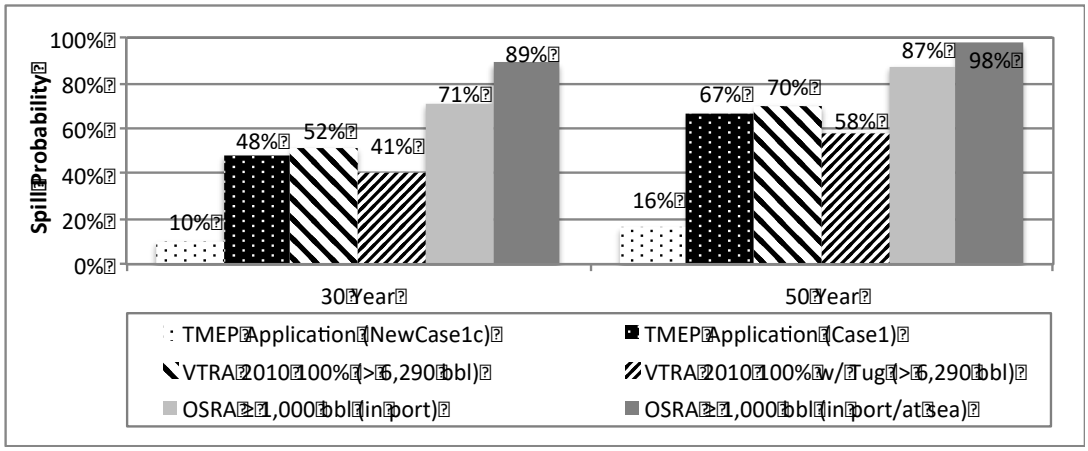
8. Pipeline spill risks are estimated based on recent historical spill frequency data from the National Energy Board, Enbridge liquids pipeline system, and the Pipeline and Hazardous Materials Safety Administration. The spill risk estimates based on these data sources as well as TMEP's own analysis show that spill likelihood is high, with the number of spills for the new Line 2 ranging from 1 to 3 spills every 2 years (Figure ES.1). The comparison of pipeline spill risk for the TMEP shows that TM's unmitigated pipeline spill frequency estimate is similar to the estimate based on data from the National Energy Board, but much lower than spill risk frequencies based on data from Enbridge and the Pipeline and Hazardous Materials Safety Administration. The Enbridge and Pipeline and Hazardous Materials Safety Administration data are based on pipelines that use mitigation measures similar to those proposed by TM for the TMEP. The fact that spill frequency rates forecasted by TM are so much lower than the actual spill rates observed in other pipeline systems, as reported by Enbridge and Pipeline and Hazardous Materials Safety Administration data, that use similar mitigation measures raises doubts about the reliability of the TMEP forecasts.

Figure ES.1. Comparison of Pipeline Spill Frequency



9. Tanker spill risk probabilities based on the TMEP application, the United States Oil Spill Risk Analysis model, and the Vessel Traffic Risk Assessment model are summarised in Figure ES.2. The spill risk estimates from the three different methodologies including the one used by TMEP show a high likelihood of a tanker spill ranging from 58% to 98% over a 50 year operating period. The only outlier result is the TMEP NewCase1c estimate showing a probability of 16%. Given the weaknesses in the methodology used in the TMEP application and the fact that this estimate is an outlier significantly below the estimates based on other methods, the tanker spill risk estimate NewCase1c in the TMEP application is an inaccurate and unreliable estimate of tanker spill risk.

Figure ES.2. Comparison of TMEP Tanker Spill Probabilities

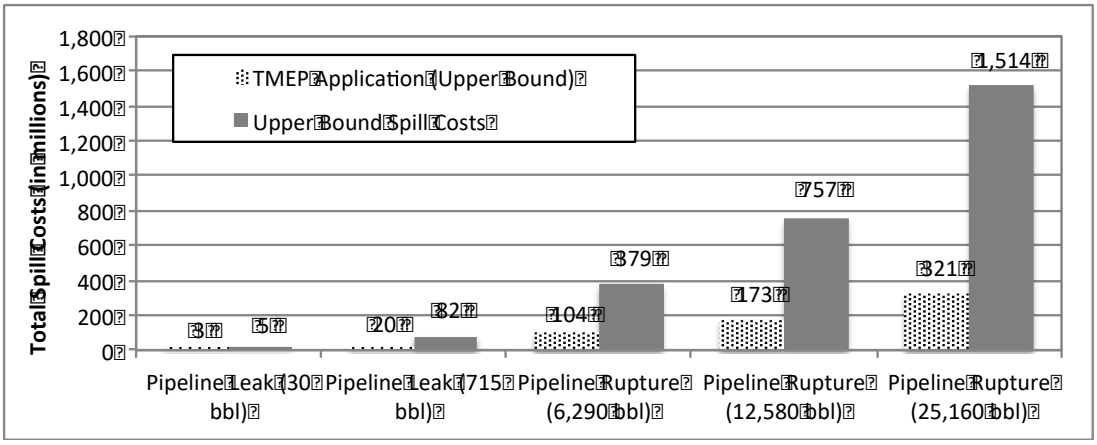


Note: The three methodological approaches for estimating tanker spill probabilities are different and therefore the results are not directly comparable. See Section 5.3 of this report for further discussion of these differences.

10. Potential pipeline, tanker, and terminal spill costs are estimated based on evidence from peer-reviewed literature, government data, regulatory applications, and case studies.

11. Total potential pipeline spill costs range from $5 million to $1.5 billion for a single spill (Figure ES.3). These spill cost estimates are approximately 1.7 to 4.7 times higher (depending on size) than those presented in the TMEP application. Therefore, spill costs in the TMEP application significantly underestimate potential upper bound TMEP pipeline spill costs.

Figure ES.3. Comparison of Upper Bound Pipeline Spill Costs



12. Potential tanker spill costs range from $2.2 to $4.4 billion for a single spill (Table ES.2). If passive use damages are included in the spill cost estimates, the cost of a potential tanker spill could increase up to $25.5 billion. Actual damages would be even higher because many costs such as ecosystem service losses and psychological damages are not included in these estimates. The TMEP application does not provide any estimates of potential tanker spill damage costs.

Table ES.2. Potential Spill Cost Estimates for TMEP Tanker Spills

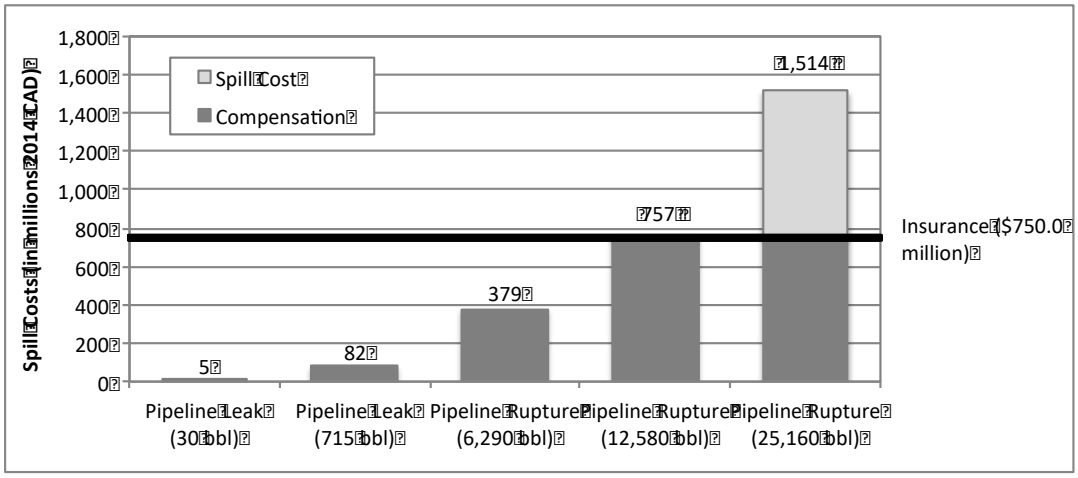
Method	**Spill size** (bbl)	**Potential Spill Costs** (in millions)			
		Clean-up	**Social and Environmental**	**Total**	**Total w/ Passive Use**
Mean Outflow	51,891	886	1,330	2,216	3,586 – 23,290
Worst Case Outflow	103,782	1,773	2,659	4,432	5,802 – 25,506

13. Compensation for pipeline spill damages depends on the amount of insurance maintained by the pipeline operator and any other financial assets that the operator could draw upon for compensation purposes. Trans Mountain Pipeline ULC currently maintains general liability insurance of $750 million per year and intends to maintain this level of insurance over the life of the project.

14. In the event of a TMEP pipeline rupture, insurance may be insufficient to fully compensate parties that incur losses from a spill. The shortfall in compensation from a $1.5 billion pipeline spill could total $764 million, which would have to be covered by TMEP (Figure ES.4). TM's ability to cover

compensation that exceeds insurance coverage, the details of what will be compensated and how the value of damages requiring compensation will be determined are all unknown.

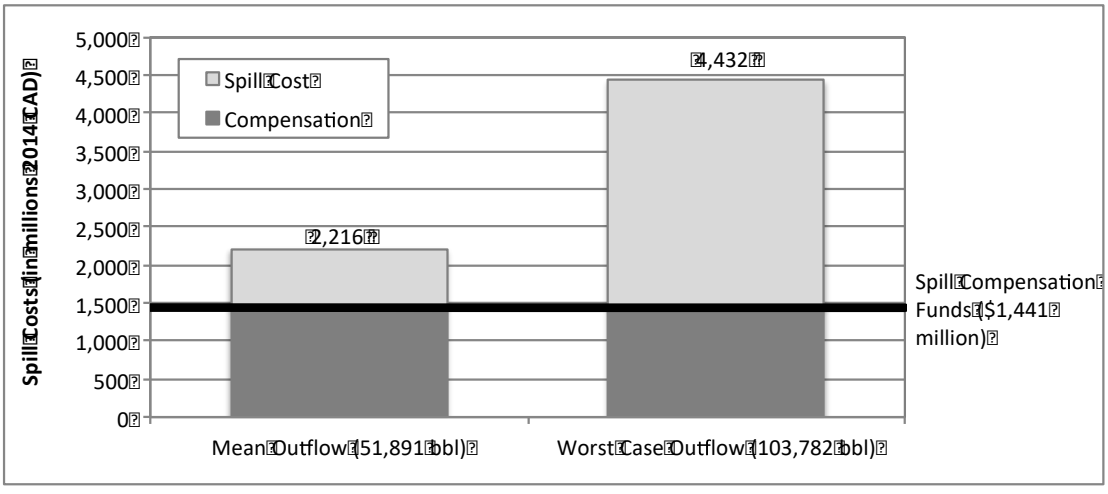
Figure ES.4. Potential Pipeline Spill Costs and Compensation



15. Compensation for a tanker spill is governed by domestic law combined with several international conventions. Under the four-tier system, the total amount available for clean-up, compensation, and natural resource damages from tanker spills in Canada is currently limited to approximately $1.44 billion.

16. Total spill costs could exceed available compensation by over $2.9 billion (Figure ES.5). The compensation shortfall would be higher if passive use damages were included in the spill cost estimates. Consequently, the international and domestic compensation funds are inadequate to cover potential damage costs from a large tanker spill along the TMEP route.

Figure ES.5. Potential Tanker Spill Costs and Compensation



17. TM has not provided in the application a comprehensive mitigation and compensation plan to provide assurance to the Canadian public that TM will

be fully responsible for all spill clean-up and damage costs from a tanker, terminal, or pipeline spill along the TMEP route. The elements of a comprehensive compensation plan include:

- defining compensable and non-compensable damages;
- identifying eligible and ineligible parties for compensation;
- specifying methods for determining and evaluating damage claims;
- identifying timelines for impacted parties to receive compensation;
- identifying funding sources to fully cover all damage costs;
- requiring the project proponent to accept unlimited liability for all damages resulting from the project;
- specifying dispute resolution procedures;
- establishing an independent monitoring process to assess ongoing impacts;
- specifying a legally binding and independent arbitration process to determine damages; and
- providing financial support for First Nations and stakeholders to participate in the monitoring and compensation process.

18. TM has not assessed the likelihood of significant adverse environmental effects as required by the *CEAA 2012*. In its application, TM (2013, Vol. 1 p. 1-59) states "Potential effects of credible worst case and smaller spills discussed in Volume 7 and 8A are not evaluated for significance because these represent low probability, hypothetical events". The probability of oil spills is high and therefore TM should have assessed the adverse impacts of spills as required by *CEAA 2012.*

19. The conclusions of this report are as follows:

I. The TMEP application does not provide an accurate assessment of the likelihood of adverse environmental impacts resulting from oil spills as required by the *CEAA*.

TM's spill risk analysis contains 27 major weaknesses. As a result of these weaknesses, TM does not provide an accurate assessment of the likelihood of oil spill risk associated with the TMEP. Some of the key weaknesses include:

- Ineffective communication of spill probability over the life of the project;
- Lack of confidence ranges for spill risk estimates;
- Inadequate sensitivity analysis of spill risk estimates;
- No presentation of the combined spill risk for the entire project;
- Reliance on tanker incident frequency data that underreport incidents by up to 96%;
- Incomplete assessment of the significance of oil spills; and

- Inadequate disclosure of information and data supporting key assumptions that were used to reduce spill risk estimates.

II. TM's own analysis shows spill likelihood for the TMEP is high (99%)

TM's spill risk estimates show that the combined likelihood of an oil spill from the TMEP is high (99%) (Table ES.3). The individual spill probabilities for the specific types of spills, that is tanker (16 – 67%), terminal (77%), and pipeline (99%) spills, understate the likelihood of spills associated with the TMEP because of the methodological weaknesses in the TM analysis.

Table ES.3. Probabilities for TMEP Tanker, Terminal, or Pipeline Spills

Type of Spill	Spill Probability over 50 Years
Tanker Spill	16 – 67%
Terminal Spill	77%
Pipeline Spill	99%
Combined Spills	99%

III. The likelihood of an oil spill from the TMEP is high

The probabilities of oil spills from the TMEP are estimated using a range of widely accepted methods. The estimates show that the likelihood of spills is high. For pipeline spills, data from the National Energy Board, the Enbridge liquids pipeline system, the Pipeline and Hazardous Materials Safety Administration and the TMEP application show that a spill is highly likely to occur (99%). The Pipeline and Hazardous Materials Safety Administration methodology is the standard methodological approach for estimating spill risk in the United States and the method may provide the most reliable estimates of potential spill risk for the TMEP.

The United States Oil Spill Risk Analysis model and the Vessel Traffic Risk Assessment methodology estimate that there is a high likelihood of a tanker spill (58% to 98%) (Figure ES.2). Tanker spill risk estimates in the TMEP application range from 16% to 67% depending on mitigation measures (Figure ES.2). The low end of TMEP estimates of 16% is an outlier significantly below the estimates based on other methods. Therefore, given the methodological deficiencies in TM's oil spill risk assessment and the fact that TM's low end estimates are significantly below the estimates generated by other methodologies, the low end spill risk estimates in the TMEP application should not be relied on as accurate estimates of tanker spill risk.

IV. TM underestimates the upper bound damage costs of a pipeline spill and provides no estimates of the damage costs of a tanker spill

Total potential pipeline spill costs range from $5 million to $1.5 billion for a single spill, which is 1.7 to 4.7 times higher than the upper bound spill costs estimated in the TMEP application. Therefore, spill costs in the

TMEP application cannot be relied on as accurate estimates of upper bound costs. TM provides no estimates of the potential damages resulting from a tanker oil spill.

V. Potential spill costs from the TMEP could exceed available compensation

The comparison of potential pipeline and tanker spill damages to available compensation shows that existing mechanisms could provide inadequate compensation after a spill. Based on Trans Mountain's liability insurance of $750 million, we estimate that potential pipeline spill costs for a 25,160 barrel rupture could exceed this insurance by $764 million for a single spill. For a tanker spill, a worst-case spill of 103,782 barrels could exceed available compensation from domestic and international spill compensation funds by $2.9 billion. The government's recent plans to remove the liability cap for the domestic compensation fund could be insufficient to cover all tanker spill costs in this worst-case scenario. As a result, British Columbians and Canadians could incur those spill costs that are not compensated.

VI. Overall Conclusion

The overall conclusion of this report is that:

1. TM's application contains major methodological weaknesses that do not provide an accurate assessment of the degree of risk associated with the TMEP;
2. There is a high probability of oil spills from the TMEP ; and
3. Pipeline or tanker spills from the TMEP could result in significant damage costs that exceed existing compensation schemes.

Appendix 4

Public Interest Evaluation of the Trans Mountain Expansion Project

By

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December 2015

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Submission to the NEB TMEP Hearings on behalf of Upper Nicola Band, Tsawout First Nation and Living Oceans Society

Executive Summary

1. The purpose of this report is to assess whether the proposed Trans Mountain Expansion Project (TMEP) is required and in the public interest.
2. The TMEP is a proposal to expand the existing Trans Mountain Pipeline (TMPL) to provide an additional 590 kbpd transportation capacity to ship crude oil from Alberta to markets in the Pacific Rim. The TMEP would consist of twinned pipelines (one new and one existing), a marine terminal, and tanker traffic to ship oil from Vancouver to Pacific Rim markets.
3. The National Energy Board (NEB) approval criteria as specified in Section 52 of the *National Energy Board Act* require the applicant to show that:
    a) the project is required; and
    b) the project is in the public interest.
4. The TMEP application states that the TMEP is required and in the public interest for the following reasons:
    a) growth in production from the Western Canada Sedimentary Basin (WCSB) requires increased oil transportation capacity;
    b) TMEP will provide access to new markets in Asia and the United States;
    c) TMEP will increase netbacks to all Western Canadian oil producers by lowering transportation costs and accessing higher price markets; and
    d) construction and operation of the TMEP will stimulate economic activity in Canada and generate tax revenue for government.
5. The evidence in the TMEP application that the TMEP is required and in the public interest is incomplete and deficient in the following respects:
    a) TM overstates project benefits by using gross economic impacts as the primary measure of the contribution of the project to the public interest instead of net impacts and net economic benefits;
    b) TM incorrectly assumes that economic impacts are a measure of benefits without taking into account the opportunity cost of the labour, capital and other resources it uses;
    c) TM's conclusion that the TMEP will generate significant benefits in the form of increased prices for Canadian oil exports is based on a questionable methodology, unrealistic assumptions, and is inconsistent with oil market dynamics; and
    d) TM's assessment of the need for the TMEP is deficient because it underestimates WCSB transportation capacity, likely overestimates oil production and oil prices, and does not include alternative production and transportation capacity scenarios;
6. While TM provides an estimate of the alleged benefits of the TMEP, it does not provide an estimate of the costs. Most importantly, TM provides no estimates of the economic losses resulting from potential excess transportation capacity that

TMEP may cause and no estimates of social and environmental costs of air pollution, greenhouse gas (GHG) emissions, oil spills, and other environmental and social impacts resulting from the TMEP. TM fails to provide any comparison of benefits and costs in accordance with well-established principles and guidelines such as benefit cost analysis that can be used to assess whether the TMEP is a net benefit to Canada, and does not set out in a clear and comprehensive way the advantages, disadvantages, and trade-offs of the TMEP. Consequently, TM does not provide the information necessary for determining whether the TMEP is in Canada's public interest.

7. To assess the need for the TMEP, we completed a supply and demand analysis for WCSB transportation services using forecasts from the Canadian Association of Petroleum Producers (CAPP). The analysis shows that construction of the TMEP will contribute to the creation of surplus capacity in the oil transportation sector. (Figure ES-1).

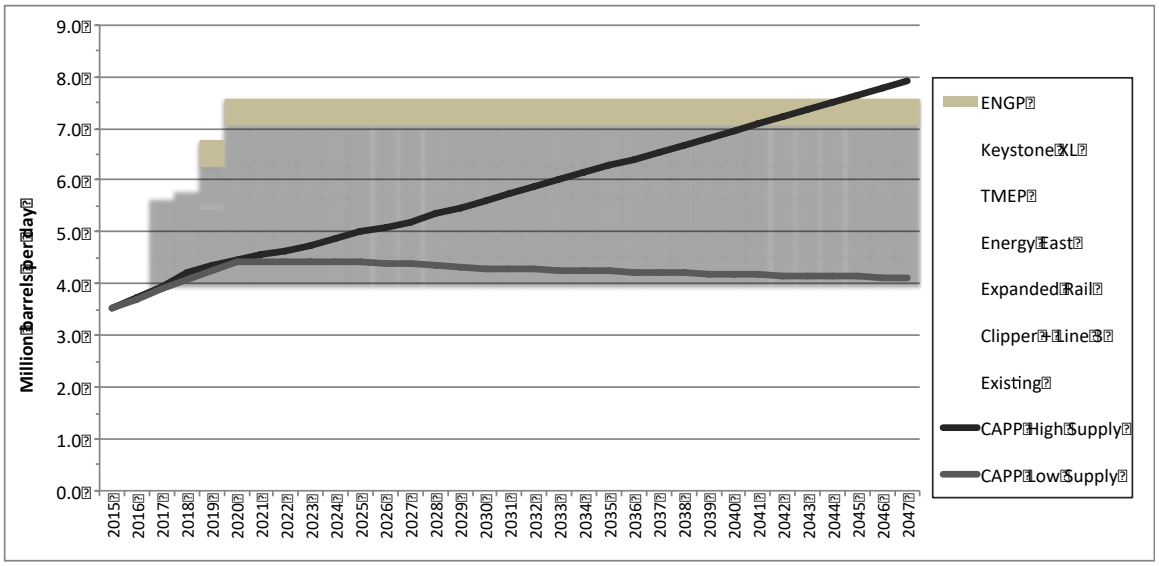
   a) Under CAPP's high growth forecast, construction of currently planned projects (Enbridge Clipper, Enbridge line 3 replacement, TMEP, and Energy East but excluding Keystone XL and Northern Gateway) will result in surplus transportation capacity of 1.6 million bpd in 2020 and there is surplus capacity until about 2034. The surplus capacity in 2020 is equivalent to just over three Northern Gateway's worth of empty pipeline space.

   b) Under CAPP's low growth forecast there is surplus capacity to the end of the forecast period (2047).

   c) If Enbridge Clipper, Enbridge line 3 replacement, and Energy East are built, the TMEP is not required until 2029 under CAPP's high growth forecast and is not required at all under CAPP's low growth forecast. If Energy East is not built, the TMEP is not required until 2023 under CAPP's high growth forecast and is not required at all under CAPP's low growth forecast.

   d) Although some unused capacity is necessary and beneficial, the magnitude of unused capacity resulting from premature construction of the TMEP would impose a large cost on Canada's oil transportation sector, oil producers and the Canadian public in the form of reduced tax revenues. TM has not included the costs of this unused capacity in its evaluation of TMEP costs and benefits.

Figure ES-1. Estimates of Western Canadian Oil Supply and Transportation Capacity



8. To assess the need for and the impact of the TMEP on the Canadian public interest we completed a comprehensive benefit cost analysis of the TMEP (Table ES-1). We assessed the benefits and costs by key sector and stakeholder group and tested a range of scenarios and assumptions in our analysis to address uncertainty in project parameters and impacts. Our benefit cost analysis shows that:

   a) Under base case assumptions the TMEP results in a **net cost to Canada of $7.4 billion**.

   b) Net costs could range between $**4.6 and $23.0** billion based on different scenarios and assumptions. Fewer new transportation projects, higher oil production, and lower environmental costs reduce the net costs while more new transportation projects, lower oil production, and higher environmental impacts increase the net costs. We also included a sensitivity that incorporated potential option and diversification values provided by the TMEP accessing new markets with higher oil prices. Under all scenarios tested, construction of the TMEP as planned will result in a net cost to Canada.

   c) We recognize that estimating benefits and costs of the TMEP is challenging and subject to many uncertainties. Current uncertainties in oil markets are unusually high due to uncertainty over the future direction of oil prices, Canadian oil production, and public policies such as climate change that can all significantly impact the Canadian oil sector and the demand for new transportation capacity.

   d) We have addressed these uncertainties in two ways. First we have completed a large number of sensitivity analyses using different assumptions and forecasts. Second we did a risk assessment of building and not building the TMEP. If the TMEP is built in accordance with the schedule proposed in the application, there will be a net cost to Canada under all likely scenarios. Not building the TMEP as planned has minimal downside risk because if demand for new transportation projects is higher than forecast, there would be sufficient

lead time to provide new transportation services to accommodate increased demand.

Table ES-1. Benefit Cost Analysis Results for TMEP

Item	Net Benefit (Cost), Base Case (million $)	Sensitivity Analysis Range (million $)
TMEP Pipeline Operations	0	(792) to 396
Unused Oil Transportation Capacity	(4,381)	(6,233) to (2,173)
Option Value/Oil Price Netback Increase	0	0 to 2,784
Employment	77	77 to 284
Tax Revenue	242	242 to 1,143
Electricity	(257)	No sensitivity
GHG Emissions from Construction and Operation of TMEP and marine traffic in defined study area	(289)	(916) to (289)
Other Air Emissions	(85)	(427) to (6)
Oil Spills	(675)	(1,022) to (310)
Passive Use Damages from Oil Spill	(2,026)	(17,667) to (2,026)
Other Socio Economic, Environmental Costs not estimated	See Appendix A	
Base Case Net Cost	**(7,394)**	**(4,610) to (23,035)**

9. One of the primary reasons that the TMEP may result in a large net cost to Canada is because building the TMEP under the proposed schedule will create excess pipeline capacity. There are currently more WCSB oil transportation projects planned than required, and construction of currently proposed projects will result in a net cost to Canada. These pipeline projects were proposed before the current downturn in the oil markets and some were able to secure long-term shipping contracts that may allow these projects to be feasible financially while externalizing the cost of the surplus capacity onto existing transportation systems, oil producers, and governments. The creation of this excess capacity can be prevented by rejecting or deferring new projects that are not required.
10. A further reason that the TMEP will result in a net cost to Canada is due to the

environmental risks it entails, including the risk of marine oil spills in British Columbia, which could be avoided if other transportation options are used. We caution that estimating these environmental costs is challenging. Many environmental impacts of the TMEP are not included in our benefit cost estimates because they are difficult to estimate in dollar terms. Inclusion of these impacts would increase our environmental cost estimates. Increased environmental costs of shipping oil on the TMEP may to some degree be offset by reduced oil shipments on other transportation facilities. Inclusion of these potential avoided environmental costs on other transportation facilities would reduce our environmental cost estimates. We have also omitted all environmental costs associated with the upstream production of oil consistent with the NEB's terms of reference. These costs are important and should be assessed as part of a comprehensive energy and climate change policy.

11. In summary, our evaluation shows that:

    a) the TMEP application fails to show that the TMEP meets the need and public interest criteria required for NEB approval;

    b) the TMEP will result in a net cost to Canada if the project is built as planned. Therefore approving the application for the TMEP is not in Canada's public interest; and

    c) If and when the TMEP transportation capacity is required, the TMEP should be evaluated as part of a comprehensive oil transportation strategy that comparatively evaluates all proposed projects from a social, economic, and environmental perspective to determine which project or mix of projects are required and best meet Canada's public interest.

Appendix Five

Analysis of Need for the TMEP Public Interest Evaluation of the Trans Mountain Expansion Project

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Analysis of Need for TMEP

TM does not provide a comprehensive assessment of oil transportation capacity and demand to assess the need for the TMEP. Such an assessment is essential in evaluating whether the TMEP is needed. To address this deficiency, we provide the following supply and demand analysis. The first step is estimation of available and potential WCSB oil transportation capacity. Existing and proposed transportation projects based on CAPP (2015) data are summarized below (Table 1). To reflect various constraints on pipeline operations, we assume that the transportation system effective capacity is 95% of nameplate capacity.

Table 1. Existing and Proposed Projects (Based on CAPP 2015)

Facility	**CAPP (2015) (kbpd)**
Enbridge Mainline	2,621
Express/Milk River/Rangeland[1]	490
Trans Mountain	300
Keystone	591
Rail[2]	200
Existing Subtotal	**4,202**
Alberta Clipper Expansion (2015)	230
Line 3 Restoration (2017)	370
Kinder Morgan TMEP (2018)	590
Energy East (2020)	1,100
ENGP (2019)	525
Keystone XL (tbd)	830
Subtotal Existing and Proposed Pipeline	**7,847**
Rail[2] (2018)	350
Total Existing and Proposed Pipeline and Rail	**8,197**

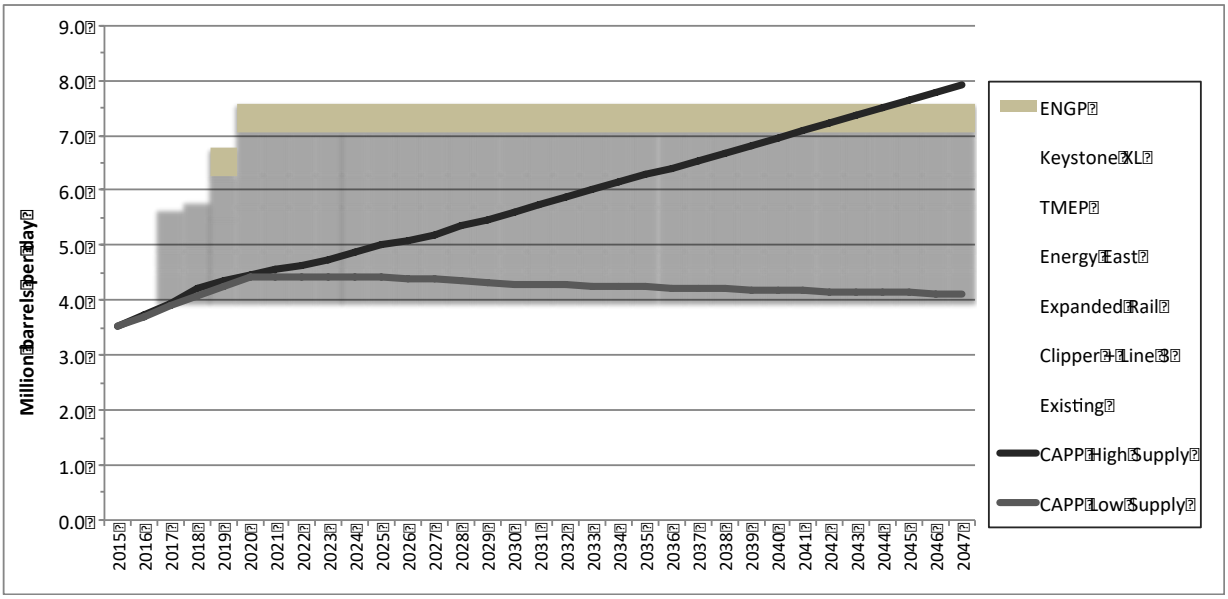
Sources: CAPP (2015). Note. 1. Rangeland and Milk River are included on pipeline maps by CAPP but their capacity is not provided in the CAPP report. Capacity for these two pipelines is from Ensys (2010; 2011). 2. Rail estimates in the table are forecast shipments of oil by rail and are not rail capacity. The 200 kbpd is CAPP's estimated shipments by rail in 2015 and the 350 kbpd increase (total 550 kbpd) is

CAPP's mid-point estimate of rail shipments if Keystone XL is not built. If Keystone XL is built we assume rail shipments of 350 kbpd, which is the amount CAPP (2015) forecasts in 2017 before Keystone XL. Actual rail capacity is much higher than forecast rail shipments. According to CAPP (2015), there is currently 776 kbpd of rail capacity for WCSB shipments with significant expansion potential. MS (TM 2015c, p. 12) assumes that rail shipments could grow to 2,255 kbpd by 2038 and rail capacity to 3,870 kbpd by 2038 (MS 2015, p. 43). Therefore if we used rail capacity in our analysis instead of rail shipments, the estimates of surplus capacity would be much higher.

The next step is to forecast demand for WCSB export capacity. Again we rely on CAPP's 2015 forecasts. CAPP provides two supply forecasts: a low growth forecast based on currently operating and under construction projects and a high growth forecast based on currently operating, under construction and new projects. The low growth and high growth CAPP forecasts are essentially the same to 2020 as existing projects under construction are built out and come into production. After 2020, the low growth forecast assumes no additional expansion while the higher growth forecasts adds an additional 577 kbpd by 2025 and 1,288 kbpd by 2030. To estimate the export demand for oil transportation services, refinery consumption from Alberta and Saskatchewan refineries are deducted from the CAPP supply forecasts. Export shipments of refined oil products are then added back in as a demand for transportation services. We also adjust for the proportion of Canadian pipeline space used to ship US Bakken oil by using CAPP's estimates of Bakken shipments on Canadian pipelines. As we discuss in section **Error! Reference source not found.**, CAPP's estimates of Bakken shipments are high, so this adds an upward bias to the demand for transportation services.

The supply and demand assessment is summarized below (Figure 1). The analysis shows that under both CAPP's high and low growth forecast, some additional capacity is required by 2018, which will consist of completion of the Enbridge Clipper project (230 kbpd) that involves adding pumping capacity to the existing Enbridge Clipper Line and the replacement of Enbridge Line 3, which adds 370 kbpd of capacity. Both of these projects are expected to be in service by 2017. With completion of these two projects, no additional projects are required under CAPP's low growth forecast. Under the higher growth forecast completion of these two projects plus CAPP's forecast rail expansion to 550 kbpd assuming Keystone XL is not built provides sufficient capacity to 2023. In 2023, one new pipeline project (TMEP or Energy East) is required under the higher growth forecast and a second new project will be required around 2029. The analysis shows that the TMEP is not needed until 2023 under the higher growth forecast. If Energy East is built, the TMEP is not needed until 2029. Under the low growth forecast, the TMEP is not required at all during the forecast period to 2048.

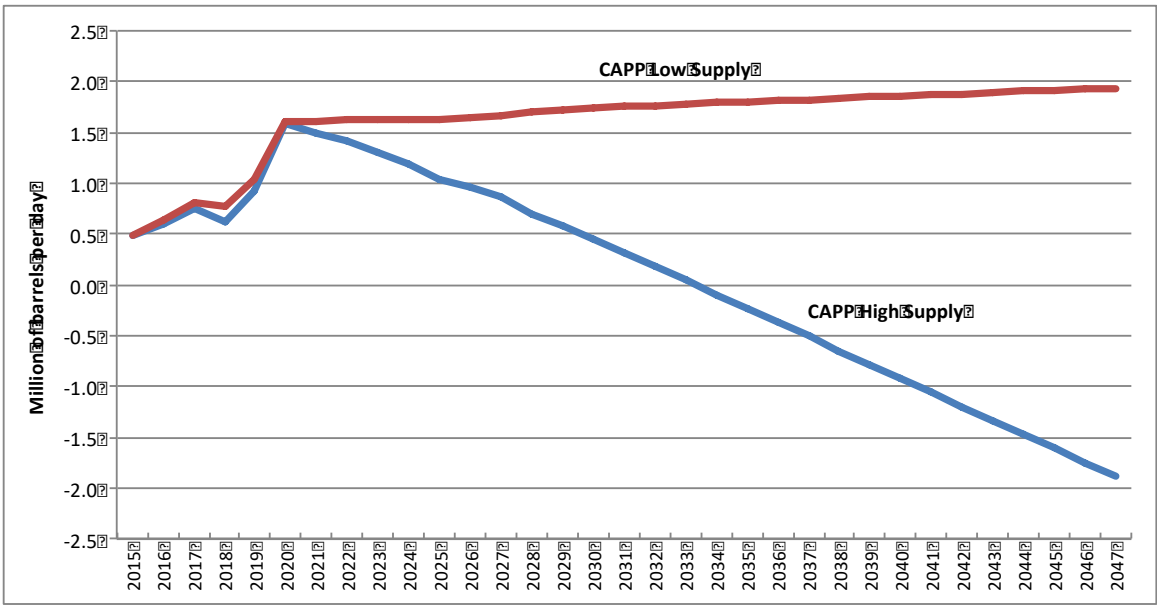
Figure 1. Estimates of Western Canadian Oil Supply Transportation Capacity



Source: Adapted from CAPP (2015). Note: Pipeline capacities reflect nameplate capacities.

We have also estimated surplus capacity under the low and high growth forecast assuming both Energy East and TMEP are approved and built as planned (Figure 2). Under the low growth forecast, surplus capacity increases from 1.6 million bpd in 2020 to over 1.9 million bpd by 2047, which is equivalent to approximately four Northern Gateway's worth of empty pipeline space. Under the high growth forecast, surplus capacity peaks at 1.6 million bpd in 2020 and remains until 2034. These estimates of surplus capacity do not include pipeline capacity from ENGP and Keystone XL. If Keystone XL is built, surplus capacity will peak at over 2.0 million bpd in 2020, and surplus capacity will remain under the high growth forecast until 2037.

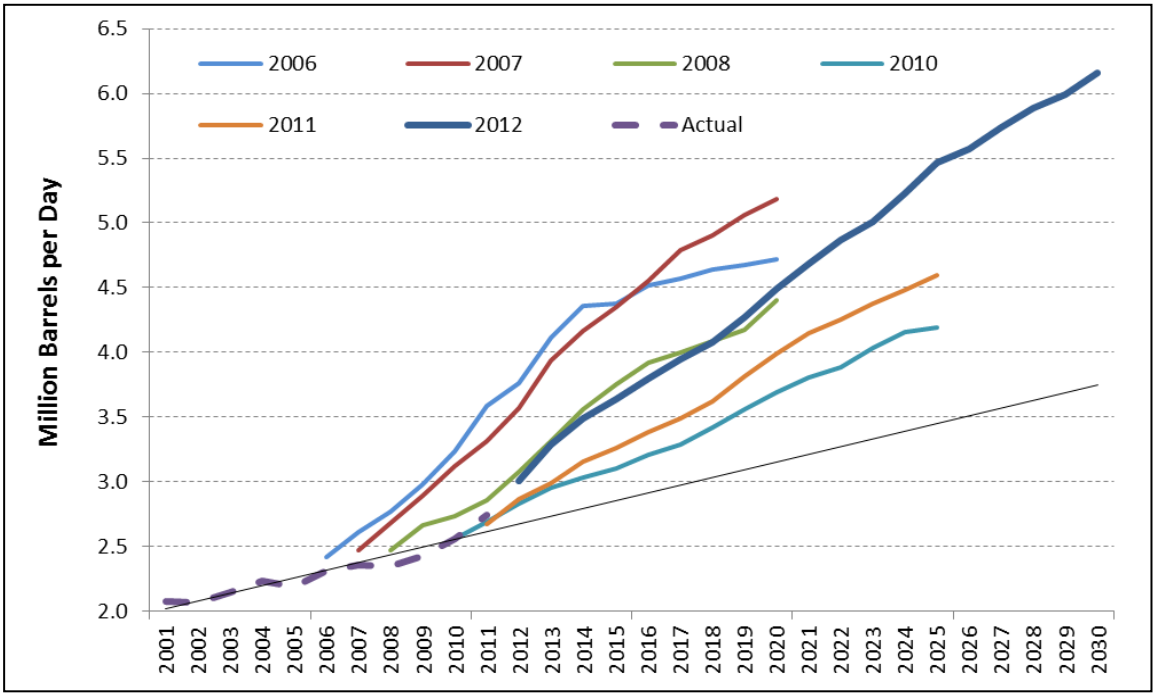
Figure 2. Surplus Capacity Estimates Under CAPP Low and High Supply Forecasts



Note: Surplus capacity estimated based on 95% of nameplate pipeline capacity.

It is important to keep several factors in mind when reviewing these scenarios. First, it is important to note that CAPP's forecasting has been criticized for being overly optimistic. In its review of the Keystone XL pipeline the US government provides a comparison of CAPP forecasts with actual production (Figure 3) and concludes "The CAPP forecasts generally have overestimated potential production compared to the trend of actual production" (USDS 2013, Vol 1.4-24). The analysis shows the 2006 CAPP forecast is higher than actual production by more than 800 kbpd in 2011 and 2012, and the CAPP 2007 forecast exceeds actual production by about 300 kbpd from 2009 to 2011 (CAPP 2006; CAPP 2007; CAPP 2008; CAPP 2011; CAPP 2012; CAPP 2013). The current 2015 CAPP forecast addresses this uncertainty in forecasting by providing a low and high range. However, CAPP's high growth forecast may still reflect this upward bias.

Figure 3. Comparison of Historical CAPP Forecasts of Canadian Oil Sands Production



Source: CAPP (2006; 2007; 2008 as cited in USDS 2013, Vol. 1.4 p. 1.4-25; 2011; 2012; 2013).

Second, CAPP's 2015 forecast was completed in the Spring of 2015 when it was assumed by many forecasters that the downturn in oil prices was short-term and prices would begin to recover in late 2015 and 2016. The US EIA, for example, forecast in March 2015 that Brent would rise to $75 per barrel in 2016 but now forecasts (October 2015) that Brent will be just over $56 per barrel in 2016 (

Table 2).

Table 2. Comparison of US EIA Oil Price Forecasts

Year	US EIA March 2015 (Brent in 2014 US $)	US EIA October 2015 (Brent in 2014 US $)
2014 (actual)	99.00	99.00
2015	59.50	53.82
2016	75.03	56.24

Sources: US EIA (2015a, 2015c).

The International Energy Agency's (IEA) most recent annual energy report (IEA 2015) includes two long-term oil price forecasts: one assumes that oil prices remain below $80 until 2020 and then gradually rise and the second lower price forecast assumes oil prices remain in the $50 to $60 range until 2020 and then gradually rise to $85 by 2048. Under the low price forecast, the IEA predicts very little expansion in oil production in Canada (IEA 2015, p. 168). The IEA does state that they view the higher price forecast as more likely than the low price forecast. This compares to their previous annual energy review (IEA 2014) in which they forecast oil prices to remain above $100 per barrel throughout the forecast period. Some other analysts also forecast continued low oil prices in the range of $50 to $70 per barrel for the next 10 to 20 years (Wolak 2015).

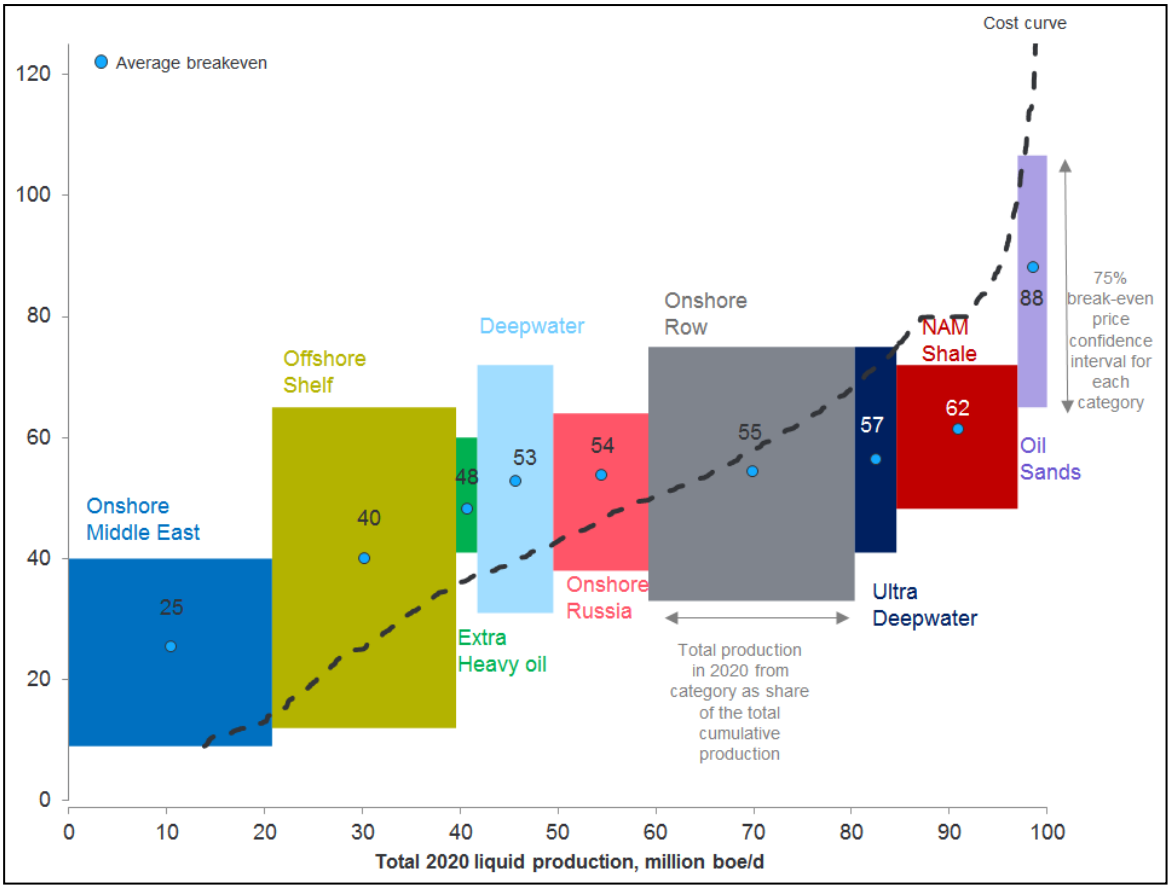
Another factor contributing to the uncertainty over oil production is climate change policy. Alberta has just announced a major policy change that caps GHG emissions from oil sands at 100 Megatonnes per year, just a 30 Megatonnes per year increase above current emissions and a new carbon tax of $30 per tonne applied to oil sands (Alberta 2015). Additional commitments may be made by the Canadian government as a result of climate change negotiations in Paris. These policies increase the cost of production in Alberta and will likely reduce production below what it would otherwise be, thus further reducing demand for new oil transportation capacity.

These increasingly pessimistic oil price forecasts and new climate change policies are particularly critical for Canadian production because Canadian oil sands production (Figure 4, see Oil Sands) is at the high end of the international cost curve (see also IEA (2013, p.454)). Studies by the Canadian Energy Research Institute (CERI) (2014) estimate that WTI prices (2013 US $) needed to justify oil sands expansion are $85 for *in situ* SAGD projects and $105 for mine projects.[3] While some oil sands projects will have higher or lower supply costs than CERI's average estimates, CERI's analysis shows that many previously planned new greenfield projects in the oil sands are unlikely to be developed at current WTI prices. While some other forecasts have lower cost of production estimates for the oil sands, they also forecast slower growth in WCSB production.[4] Lower oil prices and climate change policies that increase costs will therefore have dramatic impacts on Canadian production (McGlade and Ekins 2015).

[3] CERI's estimates are based on a US/Canada exchange rate of 0.98, but with the recent decline in the Canadian dollar and potential reductions in costs due to slower rates of expansion, the WTI break-even prices will fall.

[4] Leach (2015) estimates current break-even costs for new *in situ* projects at just under $50 WTI and new mines at about $63 WTI based on lower exchange rates and lower diluent costs. Leach nonetheless anticipates a downward revision in the oil sands production forecasts due to lower prices.

Figure 4. Oil Supply Cost Curve (US $ per barrel)



Source: Rystad Energy Research and Analysis (2015).

Given all these factors it is likely that CAPP's high growth production forecast is too optimistic. Indeed, Alberta producers have already announced cancellation of 17 projects amounting to 1.3 million bpd of capacity (Lewis 2015, p. B1). CAPP's low growth forecast provides a reasonable estimate of the lower bound range of oil production because it is based on currently operating projects plus projects under construction. Projects already under construction have a high probability of being completed and coming into production. However, it is important to note that some producers such as Shell have stopped construction on existing projects such as the 80 kbpd Carmen Creek Project (Shell 2015). If more projects under construction are stopped, it is possible that production could fall below CAPP's low forecast.

What are the implications of this uncertainty for the TMEP? Under the high growth forecast, TMEP is not needed until 2023 (or until 2029 if Energy East is built as planned) and under the low growth forecast it is not needed at all. Given market developments, the high growth forecast seems increasingly less likely and the date that the TMEP capacity may be needed may be later, if at all. It is also possible that oil markets could fully recover and generate sufficient demand to justify construction of the TMEP earlier. If this occurs, there is sufficient lead-time to build the TMEP and/or other transportation infrastructure such as rail to accommodate the demand.

A final issue in assessing need for the TMEP is the existence of shipping contracts. Do the shipping contracts prove that the TMEP is needed and if it is not needed will it get built? These two issues are related. Shipping contracts were signed for TMEP, Keystone XL and Energy East well before the current downturn in oil markets. The signing of take-or-pay contracts obligates shippers to pay the tolls for these pipelines regardless of whether the capacity is needed. This provides the financial rationale to allow the projects to be built thus obligating shippers to divert oil from other transportation facilities to meet their obligations to the new pipelines. The shippers are largely indifferent to the cost because they are able to shift the cost burden onto the other existing transportation facilities that they no longer need. Therefore, the TMEP could be built even if the additional capacity is not required.

The conclusion of the supply and demand analysis is that if the TMEP is not needed at its planned in-service dates and if it is approved there will be a significant surplus capacity. While some degree of surplus capacity is inevitable as new pipeline projects come into operation and is beneficial to provide some degree of flexibility in the oil transportation system, the magnitude of surplus capacity that would be created with completion of proposed projects is unprecedented and will impose a significant cost on Canada. We discuss the implications of this in our benefit cost analysis below.