Canadian Energy Research Institute

Economic Impacts of Staged Development of Oil Sands Projects in Alberta (2010-2035)

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Executive Summary

The worldwide economic recession that hit in 2008 affected the Canadian oil sands significantly. But close to three years later the industry is once again expanding, with a number of major projects under development and still more proposed for the future. Pipelines, or other transportation means such as increased rail haulage, will soon be required to ship new product to destinations in the United States and elsewhere. Three major transportation projects are being planned and have received considerable attention from government, stakeholders, and the general public:

1) TransCanada's Keystone XL Pipeline which, if approved by the United States State Department, will ship Alberta bitumen to the refineries of the United States Gulf Coast.
2) Enbridge's Northern Gateway Pipeline from Bruderheim, Alberta to the port of Kitimat, British Columbia, and
3) Kinder Morgan's Trans Mountain Pipeline system Northern Leg expansion to Kitimat, British Columbia.

These pipeline proposals face opposition, and the possibility exists that one, two, or all three may not be realized. This study examines the impacts of oil sands operations (existing and future) limited by pipeline export capacity. Four capacity scenarios, or cases, are documented within this report:

Case 1 – Existing pipelines operations. This case examines the economic impacts of existing oil sands operations and those that are still under construction. It assumes no new pipeline capacity and serves as a baseline scenario.

Case 2 – Existing pipelines operations + TransCanada Keystone XL Pipeline. This case considers the economic impacts of existing oil sands operations and those currently under construction. It assumes the Keystone XL pipeline comes on stream in 2013, and that a portion of approved oil sands projects not yet under construction will in fact become operational.

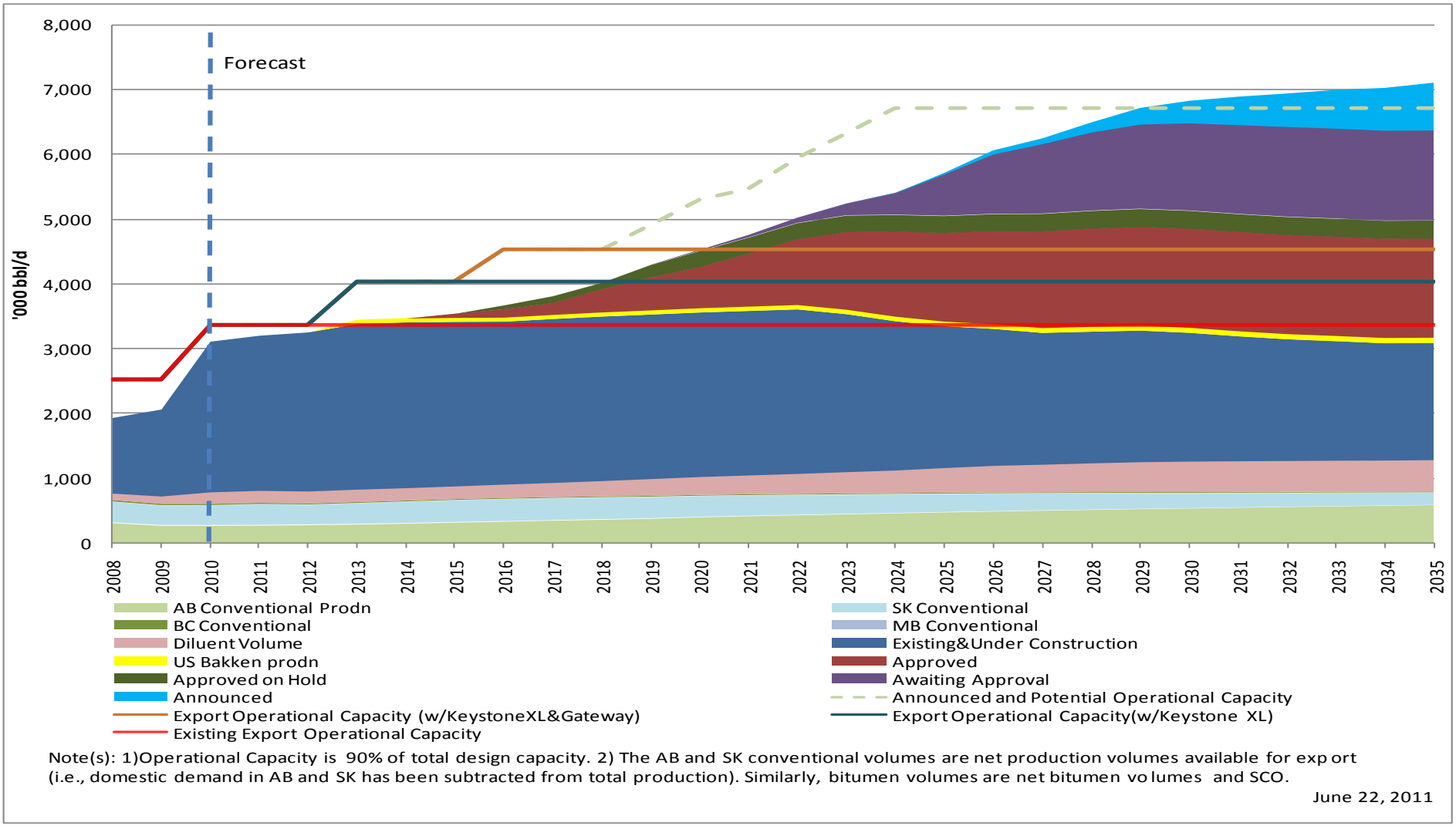
Case 3 – Existing pipelines operations + TransCanada Keystone XL Pipeline + Enbridge Northern Gateway Pipeline. Case 3 includes all of the projects considered in Case 2 and adds an additional portion of approved projects that can be accommodated by the Northern Gateway pipeline in operation by 2016.

Case 4 – Announced and Potential Capacity. This case assumes that, in addition to Case 3, all other remaining oil sands projects will proceed and that the required pipeline capacity to move new product will be constructed, including projects such as Kinder Morgan's Northern Leg expansion.

Figure 1 represents the supply and export pipeline dynamics over the next 25 years for each case. Existing pipeline operations capacity (Case 1) is denoted by the red horizontal line. If no infrastructure is built beyond existing operations, all of the volumes above the red line will not make their way to market. The blue horizontal line represents existing pipeline operations capacity + the capacity of TransCanada Keystone XL Pipeline (Case 2). If Keystone XL comes on stream, the additional volumes that can be transported lie between the red and blue lines. The oil sands projects that are above the blue line will not get built because there will be no take-away capacity to transport these crude volumes

to market. Existing + Keystone XL + Enbridge Northern Gateway Pipeline capacity (Case 3) are denoted by the orange horizontal line. If Northern Gateway comes on stream, the additional volumes that can be transported lie between the blue and orange lines. The oil sands projects that are above the organ line will not get built because there will be no take-away capacity to transport these crude volumes to market. Finally, the grey, dashed line represents all announced and potential operational capacity (Case 4). Even with a significant increase to the take-away capacity, not all oil sands projects will get built. The portion that will be left out is above the grey line.

Figure 1: Pipeline Capacity and Crude Exports



Source: CERI.

Major Findings

Case 1

- Over the 2010-2035 period, the estimated investments, reinvestments, and revenues from operation of the existing and under construction oil sands projects are **$2,197 billion**.
- Total Canadian GDP impact as a result of the investment shocks is estimated at close to **$2,283 billion** over the 25-year period (see Table 1.3).
- Canadian employee compensation will reach almost **$650 billion** over this time period.
- Employment in Canada (direct, indirect, and induced) is expected to grow from **390,000 jobs** to a peak of **490,000 jobs** in 2020 (see Figure 1.4).
- Alberta royalties are expected to grow from **$3.56 billion** in 2010 to a peak of **$22.6 billio**n in 2020 (see Figure 1.5).
- US GDP impact from 2010-2035, as a result of the investment shocks, is estimated at close to **CAD$210 billion** (see Table 1.6).
- US employee compensation will exceed **$100 billion** over the period.
- US employment totals are expected to grow from **80,000 jobs** to a peak of **94,000 jobs** in both 2018 and 2019 (see Figure 1.6).

Case 2

- Over the 2010-2035 period, the estimated investments, reinvestments, and revenues from operation of the existing and under construction oil sands projects + Keystone XL Pipeline are **$2,821 billion**.
- Total Canadian GDP impact as a result of the investment shocks is estimated at close to **$2,916 billion** over the 25-year period (see Table 1.8).
- Canadian employee compensation will reach almost **$835 billion** over this time period.
- Employment in Canada (direct, indirect, and induced) is expected to grow from **390,000 jobs** to a peak of close to **690,000 jobs** in 2019 (see Figure 1.7).
- Alberta royalties are expected to grow from **$3.56 billion** in 2010 to **$27.6 billion** by 2035 (see Figure 1.8).
- US GDP impact from 2010-2035 as a result of the investment shocks is estimated at **CAD$359 billion** (see Table 1.11).
- US employee compensation will exceed **$171 billion** over the period.
- US employment totals are expected to grow from **80,000 jobs** to a peak of **179,000 jobs** in 2035 (see Figure 1.9).

Case 3

- Over the 2010-2035 period, the estimated investments, reinvestments, and revenues from operation of the oil sands projects under Case 1 and Case 2 plus projects that can be accommodated by the Northern Gateway pipeline are **$3,208 billion**.
- Total Canadian GDP impact as a result of the investment shocks is estimated at close to **$3,317 billion** over the 25-year period (see Table 1.13).
- Canadian employee compensation will reach almost **$948 billion** over this time period.
- Employment in Canada (direct, indirect, and induced) is expected to grow from **390,000 jobs** to a peak of **790,000 jobs** in 2020 (see Figure 1.10).
- Alberta royalties are expected to grow from **$3.56 billion** in 2010 to **$32.9 billion** by 2035 (see Figure 1.11).
- US GDP impact from 2010-2035 as a result of the investment shocks is estimated at close to **CAD$397 billion** (see Table 1.16).
- US employee compensation will exceed **$189 billion** over the period.
- US employment totals are expected to grow from **80,000 jobs** to a peak of **200,000 jobs** in 2020 (see Figure 1.12).

Case 4

- Over the 2010-2035 period, the estimated investments, reinvestments, and revenues from operation of all oil sands projects are **$4,783 billion**.
- Total Canadian GDP impact as a result of the investment shocks is estimated at close to **$4,925 billion** over the 25-year period (see Table 1.18).
- Canadian employee compensation will reach almost **$1,417 billion** over this time period.
- Employment in Canada (direct, indirect, and induced) is expected to grow from **390,000 jobs** to a peak of **1,600,000 jobs** in 2035 (see Figure 1.13).
- Alberta royalties are expected to grow from **$3.56 billion** in 2010 to **$65.2 billion** 2035 (see Figure 1.14).
- US GDP impact from 2010-2035 as a result of the investment shocks is estimated at close to **CAD$775 billion** (see Table 1.21).
- US employee compensation will exceed **$368 billion** over the period.
- US employment totals are expected to grow from **80,000 jobs** to a peak of **600,000 jobs** in 2035 (see Figure 1.15).

In all 4 cases, the oil sands affect Alberta much more than any other province. Ranked in order are the top 5 provinces most impacted by oil sands development:

1. Alberta
2. Ontario
3. British Columbia
4. Quebec
5. Saskatchewan

In general, the following, ranked in order, are the top 5 states most impacted by oil sands development:

1. Illinois
2. California
3. Texas
4. Wisconsin
5. Ohio

Figures 2 through 5 isolate the impacts of each individual case, while demonstrating the overall impacts of all 4 cases summed together. Figure 6 illustrates the degree to which both Canada and the US are impacted by each case.

Figure 2: Canada Employment – Jobs (x 1,000) Created and Preserved, 2010-2035

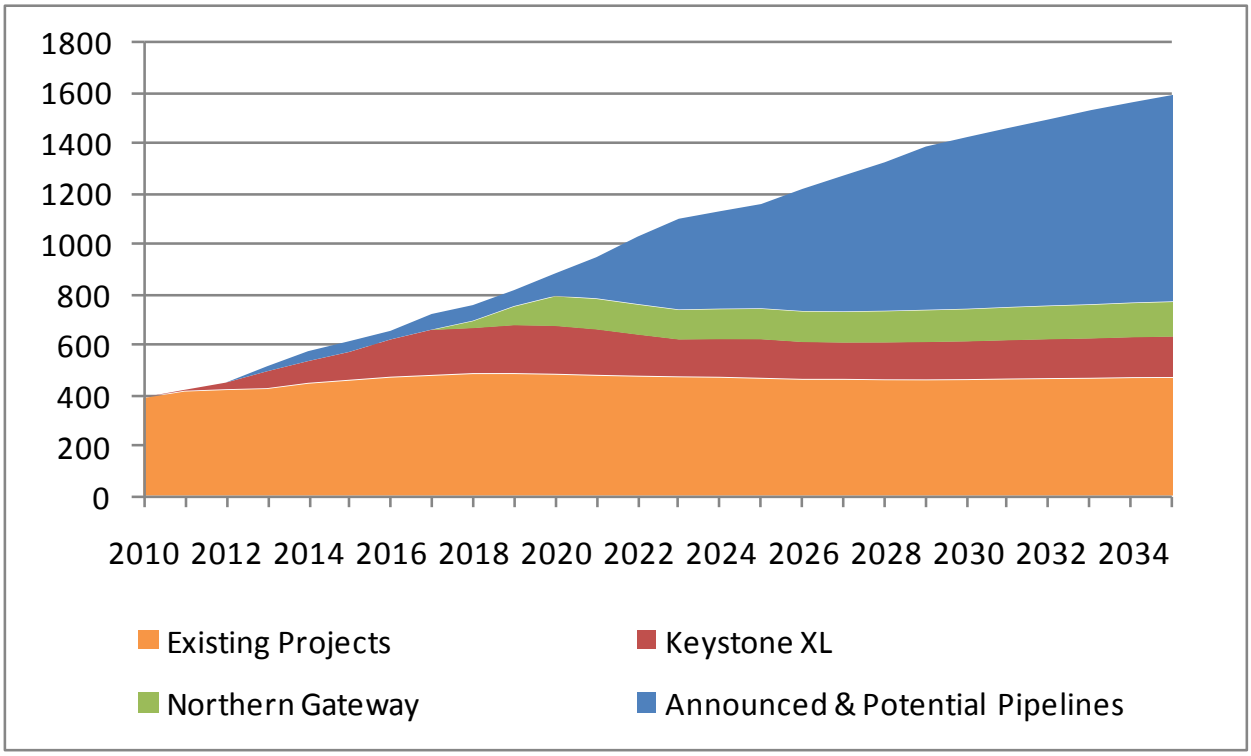


Figure 3: Canada GDP – Potential Additions, 2010-2035 – 4 Cases

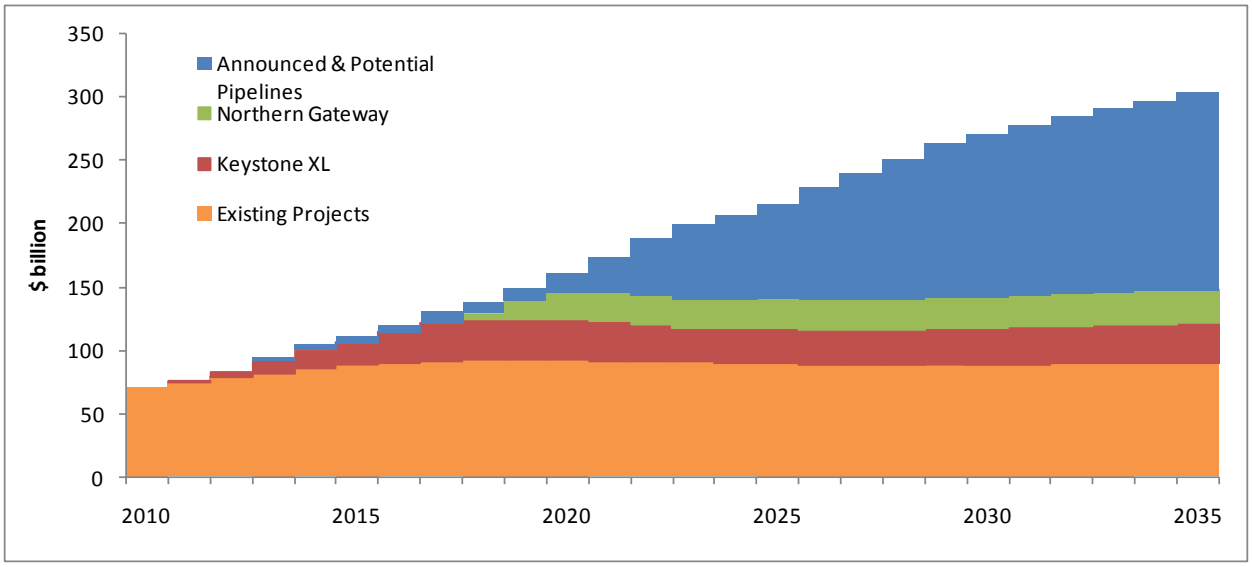


Figure 4: US Employment – Jobs (x 1,000) Created and Preserved, 2010-2035

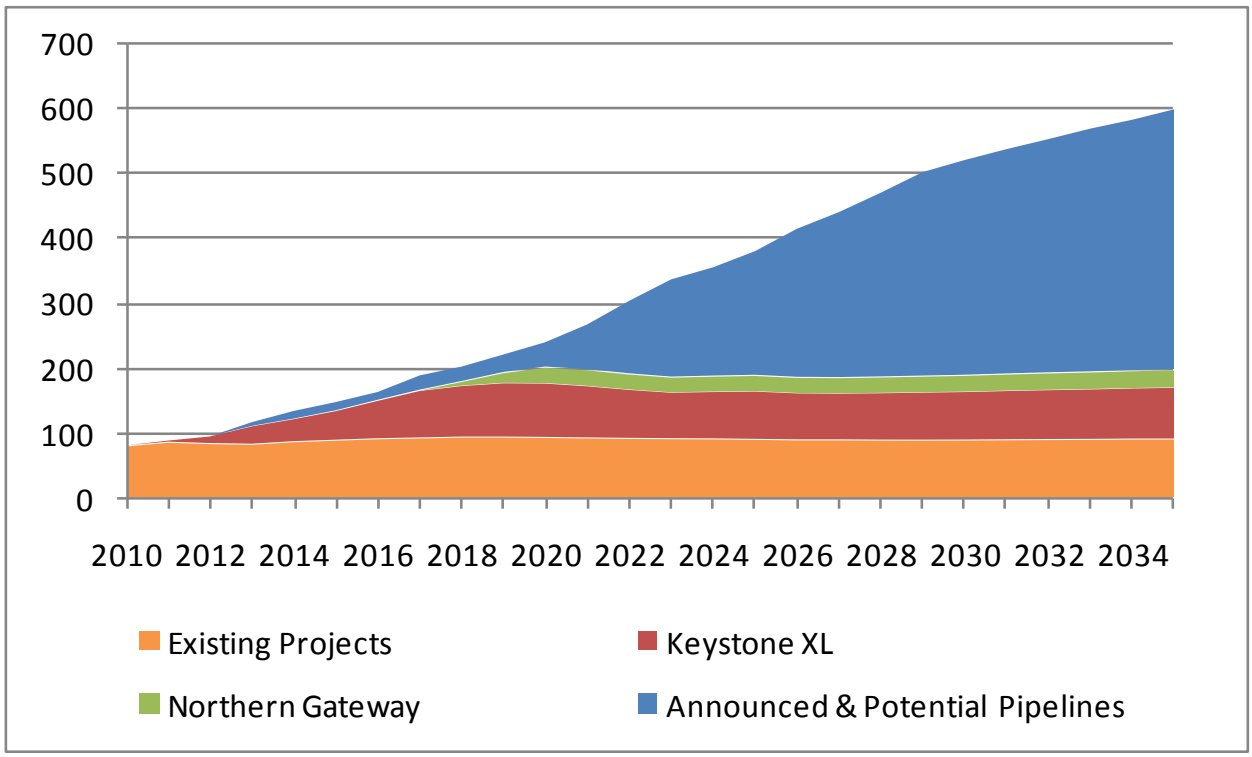


Figure 5: US GDP – Potential Additions, 2010-2035 – 4 Cases

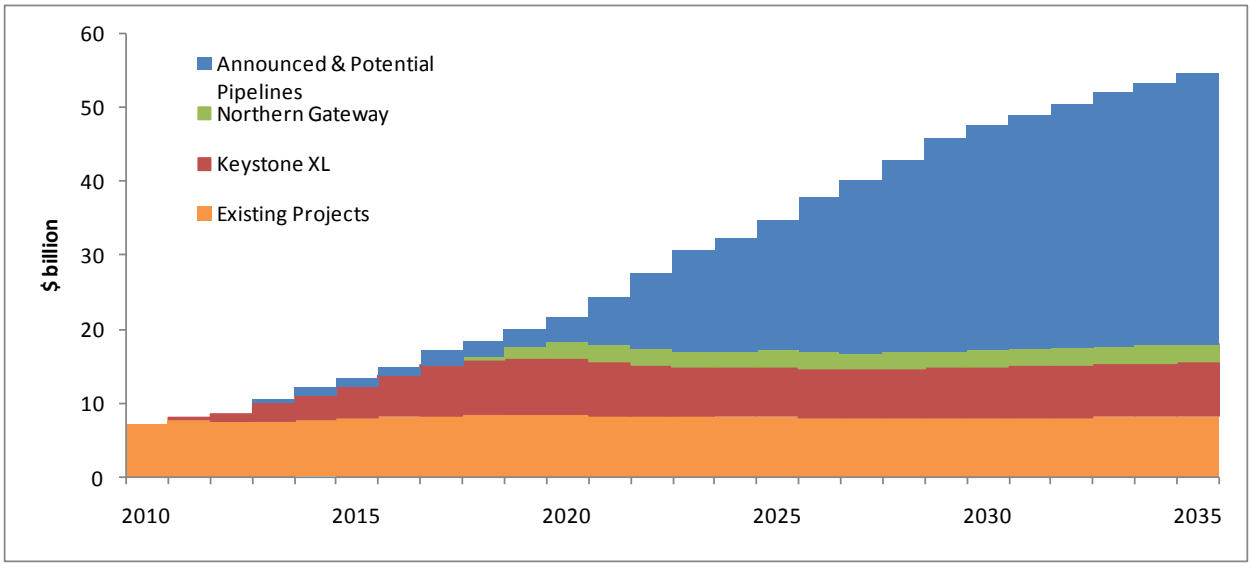
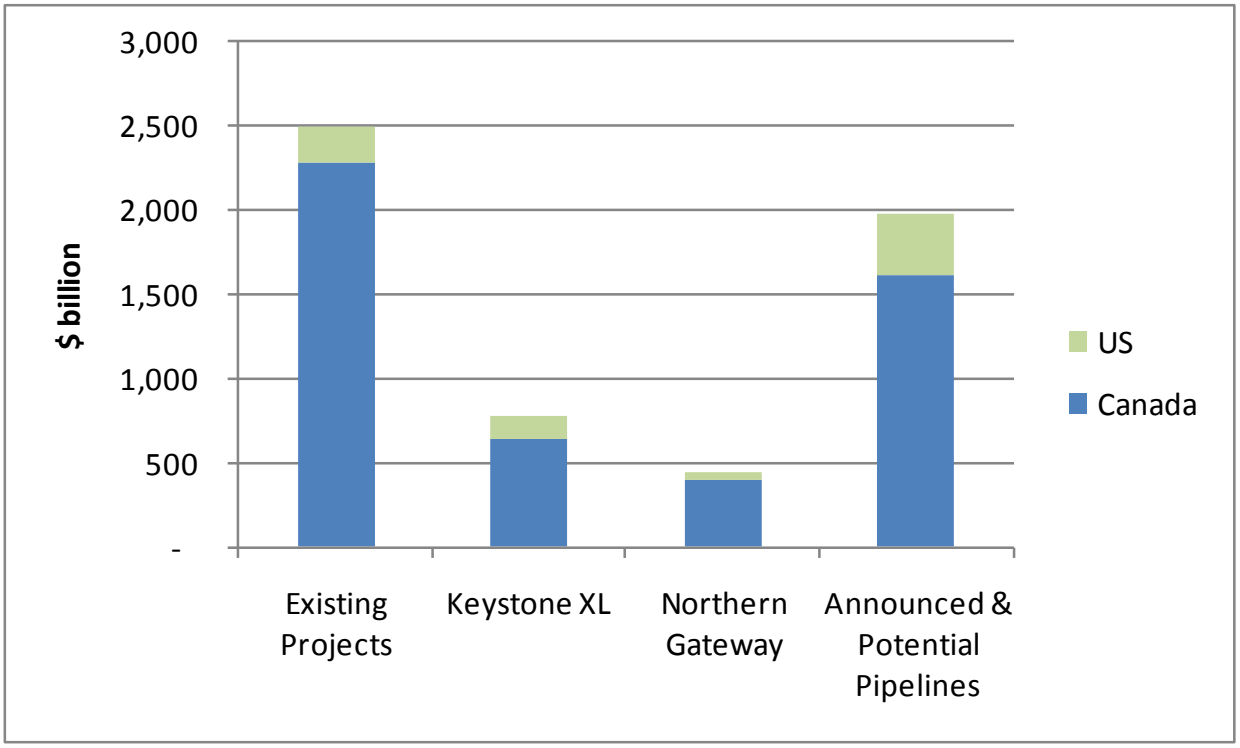


Figure 6: GDP Impact for the US and Canada, by Case



Terminology and Assumptions

- **Forecast Period** – The forecast period is 25 years, starting at the end of 2010, with 2011 being the first year of capital injections for the new oil sands projects and going out to 2035.
- All currency figures are in real 2010 (base year) Canadian dollars, unless specified otherwise.
- **Employment (Thousand Person Years)**: Thousands of jobs created and preserved every year. For instance, if a new oil sands in situ project with a capacity of 10,000 BPD starts operation by hiring 60 people in the initial year, the employment is 0.06 thousand person years in the first year. If this new oil sands facility adds 5,000 BPD capacity in the second year and hires 25 more employees to operate the new facility, in the second year the in situ project has created and preserved 0.085 thousand person years of employment. Of the 0.085 thousand person years of employment, 0.06 represents preserved jobs and 0.025 refers to new jobs.
- **Jobs** – Thousand person years and jobs are used interchangeably throughout this report. Thousand person years is the unit for the number of people employed in a job for a year. A job is an occupation that one needs to do in order to be employed. This should not be confused with stating that a job is a position that one is hired into (i.e., as a plumber). For example, a company could hire 10 people in a year for a position as manager and not hire any managers for later years. For the first year, the total amount of jobs is 10 and the total amount of person years for that year is 10. However, for the second year, the total amount of manager jobs is still 10 but the person years are now 20 as 10 people have now worked for 2 years. While the definitions of job and person years of employment may be subject to interpretation, for the purposes of this report, the number 10,000 jobs and 10 thousand person years both denote that 10,000 people are employed for a year.
- **Taxes** – Note that all of the tax estimates presented in this study include direct, indirect and induced impacts. Generally speaking, taxes on income are considered direct taxes, while taxes on expenditures (such as GST, HST, and PST) and all taxes deductible by corporations for income tax purposes (such as property taxes) are considered indirect taxes. The tax impact on a province includes taxes generated by economic activity within a province payable to federal, provincial, and municipal governments.
- **PADD** – Petroleum Administration for Defence Districts. These are five groups of US states that were organized as such during WWII to ensure efficient distribution of petroleum resources. The groupings remain in place today.
  - PADD I – Connecticut, Delaware, District of Columbia, Florida, Georgia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, West Virginia
  - PADD II – Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Ohio, Oklahoma, Tennessee, Wisconsin
  - PADD III – Alabama, Arkansas, Louisiana, Mississippi, New Mexico, Texas
  - PADD IV – Colorado, Idaho, Montana, Utah, Wyoming
  - PADD V – Alaska, Arizona, California, Hawaii, Nevada, Oregon, Washington
- **Oil Sands Projects** – The oil sands projects are reported by status in the following order: 1) on stream or existing; 2) under construction; 3) approved; 4) approved – on hold; 5) awaiting approval; and 6) announced.

Economic Impacts of Staged Development of Oil Sands Projects in Alberta (2010-2035)

Introduction

The existing crude oil pipeline infrastructure underwent a much needed expansion recently in order to accommodate growing volumes of oil sands production. A number of pipeline expansions were completed in 2009, and two major additional pipelines became operational at the end of 2010, namely TransCanada's Keystone and Enbridge's Alberta Clipper. Currently, there are several pipelines that are directly connected to the Canadian supply hubs, which are located in Edmonton and Hardisty, Alberta. These include: Enbridge Mainline, Kinder Morgan Trans Mountain, Kinder Morgan Express, Enbridge Alberta Clipper, and the TransCanada Keystone pipeline. The Alberta Clipper and Keystone pipelines have added 885,000 barrels per day (BPD) of pipeline capacity out of Western Canada, bringing the total export capacity to 3.5 million barrels per day (MMBPD) of crude oil, as shown in Table 1.1.

Table 1.1: Alberta Export Pipelines

Export Pipelines			
Name	**Type**	**Destination**	**Capacity ('000b/d)]**
Enbridge Pipeline	Crude oil	Eastern Canada US East coast US Midwest	1,868.0
Kinder Morgan (Express)	Crude oil	US Rocky Mountains US Midwest	280.0
Kinder Morgan (Trans Mountain)	Crude oil and Refined Products	British Columbia US West Coast Offshore	300.0
Enbridge Alberta Clipper	Heavy crude	US Midwest	450.0
TransCanada Keystone	Light/heavy crude	US Midwest	435.0
Milk River Pipeline	Light oil	US Rocky Mountains	118.3
Rangeland Pipeline	Cold Lake blend	US Rocky Mountains	84.9
TOTAL			3,536.2

Source: (1) Energy Resources Conservation Board (ERCB), "Alberta's Energy Reserves 2009 and Supply/Demand Outlook 2010-2019", ST98-2010, June 2010; and (2) CAPP, "Crude Oil Forecast, Markets, and Pipelines", June 2010.

The oil sands production projection profile under the Realistic Scenario in CERI Study 122 forecasts a significant increase;[1] add to that the forecast for Western Canadian crude oil production, and it becomes apparent that the current pipeline infrastructure in Alberta will not be sufficient to transport forecasted oil sands volumes. Expansion will be required.

Overall conventional crude oil production out of Western Canada has slowed down in recent years. However, the use of newer technology in mature fields in Saskatchewan, Alberta, and Manitoba is expected to increase light crude oil production from these provinces during the next few years. In particular, the industry is optimistic over the potential growth in production from the Cardium and Viking oil plays in Alberta, which promises an increase in production volumes similar to that witnessed recently from the Bakken formation in Saskatchewan.

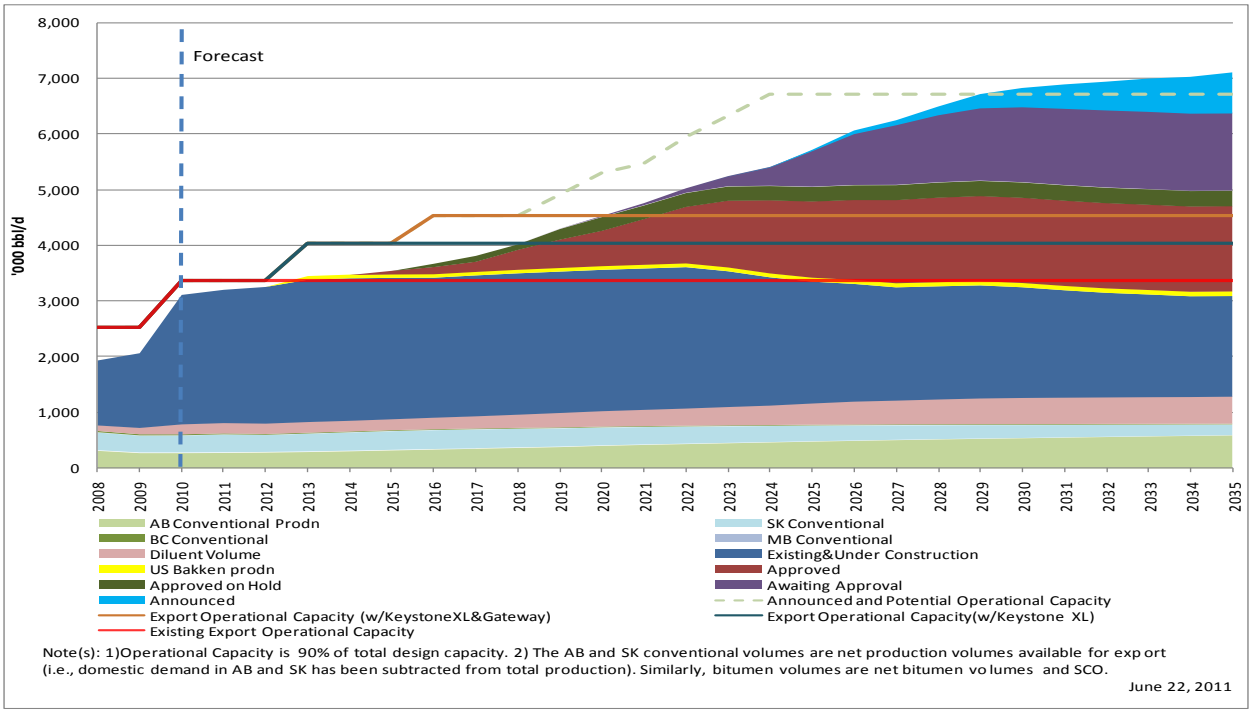
Figure 1.1 illustrates the historical and forecasted production levels from conventional crude sources in Western Canada. These include production volumes from conventional oil resources in Alberta and Saskatchewan, which are increasing at the beginning of the forecast period and levelling off in the latter part. The volumes out of British Columbia and Manitoba are also included; however, their production volumes are much smaller and may not be visible on the graph.

Figure 1.1 also includes Bakken production from the US. Since TransCanada has signed contracts with oil producers in the US[2] to carry crude from the US Bakken play via the Keystone XL pipeline, 65,000 BPD of US Bakken production is included. This is projected to increase to 100,000 BPD over the projection period. This crude is assumed to come on stream the year Keystone XL becomes operational.

[1]For more information about the oil sands production forecasts and to download CERI Study 122, "Canadian Oil Sands Supply Costs and Development Projects (2010-2044)", see http://ceri.ca/images/stories/CERI%20Study%20122.pdf.

[2]The Bakken formation in the Williston Basin underlies parts of North Dakota, eastern Montana, and north western South Dakota. Current Bakken production is approximately 350,000 BPD, much of which is currently taken away by rail and truck.

Figure 1.1: Pipeline Capacity and Crude Exports



Source: CERI.

In addition, the graph presents historical and forecast volumes available for export from oil sands production. These are net bitumen and synthetic crude oil (SCO) volumes broken down by project status. The sudden jump in production from existing and under construction oil sands projects from 2009 to 2010 can be explained by an increase in production from four large mines belonging to Syncrude, Suncor, and CNRL. A large portion of bitumen and SCO volumes will come from the existing and under construction projects, with significant potential growth exhibited in projects that are approved, awaiting approval, and announced. Diluent volumes, calculated as a percentage of total oil sands production, are also included in this forecast. This analysis does not address any shortfall in diluent supply and assumes the industry will secure supply when necessary.

The three solid lines in Figure 1.1 represent export operational capacities – the red line being the current existing capacity, the blue representing Keystone XL, and the orange depicting the Northern Gateway pipeline. These three pipelines comprise the first three cases of this report. The announced and potential pipeline capacity for Case 4 is represented by the grey, dashed line.

This study is based on probabilities and delays. If the Keystone XL and the Northern Gateway pipelines are approved, several of the approved oil sands projects will advance construction schedules within the limits of labour and materials availability. In short, the feasibility of these oil sands projects is predicated on assured pipeline access to markets.

Case Analysis

This section provides a detailed overview of four cases. In each case, the pipeline capacity sets an upper bound limit on how much crude can be sent via the pipelines. It is assumed that conventional crude from British Columbia, Alberta, Saskatchewan, Manitoba, the US Bakken, and diluent volumes retain first place in the pipeline and, hence, might "push out" some volumes from oil sands production.

Case 1 – Existing Pipelines Operations

This case represents the existing export pipeline capacity out of Alberta, which is 3.5 MMBPD. If no other pipeline is built, the current capacity will be able to transport conventional production from Western Canada, diluent volumes, and exports from the oil sands projects that are currently on stream and a portion of under construction projects. The portion of under construction projects that will fill the existing pipelines is determined by the difference between Case 1 total production[3] and the existing pipeline capacity. Here we do not explicitly judge individual projects from the under construction category that will be included in the existing pipeline capacity. The calculation is done at the aggregate industry level, where the projects are already summed accordingly, based on their project status. In fact, we assume one of two possibilities could occur: either some under construction projects will be halted or the entire supply side will be apportioned to pipeline capacity.

Case 1 omits the US Bakken production because crude from US Bakken will only come on stream when the Keystone XL pipeline's capacity is added to the total existing capacity. The total crude volume that can be transported via the current pipelines is represented by the area under the red line in Figure 1.1. In other words, if no other pipeline is constructed, the oil sands projects that are above the red line will not get built because there will be no take-away capacity to move these crude volumes to markets. The projects affected include those categorized as approved, approved – on hold, awaiting approval, and announced.

Case 2 – Existing Pipelines Operations + TransCanada Keystone XL Pipeline

Case 2 differs from Case 1 by adding the capacity of the proposed Keystone XL pipeline, which is shown as a blue line in Figure 1.1. With US State Department approval of the project, Western Canada's total pipeline capacity would expand by 700,000 BPD to 4.2 MMBPD in 2013. Case 2 includes all the crude volumes from Case 1. In addition, it takes into account US Bakken crude, oil sands under construction volumes that were not included in Case 1, and the portion of oil sands approved projects volumes that would fill Keystone XL to operational capacity. Similarly, as in Case 1, the portion of approved projects is determined by the difference between Case 2 production[4] and the sum of existing pipeline capacity and Keystone XL. Again, the difference is calculated at the aggregate level, not on the individual project level.

The Keystone Gulf Coast Expansion pipeline (Keystone XL) is a 36-inch crude oil pipeline that would begin at Hardisty, Alberta and extend southeast through Saskatchewan, Montana, South Dakota, Nebraska, Oklahoma, and Texas, as illustrated in Figure 1.2. The proposed pipeline would be built in two

[3]Case 1 production consists of Western Canadian conventional crude production, diluent, on stream and under construction projects.

[4]Case 2 production consists of Western Canadian conventional crude production, diluent, US Bakken, on stream, under construction and approved projects.

phases and have capacity to transport 700,000 BPD, delivering crude to the US Gulf Coast refineries.[5] The pipeline could ultimately transport up to 900,000 BPD by increasing its pumping capacity.[6]

Figure 1.2: Keystone XL Pipeline Project

Source: TransCanada, Inc.

The total crude volume that can be transported via the existing pipelines and the Keystone XL is represented by the area under the blue line in Figure 1.1. The difference between the red and blue lines is the impact Keystone XL would have on oil sands projects. In other words, if Keystone XL comes on stream, the additional volumes that can be transported lie between the red and blue lines. The oil sands projects that are above the blue line would not get built because there would be no take-away capacity to move these crude volumes to markets.

Case 3 – Existing Pipelines Operations + TransCanada Keystone XL Pipeline + Northern Gateway Pipeline

Case 3 sees the addition of the Northern Gateway pipeline, represented by the orange line in Figure 1.1, to already existing and Keystone XL capacities. The total pipeline capacity would then be expanded by 525,000 BPD in 2016 to almost 4.8 MMBPD. Case 3 includes all the crude volumes from Case 2; in addition, a portion of approved oil sands projects that lies between the blue and orange lines will be added to the total volume of crude that can be transported with inclusion of the Gateway pipeline. As with the two cases above, the portion of approved projects is calculated at the aggregate level.

[5]Congressional Research Service. "Keystone XL Pipeline Project: Key Issues". March 4, 2011.
[6]U.S. Department of State. "Draft Environmental Impact Statement for the Keystone XL Oil Pipeline Project". April 16, 2010.

The Enbridge Northern Gateway Pipelines Project is a proposal to construct two pipelines running from Bruderheim, Alberta to Kitimat, British Columbia – as shown in Figure 1.3. The eastbound pipeline would import natural gas condensate and the westbound pipeline would export crude oil. The crude oil pipeline, a 36-inch diameter line, would provide capacity of 525,000 BPD. The 20-inch condensate pipeline would run at a capacity of 193,000 BPD.

Figure 1.3: Northern Gateway Pipeline Project

Source: Enbridge

The total crude volume that can be transported via Keystone XL, Gateway, and all existing pipelines is represented by the area under the orange line in Figure 1.1. The difference between the blue and orange lines is the additional volumes from oil sands projects that can be transported to markets by Gateway. Cumulatively, if Keystone XL and Gateway become operational, the additional volumes that can be transported lie between the red and orange lines. The oil sands projects above the orange line will not get built because there will be no take-away capacity to move these crude volumes to markets.

Case 4 – Announced and Potential Capacity

This case is an if-you-come-they-will-build-it view of the potential growth in take-away pipeline capacity out of Western Canada. The grey, dashed line in Figure 1.1 represents the cumulative addition of all considered pipeline proposals. These pipelines are presented in Table 1.2.

Table 1.2: Announced and Potential Export Pipelines

Name	Type	Capacity ('000 b/d)	Destination
Kinder Morgan			
TMX2	Crude oil &RPPs	80	US West coast/Offshore/Far East
TMX3		320	
TMX Northern leg expansion	Crude oil &RPPs	400	British Columbia/US West coast/Far East
TCPL Keystone XL expansion	Crude oil	200	US Gulf Coast
Gas Transmission Northwest (GTN) conversion	Crude oil	500	US West coast/Offshore/Far East
Enbridge Southern Access Extension 1	Crude oil	400	US Gulf Coast
Enbridge Southern Access Extension 2	Crude oil	400	US Gulf Coast
Total		**2,300**	

Source: CAPP, CERI.

Some of these projects are more likely to come to fruition than others. For example, Kinder Morgan's TMX2, TMX3 and TMX Northern leg expansion are closer to being operational than the Enbridge Southern Access Extension. The conversion of one of the two gas pipelines to oil for Gas Transmission Northwest has only been mentioned a few times, but the Keystone XL expansion would only require increased pumping to bring total capacity up to 900,000 BPD.

If and/or when these pipelines become operational, they can add another 2.3 MMBPD by 2024 for a total export operational capacity approaching 7 MMBPD. The total crude volume that can be transported via this pipeline capacity is represented by the area under the grey, dashed line in Figure 1.1. Even with a significant increase to the take-away capacity, there remains a possibility that not all oil sands projects will be built. The portion that will be left out is above the grey line and represents projects from the announced category. The difference between the orange and grey lines is the additional volumes from oil sands projects that can be transported to markets by adding the announced and potential pipelines.

Methodology

Among the four cases, we recognize that the Keystone XL pipeline, the Northern Gateway pipeline, and the Announced and Potential Export Pipelines are intended to transport bitumen and SCO to different market destinations. More specifically, the Keystone XL and the Announced & Potential Export Pipelines would transport bitumen and SCO to the US market, while the Northern Gateway pipeline would provide transportation to the Pacific Ocean and the international oil market. In order to differentiate the economic impacts of the Alberta oil sands industry on the US and international markets, we have employed CERI's proprietary US-Canada Multi-Regional I/O Model (*UCMRIO 2.0*). We expect that the projects which deliver bitumen and SCO to the US will create stronger energy ties between Canada and the US. These stronger future energy ties, which will elevate the energy trade between the two countries, are not captured in the I/O tables.

The first case under discussion in this report, Existing Pipeline Operations, is based on the existing trade pattern between the US and Canada. CERI employs the *Reference Case* scenario of the above-mentioned I/O model to evaluate the economic impact of Alberta's existing oil sands projects on the US and Canadian economies.

As the Keystone XL Pipeline project has not yet received final State Department approval, judging its impact on North American crude transportation involves speculation on future developments. We therefore utilize a *Plausible Scenario* (see CERI Study 124[7] for more information on this scenario) to forecast economic impacts and how the US-Canada trade pattern could be affected.

The Northern Gateway Pipeline project, also not yet approved, would not have as profound an effect as Keystone XL on the US-Canada trade pattern because the entire pipeline would be located within Canada – crude would ship to a Canadian port for delivery to various international destinations, possibly including or not including the US. For these reasons, we return to the *Reference Case* scenario to analyze economic impacts expected with an operational Gateway pipeline.

Finally, this report analyzes the effects of all oil sands projects and the required transportation capacity to move the produced product. In this case, the destination of much of the crude will be US refineries. Therefore, there would be considerable implications for the US-Canada trade pattern; the *Plausible Scenario* is the economic tool used to measure impacts under this situation.

[7] "Economic Impacts of New Oil Sands Projects in Alberta (2010-2035), May 2011. http://ceri.ca/images/stories/CERI%20Study%20124.pdf

Results

This section describes the economic impacts of oil sands projects – both existing and new – over the period 2010-2035. The impacts are calculated both for Canada and the US, with Canadian impacts examined at the provincial level and US impacts broken down to PADD and state levels. The impacts under consideration are Gross Domestic Product (GDP), employee compensation, and employment; tax and royalty implications are also considered. The economic impacts associated with investment and operation of pipelines are outside the scope of this study.

Case 1 – Existing Pipelines Operations

This case examines the economic impacts of existing oil sands operations and those that are still under construction. It assumes no new pipeline capacity. The findings of this section serve as a baseline, relative to which the impacts of more expansive scenarios are to be compared.

Canadian Impacts

Cash injections into the oil sands industry over the next 25 years are estimated to be $2,190 billion and consist of the following:

a) investment outlays for projects currently under construction prior to commencing production, plus the gross value of their marketable bitumen and synthetic crude oil output over this period, plus
b) "sustaining investment" outlays over the projects' operating lives up to 2035 that are required to replace the worn out capital.

The cumulative sum of additional Canadian GDP from 2010 to 2035, as a result of the continued operation of existing projects and projects under construction is estimated at $2,283 billion (see Table 1.3). Employment in Canada (direct, indirect, and induced) is expected to grow from 390,000 jobs to a peak of 490,000 jobs in 2020 (Figure 1.4). Direct employment in Alberta is estimated at 132,000 jobs at the beginning of the study period, reaching a peak of 163,000 jobs in 2019. Compensation of Canadian employees will reach a cumulative total of $650 billion by 2035.

Table 1.4 further categorizes the person-years of employment into direct, indirect, and induced impacts. For every province except Alberta, the induced impact is the largest of all economic impact types. Alberta, however, captures the entire direct impact, and the induced impact is smaller than either the direct or the indirect impact within that province.

Figure 1.4 depicts the national pattern of employment creation and preservation in each year over the 25 year time frame of the study. The maximum employment impact occurs in the years 2017 to 2019.

Table 1.3: Economic Impact of Oil Sands in Alberta, 2010-2035 – Case 1 Investments and Operations

Investments and Operations	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alberta	2,165,038	581,607	10,372
British Columbia	28,776	15,886	426
Manitoba	4,323	2,341	67
New Brunswick	838	413	12
Newfoundland & Labrador	369	133	4
Northwest Territories	151	73	2
Nova Scotia	857	439	12
Nunavut	30	18	0
Ontario	64,888	37,283	882
Prince Edward Island	65	35	1
Quebec	14,066	7,842	211
Saskatchewan	4,525	1,964	55
Yukon Territory	40	25	1
Total Canada	**2,283,966**	**648,059**	**12,046**

Table 1.4: Jobs as a Result of Oil Sands Projects in Alberta, 2010-2035 – Case 1 Investments and Operations

Thousand Person Years	Direct	Indirect	Induced
Alberta	100.0%	82.3%	76.1%
British Columbia	0.0%	4.3%	6.3%
Manitoba	0.0%	0.7%	0.9%
New Brunswick	0.0%	0.1%	0.2%
Newfoundland & Labrador	0.0%	0.0%	0.1%
Northwest Territories	0.0%	0.0%	0.0%
Nova Scotia	0.0%	0.1%	0.2%
Nunavut	0.0%	0.0%	0.0%
Ontario	0.0%	9.6%	12.4%
Prince Edward Island	0.0%	0.0%	0.0%
Quebec	0.0%	2.1%	3.1%
Saskatchewan	0.0%	0.6%	0.7%
Yukon Territory	0.0%	0.0%	0.0%
SUM	100.0%	100.0%	100.0%

Figure 1.4: Jobs (x 1,000) Created and Preserved in Canada, 2010-2035 – Case 1

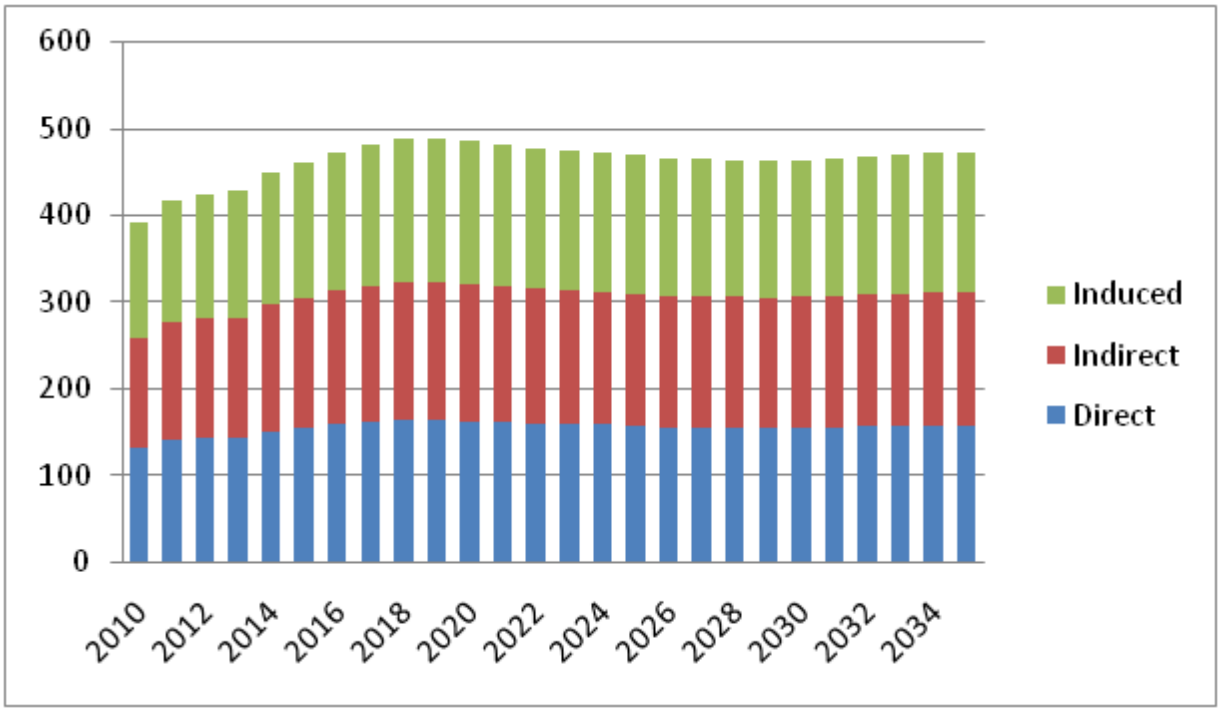


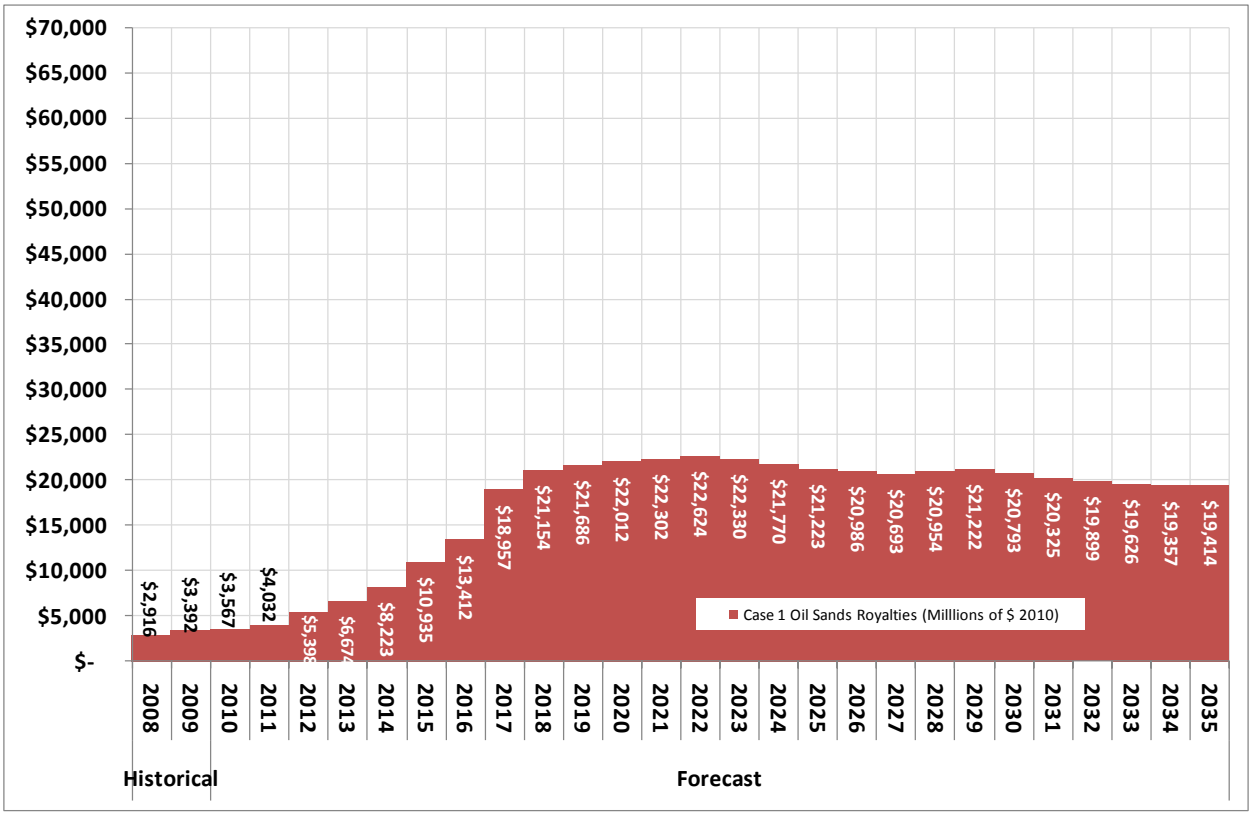
Table 1.5 summarizes the tax impacts by type of tax and by taxpayer's province. Note that in this format federal, provincial, and municipal taxes are shown together. Once again, Alberta leads the pack, followed by Ontario and British Columbia. Not shown in Table 1.5 are total royalties over the 25-year period of $450 billion, all payable to the Alberta government; those royalties are broken down year by year in Figure 1.5.

Table 1.5: Tax Receipts as a Result of Alberta Oil Sands Investments and Operations, 2010-2035 – Case 1
Federal and Provincial-Municipal

CAD Million	Indirect Tax	Personal Income Tax	Corporate Tax	Sum
Alberta	134249	206684	102024	442956
British Columbia	3808	3140	711	7660
Manitoba	657	473	77	1208
New Brunswick	119	91	20	230
Newfoundland & Labrador	37	27	13	77
Northwest Territories	14	8	8	29
Nova Scotia	137	106	26	270
Nunavut	2	2	0	4
Ontario	10343	7748	3216	21308
Prince Edward Island	11	8	1	20
Quebec	2602	2028	589	5219
Saskatchewan	738	418	255	1412
Yukon Territory	4	3	0	7

Royalties increase over the 2010-2022 time frame as a direct result of the increase in real oil price and the increase in royalty rates as a result of individual projects advancing from pre- to post-payout condition. After 2022, royalties remain flat as a result of declining production from older existing projects, even though real oil prices continue to increase.

Figure 1.5: Royalties Paid to the Alberta Government – Case 1



US Impacts

Total cumulative GDP impact in the US for Case 1 as a result of continued operation of existing oil sands projects and projects under construction is estimated to be CAD$210 billion over the 25-year projection period, approximately 10 percent of the total GDP generated in Canada. Total employment in the US is projected to grow from 80,000 jobs created and preserved to a peak of 94,000 jobs created and preserved in 2019. Cumulative compensation of employees in the US will reach CAD $100 billion by the end of the study period in 2035.

The total economic impacts on the US by PADD are presented in Table 1.6. Although these aggregate impacts are lower than those for Alberta, they are higher than all other provinces and territories combined. Table 1.7 shows the total economic impacts in the US on a state level for Case 1.

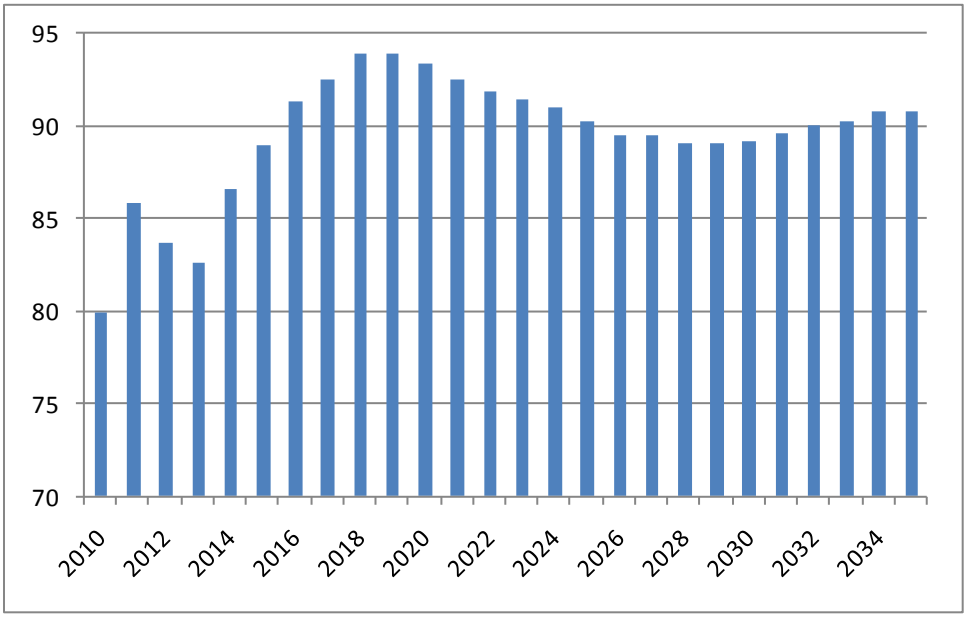
Table 1.6: Total Economic Impact of Alberta Oil Sands by US PADD – Case 1

2010-2035	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
PADD I	56,907	28,805	657
PADD II	75,972	37,523	868
PADD III	29,398	11,579	289
PADD IV	12,167	5,670	133
PADD V	36,088	16,827	381
Total US	210,531	100,403	2,328

Table 1.7: Total Economic Impact of Alberta Oil Sands in US by State, 2010-2035 – Case 1

	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alabama	1,890	948	28
Alaska	772	168	4
Arizona	2,533	1,243	33
Arkansas	1,107	521	17
California	22,155	10,292	221
Colorado	4,978	2,354	53
Connecticut	2,499	1,231	22
Delaware	700	260	6
District of Columbia	701	431	6
Florida	7,558	3,674	102
Georgia	4,158	2,165	56
Hawaii	585	268	8
Idaho	548	281	9
Illinois	26,437	12,886	264
Indiana	3,573	1,777	44
Iowa	1,563	686	21
Kansas	3,042	1,479	35
Kentucky	1,778	877	26
Louisiana	5,230	1,679	40
Maine	499	262	9
Maryland	2,557	1,315	31
Massachusetts	3,751	2,141	42
Michigan	6,618	3,510	80
Minnesota	3,000	1,559	38
Mississippi	1,123	541	17
Missouri	2,533	1,347	37
Montana	4,916	2,327	50
Nebraska	870	411	12
Nevada	1,333	639	17
New Hampshire	625	347	9
New Jersey	5,225	2,654	52
New Mexico	894	313	10
New York	11,342	5,739	104
North Carolina	4,568	2,031	54
North Dakota	305	129	5
Ohio	9,982	5,028	116
Oklahoma	2,011	817	24
Oregon	1,982	932	25
Pennsylvania	5,958	3,081	74
Rhode Island	495	243	6
South Carolina	1,637	881	26
South Dakota	369	143	6
Tennessee	2,729	1,398	40
Texas	19,153	7,577	177
Utah	1,157	561	16
Vermont	252	131	4
Virginia	3,789	1,930	45
Washington	6,727	3,284	72
West Virginia	591	287	9
Wisconsin	11,164	5,478	120
Wyoming	567	146	4
Total US	**210,531**	**100,403**	**2328**

Figure 1.6: Total Jobs (x 1,000) Created and Preserved in the US, 2010-2035 – Case 1



Case 2 – Existing Pipelines Operations + TransCanada Keystone XL Pipeline

This case considers the economic impacts of existing oil sands operations and those currently under construction. It assumes the Keystone XL pipeline comes on stream in 2013 and that a portion of approved oil sands projects not yet under construction will in fact become operational. The difference between the impacts of Case 1 and Case 2, therefore, is a measure of the impacts attributable to constructing and operating a portion of approved oil sands projects that require the capacity of the Keystone XL pipeline to deliver their output to market.

Canadian Impacts

Cumulative cash injections into the oil sands industry over the next 25 years for Case 2 are estimated to be $2,821 billion. The cumulative sum of additional Canadian GDP from 2010 to 2035, as a result of the continued operation of existing projects and projects under construction, and the development of new projects to support the Keystone XL pipeline is estimated at $2,916 billion (see Table 1.8). Employment in Canada (direct, indirect, and induced) is expected to grow from 390,000 jobs to a peak of 690,000 jobs in 2019 (Figure 1.7). Direct employment in Alberta is estimated at 132,000 jobs at the beginning of the study period, peaking at 229,000 jobs by 2019. Compensation of Canadian employees will reach a cumulative total of $834 billion by 2035.

Table 1.9 further categorizes the person-years of employment into direct, indirect, and induced impacts. For every province except Alberta, the induced impact is the largest of all economic impact types. Alberta, however, captures the entire direct impact, and the induced impact is smaller than either the direct or the indirect impact within that province.

Figure 1.7 depicts the national pattern of employment creation and preservation in each year over the 25-year time frame of the study. The maximum employment impact occurs in the year 2019.

Table 1.8: Economic Impact of Oil Sands in Alberta, 2010-2035 – Case 2 Investments and Operations

Investments and Operation	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alberta	2,761,936	748,617	13,394
British Columbia	37,363	20,622	553
Manitoba	5,659	3,062	88
New Brunswick	1,093	538	16
Newfoundland & Labrador	480	172	5
Northwest Territories	196	96	2
Nova Scotia	1,115	572	16
Nunavut	38	23	1
Ontario	83,830	48,202	1,141
Prince Edward Island	84	46	1
Quebec	18,238	10,176	274
Saskatchewan	5,997	2,602	72
Yukon Territory	52	32	1
Total Canada	**2,916,081**	**834,759**	**15,563**

Impacts, in terms of employment created and preserved, are shown in Table 1.9 by province and by the categories of direct, indirect, and induced employment. As in Case 1, the induced impact in each province except Alberta equals or exceeds the indirect impact, whereas in Alberta direct impact is greatest, followed by indirect impact and induced impact.

Table 1.9: Jobs as a Result of Oil Sands Projects in Alberta, 2010-2035 – Case 2 Investments and Operations

Thousand Person Years	Direct	Indirect	Induced
Alberta	100.0%	82.2%	76.0%
British Columbia	0.0%	4.4%	6.3%
Manitoba	0.0%	0.7%	1.0%
New Brunswick	0.0%	0.1%	0.2%
Newfoundland & Labrador	0.0%	0.0%	0.1%
Northwest Territories	0.0%	0.0%	0.0%
Nova Scotia	0.0%	0.1%	0.2%
Nunavut	0.0%	0.0%	0.0%
Ontario	0.0%	9.6%	12.4%
Prince Edward Island	0.0%	0.0%	0.0%
Quebec	0.0%	2.2%	3.1%
Saskatchewan	0.0%	0.6%	0.8%
Yukon Territory	0.0%	0.0%	0.0%
SUM	100.0%	100.0%	100.0%

Figure 1.7 portrays Case 2 employment impacts by year, classified by direct, indirect, and induced impacts. Employment impact reaches a plateau in 2018- 2019.

Figure 1.7: Jobs (x 1,000) Created and Preserved in Canada, 2010-2035 – Case 2

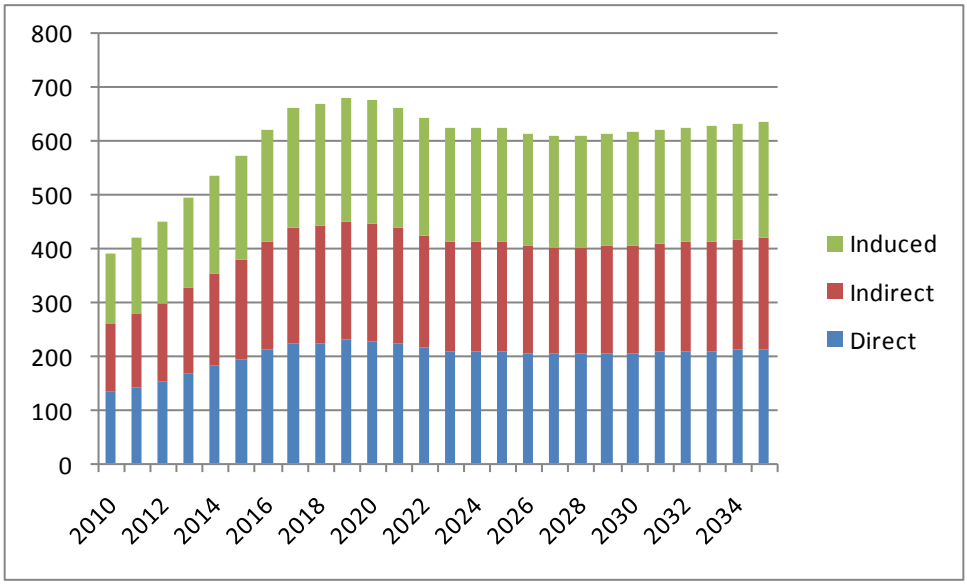
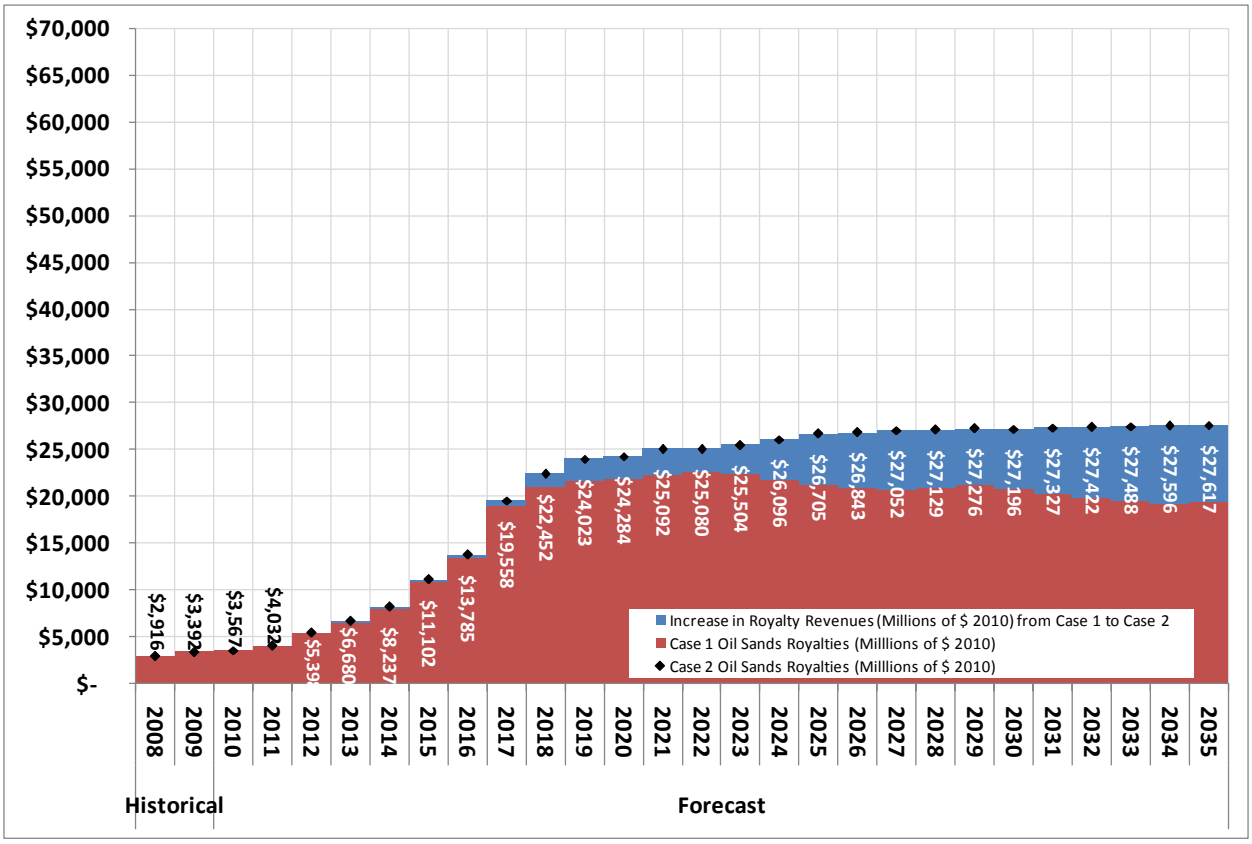


Table 1.10 summarizes the tax impacts by type of tax and by taxpayer's province. By far, Alberta collects the most revenue through tax, followed by Ontario and British Columbia. Figure 1.8 shows the annual royalties paid over the 25-year period which has a cumulative total of $551 billion, all payable to the Alberta government.

Table 1.10: Tax Receipts as a Result of Alberta Oil Sands Investments and Operations, 2010-2035 – Case 2
Federal and Provincial-Municipal

CAD Million	Indirect Tax	Personal Income Tax	Corporate Tax	Sum
Alberta	171,400	263,666	130,151	565,218
British Columbia	4,943	4,077	924	9,944
Manitoba	861	620	101	1,582
New Brunswick	155	118	26	300
Newfoundland & Labrador	49	35	17	101
Northwest Territories	18	10	10	38
Nova Scotia	179	138	34	351
Nunavut	2	3	1	6
Ontario	13,341	10,010	4,155	27,506
Prince Edward Island	15	10	2	27
Quebec	3,366	2,629	763	6,759
Saskatchewan	990	554	338	1,883
Yukon Territory	5	4	0	9

Figure 1.8: Royalties Paid to the Alberta Government – Case 1 + Case 2



US Impacts

Total cumulative GDP impact in the US for Case 2 as a result of continued operation of oil sands projects is estimated to be CAD$359 billion over the 25-year projection period, approximately 10 percent of the total GDP generated in Canada. Total employment in the US is projected to grow from 80,000 jobs created and preserved at the beginning of the study period to a peak of 179,000 jobs created and preserves in the year 2019. Compensation of employees in the US will reach a cumulative total of CAD$171 billion by the end of the study period in 2035.

As shown in Table 1.11, the greatest US impacts – in all three categories – are felt in PADD II, the Midwest region, which is the leading importer of Canadian liquid hydrocarbons. Table 1.12 shows the economic impacts on the US by state for Case 2.

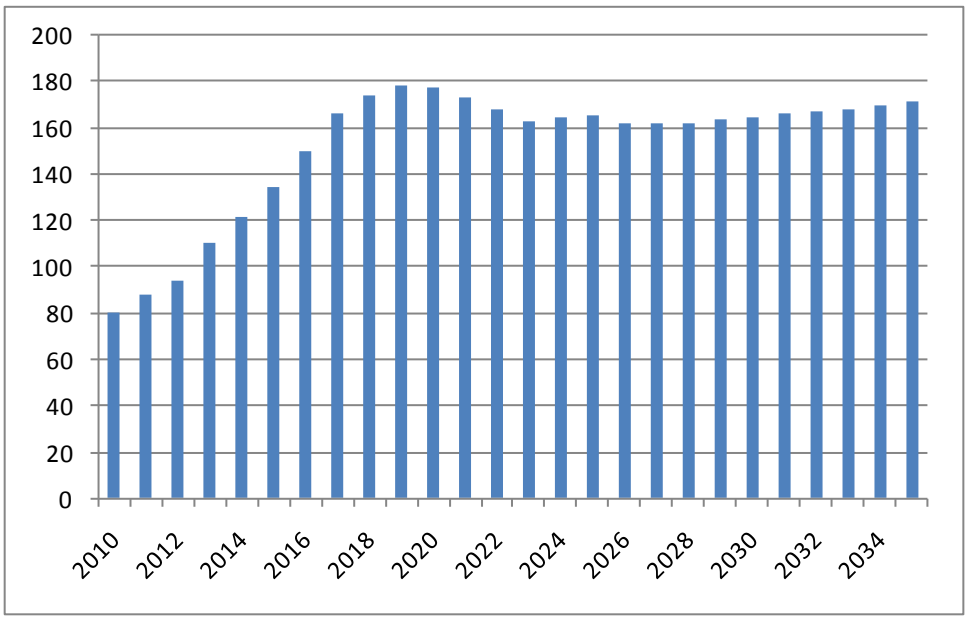
Table 1.11: Total Economic Impact of Alberta Oil Sands by US PADD – Case 2

2010-2035	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
PADD I	90,274	45,035	1,028
PADD II	139,551	68,070	1,576
PADD III	47,280	19,606	478
PADD IV	22,866	10,742	252
PADD V	59,195	27,763	631
Total US	359,167	171,216	3,965

Table 1.12: Total Economic Impact of Alberta Oil Sands in US by State, 2010-2035 – Case 2

	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alabama	3,007	1,489	41
Alaska	1,119	293	7
Arizona	4,087	1,991	51
Arkansas	1,737	820	24
California	35,236	16,472	360
Colorado	9,060	4,295	98
Connecticut	3,887	1,900	36
Delaware	1,094	434	9
District of Columbia	1,190	683	11
Florida	12,095	5,851	155
Georgia	6,587	3,359	84
Hawaii	958	444	13
Idaho	886	445	14
Illinois	52,118	25,179	544
Indiana	5,755	2,830	69
Iowa	2,436	1,089	31
Kansas	5,705	2,754	65
Kentucky	2,842	1,389	39
Louisiana	8,593	3,117	74
Maine	801	411	13
Maryland	4,153	2,095	49
Massachusetts	5,966	3,265	66
Michigan	11,691	5,997	137
Minnesota	4,798	2,441	59
Mississippi	1,826	877	26
Missouri	4,008	2,076	55
Montana	10,208	4,846	108
Nebraska	1,368	647	19
Nevada	2,093	1,002	26
New Hampshire	1,003	537	13
New Jersey	8,218	4,114	84
New Mexico	1,383	523	15
New York	17,858	8,908	172
North Carolina	7,128	3,221	83
North Dakota	490	214	7
Ohio	18,162	8,978	207
Oklahoma	3,126	1,319	37
Oregon	3,188	1,503	39
Pennsylvania	9,439	4,786	114
Rhode Island	787	384	9
South Carolina	2,618	1,369	39
South Dakota	584	240	8
Tennessee	4,344	2,186	59
Texas	30,734	12,780	297
Utah	1,863	900	25
Vermont	405	206	6
Virginia	6,097	3,054	71
Washington	12,515	6,057	135
West Virginia	951	459	13
Wisconsin	22,122	10,730	241
Wyoming	849	256	7
Total US	**359,167**	**171,216**	**3,965**

Figure 1.9: Total Jobs (x 1,000) Created and Preserved in the US, 2010-2035 – Case 2



Lost Growth if Keystone XL Pipeline Project Cancelled

In 2011, Western Canada's total pipeline export capacity stands at 3.5 MMBPD. The addition of the Keystone XL Pipeline would grow the export capacity by 700,000 BPD. Substantial GDP and employment increases would then follow throughout North America. However, if the project does not go ahead, Canada would forego $632 billion in additional GDP over the next 25 years, with 94 percent of the loss being felt in Alberta. The US would forego $148 billion in GDP, with 43 percent lost to PADD II, 22 percent lost to PADD I, 16 percent lost to PADD V, 12 percent lost to PADD III, and 7 percent lost to PADD IV.

In terms of employment, over the 25-year period, Canada would lose out on a total of 3.5 million person years of employment creation. Alberta would stand to lose the most because the vast majority of created employment would be within the province; more than 86 percent of foregone Canadian employment would be lost within Alberta. Ontario would lose 7 percent, followed by British Columba with 3.5 percent.

The US total of lost employment would be 1.6 million person years. PADD II would lose 43 percent of that total, followed by PADD I (23 percent), PADD V (15 percent), PADD III (12 percent), and PADD IV (7 percent).

In terms of uncollected federal, provincial, and municipal tax revenues in the event of the cancellation of Keystone XL, the most would be from Alberta – more than $122 billion in foregone tax collections, 92 percent of the total. Not surprising, considering that the majority of oil sands related employment occurs within Alberta, personal income tax would be most affected, with almost half of foregone revenues arising from that category. Indirect taxes make up a greater proportion of the total in other jurisdictions. Royalties foregone to the Government of Alberta would total $95 billion.

Case 3 – Existing Pipelines Operations + TransCanada Keystone XL Pipeline + Enbridge Northern Gateway Pipeline

Case 3 includes all of the projects considered in Case 2 and adds an additional portion of approved projects that can be accommodated by the Northern Gateway pipeline in operation by 2016. The difference between the impacts of Case 2 and Case 3, therefore, is a measure of the impacts attributable to constructing and operating the oil sands projects that would require the capacity of the Northern Gateway pipeline in order to deliver output to market.

Canadian Impacts

Cumulative cash injections into the oil sands industry over the next 25 years for Case 3 are estimated to be $3,208 billion. The cumulative sum of additional GDP from 2010 to 2035 as a result of the continued operation of existing projects, the start up of projects under construction, and the development of new projects to support the Keystone XL and Gateway pipelines is estimated at $3,317 billion (see Table 1.13). Employment in Canada (direct, indirect, and induced) is expected to grow from 390,000 jobs to a peak of 790,000 jobs in 2020 (Figure 1.10). Direct employment in Alberta is estimated at 132,000 jobs at the beginning of the study period, peaking at 268,000 in 2020. Direct employment includes people working at the individual oil sands sites and people working in the manufacturing industries that build products specifically required for the operation of these projects. Compensation of Canadian employees will reach a cumulative total of close to $950 billion by 2035.

The economic impacts presented for Case 3 are uniformly larger than for Case 2 (see Tables 1.14-1.16 and Figure 1.10). It should be noted that employment peaks in 2020, and nears that peak again by the last year under consideration in this study (see Figure 1.10). It is also notable that Table 4.3 does not report royalty revenue paid to the Government of Alberta, a total of $618 billion over the 25-year projection period; royalties are broken down by year in Figure 1.11.

Table 1.13: Economic Impact of Oil Sands in Alberta, 2010-2035 – Case 3 Investments and Operations

Investments and Operation	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alberta	3,142,308	851,065	15,222
British Columbia	42,446	23,428	628
Manitoba	6,425	3,477	100
New Brunswick	1,241	611	18
Newfoundland & Labrador	545	195	5
Northwest Territories	223	109	3
Nova Scotia	1,267	649	18
Nunavut	44	26	1
Ontario	95,274	54,779	1,296
Prince Edward Island	95	52	2
Quebec	20,721	11,561	311
Saskatchewan	6,802	2,951	82
Yukon Territory	59	37	1
Total Canada	**3,317,449**	**948,939**	**17,687**

Table 1.14: Jobs as a Result of New Oil Sands Projects in Alberta, 2010-2035 – Case 3 Investments and Operations

Thousand Person Years	Direct	Indirect	Induced
Alberta	100.0%	82.2%	76.0%
British Columbia	0.0%	4.4%	6.3%
Manitoba	0.0%	0.7%	1.0%
New Brunswick	0.0%	0.1%	0.2%
Newfoundland & Labrador	0.0%	0.0%	0.1%
Northwest Territories	0.0%	0.0%	0.0%
Nova Scotia	0.0%	0.1%	0.2%
Nunavut	0.0%	0.0%	0.0%
Ontario	0.0%	9.6%	12.4%
Prince Edward Island	0.0%	0.0%	0.0%
Quebec	0.0%	2.2%	3.1%
Saskatchewan	0.0%	0.6%	0.8%
Yukon Territory	0.0%	0.0%	0.0%
SUM	100.0%	100.0%	100.0%

Figure 1.10: Jobs (x 1,000) Created and Preserved in Canada, 2010-2035 – Case 3

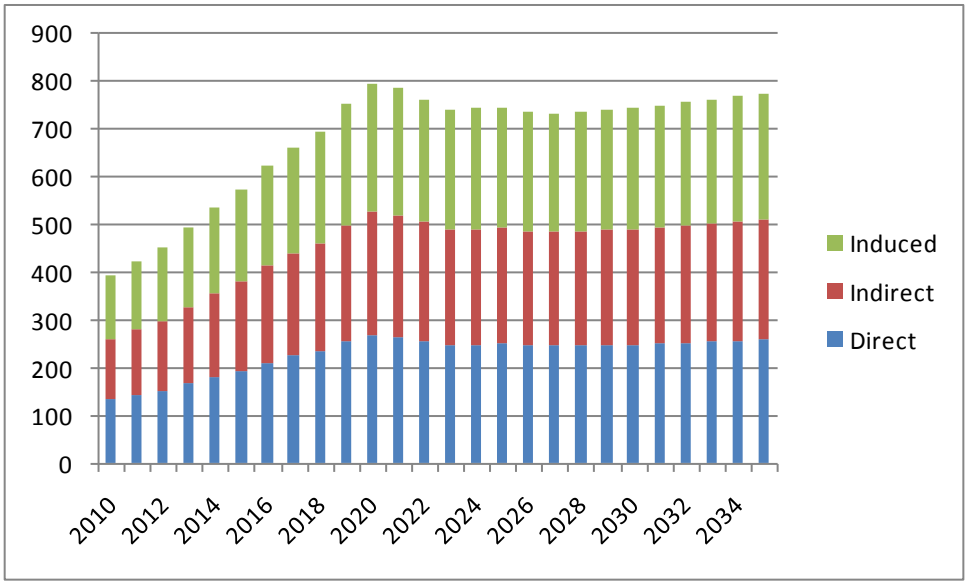
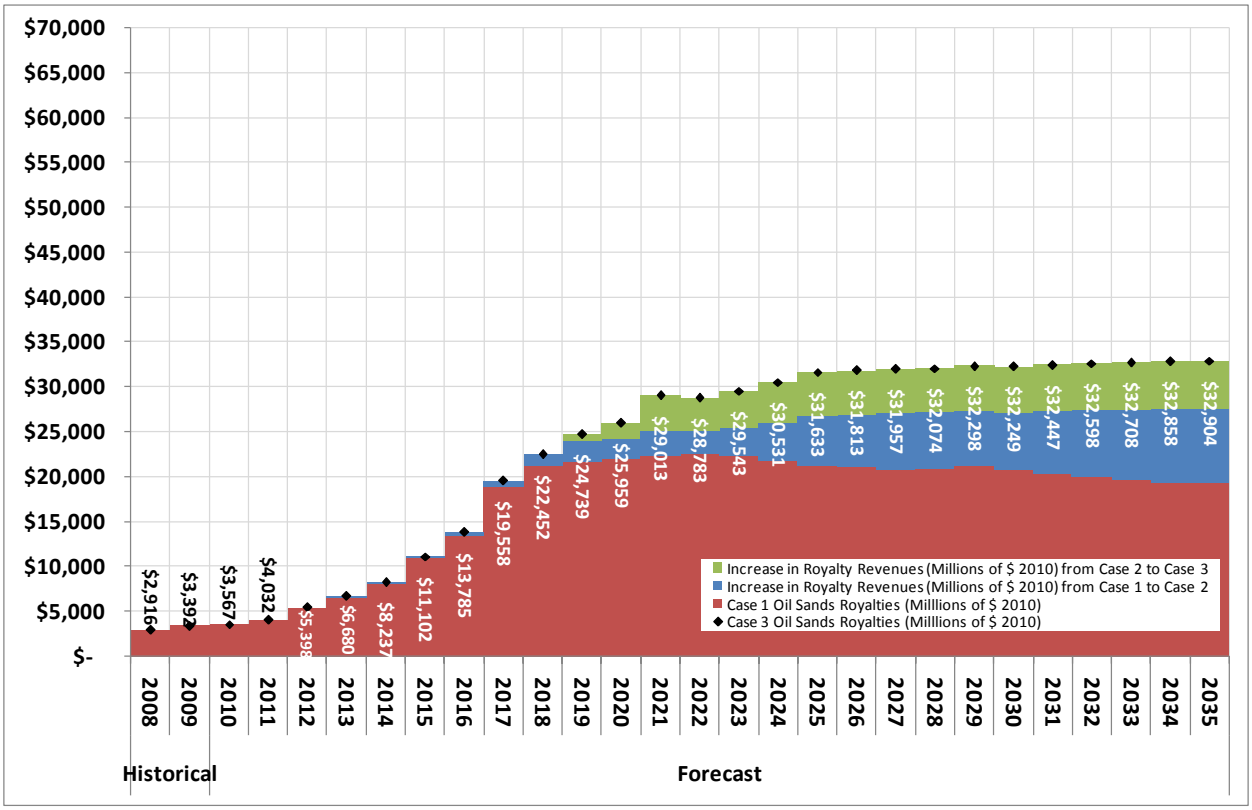


Table 1.15: Tax Receipts as a Result of Alberta Oil Sands Investments and Operations, 2010-2035 – Case 3
Federal and Provincial-Municipal

CAD Million	Indirect Tax	Personal Income Tax	Corporate Tax	Sum
Alberta	194,994	299,978	148,076	643,048
British Columbia	5,616	4,632	1,049	11,297
Manitoba	977	703	115	1,796
New Brunswick	176	134	29	340
Newfoundland & Labrador	55	40	19	114
Northwest Territories	20	12	11	43
Nova Scotia	203	157	39	398
Nunavut	3	3	1	6
Ontario	15,164	11,377	4,722	31,263
Prince Edward Island	17	11	2	30
Quebec	3,825	2,987	867	7,680
Saskatchewan	1,122	629	383	2,135
Yukon Territory	5	5	0	11

Figure 1.11: Royalties Paid to the Alberta Government – Case 1 + Case 2 + Case 3



US Impacts

Total cumulative GDP impact in the US for Case 3 as a result of continued operation of oil sands projects is estimated to be CAD$397 billion over the 25-year projection period. Total employment in the US is projected to grow from 80,000 jobs created and preserved to a peak of 200,000 jobs created and preserved in 2020. Cumulative compensation of employees in the US will reach CAD$189 billion by the end of the study period in 2035.

US GDP and employment figures are not affected as significantly for Case 3 as they are for Case 2 because the Gateway pipeline will ship crude primarily to destinations outside of North America. It will not, therefore, affect the US economy as profoundly as the Keystone XL which will transport the crude directly into the United States and its refineries along the Gulf coast.

Table 1.16 shows that the greatest US impacts – in all three categories – are felt in PADD II. Table 1.17 shows the economic impacts on the US by state for Case 3.

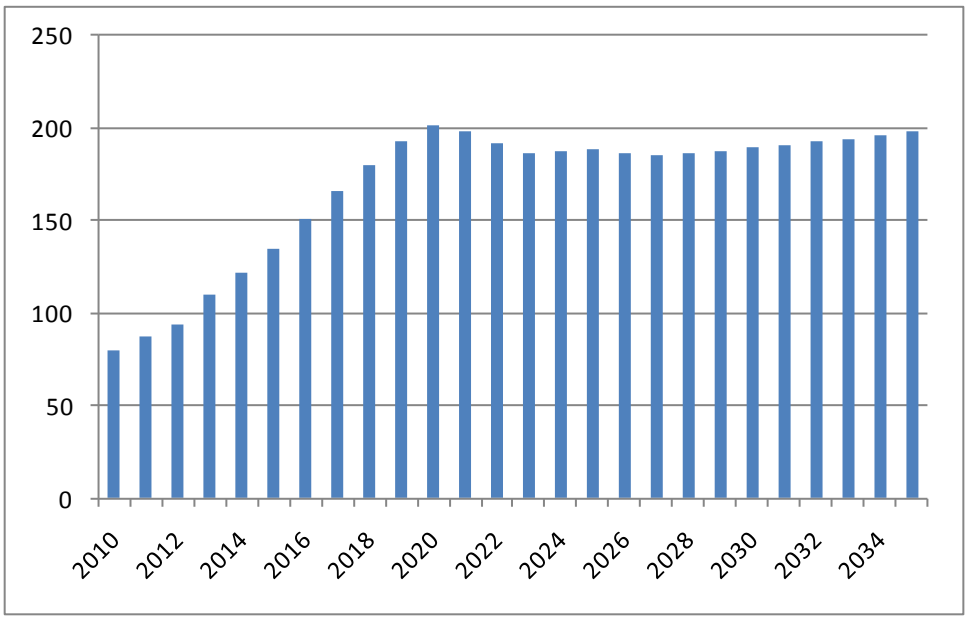
Table 1.16: Total Economic Impact of Alberta Oil Sands by US PADD – Case 3

2010-2035	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
PADD I	100,391	50,156	1,145
PADD II	152,982	74,704	1,730
PADD III	52,500	21,662	529
PADD IV	25,010	11,741	275
PADD V	65,608	30,753	699
Total US	396,491	189,016	4,378

Table 1.17: Total Economic Impact of Alberta Oil Sands in US by State, 2010-2035 – Case 3

	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alabama	3,344	1,658	46
Alaska	1,256	323	8
Arizona	4,538	2,213	57
Arkansas	1,934	913	27
California	39,178	18,304	399
Colorado	9,939	4,711	108
Connecticut	4,331	2,119	40
Delaware	1,218	480	10
District of Columbia	1,314	759	13
Florida	13,438	6,504	173
Georgia	7,326	3,743	94
Hawaii	1,062	491	14
Idaho	984	495	15
Illinois	56,766	27,445	590
Indiana	6,394	3,147	76
Iowa	2,715	1,212	35
Kansas	6,241	3,014	72
Kentucky	3,160	1,545	43
Louisiana	9,518	3,413	81
Maine	890	457	14
Maryland	4,607	2,328	55
Massachusetts	6,634	3,646	73
Michigan	12,868	6,621	151
Minnesota	5,333	2,719	66
Mississippi	2,025	974	29
Missouri	4,459	2,316	62
Montana	11,068	5,253	117
Nebraska	1,523	720	21
Nevada	2,329	1,115	29
New Hampshire	1,115	599	15
New Jersey	9,145	4,585	93
New Mexico	1,543	579	17
New York	19,872	9,928	190
North Carolina	7,942	3,583	92
North Dakota	544	237	8
Ohio	19,929	9,868	227
Oklahoma	3,484	1,464	41
Oregon	3,545	1,671	44
Pennsylvania	10,499	5,334	127
Rhode Island	875	427	11
South Carolina	2,910	1,526	43
South Dakota	650	265	9
Tennessee	4,831	2,436	67
Texas	34,136	14,125	328
Utah	2,069	1,000	28
Vermont	450	229	7
Virginia	6,770	3,397	80
Washington	13,701	6,636	148
West Virginia	1,056	510	15
Wisconsin	24,086	11,694	262
Wyoming	950	282	7
Total US	**396,491**	**189,016**	**4,378**

Figure 1.12: Total Jobs (x 1,000) Created and Preserved in the US, 2010-2035 – Case 3



Lost Growth if Northern Gateway Pipeline Project Cancelled

As mentioned previously, Western Canada's 2011 total crude oil pipeline export capacity stands at 3.5 MMBPD. Keystone XL would add 700,000 BPD to that capacity, and the Northern Gateway Pipeline would add another 525,000 BPD; it would also serve to open up passage to the Pacific Rim. This would mean a sizeable increase in GDP and employment numbers for Alberta and Canada. If the Northern Gateway is cancelled, however, Canada would lose $400 billion in additional GDP over the next quarter century – 95 percent of it lost within Alberta. The US would lose $37 billion in GDP, with 36 percent of that amount lost in PADD II, 27 percent lost in PADD I, 17 percent lost in PADD V, 14 percent lost in PADD III, and the remaining 6 percent lost in PADD IV.

Cancellation of the Gateway project would see Canada foregoing approximately 2.1 million person years of employment creation. Alberta would lose 86 percent of this total, with Ontario losing 5.4 percent and British Columbia losing 3.5 percent.

The US will also lose out on employment creation if the Gateway project is cancelled; a total of 413 thousand person years of employment would be foregone. PADD II would lose 37 percent of the total, followed by PADD I (28 percent), PADD V (16 percent), PADD III (12 percent) and PADD IV (5.7 percent).

Uncollected federal, provincial, and municipal tax revenues in the event of a cancellation of Gateway would be highest in Alberta – more than $77 billion in lost tax collections would be the result, which is 92 percent of the total foregone nationwide. Because most oil sands related employment occurs within Alberta, personal income tax would be most affected. Indirect taxes make up a greater proportion of the total in other jurisdictions. Royalties foregone to the Government of Alberta would total $74 billion.

Case 4 – Announced and Potential Capacity

Case 4 assumes that all oil sands projects, regardless of their current status, will proceed; it also assumes that the required pipeline capacity will be constructed in time to prevent transportation bottlenecks. The difference between the impacts of Case 3 and Case 4, therefore, is a measure of the impacts attributable to construction and operating all planned oil sands projects over the study period and gauging the transportation capacity required to deliver all possible output to market.

Canadian Impacts

Cumulative cash injections into the oil sands industry over the next 25 years for Case 4 are estimated to be $4,783 billion (see Figure 1.13). The cumulative sum of additional GDP from 2010 to 2035 as a result of the continued operation of existing oil sands projects, the start-up of projects under construction, and the development of new projects is estimated at $4,925 billion (see Table 1.18). Employment in Canada (direct, indirect, and induced) is expected to grow from 390,000 jobs to a peak of 1,600,000 jobs in 2035 (Figure 1.13). Direct employment in Alberta is estimated at 132,000 jobs in 2010 and could grow to 533,000 jobs by 2035 if all projects proceed. Compensation of Canadian employees will reach a cumulative total of $1,417 billion by 2035.

In terms of taxes, Table 1.20 shows that Alberta will see total taxes generated over the 25-year period approaching $1 trillion. This does not include royalties, which will move above $927 billion in total; the breakdown by year can be seen in Figure 1.14.

Table 1.18: Economic Impact of Oil Sands in Alberta, 2010-2035 – Case 4
Investments and Operations

Investments and Operation	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alberta	4,662,765	1,271,074	22,788
British Columbia	63,774	35,195	943
Manitoba	9,708	5,250	150
New Brunswick	1,871	921	26
Newfoundland & Labrador	820	292	8
Northwest Territories	335	163	4
Nova Scotia	1,907	977	27
Nunavut	65	39	1
Ontario	142,656	82,065	1,942
Prince Edward Island	144	79	3
Quebec	31,105	17,365	468
Saskatchewan	10,362	4,496	125
Yukon Territory	88	55	2
Total Canada	**4,925,599**	**1,417,971**	**26,487**

Table 1.19: Jobs as a Result of Oil Sands Projects in Alberta, 2010-2035 – Case 4 Investments and Operations

Thousand Person Years	Direct	Indirect	Induced
Alberta	100.0%	82.1%	75.9%
British Columbia	0.0%	4.4%	6.3%
Manitoba	0.0%	0.7%	1.0%
New Brunswick	0.0%	0.1%	0.2%
Newfoundland & Labrador	0.0%	0.0%	0.1%
Northwest Territories	0.0%	0.0%	0.0%
Nova Scotia	0.0%	0.1%	0.2%
Nunavut	0.0%	0.0%	0.0%
Ontario	0.0%	9.6%	12.4%
Prince Edward Island	0.0%	0.0%	0.0%
Quebec	0.0%	2.2%	3.1%
Saskatchewan	0.0%	0.7%	0.8%
Yukon Territory	0.0%	0.0%	0.0%
SUM	100.0%	100.0%	100.0%

Figure 1.13: Jobs (x 1,000) Created and Preserved in Canada, 2010-2035 – Case 4

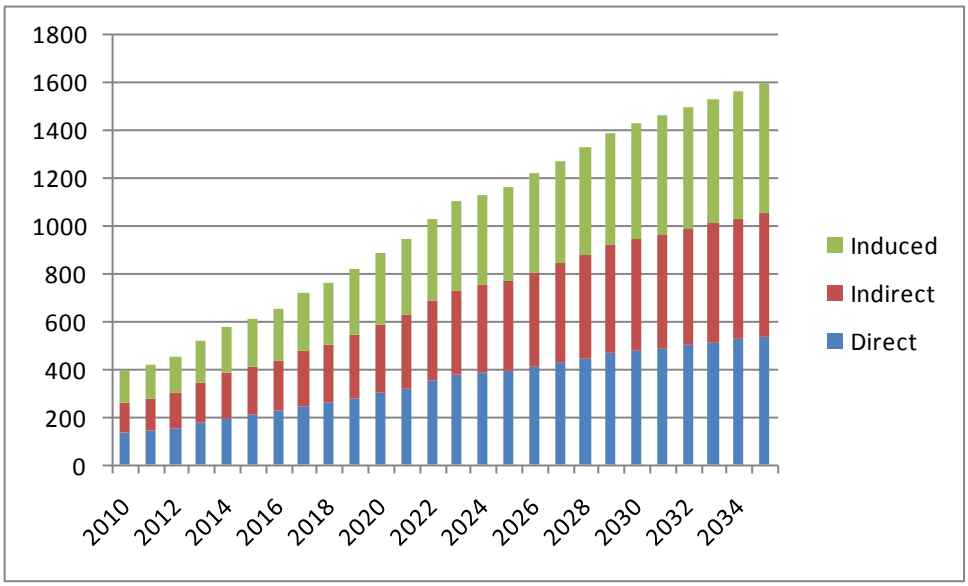
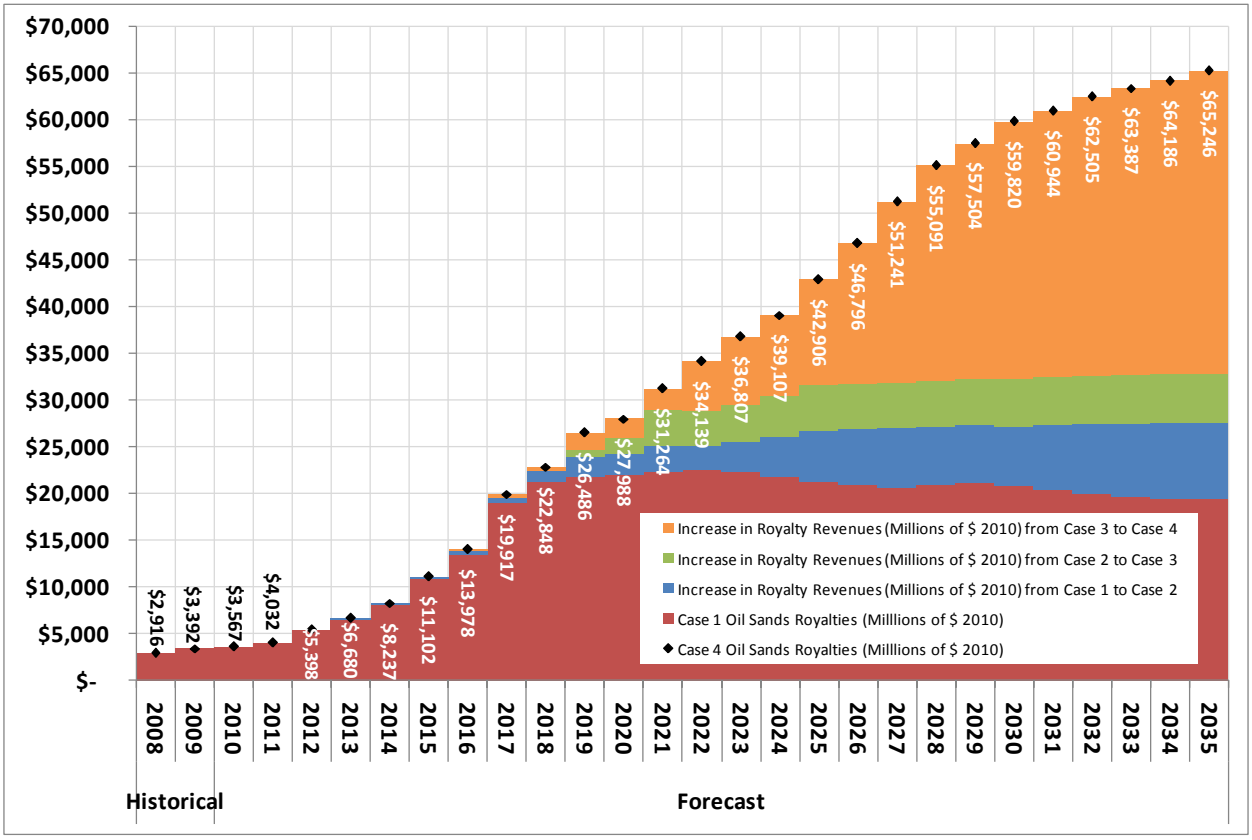


Table 1.20: Tax Receipts as a Result of Alberta Oil Sands Investments and Operations, 2010-2035 – Case 4
Federal and Provincial-Municipal

CAD Million	Indirect Tax	Personal Income Tax	Corporate Tax	Sum
Alberta	289,498	445,128	219,725	954,350
British Columbia	8,436	6,959	1,577	16,972
Manitoba	1,478	1,063	174	2,715
New Brunswick	266	203	44	513
Newfoundland & Labrador	83	60	28	172
Northwest Territories	30	18	17	65
Nova Scotia	305	236	58	599
Nunavut	4	5	1	10
Ontario	22,680	17,034	7,071	46,785
Prince Edward Island	25	17	3	46
Quebec	5,732	4,484	1,302	11,518
Saskatchewan	1,724	958	584	3,266
Yukon Territory	8	7	1	16

Figure 1.14: Royalties Paid to the Alberta Government – Case 1 + Case 2 + Case 3 + Case 4



US Impacts

Total cumulative GDP impact in the US for Case 4 is estimated to be CAD$774 billion over the 25-year projection period. Total employment in the US is projected to grow from 80,000 jobs created and preserved to a peak of 600,000 jobs created and preserved in 2035. Cumulative compensation of employees in the US will reach CAD $368 billion by the end of the study period in 2035.

There is a significant difference in the US impacts for Case 4 compared to the US impacts for Case 3. The Northern Gateway pipeline, which determines Case 3 outcome, would be built entirely within Canada and would ship crude to a number of international destinations – not just the US. However, the infrastructure considered in Case 4 would be built to deliver crude almost exclusively to US markets; thus the impacts on the US would be considerable.

Table 1.21 indicates that the greatest US impacts would be felt in PADD II. Table 1.22 shows the economic impacts on the US by state for Case 4.

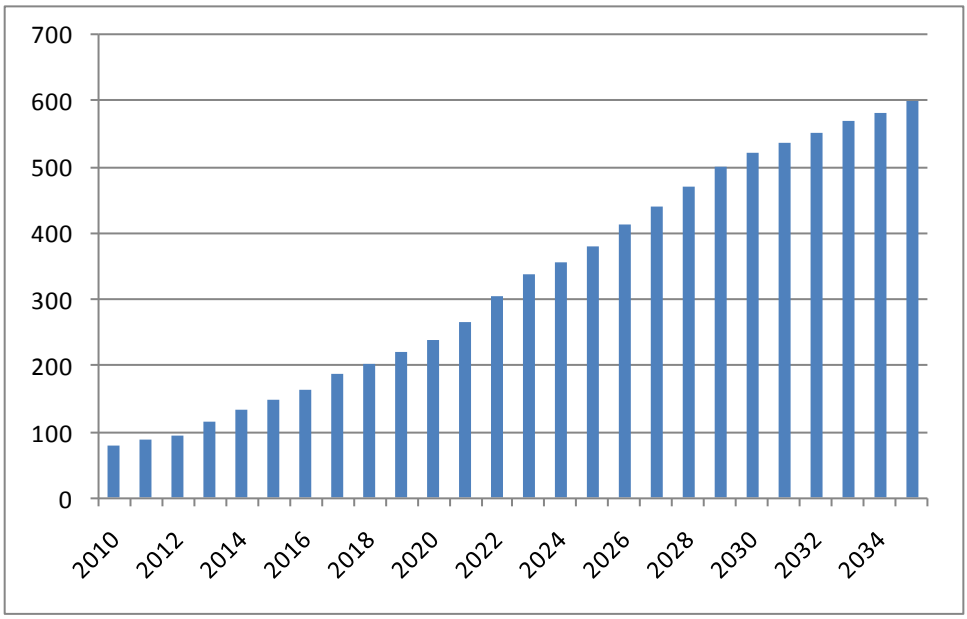
Table 1.21: Total Economic Impact of Alberta Oil Sands in US by State, 2010-2035 – Case 4

2010-2035	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
PADD I	183,955	90,649	2,069
PADD II	316,141	152,821	3,527
PADD III	97,529	41,925	1,004
PADD IV	52,667	24,821	578
PADD V	123,759	58,220	1,324
Total US	774,052	368,436	8,502

Table 1.22: Total Economic Impact of Alberta Oil Sands by US PADD – Case 4

	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alabama	6,120	2,998	80
Alaska	2,119	641	15
Arizona	8,421	4,076	101
Arkansas	3,504	1,655	46
California	71,864	33,719	745
Colorado	20,447	9,695	222
Connecticut	7,790	3,781	76
Delaware	2,209	918	20
District of Columbia	2,557	1,394	26
Florida	24,841	11,959	306
Georgia	13,417	6,723	165
Hawaii	2,009	937	25
Idaho	1,817	900	26
Illinois	123,467	59,264	1,309
Indiana	11,793	5,747	137
Iowa	4,864	2,206	60
Kansas	13,121	6,296	148
Kentucky	5,801	2,813	75
Louisiana	18,087	7,106	167
Maine	1,646	828	24
Maryland	8,619	4,280	100
Massachusetts	12,142	6,425	133
Michigan	25,706	12,885	294
Minnesota	9,817	4,909	117
Mississippi	3,791	1,815	51
Missouri	8,137	4,127	106
Montana	24,907	11,820	267
Nebraska	2,763	1,308	36
Nevada	4,249	2,029	51
New Hampshire	2,048	1,065	25
New Jersey	16,665	8,237	172
New Mexico	2,758	1,104	31
New York	36,223	17,852	359
North Carolina	14,289	6,533	163
North Dakota	1,002	447	14
Ohio	40,863	19,937	458
Oklahoma	6,258	2,716	72
Oregon	6,458	3,049	77
Pennsylvania	19,194	9,577	226
Rhode Island	1,607	779	19
South Carolina	5,347	2,730	73
South Dakota	1,186	506	16
Tennessee	8,832	4,382	114
Texas	63,269	27,246	630
Utah	3,838	1,845	49
Vermont	829	415	11
Virginia	12,573	6,213	144
Washington	28,640	13,770	311
West Virginia	1,959	942	26
Wisconsin	52,529	25,279	572
Wyoming	1,657	561	14
Total US	**774,052**	**368,436**	**8,502**

Figure 1.15: Total Jobs (x 1,000) Created and Preserved in the US, 2010-2035 – Case 4



Lost Growth if Further Pipeline Capacity Cancelled

Besides the Keystone XL and Northern Gateway projects, additional pipeline capacity would be needed in order to transport the volumes of crude bitumen produced, assuming that all oil sands projects – on stream, under construction, approved, approved – on hold, awaiting approval, and announced – are developed.

In this hypothetical situation, CERI projects that a total of 2.3 MMBPD of pipeline capacity, above and beyond Keystone XL and Gateway, could be feasibly constructed. This would grow export capacity significantly and bring a high degree of GDP and employment growth.

Cancellation of this extra capacity, though, would result in significant lost growth. Approximately $1.6 trillion of additional Canadian GDP growth over the study period would be lost, with 95 percent of that GDP lost within the province of Alberta. In the United States, an additional $377 billion in GDP would be lost, with 43 percent lost in PADD II, 22 percent lost in PADD I, 15 percent lost in PADD V, 12 percent lost in PADD III, and the remaining 7 percent lost in PADD IV.

Foregone employment in Canada would total approximately 8.8 million person years. Again, Alberta would lose the most, approximately 86 percent, with Ontario losing 7.3 percent, and BC losing 3.5 percent.

The US would also be affected substantially in terms of employment with about 60 percent as much employment at risk as Canada. In total, the US stands to lose 4.1 million person years of employment years, with PADD II losing 44 percent of the total, followed by PADD I (22 percent), PADD V (15 percent), PADD III (12 percent) and PADD IV (7 percent).

No construction of further pipeline infrastructure after Keystone XL and Gateway would affect federal, provincial, and municipal tax revenues in the following ways: Alberta would see more than $311 billion in foregone tax collections, which is 92 percent of the Canadian total. As discussed earlier, most oil sands related employment occurs within Alberta, therefore personal income tax would be most affected in that jurisdiction. Indirect tax makes up the greatest proportion of the total in other provinces, followed by personal and then corporate taxes. The nationwide total of foregone tax revenue, not including Alberta, would amount to approximately $339 billion. Royalties foregone to the Government of Alberta would total $302 billion.

Concluding Remarks

This report evaluated the economic impacts of staged development of Alberta's oil sands projects. The report showed that without additional pipeline capacity (assuming only the existing export capacity out of Western Canada), the benefits that will be lost in Alberta, Canada and the US are substantial.

As oil sands production increases, more pipeline capacity and more diluent will be needed. Pipelines will be needed within Alberta (i.e., regional pipelines) as well as outside Alberta to reach markets in the US and Pacific Rim through accessing Canada's West Coast. In an effort to continue to investigate issues pertaining to accessing markets and transportation, CERI will be undertaking a new study. A significant part of this new study will focus on the relative dynamics of the upstream and downstream industries and identify various markets for Canadian crude and how they can be accessed, specifically the energy-hungry Asian markets. Based on CERI's oil sands production forecast, we estimate the timing and magnitude of regional pipeline additions and discuss numerous proposals that have been announced for new pipeline projects. Also, we take a closer look at export pipeline proposals, including Northern Gateway and Trans Mountain that would help Canadian crude, namely oil sands bitumen to reach Pacific Rim.

Diluent supply – another major issue affecting the oil sands production – will be discussed in the new study as well. Condensate supply in Western Canada from natural gas production is near its peak, while diluent demand is increasing, reflecting higher bitumen production. Condensate is in short supply and this has resulted in a significant price premium. Some potential sources of condensate include imports and diluent recycling but economical transportation systems would be required. We will assess the potential for condensate imports, either from the US or internationally (through inclusion of an eastbound twin condensate pipeline of the Gateway project) and look at the potential impact the diluent may have on bitumen netback prices.