



# The Future of Alberta's Oil Sands Industry

More Production, Less Capital, Fewer Jobs

Ian Hussey





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Ian Hussey

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## About the Author

**Ian Hussey** is a research manager at Parkland Institute, and a steering committee member of the SSHRC-funded Corporate Mapping Project.



## About Parkland Institute

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## Executive Summary

Major restructuring and consolidation of the Alberta-dominated Canadian oil and gas industry has been taking place since 2014 (Hussey et al. 2018), when the lower-for-longer oil price scenario in which the province still finds itself began. This report explores the employment, capital spending, and operational spending implications of the ongoing restructuring and consolidation of the industry. More specifically, the report explains that oil sands industry maturation—which was significantly advanced over the latest commodity cycle—means there has been a recent shift in the industry from its growth phase (2000–2018) to its mature phase (2019 onward).

### Oil Sands Industry Shifts from its Growth Phase to its Mature Phase

The five overriding characteristics of the mature phase of the oil sands industry are provided in this section of the report. In short, the rate of oil sands production growth is expected to slow in the mature phase, and capital spending and related employment are not expected to return to the highs of the early 2010s. Adding new technologies and modularization trends into the picture casts further doubt on oil sands employment increasing significantly in the future.

Bitumen production grew 376% from 2000 through 2018, for an impressive compound annual growth rate (CAGR) of 8.6%. By comparison, oil production in the rest of Canada grew 45% over the same period, and Alberta conventional oil production declined by a third. Compared to a CAGR of 8.6% throughout the oil sands growth phase (2000–2018), the Canadian Energy Regulator predicts that bitumen production will grow at a CAGR of 1.68% from 2018 to 2040, for an overall growth of 1.41 million barrels per day by 2040, or 41% over 2018 levels.

### Canadian Oil and Gas Employment Trends

Peak employment for the Canadian oil and gas industry in the last decade came in 2014. Industry employment then decreased significantly for three years, increased slightly in 2018, and then further declined in 2019. The net result is the Canadian oil and gas industry terminated an estimated 53,119 jobs from 2014 through 2019.

### Canadian Oil Spending Trends

Capital spending (CapEx) in the Canadian conventional oil industry saw an estimated decrease of 58.2% from 2014 through 2019, and oil sands CapEx experienced an estimated decrease of 64.6% in the same timeframe. Oil sands operational spending (OpEx) experienced an estimated decrease of 15.7% from 2014 through 2019, while OpEx in the Canadian conventional oil industry was estimated to be 4.1% higher in 2019 compared to 2014.



In May 2019, the Alberta Energy Regulator (AER) published its annual Alberta Energy Outlook, predicting that oil sands CapEx will “moderately increase” in 2020 and 2021 but then “decrease from 2022 to 2028.” The AER noted there was only one possible new oil sands mine (Teck’s Frontier mine, which the company withdrew the application for on February 23, 2020) and in situ CapEx is expected to focus on low-cost expansions, not new facilities. So, oil sands CapEx is not expected to bounce back to boom-time levels and is forecast to further decline in the next decade. This is because the massive CapEx of the growth phase of the oil sands industry is over and, as a mature industry, the oil sands are expected to see less CapEx going forward.

## **An Update on the Big Five Canadian Oil Companies**

### *The Big Five’s fossil fuel production and proven reserves, 2018*

The Big Five are Suncor Energy, Canadian Natural Resources Limited (CNRL), Imperial Oil, Cenovus Energy, and Husky Energy. In 2018, the five firms maintained their status as the largest Canadian oil companies. Suncor continues to be the largest bitumen producer in Canada, and Suncor continues to be strictly an oil company. CNRL remains the top Canadian gas producer, the top overall oil producer in Canada, and the largest overall Canadian producer of oil and gas. Cenovus is Canada’s fifth largest gas producer, Husky is 12th, and Imperial is 17th.

### *The Big Five’s key economic variables, 2018*

In 2018, the Big Five’s assets were worth a total of \$273 billion, down \$5.82 billion, or 2.1%, from 2017. The Big Five’s aggregate gross revenue for 2018 was \$140.81 billion, up \$25.58 billion, or 22.2%, from 2017.

The total net earnings for the Big Five in 2018 were about \$7 billion, down \$6.74 billion, or 49%, from 2017. The net earnings of CNRL, Imperial, and Husky all went up in 2018 compared to 2017. Suncor’s net earnings were down about \$1.1 in 2018 compared to 2017.

The Big Five’s total net earnings were largely down in 2018 because Cenovus recorded a significant net loss for the year. Cenovus’ net loss was in part due to a \$2.1 billion write-off of exploration expenses in the Deep Basin. Cenovus also reduced its debt from \$13 billion in mid-2017 (after the big asset purchase from ConocoPhillips) to \$8.4 billion by the end of 2018.

The Big Five’s average net profit rate in 2018 was 4.1%. If you exclude Cenovus’ negative rate, the average net profit rate for the other four firms was 8.26%. The average net profit rate of the Big Five in 2017 was 10.5%. It is noteworthy that Cenovus had the highest net profit rate of the five companies in 2017—an impressive 19.44%.



In 2018, the Big Five transferred \$11.34 billion to their shareholders via dividends and share buybacks, up \$5.14 billion, or 82.9%, from 2017. In 2018, the Big Five transferred \$6.97 billion to various levels of government in the form of taxes, fees, and royalties. The five firms' total transfer to various governments was up \$2.25 billion, or 47.7%, in 2018 compared to 2017.

The Big Five's 2018 CapEx was \$16.69 billion, up \$558 million, or 3.46%, from 2017.

### *The Big Five's key economic variables, Q1–Q3 2019*

After nine months in 2019, the Big Five's assets were worth \$286.17 billion, up \$13.17 billion from 2018. The companies' aggregate gross revenue for the first nine months of 2019 was \$105 billion, which puts them on pace to match their 2018 total of \$140.81 billion by the end of 2019.

The total net earnings for the Big Five in the first nine months of 2019 was \$15 billion, which is more than double the 12-month total for 2018 of \$7 billion. The Big Five's average net profit rate for the first three quarters of 2019 was an impressive 14.2%. All of the companies had healthy profit rates in those nine months, with Cenovus, Suncor, and CNRL earning extraordinary profits of 12.85%, 17.8%, and 26.7%, respectively.

The Big Five transferred \$8 billion to their shareholders in the first three quarters of 2019, which almost puts them on pace to match their impressive 2019 total of \$11.34 billion.

The Big Five's CapEx for the first three quarters of 2019 was \$17.83 billion, which is higher than the 12-month total for 2018 of \$16.69 billion. Suncor and CNRL were responsible for about \$14 billion of this capital spending.

Most significantly, CNRL bought in situ and heavy crude oil assets from US-based Devon Energy for \$3.412 billion in June 2019. Devon Energy's divestment from Canada is the latest example of an international company divesting from the oil sands, following divestments by France's Total in 2015, Norway's Equinor in late 2016, and the Netherlands' Royal Dutch Shell and the US's ConocoPhillips in the first half of 2017.

Alberta's United Conservative Party (UCP) government is slashing the province's tax rate for large corporations from 12% in spring 2019 to 8% by January 2022. In their 2019 third quarter reports, the Big Five estimated gains from UCP tax cut as follows: Suncor, \$1.116 billion saved, 2019–2022; CNRL, \$1.618 billion saved, 2019–2022; Imperial, \$662 million saved, 2019–2022; Cenovus, \$663 million saved, 2019–2022; and Husky, \$233 million saved, 2019–2022. In sum, the Big Five estimate they will save \$4.292 billion in 2019–2022 from the UCP corporate tax cut.

### *The Big Five's capital expenditures, 2009–2018*

Suncor and CNRL had by far the highest CapEx of the Big Five during these 10 years. Cenovus spent the least of the five firms by over \$10 billion. In total, the Big Five's CapEx was a whopping \$212.63 billion over the decade.

The aggregate CapEx of the Big Five plummeted 40% in 2015 compared to 2014 because of the oil price downturn. The total CapEx decreased a further 25% in 2016 before recovering slightly in 2017 and 2018. In sum, the Big Five's 2018 CapEx was 52.6% of the 2014 total.

### *The Big Five's dividends paid to shareholders, 2009–2018*

In aggregate, the Big Five paid \$36.79 billion in dividends to their shareholders over the decade, with 35% of this total coming from Suncor. Suncor's annual dividend total increased every year, including large increases in the 2014–2016 bust period. Suncor's 2018 dividends were 580% higher than its 2009 dividends. CNRL had the second highest dividend total for the decade; CNRL's 2018 dividends were 694% higher than their 2009 dividends.

### *The Big Five's climate risk disclosures and scenario modelling*

Each of the Big Five has now made public statements about how they perceive and manage their climate risk. Three of the five firms have also begun to publicly disclose their modelling of possible future scenarios and how the effects of climate change and climate policies and regulations may affect their assets and business strategies in the coming two or three decades. The Big Five support governments putting a price on carbon, and all of the Big Five consider current and possible future carbon pricing levels when making business decisions.

The five firms have all reduced the greenhouse gas (GHG) intensity of their operations in the last five years, and they have plans to further reduce the GHG intensity of their operations in the 2020s. Each of the Big Five plan to increase their production of fossil fuels in the future, and therefore none of the five companies have plans to reduce the total emissions attributable to the burning of the fossil fuels they sell. The only realistic way for the Big Five to reduce the total emissions attributable to the fuels they sell is to reduce their rate of oil and gas production.

Several of the companies stress that even if public policies and regulations in the next two decades keep global warming to 2C above pre-industrial levels (the main target of the Paris Agreement), by 2040 the global demand for oil will be close to 70 million barrels a day (down about 30% from global demand in 2019). The Big Five believe leading Canadian oil producers will play a major role in meeting global demand in 2040. There is no indication from any of the Big Five that they believe that any of their current assets will be stranded during the global transition to a low carbon economy.

## Technological Innovations and Modularization

Besides the thousands of job terminations connected to the 2014 oil price crash and to industry consolidation since then, and the decrease in construction jobs connected to the more than 50% cut in capital spending, labour productivity gains in the oil sands and in the Canadian conventional oil and gas sectors are being driven by technological innovations and modularization. The ongoing trends in technological innovations and modularization pre-date the 2014 oil price crash, and have accelerated since the crash because the Canadian oil and gas industry shrunk their technical labour force with large-scale layoffs in 2014–2016.

I discuss four technological innovations and how they are reducing the labour requirements of the oil and gas industry, including:

1. driverless haul trucks in the oil sands,
2. horizontal multi-well drilling pads,
3. supervisory control and data acquisition, remote monitoring, and information technology and analytics, and
4. replicated designs and modularization.

In short, “smarter” capital spending through the development and use of various technological and modularization innovations means less engineering, construction, and operations jobs. Despite the growth in production, fewer and fewer employees are needed. In 2019, overall productivity per employee in Canada’s oil and gas industry was 47% higher than in 2011, and productivity in the oil sands was 72% higher in 2019 than 2011. This indicates that the jobs that have been lost in recent years are likely not coming back. Production is at an all-time high and has increased 23% since 2014, while jobs have declined by 23% since 2014.

Historically, the majority of oil-sands-related construction jobs were jobs to build new production facilities and the connected infrastructure. Not only has the industry moved from its growth phase to its mature phase, meaning fewer new facilities will be built going forward, but also, because of modularization and other technological innovations, the engineering, construction, and operation of new facilities will require less labour.

## Conclusion

Oil sands production has never been higher, yet CapEx and employment levels are down significantly compared to 2014. Labour productivity has increased in recent years because of advancements in technology and modularization. The current low employment levels relative to the highs of the early 2010s are expected to continue, and could worsen in the 2020s due to a combination of CapEx levels remaining well below the peak levels seen in 2014 and additional technological innovations which are likely to further increase labour productivity.

Even with additional takeaway capacity coming online in the next couple years (additions to Enbridge's Mainline and to crude-by-rail and the completion of the Line 3 expansion), the other factors examined in this report indicate that the majority of the 53,000 jobs terminated from 2014 to 2019 are not likely to return to the Canadian oil and gas industry. It is entirely possible that industry employment and CapEx will never again reach the heights seen in 2014.

The five leading Canadian oil companies continue to make healthy rates of profit and to transfer sizeable dividends to their shareholders. The Big Five routinely test their business decisions against various possible future scenarios and how the effects of climate change and climate policies and regulations may affect their assets and business strategies in the coming decades.

The governments of Alberta and of Canada must now decide on a course of action to manage our country's transition to a net-zero-emissions economy by 2050. Plans that take the global climate crisis seriously will necessarily involve the managed decline of oil and gas production in the next three decades.

## 1. Introduction

“The explosion of oilsands growth that propelled Alberta’s economy throughout much of the 21st century is over. In its place, industry should expect slower, more gradual increases in production, according to three recent outlooks.”

– “Top Operators 2018” (Daily Oil Bulletin and KPMG 2019, page 21)

Major restructuring and consolidation of the Alberta-dominated Canadian oil and gas industry has been taking place since 2014 (Hussey et al. 2018), when the lower-for-longer oil price scenario in which the province still finds itself began. This report explores the employment, capital spending, and operational spending implications of the ongoing restructuring and consolidation of the industry. More specifically, the report explains that oil sands industry maturation—which was significantly advanced over the latest commodity cycle—means there has been a recent shift in the industry from its growth phase (2000–2018) to its mature phase (2019 onward).

While the growth phase saw surging bitumen productive capacity from 2000 through 2018 (Hughes 2018), both capital spending and employment peaked in 2014 and have remained relatively low for the last five years. Having entered its mature phase, the next decade of the oil sands industry will be broadly defined by increasing bitumen production with less capital and fewer jobs.

Put another way, the rate of oil sands production growth is expected to slow in the mature phase, and capital spending and related employment are not expected to return to the highs of the early 2010s. Adding new technologies and modularization trends into the picture casts further doubt on oil sands employment increasing significantly.

My analysis begins in Section 2 with a discussion of the five characteristics of the oil sands industry’s mature phase. Sections 3, 4, and 6 dive deeper into the details of the industry’s shift from its growth phase to its mature phase, including trends in employment, spending, technological innovation, and modularization.

Building on two previous Corporate Mapping Project reports (Hussey et al. 2018; Hussey and Janzen 2018), Section 5 provides updated financial and climate risk analysis for the five largest Canadian oil companies—Suncor Energy, Canadian Natural Resources Limited (CNRL), Imperial Oil, Cenovus Energy, and Husky Energy—referred to here as the “Big Five.”

Section 7 contains my conclusions based on the research results.

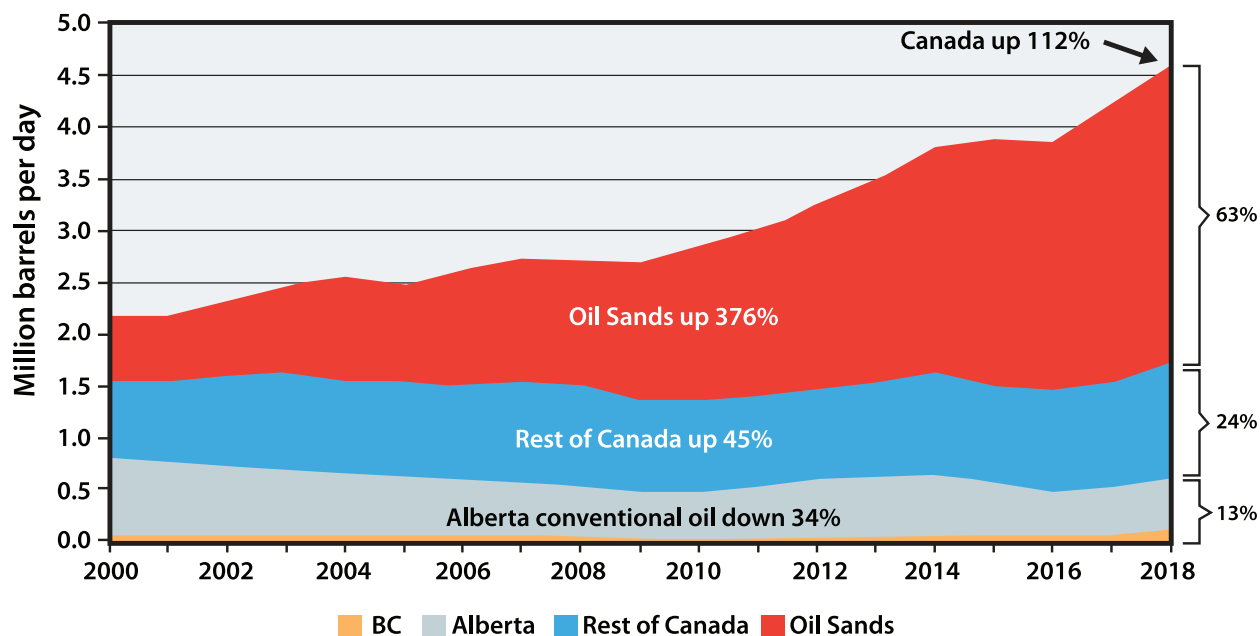
## 2. Oil Sands Industry Shifts from its Growth Phase to its Mature Phase

Figure 1 depicts the massive increase in oil sands productive capacity in the growth phase of the industry (2000–2018). Bitumen production grew 376% in this 19-year period, which equates to an impressive compound annual growth rate (CAGR) of 8.6%. Most of this growth occurred after the 2008–2009 global financial crisis.

Oil production in the rest of Canada grew 45% over the same period, a CAGR of 1.97%, and Alberta conventional oil production declined by a third, a CAGR of -2.16%. The oil production growth in British Columbia in the last five years barely registers at the bottom of Figure 1.

In sum, because of surging growth in bitumen, Canada’s overall oil production has more than doubled (up 112%) over the last two decades.

**Figure 1.** Canada Oil Production, 2000–2018



Source: Hughes, J.D., 2019, based on data from National Energy Board (now Canada Energy Regulator).

The growth phase of the oil sands industry culminated in the completion of Phase 3 of CNRL’s Horizon mine in 2017, and the completion of the Suncor-majority-owned Fort Hills mine in 2018.

As recently retired, long-time Suncor executive Steve Williams put it in 2017, “[Suncor is] coming to the end of a phase of substantial organic growth with Fort Hills and Hebron, and I don’t think I can be clearer: mining investments are coming to an end, not just for Suncor but for the industry, I believe, for a considerable period, probably in excess of 10 years” (Lunan 2017).

The completion of the Fort Hills mine marked the beginning of the oil sands' mature phase, which will broadly define industry activity for at least the next two decades. Compared to a CAGR of 8.6% in the oil sands growth phase (2000–2018), the Canadian Energy Regulator predicts that bitumen production will grow at a CAGR of 1.68% from 2018–2040, for an overall growth of 1.41 million barrels per day by 2040, or 41% over 2018 levels (see CER 2019).

The mature phase of the industry will be defined by five overriding characteristics:

1. Production growth will be slow and capital spending will be low relative to the growth phase.
2. Producers will mostly focus spending on maintaining capital assets, increasing the interconnectivity of their assets, and improving the efficiency and productivity of existing facilities. Improving efficiency and productivity will be driven by the ongoing technological innovations and modularization trends that began in the growth phase. Some in situ expansion projects and brownfield mine expansions will be undertaken, but with less engineering and construction jobs than in the growth phase because of technological advancements and the increasing use of replicable project designs. Teck's Frontier mine was the only possible new oil sands mine on the horizon (see Government of Canada 2019), but the company withdrew its application on February 23, 2020. Even if Teck had not withdrawn its application, in the current context of low oil prices (relative to the high prices in the 2004–2014 commodity boom period), it is possible that such a capital-intensive project would not have received a final investment decision because it would take decades to recoup the massive start-up costs and turn a worthwhile profit.<sup>1</sup>
3. Technological innovations and modularization of various aspects of the oil sands industry will continue the downward trend in oil-sands-related employment that began in the third quarter of 2014 and will continue to affect the kinds of skilled workers needed by the industry at this phase of its existence.
4. Highly educated workers with very specific skills and experiences in various scientific, engineering, and information technology fields will be in high demand by the industry, and competition among oil sands producers to employ these skilled workers will be fierce. There may be periods of labour shortages for certain occupations because many skilled workers moved on after the 2014–2016 downturn from the oil sands industry to career options that come with more job security and other benefits that a volatile industry like oil sands has a hard time competing with.

<sup>1</sup> According to Alberta Treasury Board and Finance, the breakeven price for a new oil sands mine is US\$75–85 per barrel; the breakeven price for a new in situ facility is US\$60/bbl and the breakeven price for an in situ expansion is US\$52/bbl (Government of Alberta 2019, 3). The breakeven price is the price of oil required for a production facility to earn a 10% return on investment.



5. The oil sands companies that win the competition to employ the most skilled and experienced scientists, engineers, and information technology workers will see the largest efficiency and productivity gains in their production facilities. Most likely, the winners will be the already-dominant producers and service companies, and this may lead to a deepening of the consolidation of industry ownership that began shortly after the 2014 oil price crash. If further consolidation of ownership occurs, it will likely lead to more job terminations as duplicate positions, particularly office jobs, are eliminated.

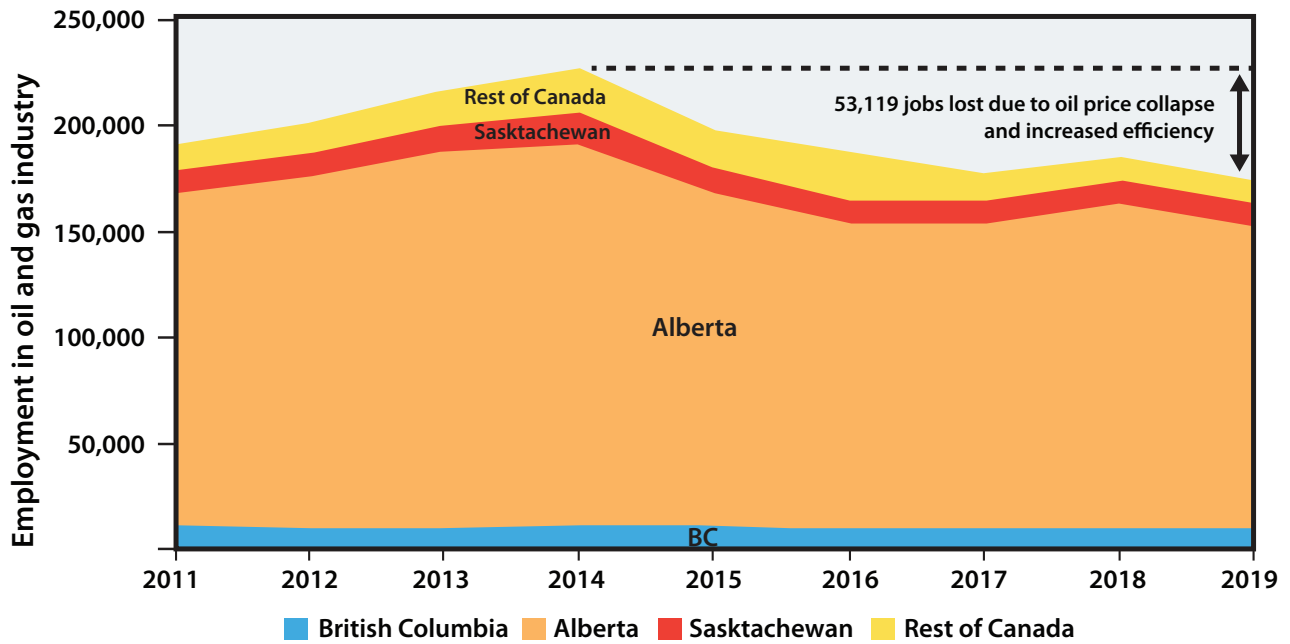
To put it bluntly, the mature phase of the oil sands industry will be defined by more production, less capital, and fewer jobs.

To begin to unpack the main issues raised in the above listed points, let's start by examining Canadian oil and gas employment trends.

### 3. Canadian Oil and Gas Employment Trends

The oil price downturn that began in mid-2014 saw significant industry restructuring and the perhaps permanent elimination of more than 50,000 oil and gas jobs in Canada (see Figure 2).

**Figure 2.** Employment in Oil and Gas Industry by Province, 2011–2019



Source: Hughes, J.D., 2019, based on data from Petroleum Labour Market Information (PetroLMI) <https://careersinoilandgas.com/what-is-lmi/labour-outlook/>

According to data from Petro Labour Market Information (see Figure 2), peak employment for the Canadian oil and gas industry in the last decade came in 2014. Industry employment then decreased significantly for three years, increased slightly in 2018, and then declined further in 2019. The net result is the Canadian oil and gas industry terminated an estimated 53,119 jobs from 2014 through 2019.

As employment in the oil and gas industry is inherently tied to capital and operational spending, Section 4 analyzes past oil industry spending levels and forecasted trends for the 2020s.

## 4. Canadian Oil Industry Spending Trends

Table 1 lists the 2005–2018 operational expenditures (OpEx) and capital expenditures (CapEx) of the Canadian conventional oil and oil sands industries. The 2019 estimates are forecasted totals from Petro Labour Market Information.

**Table 1.** The Canadian Oil Industry’s Operational and Capital Expenditures, 2005–2019 (in C\$ millions)

	Conventional CapEx	Conventional OpEx	Oil Sands CapEx	Oil Sands OpEx
2005	34,815	11,929	10,437	6,305
2006	38,574	13,599	14,337	8,051
2007	31,651	14,437	18,065	8,135
2008	36,327	15,533	18,113	11,105
2009	22,335	15,899	11,227	11,781
2010	35,666	17,127	17,195	13,275
2011	40,296	17,228	22,688	18,183
2012	39,733	18,002	27,199	20,089
2013	43,165	20,600	30,809	24,053
2014	46,872	21,229	33,868	24,305
2015	31,609	22,016	22,929	21,853
2016	23,036	21,088	15,426	20,108
2017	28,714	21,962	13,803	18,551
2018	27,442	23,874	11,661	21,812
2019 (forecast)	19,600	22,100	12,000	20,500

Source: Data for 2005–2018 are from CAPP’s Statistical Handbook. The forecasted numbers for 2019 are from PetroLMI’s 2019 Labour Market Update, page 6.

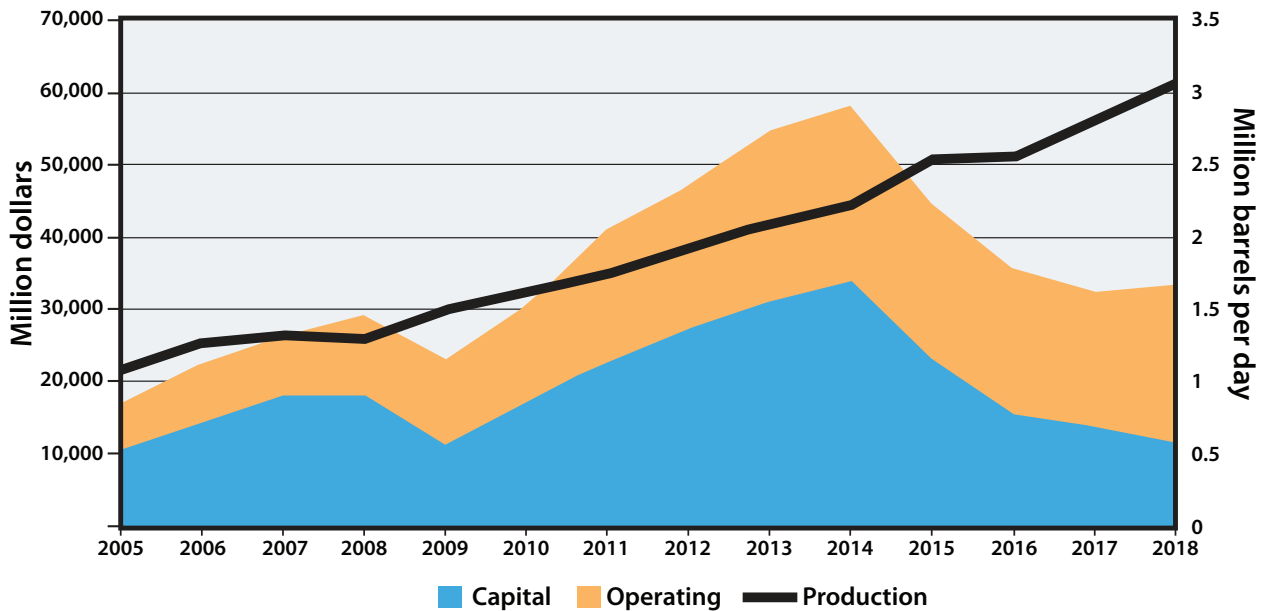
Table 1 shows the significant drop in CapEx in both the conventional oil and oil sands industries in the last five years. CapEx in the Canadian conventional oil industry saw an estimated decrease of 58.2% from 2014 through 2019, and oil sands CapEx experienced an estimated decrease of 64.6% over the same period. Oil sands operational spending (OpEx) experienced an estimated decrease of 15.7% from 2014 through 2019, while OpEx in the Canadian conventional oil industry was estimated to be 4.1% higher in 2019 compared to 2014.

In May 2019, the Alberta Energy Regulator (AER) published its annual Alberta Energy Outlook (see AER 2019), which predicts that oil sands CapEx will “moderately increase” in 2020 and 2021, but will then “decrease from 2022 to 2028” (Jaremko 2019a). The AER noted there was only one possible new oil sands mine (Teck’s Frontier mine, which the company withdrew the application for on February 23, 2020) and in situ CapEx is expected to focus on low-cost expansions, not new facilities. So, oil sands CapEx is not

expected to bounce back to boom-time levels, and is forecast to further decline in the next decade. This is because the massive CapEx of the growth phase of the oil sands industry is over and, as a mature industry, the oil sands are expected to see less CapEx going forward.

Figure 3 brings together the oil sands industry's CapEx and OpEx data for 2000–2018 with the data on daily bitumen production to highlight one of the main effects of the industry's maturation process: leading oil sands producers are now able to produce more bitumen with less capital (this dynamic is explored more in the following two sections).

**Figure 3.** Capital and Operational Expenditures in the Oil Sands Versus Bitumen Production



Source: Hughes, J.D., 2019, based on data from the Canadian Association of Petroleum Producers' Statistical Handbook retrieved January, 2020; production data from Canada Energy Regulator, 2019.

Having discussed general spending trends in Canada's oil industry, let's turn now to an updated financial and climate risk analysis of the five largest Canadian oil companies.

## 5. An Update on the Big Five Canadian Oil Companies

In 2018, Parkland Institute and the Corporate Mapping Project published two reports on the Big Five. Hussey and Janzen (2018) explores the implications of the Paris Agreement on the Big Five by analyzing the carbon liabilities embedded in their fossil fuel reserves. Hussey et al. (2018) explicates the accumulation dynamics of the “Big Five” through the latest commodity cycle of boom (2004–2014), bust (2014–2016), and restructuring and consolidation (2015 onward).

My new research and analysis on the Big Five is presented in the following six sub-sections on the five corporations:

1. Fossil fuel production and proven reserves for 2018.
2. Key economic variables for 2018.
3. Key economic variables for the first three quarters of 2019.
4. Capital expenditures for 2009–2018.
5. Dividends paid to shareholders for 2009–2018.
6. Climate risk disclosures and scenario modelling.

### *The Big Five’s fossil fuel production and proven reserves, 2018*

Table 2 shows the Big Five’s 2018 daily production totals for bitumen, total oil, and total oil and gas, as well as their proven (1P) reserves of bitumen, total oil, and total oil and gas.

**Table 2.** The Big Five’s Daily Fossil Fuel Production and Proven Reserves, 2018

Company	Bitumen production (bbl/d)	Total Oil Production (bbl/d)	Total Oil & Gas Production (boe/d)	Bitumen 1P Reserves (bbl)	Total Oil 1P Reserves (bbl)	Total Oil & Gas 1P Reserves (boe)
Suncor	630,900	684,300	684,800	4,510,000,000	4,633,000,000	4,633,000,000
CNRL	534,029	777,151	1,025,484	7,631,000,000	8,579,000,000	9,678,500,000
Imperial	355,000	361,000	383,000	3,936,000,000	4,008,000,000	4,101,166,667
Cenovus	362,996	395,450	483,458	4,831,000,000	4,915,000,000	5,167,166,667
Husky	124,200	203,800	252,300	889,700,000	1,101,200,000	1,315,883,333

Source: Oilweek’s 2019 Top 100 report.

In 2018, the five firms maintained their status as the largest Canadian oil producers. Suncor continues to be the largest bitumen producer in Canada, and also continues to be strictly an oil company (over 97% of its 1P reserves are bitumen). CNRL remains the top Canadian gas producer, the top overall oil producer in Canada, and the largest overall Canadian producer of oil and gas. Cenovus is Canada’s fifth largest gas producer, Husky is 12th, and Imperial is 17th.

*The Big Five's key economic variables, 2018*

Table 3 summarizes some key economic variables of the Big Five for 2018.

**Table 3.** The Big Five's Key Economic Variables, 2018 (in C\$ millions)

Company	Assets	Gross Revenue	Net Earnings	Net Profit Rate	Dividends & Share Buybacks	Taxes, Fees, & Royalties	CapEx
Suncor	89,579	39,592	3,293	8.32%	5,386	2,328.7	5,250
CNRL	71,559	22,282	2,591	11.63%	2,844	2,340	4,731
Imperial	41,456	34,964	2,314	6.62%	2,543	739	1,427
Cenovus	35,174	21,389	-2,669	-12.5%	245	887.7	1,704
Husky	35,225	22,587	1,456	6.45%	319	676.7	3,578
Big Five Total	272,993	140,814	6,985	4.1%	11,337	6,972	16,690

Source: All data are from the Big Five's 2018 annual reports, except data on taxes, fees, and royalties, which are from each firm's annual Extractive Sector Transparency Measures Act (ESTMA) disclosures.

In 2018, the Big Five's assets were worth a total of \$273 billion, down \$5.82 billion, or 2.1%, from 2017.

The Big Five's aggregate gross revenue for 2018 was \$140.81 billion, up \$25.58 billion, or 22.2%, from 2017.

The total net earnings for the Big Five in 2018 were just under \$7 billion, down \$6.74 billion, or 49%, from 2017. The net earnings of CNRL, Imperial, and Husky all went up in 2018 compared to 2017. Suncor's net earnings were down about \$1.1 billion in 2018 compared to 2017.

The total net earnings for the Big Five as a group were largely down in 2018 because Cenovus recorded a significant net loss for the year. Cenovus' net loss was in part due to a \$2.1 billion write-off of exploration expenses in the Deep Basin. The company also reduced its debt from \$13 billion in mid-2017 (after the big asset purchase from ConocoPhillips) to \$8.4 billion by the end of 2018.

The Big Five's average net profit rate in 2018 was 4.1%. Excluding Cenovus' negative rate, the average net profit rate for the other four firms was 8.26%. In comparison, the average net profit rate of the Big Five in 2017 was 10.5%. It is noteworthy that Cenovus had the highest net profit rate of the five companies in 2017—an impressive 19.44%.

In 2018, the Big Five transferred \$11.34 billion to their shareholders via dividends and share buybacks, up \$5.14 billion, or 82.9%, from 2017.

In 2018, the Big Five transferred \$6.97 billion to various levels of government in the form of taxes, fees, and royalties. The five firms' total transfer to

various governments was up \$2.25 billion, or 47.7%, in 2018 compared to 2017. In 2018, about four out of every five dollars (79.34%) were paid to various municipal, provincial, federal, and Indigenous governments in Canada, and 20.66% went to governments outside of Canada (where Suncor, CNRL, and Husky own and operate extractive assets).

The Big Five's total capital spending in 2018 was \$16.69 billion, up \$558 million, or 3.46%, from 2017.

CNRL led the Big Five in 2018 in their common aspiration to reduce costs. CNRL's costs per barrel were \$21.75 for oil sands and upgrading assets, while Suncor's costs for fully-owned oil sands operations were \$25.25 per barrel.

### *The Big Five's key economic variables, Q1–Q3 2019*

Table 4 summarizes the key economic variables of the Big Five for the first three quarters of 2019.

**Table 4.** The Big Five's Key Economic Variables, Q1–Q3 2019 (in C\$ millions)

Company	Assets	Gross Revenue	Net Earnings	Net Profit Rate	Dividends & Share Buybacks	CapEx
Suncor	93,335	29,391	5,234	17.8%	3,792	7,913
CNRL	78,532	18,059	4,819	26.7%	2,100	6,065
Imperial	41,907	25,979	1,929	7.43%	1,537	442
Cenovus	35,779	16,190	2,081	12.85%	183	868
Husky	36,612	15,425	971	6.3%	403	2,538
Big Five Total	286,165	105,044	15,034	14.22%	8,015	17,826

Source: All data are from the Big Five's 2019 third quarter reports.

Table 4 shows that after nine months in 2019, the Big Five's assets were worth a total of \$286.17 billion, up \$13.17 billion from 2018.

The companies' aggregate gross revenue for the first nine months of 2019 was \$105 billion, which puts them on pace to match their 2018 total of \$140.81 billion by the end of 2019.

The total net earnings for the Big Five in the first nine months of 2019 was \$15 billion, which is more than double the 12-month total for 2018 of \$7 billion.

The Big Five's average net profit rate for the first three quarters of 2019 was an impressive 14.2%. All of the companies had healthy profit rates in those nine months, with Cenovus, Suncor, and CNRL earning extraordinary profits of 12.85%, 17.8%, and 26.7%, respectively.



The Big Five transferred \$8 billion to their shareholders in the first three quarters of 2019, which almost puts them on pace to match their impressive 2019 total of \$11.34 billion.

The Big Five's CapEx for the first three quarters of 2019 was \$17.83 billion, which is higher than the 12-month total for 2018 of \$16.69 billion.

Suncor, CNRL, and Husky had the three largest CapEx totals in the first nine months of 2019.

Suncor is replacing three coke-fired boilers with two natural gas co-generation units in its Oil Sands Base Plant. Suncor continues to improve the integration of its bitumen assets, with a bi-directional pipeline between Base Plant and Syncrude slated to be operational in late 2020. Suncor has also recently built the first pan-Canadian network of electric vehicle charging stations and the company is investing \$300 million in new wind farms.

CNRL bought in situ and heavy crude oil assets from US-based Devon Energy on June 27, 2019 for a total cost of \$3.412 billion. Devon Energy's divestment from Canada is the latest example of an international company divesting from the oil sands, following divestments by France's Total in 2015, Norway's Equinor in late 2016, and the Netherlands' Royal Dutch Shell and the US's ConocoPhillips in the first half of 2017.

Husky is developing seven 10,000-barrel-per-day thermal bitumen projects between 2018 and 2023, two of which are now complete. The in situ expansion projects are being built with modular designs to reduce engineering and construction labour costs. The facilities will need low sustaining capital once they are operational.

CNRL made progress in its cost cutting efforts in 2019. In the third quarter of 2019, CNRL's costs were \$20.05 per barrel for oil sands mining and upgrading assets, down an impressive 7.8% compared to 2018. On the other hand, Suncor's costs for its oil sands operations in the third quarter of 2019 were \$26.60 per barrel, an increase of 5% compared to 2018. Suncor says the increase was caused by the ongoing curtailment of oil sands production by the Alberta government.

The Big Five are benefiting from the corporate tax cut introduced by Alberta's United Conservative Party (UCP) government in mid-2019, which will see a slashing of Alberta's tax rate for large corporations from 12% to 8% over four years. The rate was cut from 12% to 11% in July 2019, to 10% in January 2020, and it will be cut to 9% in January 2021 and 8% in January 2022.

In their 2019 third quarter reports, the Big Five estimated gains from the UCP corporate tax cut as follows: Suncor (\$1.116 billion saved, 2019–2022), CNRL (\$1.618 billion saved, 2019–2022), Imperial (\$662 million saved, 2019–2022), Cenovus (\$663 million saved, 2019–2022), and Husky (\$233 million saved, 2019–2022). In total, the Big Five estimate they will save \$4.292 billion in 2019–2022 from the UCP corporate tax cut.

### *The Big Five's capital expenditures, 2009–2018*

The Big Five's expansion of oil and gas extractive capacity in the last decade was spurred by substantial capital expenditures.

**Table 5.** The Big Five's Capital Expenditures, 2009–2018 (in C\$ millions)

Company	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Company Total
Suncor	4,246	5,833	6,850	6,959	6,777	6,961	6,667	6,582	6,551	5,250	62,676
CNRL	2,985	5,335	6,201	6,104	7,067	11,398	4,468	3,797	4,698	4,731	56,784
Imperial	2,285	3,856	3,919	5,478	6,297	5,290	2,994	1,073	993	1,427	33,612
Cenovus	1,984	2,208	2,792	3,449	3,269	3,058	1,714	1,034	1,670	1,704	22,882
Husky	2,762	3,852	4,800	4,701	5,028	5,023	3,005	1,705	2,220	3,578	36,674
Big Five Total	14,262	21,084	24,562	26,691	28,438	31,730	18,848	14,191	16,132	16,690	212,628

Source: Morningstar and the Big Five's 2018 annual reports.

Suncor and CNRL had by far the highest CapEx of the Big Five over the 10-year period. Cenovus spent the least of the five firms by almost \$11 billion. In total, the Big Five's CapEx was a whopping \$212.63 billion over the decade.

As a result of the oil price downturn, the aggregate CapEx of the Big Five plummeted 40% in 2015 compared to 2014. Total CapEx decreased a further 25% in 2016 before recovering slightly in 2017 and 2018. The result is that the Big Five's 2018 CapEx was just 52.6% of the 2014 total.

*The Big Five's dividends paid to shareholders, 2009–2018*

Table 6 shows the substantial dividends that the Big Five have paid to shareholders over the last decade.

**Table 6.** The Big Five's Dividends Paid to Shareholders, 2009–2018 (in C\$ millions)

Company	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Company Total
Suncor	401	611	664	756	1,095	1,490	1,648	1,877	2,124	2,333	12,999
CNRL	225	302	378	444	523	955	1,251	758	1,252	1,562	7,650
Imperial	341	356	373	398	407	441	449	492	524	572	4,353
Cenovus	158	601	603	665	732	805	528	166	225	245	4,728
Husky	1,020	1,020	495	574	1,184	1,182	1,203	27	34	319	7,058
Big Five Total	2,145	2,890	2,513	2,837	3,941	4,873	5,079	3,320	4,159	5,031	36,788

Source: Morningstar and the Big Five's 2018 annual reports.

In aggregate, the Big Five have paid \$36.79 billion in dividends to their shareholders over the decade, with 35% of this total coming from Suncor. Suncor's annual dividend total increased every year, including large increases in the 2014–2016 bust period. Suncor's 2018 dividends were 580% higher than its 2009 dividends, so its consistently large CapEx through the decade has clearly paid off for shareholders.

Like Suncor, CNRL's substantial CapEx over the decade has paid off for its shareholders. CNRL's 2018 dividends were 694% higher than its 2009 dividends. CNRL's dividends grew for the first seven years of the time period looked at in Table 6, before cutting its 2016 dividend payments by about 40%. CNRL's dividends bounced back in 2017 to match the 2015 total, and the firm's dividends increased again in 2018.

Imperial had the smallest 10-year total, but the firm's dividend payments have increased each year, resulting in 2018 dividends that were 67.7% higher than its 2009 dividends.

Cenovus' annual dividend payments increased steadily over the first six years of the period, but were cut sharply in 2015 and 2016. The firm's annual dividend total increased in 2017 and 2018, but the 2018 total is 69.6% lower than the 2014 peak.

For the size of the company, Husky paid out relatively high dividends until 2016. The firm's dividend payments bounced back a bit in 2018 after a two-year lag in 2016 and 2017. Husky had the third-highest dividend payments of the Big Five for the last decade, but the company's 2018 dividends were 73.5% lower than the 2015 peak.

### *The Big Five's climate risk disclosures and scenario modelling*

Following recommendations made in 2017 by the Financial Stability Board's Task Force on Climate-related Financial Disclosures (see TCFD 2017), each of the Big Five have now made public statements about how they perceive and manage their climate risk. Three of the five companies have also begun to publicly disclose their modelling of possible future scenarios and how the effects of climate change and climate policies and regulations may affect their assets and business strategies in the coming two or three decades. This subsection provides a brief discussion of the main assumptions and assertions put forward by each firm in their most recent climate risk report (see Suncor 2019; CNRL 2019; Imperial 2019; Cenovus 2020; Husky 2019).

In its 2019 climate risk report, Suncor states that its target is to reduce greenhouse gas (GHG) emissions intensity from oil production processes by 30% below 2014 levels by 2030. The company reduced the GHG intensity of its production processes by 10% from 2014 through 2018. Suncor believes that future technological advancements will need to be developed and deployed for the company to meet its 2030 GHG intensity target.

In 2018, Suncor's total emissions attributable to its operations were 22 million tonnes of carbon-dioxide-equivalent, an increase of 11% from 2017 because the Fort Hills mine started operations. Suncor predicts that annual total emissions from its operations will be higher than 22 million tonnes of carbon pollution in the years 2019 through 2023 because of planned increases in bitumen production.

Suncor tests its oil production growth decisions against the current and possible future carbon prices in Canada and other jurisdictions where it operates. The company also tests its business decisions against three long-term energy future scenarios, none of which currently include a scenario where global warming is held to the Paris Agreement's 2C limit (2C warming above pre-industrial levels), but the company is in the process of developing a 2C scenario. Suncor states that in each of its three possible future scenarios none of its existing assets will be stranded.

The three main factors that Suncor seems to be considering when evaluating its current and future climate risks are carbon prices, oil prices, and forecasts of oil demand change over time. For example, Suncor's report emphasizes that the world's population is forecast to grow to about nine billion people by 2050, and that global energy demand is also predicted to grow in the coming decades, with the future energy mix forecast to include all types of energy, including oil and gas. Suncor avers that consumer choice and behaviour must change in order for the world to avoid the worst effects of climate change, "given that 80% of overall carbon emissions occur at the point of consumption" (Suncor 2019, 3).

Like Suncor, CNRL plans to increase its fossil fuel production and reduce GHG intensity in the future. CNRL has reduced its corporate GHG emissions intensity by 20% from 2014 through 2018.

CNRL's 2019 climate report includes the company's views on the climate risk exposure of its oil and natural gas assets under the International Energy Agency's 2018 Sustainable Development Scenario (the company says this scenario is considered to align with the Paris Agreement's 2C limit). CNRL asserts that under the Sustainable Development Scenario, "the world would still have oil demand of close to 70 million bbl/d in 2040" (CNRL 2019, 3). CNRL believes that it and other leading Canadian hydrocarbon producers "should be a major part of meeting this global demand" (ibid).

CNRL has also developed two internal scenarios to gauge the climate risk of its assets and business strategies. One scenario is based on current public policies, and the other is based on a possible future where public policies and regulations keep global warming below 2C. Based on its analysis of these scenarios, CNRL asserts that its oil and gas "reserves face limited risk even under more ambitious climate change scenarios" (CNRL 2019, 19).

CNRL and its Big Five peers reiterate the points made by Suncor about forecasts for the world's population and energy demand in 2040. Like Suncor, CNRL asserts that investments in new technologies will further reduce the GHG intensity of its oil sands operations in future years. CNRL has "a long-term aspirational target of net zero emissions in [its] oil sands operations" (CNRL 2019, 18), but does not state when it hopes to reach net zero emissions in its operations.

In April 2019, Imperial published its inaugural climate risk report. The report explains that Imperial reduced the GHG intensity of its operations by 20% from 2013 to 2017, and that the firm plans to reduce its corporate GHG intensity by a further 10% in the next five years. The report also states that Imperial supports "a uniform and predictable cost of carbon across the economy" (Imperial 2019, 1), and that the company factors carbon pricing into its business decisions (ibid, 23).

Imperial's climate risk analysis is based on a long-term energy outlook produced by ExxonMobil, the US-based corporation that owns about 70% of Imperial. Imperial also considers "a theoretical 2C pathway [that] would generally lower demand for oil, natural gas and coal" relative to ExxonMobil's 2018 energy outlook (Imperial 2019, 2). Imperial asserts that under the 2C scenario "significant investment will be required in oil and natural gas capacity, as well as other energy sources, to meet growing global demand and offset natural field decline" (ibid). Imperial believes that production from its oil and gas assets "will be needed to meet global demand well into the future" (ibid).

In January 2020, Cenovus announced that it is further integrating environmental, social, and governance (ESG) frameworks and targets into its business strategies. Cenovus set a target to reduce its corporate GHG intensity by 30% below 2019 levels by 2030. The company's long-term goal is to reach net zero emissions from its operations by 2050. Cenovus' business strategies seem to take into account possible future scenarios, including key factors like carbon pricing and oil demand, but the exact details of its scenario modelling are unclear.

Husky's 2019 ESG report puts significant emphasis on workplace safety because the company has had three major incidents at its facilities in recent years (a 2016 oil spill in Saskatchewan, a 2018 refinery fire in Wisconsin, and a 2018 oil spill in the Atlantic Ocean off Newfoundland and Labrador). Like the other major Canadian oil producers, Husky notes that demand for hydrocarbons continues to increase and that producers must continually reduce their operations' GHG intensity to remain competitive. Husky believes that investments in new technologies will enable future reductions in its GHG intensity, but the company's 2019 ESG report does not include specific GHG intensity targets. Like the rest of the Big Five, Husky factors current and possible future carbon pricing scenarios into its business strategies (see Husky 2019, 20 and 24).

Each of the Big Five plan to increase production of fossil fuels in the future, and therefore none of the five companies have plans to reduce the total emissions attributable to the burning of the fossil fuels they sell. Remaining below the Paris Agreement's 2C limit through 2040 and beyond will require major oil and gas producers, including Canada's Big Five oil sands majors, to reduce the supply of hydrocarbons in the coming decades and thus the total global emissions attributable to the burning of fossil fuels.

In Section 2, I noted that advancements in various technologies and in modularization have already reduced oil sands employment and will continue to do so in the coming years. It is to this topic that I now turn.

## 6. Technological Innovations and Modularization

When the topic of automation in the oil sands is discussed in Alberta and elsewhere in Canada, the example that is most often mentioned is driverless haul trucks. Driverless trucks were pilot tested by Suncor in 2015 and the firm began to permanently eliminate its truck driving jobs in January 2018. North Steepbank, one of Suncor's three operated mines, eliminated all of its truck drivers just nine months later (Jaremko 2019b). Suncor says a total of 400 drivers will have their jobs terminated by the end of 2023 as the company achieves full automation of its haul trucks (The Canadian Press 2018). CNRL and Imperial Oil are also pilot testing automated trucks in their oil sands mines (McDermott 2018), and it seems likely that these firms will similarly terminate all of their drivers in the near future.

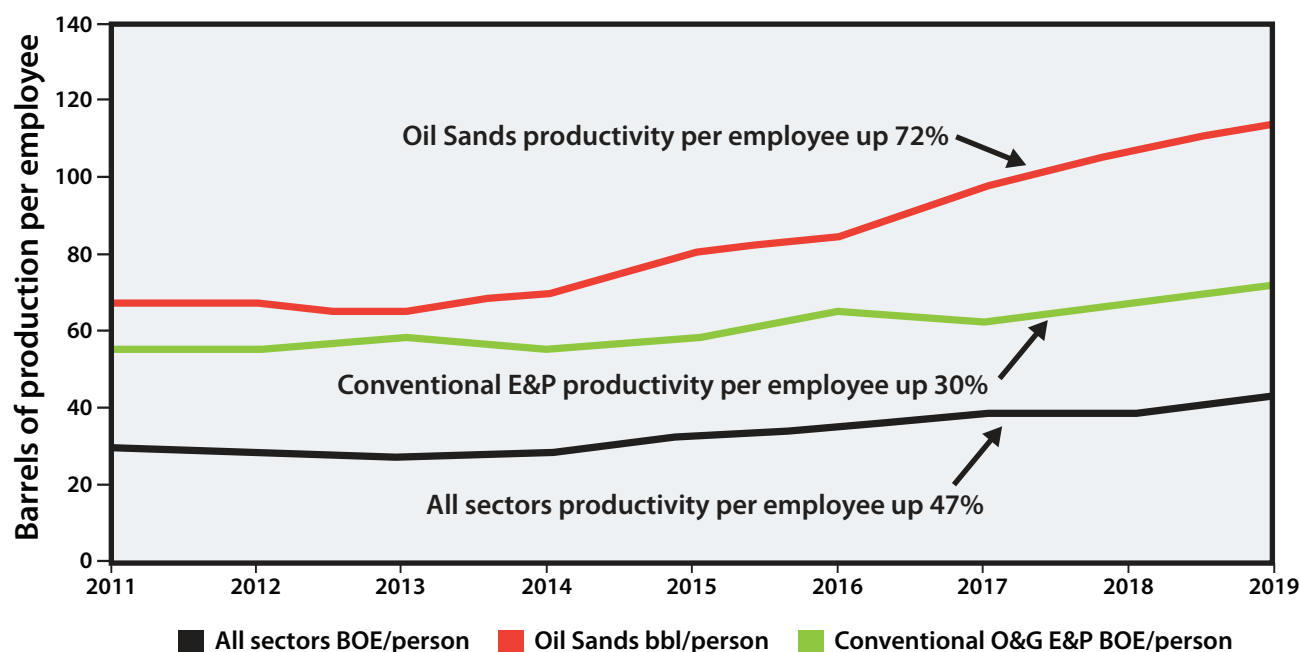
What many Albertans and Canadians may not realize is that the use of driverless trucks is only one example of larger trends in the oil sands industry to use new technologies and modularization of facility design to terminate jobs, reduce capital costs, and increase the productivity of bitumen mines and in situ facilities.

Before discussing these larger trends momentarily, it's useful to first examine the labour productivity gains made in recent years in the Canadian oil and gas industry.

Figure 4 (on page 24) illustrates the increase in productivity per employee by oil and gas sector over the 2011–2019 period. Despite the growth in production, fewer and fewer employees are needed. Overall productivity has increased by 47% per employee since 2011, and productivity in the oil sands has increased by 72%. This indicates that the jobs lost in recent years are likely not coming back. Production is at an all-time high and has increased 23% since 2014, while jobs have declined by 23% in the same five-year period.

Besides the thousands of job terminations connected to the 2014 oil price crash and subsequent industry consolidation (Hussey et al. 2018) and the decrease in construction jobs connected to the more-than-50% cut in capital spending, labour productivity gains in the oil sands and conventional oil and gas sectors have been and will continue to be driven by technological innovations and modularization.



**Figure 4.** Productivity per Employee by Oil and Gas Production Sector, 2011–2019

Source: Hughes, J.D., 2019, based on data from Petroleum Labour Market Information (PetroLMI) <https://careersinoilandgas.com/what-is-lmi/labour-outlook>; production data from Canadian Energy Regulator, 2019.

The ongoing trends in technological innovations and modularization pre-date the 2014 oil price crash, and have accelerated since the crash because the oil and gas industry has a “shrinking technical labour force” because of “large-scale layoffs,” particularly among engineers, geophysicists, and geologists (PetroLMI 2017, 16).

The ongoing technology and modularization trends are discussed in detail in the “innovation” sub-section of the appendix of Petro Labour Market Information’s labour productivity report (PetroLMI 2017, 27–30). For brevity, I will highlight three innovations and how they are reducing the labour requirements of the oil and gas industry, including:

1. horizontal multi-well drilling pads,
2. supervisory control and data acquisition (SCADA), remote monitoring, and information technology and analytics, and
3. replicated designs and modularization.

The rollout of horizontal multi-well drilling pads means rigs can drill more wells before having to be moved. This reduces the labour required to dismantle and rebuild rigs, lay down drill pipe, and design and build access roads. The net result of this technological innovation is that more wells can be drilled with less labour, and the wells take less time to drill, thus reducing labour requirements even further. Multi-well pads also enable efficiency gains in the delivery of materials and reduce the labour required

for reclamation of wells and disturbed land. The materials used by industry have also improved, reducing the labour costs of pipeline maintenance and well workovers.

Increased industry adoption and continual improvement of SCADA and remote monitoring systems enable the monitoring and optimization of various operating systems and the compilation of vast amounts of data. The data are then either automatically acted upon by software to optimize production from wells, or the data are provided to operators to analyze, monitor, and act upon.

Information technology and analytics in combination with SCADA and remote monitoring have enabled the industry to increasingly centralize operations and reduce the labour time required in the field. The resulting optimization of various systems reduces work stoppages and increases maintenance reliability, thus further reducing labour time for monitoring, testing, and repairs, while simultaneously increasing the productivity of assets.

Replicated design and modularization enables the oil and gas industry to reduce engineering and construction labour time and costs. Examples of replicated designs and modularization can now be found throughout the oil and gas industry, including in production, processing, and pipelines.

For example, in March 2017, Suncor said “it has slashed the engineering time for a new steam-based oil sands well pad to 800 hours for its new design, compared with about 9,100 hours between 2010 and 2015” (Bickis 2017).

In 2019, Husky announced two large reductions to its five-year capital spending plan. In May, Husky announced that it was reducing its capital plan by \$1.7 billion (Healing 2019a), and in December the company said that it plans to reduce its capital plan a further \$500 million (Healing 2019b). One way Husky is reducing its capital spending while increasing bitumen production is through the roll-out of modular 10,000-barrels-per-day in situ facilities.

In sum, “smarter” capital spending through the development and use of various technological and modularization innovations means less engineering, construction, and operations jobs.

Historically, the majority of oil-sands-related construction jobs were in construction of new production facilities and connected infrastructure. Not only has the industry moved from its growth phase to its mature phase—meaning fewer new facilities will be built going forward—but because of modularization, the engineering and construction of new facilities will also require less labour, as will the operation of those new facilities because of other technological innovations.

## 7. Conclusion

Oil sands production has never been higher, yet CapEx and employment levels are down significantly compared to 2014. Labour productivity has increased in recent years because of advancements in technology and modularization. The current low employment levels relative to the highs of the early 2010s are expected to continue, and could worsen in the 2020s due to a combination of CapEx levels remaining well below the peak levels seen in 2014 and additional technological innovations which are likely to further increase labour productivity.

Even with additional takeaway capacity coming online in the next couple years (additions to Enbridge's Mainline and to crude-by-rail and the completion of the Line 3 expansion), the other factors examined in this report indicate that the majority of the 53,000 jobs terminated from 2014 to 2019 are not likely to return to the Canadian oil and gas industry. It is entirely possible that industry employment and CapEx will never again reach the heights seen in 2014.

The five leading Canadian oil companies continue to make healthy rates of profit and to transfer sizeable dividends to their shareholders. The Big Five routinely test their business decisions against various possible future scenarios and how the effects of climate change and climate policies and regulations may affect their assets and business strategies in the coming decades.

The governments of Alberta and of Canada must now decide on a course of action to manage our country's transition to a net-zero-emissions economy by 2050. Plans that take the global climate crisis seriously will necessarily involve the managed decline of oil and gas production in the next three decades.

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