Canadian Oil and Gas Production

January 2025

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Canadian Oil and Gas Production Definitions

Oil Sands

About 58% of Canada's total oil production is from oil sands. The extra heavy crude produced from the oil sands formation is called bitumen. Oil sands can be produced by mining or in-situ:

- **Mined**. The bitumen is extracted from the surface using traditional mining techniques and then physically separated from the sand in a processing plant. Mined bitumen is either upgraded into a lighter crude oil, called Synthetic Crude Oil (SCO), or diluted with light liquids (often condensates) so that it can be thinned and transported by pipeline.
- **In-situ**. Relies on high-pressure steam to recover bitumen from underground reservoirs. The most common method is steam-assisted gravity drainage (SAGD); the other is cyclic steam stimulation (CSS).

Conventional Oil and Gas

Roughly 40% of Canada's oil and almost all of Canada's natural gas is called conventional production. Traditionally, oil and gas were produced from vertical wells, but today, horizontal wells and hydraulic fracturing are the dominant methods. While it is not always in shale formations, this new production technique is often called shale gas or shale oil. The Montney and the Duvernay are two dominant Canadian shale plays. Condensates and pentanes plus, as well as natural gas liquids (NGLs), are also categorized as conventional production in this book:

- **NGLs**. Often, light liquids are a byproduct of producing natural gas, including molecules like ethane, propane, and butane.
- **Condensate and Pentanes Plus**. These light liquids are heavier than NGLs and similar in quality to naphtha from a refinery. They are a byproduct of natural gas production, often from shale gas and oil wells. The light liquids are often used to dilute bitumen for pipeline transportation.

East Coast Production

About 4% of Canada's oil production comes from four offshore developments in Newfoundland and Labrador; Hibernia, Terra Nova, White Rose, and Hebron.

CAPP

Source: Alberta Government ST98 2023 (Alberta Energy Outlook), S&P Global Oil Sands Dialogue, Canada Energy Regulator

Summary of Canadian Oil and Gas Production

Canada is a significant supplier of oil and gas. Canada is the fourth-largest producer of oil in the world and the fifth-largest producer of natural gas.

Natural Gas Highlights

- Competition from US shale gas starting in 2008 led to a decline in Canadian production. In 2012-13, the trend reversed with the discovery of shale gas in BC and Alberta. Canadian production has now recovered to a record high of 18.1 Bcf/d (YTD average in 2024).
- Shale gas has also shifted the dominant location for natural gas production; from southern Alberta to northeast BC and northern Alberta.

Crude Oil Highlights

- Canadian oil production includes oil sands at 3.3 MMB/d (58%), conventional at 1.5 MMB/d (26%), east coast offshore at 0.2 MMB/d (4%) and NGLs at 0.7 MMB/d (12%).
- Since 2005, oil sands production has tripled, but after 2018, production growth has moderated. Production has ranged between 3.1 and 3.2 MMB/d in the last few years (2021, 2022, and 2023).
- Condensate and pentanes plus production has doubled since 2014 and averaged just over 500,000 B/d YTD in 2024. The growth of light liquids is a byproduct of the prolific shale gas and oil wells.

Canadian Oil and Gas Production (Sept 2024)

18.1 Bcf/d
Natural Gas

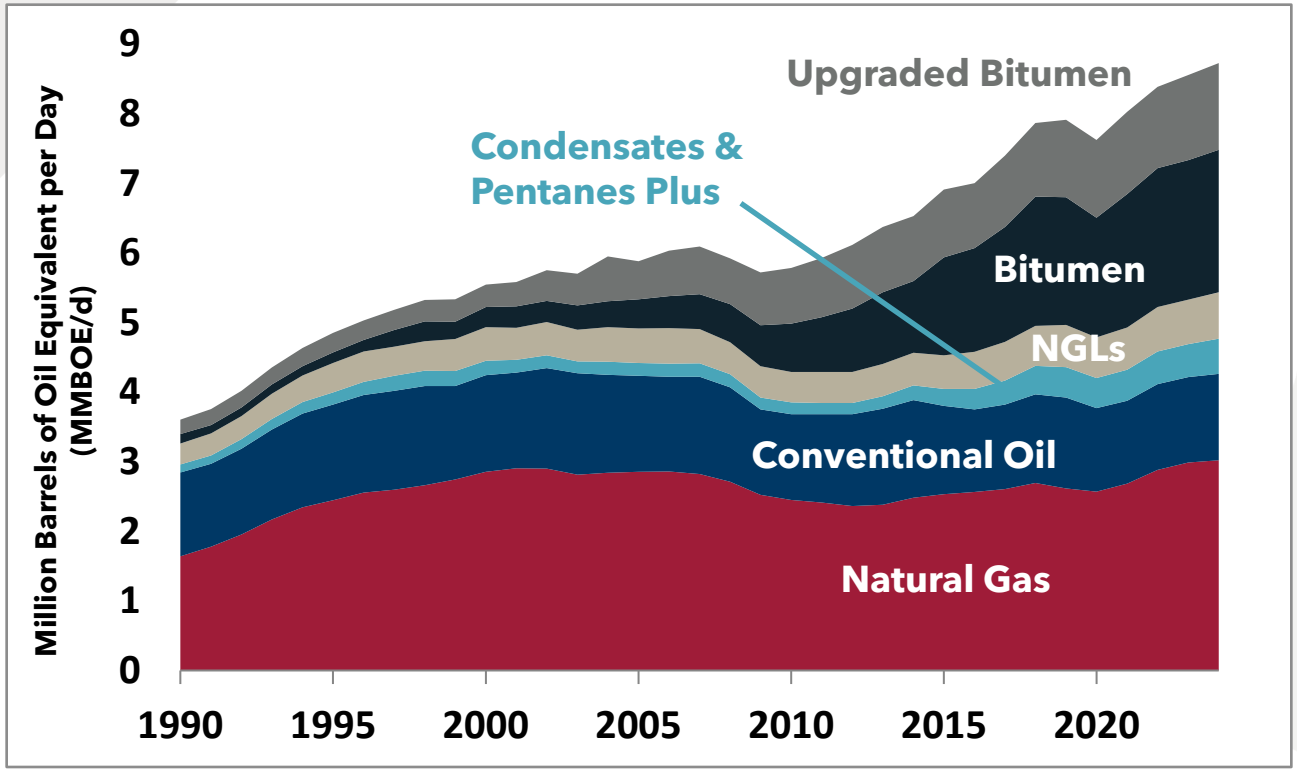
5.7 MMB/d
Crude Oil*

* Includes crude oil, shale oil, oil sands, condensates and NGLs.

CAPP

Source: Canada Energy Regulator, Energy Institute Statistical Review of World Energy (2024)

Annual Canadian Total Hydrocarbon Production by Type | 1990 to 2024*

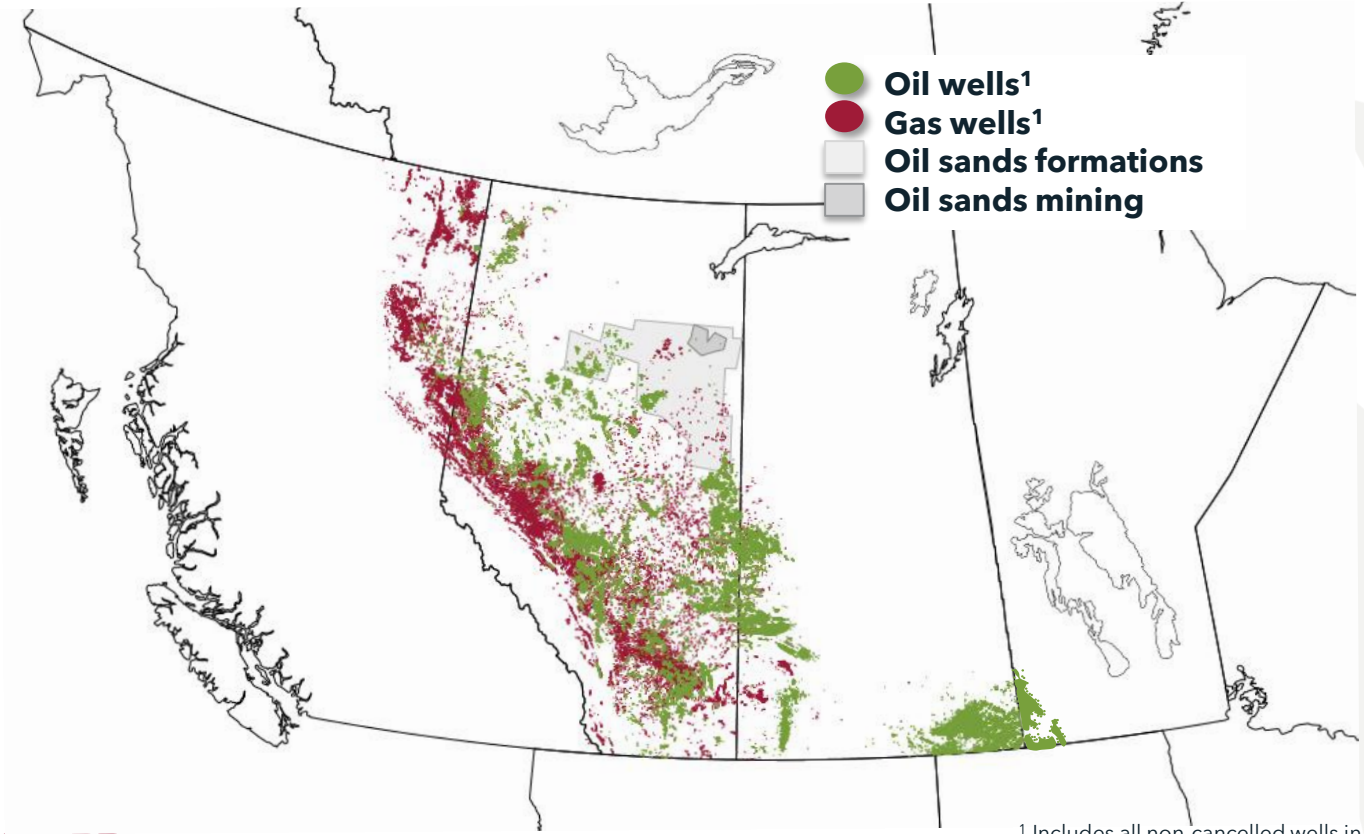


- In 2024 YTD, Canada's total oil and gas production averaged over 8.7 MMBOE/d.
- NGLs include ethane, propane, and butane.

Source: CAPP (1990-2017), Canada Energy Regulator and Provincial Regulators (2018 to Current);*2024 is YTD average from Jan-Sep

Western Canadian Sedimentary Basin (WCSB)

The Western Canadian Sedimentary Basin (WCSB)

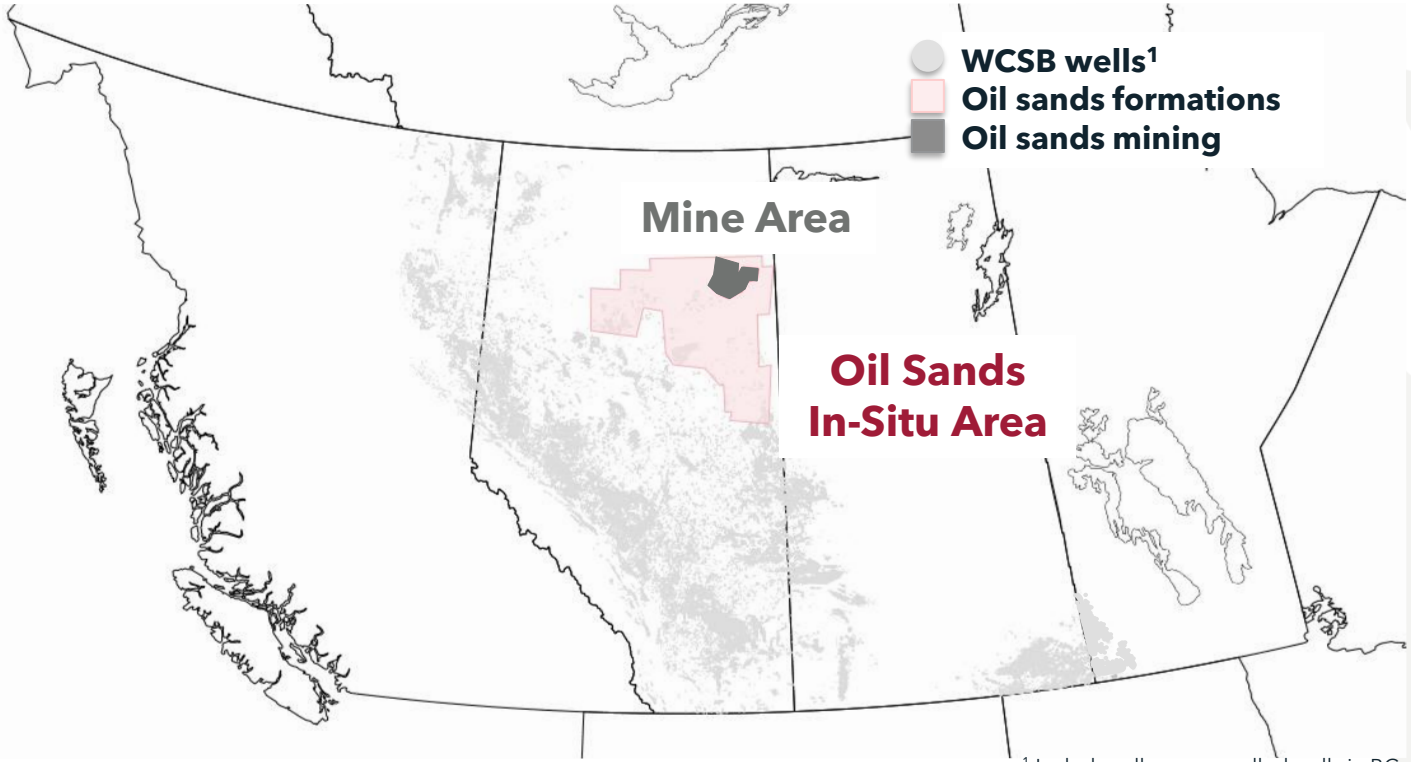


- 95% of Canada's oil production and all its marketable gas is produced in the WCSB.
- The WCSB is a large, well-explored basin with 100+ years of history, spanning four provinces.
- The WCSB has over 850,000 wells drilled (oil and gas) since 1901, creating a wealth of data on the basin.
- The total area is ~1.4 million km^2, about two times larger than the state of Texas[2].

Source: geoSCOUT

[1] Includes all non-cancelled wells in BC, AB, SK, and MB (~850,000 wells)
[2] Canada Energy Regulator - Energy Information Program – Glossary

The Western Canadian Sedimentary Basin (WCSB) | Oil Sands

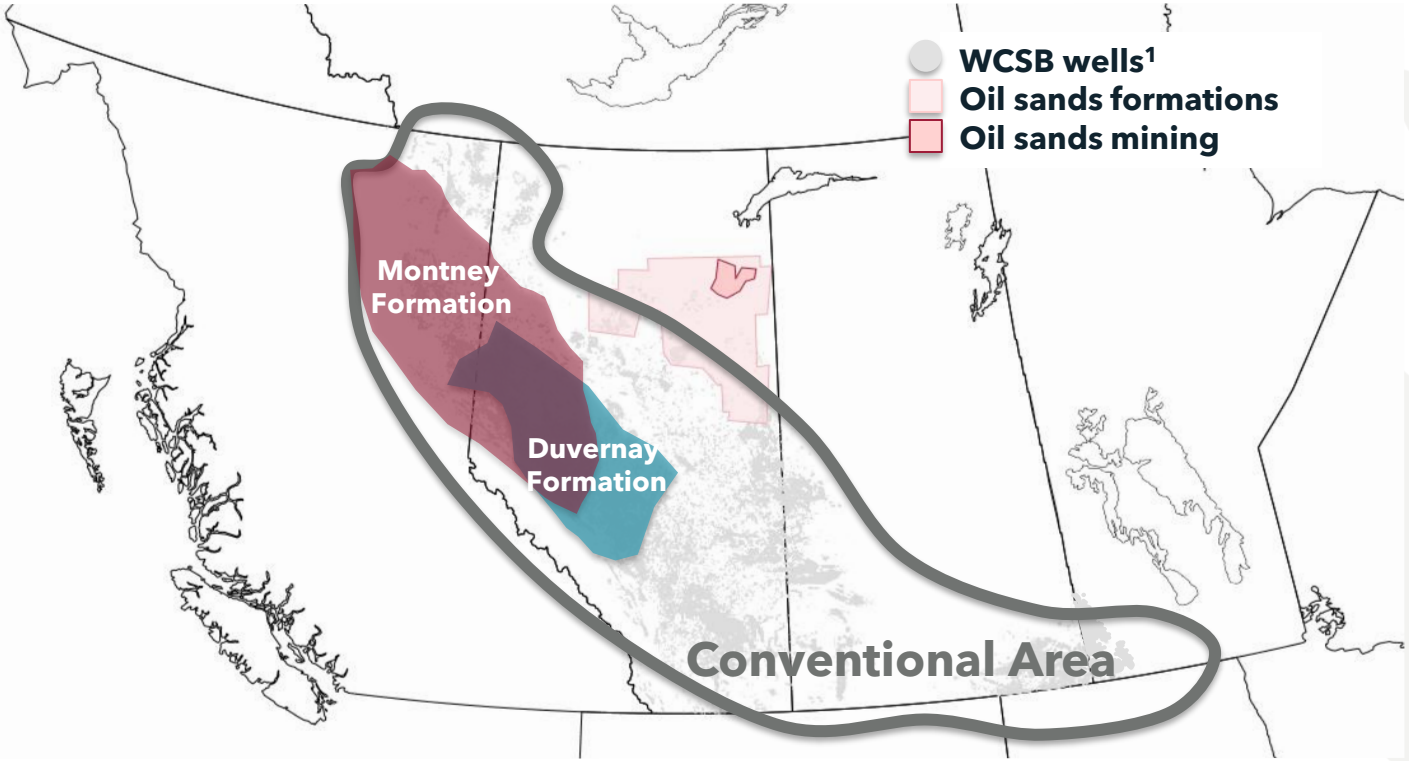


- Oil sands reserves are estimated at 168 billion barrels, ranking 4th largest after Venezuela, Saudi Arabia, and Iran[2].
- The oil sands region covers 142,000 km^2 a smaller area than the Permian Basin[3].
- Oil sands are mined and produced by wells (in-situ). The minable area is a relatively small part.
- The active mined area is about 1,264 km^2; a footprint that is 1.5X larger than the city of Calgary[4].

Source: geoSCOUT; Natural Resources Canada for oil sands areas

[1] Includes all non-cancelled wells in BC, AB, SK, and MB (~850,000 wells)
[2] Oil and Gas Journal estimate as of January 2022
[3] Alberta Government
[4] ABMI (2018 estimate)

The Western Canadian Sedimentary Basin (WCSB) | Conventional

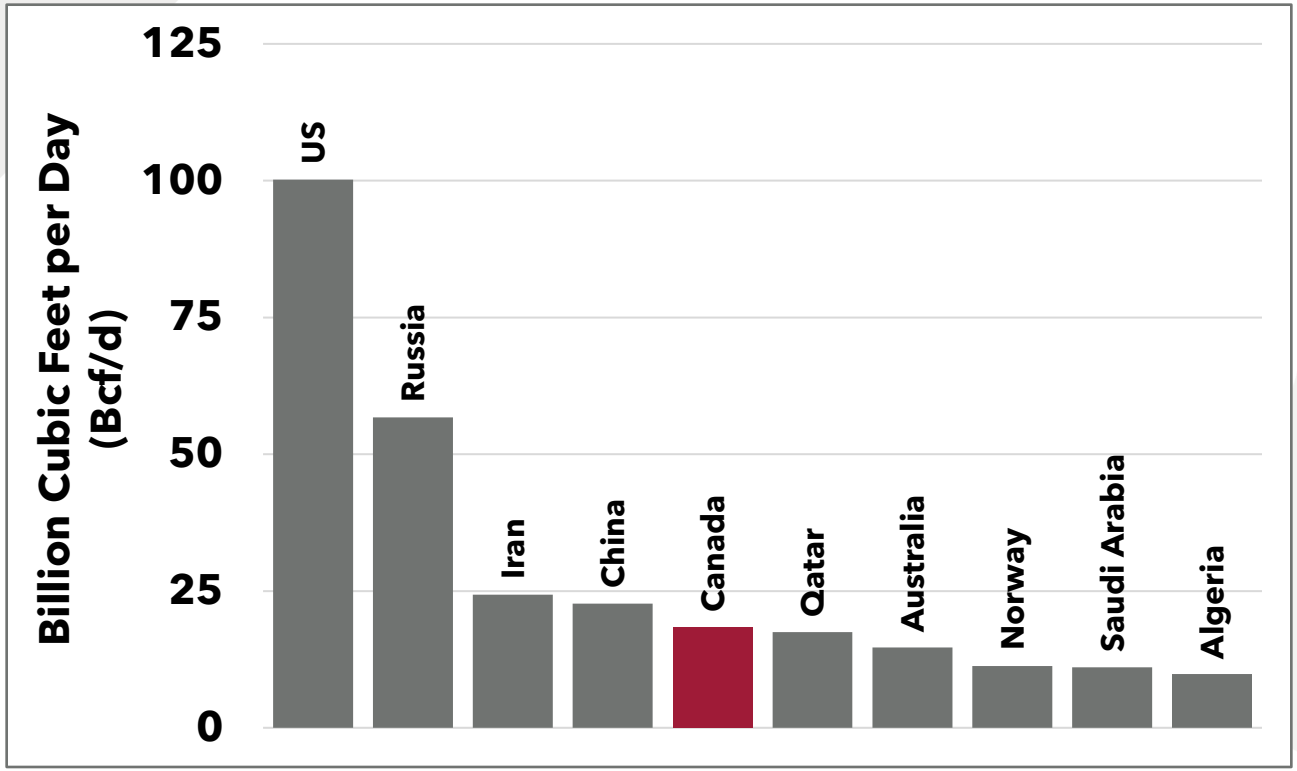


- Conventional WCSB production makes up roughly 40% of Canada's total oil production and almost all of its natural gas production.
- Conventional oil and gas is produced from a large area, spanning four provinces.
- Since the early 2010s, the Montney and Duvernay have become important plays that are attracting new investment. They are shale plays that use horizontal wells and hydraulic fracturing to liberate the gas and light oil.

Source: geoSCOUT; Natural Resources Canada for oil sands areas
The Duvernay and Montney formation locations are approximate

[1] Includes all non-cancelled wells in BC, AB, SK, and MB (~850,000 wells)

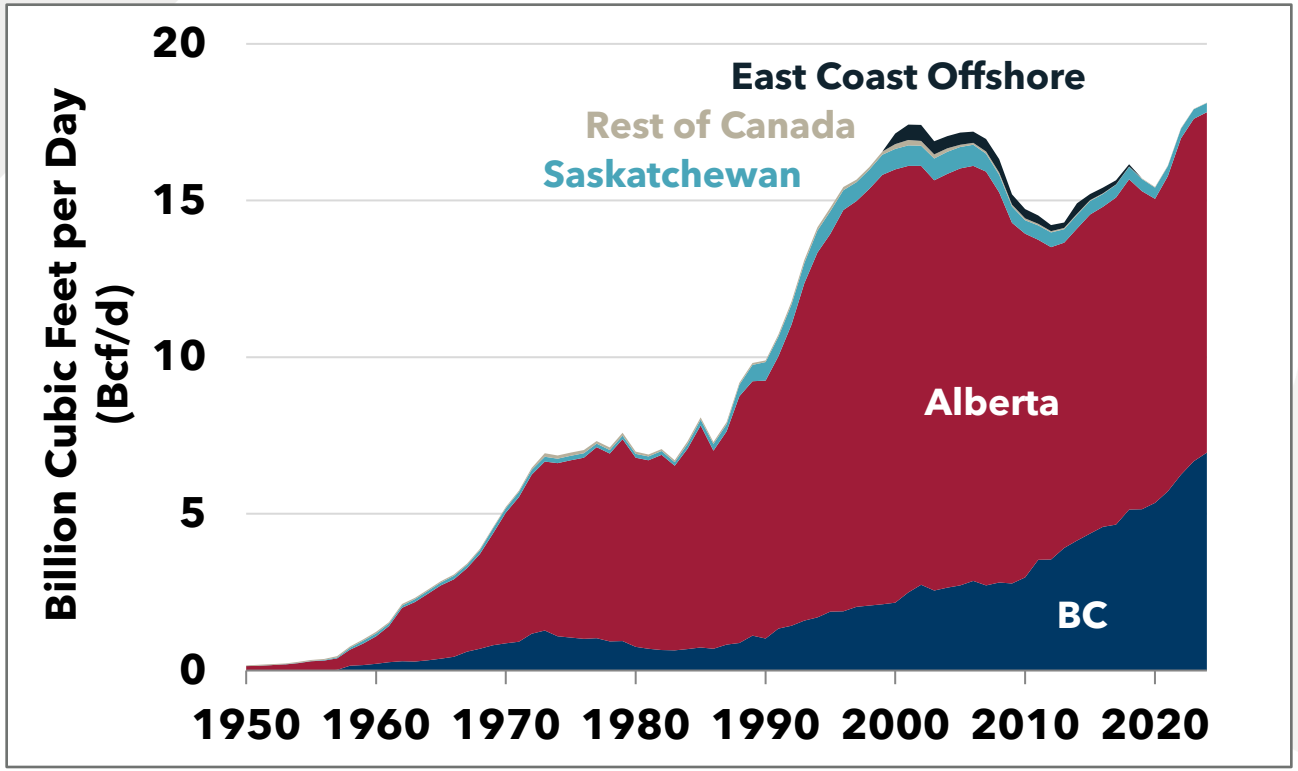
Canada is the World's Fifth Largest Natural Gas Producer | 2023



- In 2023, the US and Russia together made up approximately 40% of the world's natural gas production.
- By comparison, in 2023, Canada accounted for 4.7% of the world's natural gas production.

Source: Energy Institute Statistical Review of World Energy (2024)

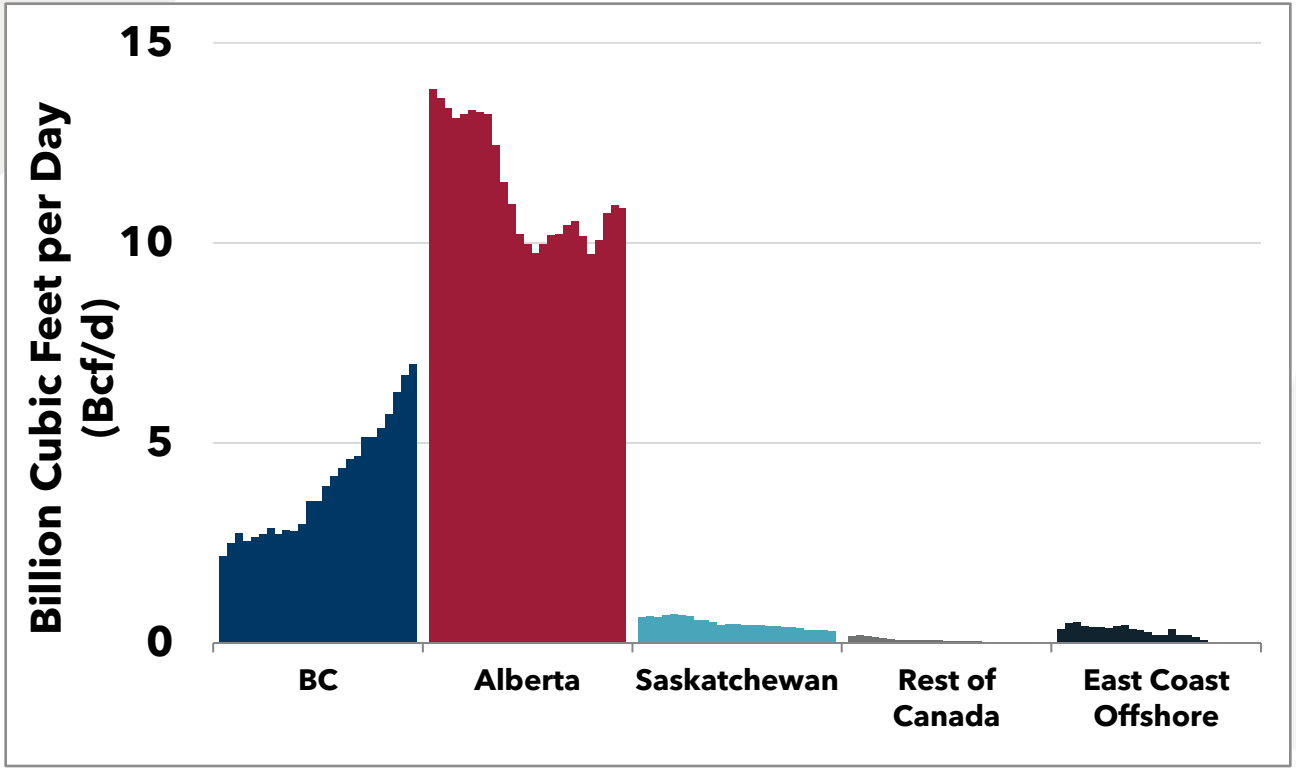
Annual Marketable Natural Gas Production | 1950 to 2024*



- The surge of US shale gas starting in 2008 led to a collapse in Canadian natural gas prices and a decline in production and exports.
- Alberta and BC regained competitiveness when shale gas was discovered in these provinces.
- Canadian production averaged 18.1 Bcf/d YTD in 2024.
- Production from Rest of Canada is too small to see on this graph, at less than 10 MMcf/d.

Source: CAPP (1950-2017), Canada Energy Regulator and Provincial Regulators (2018 to Current); *2024 is YTD average from Jan-Sep

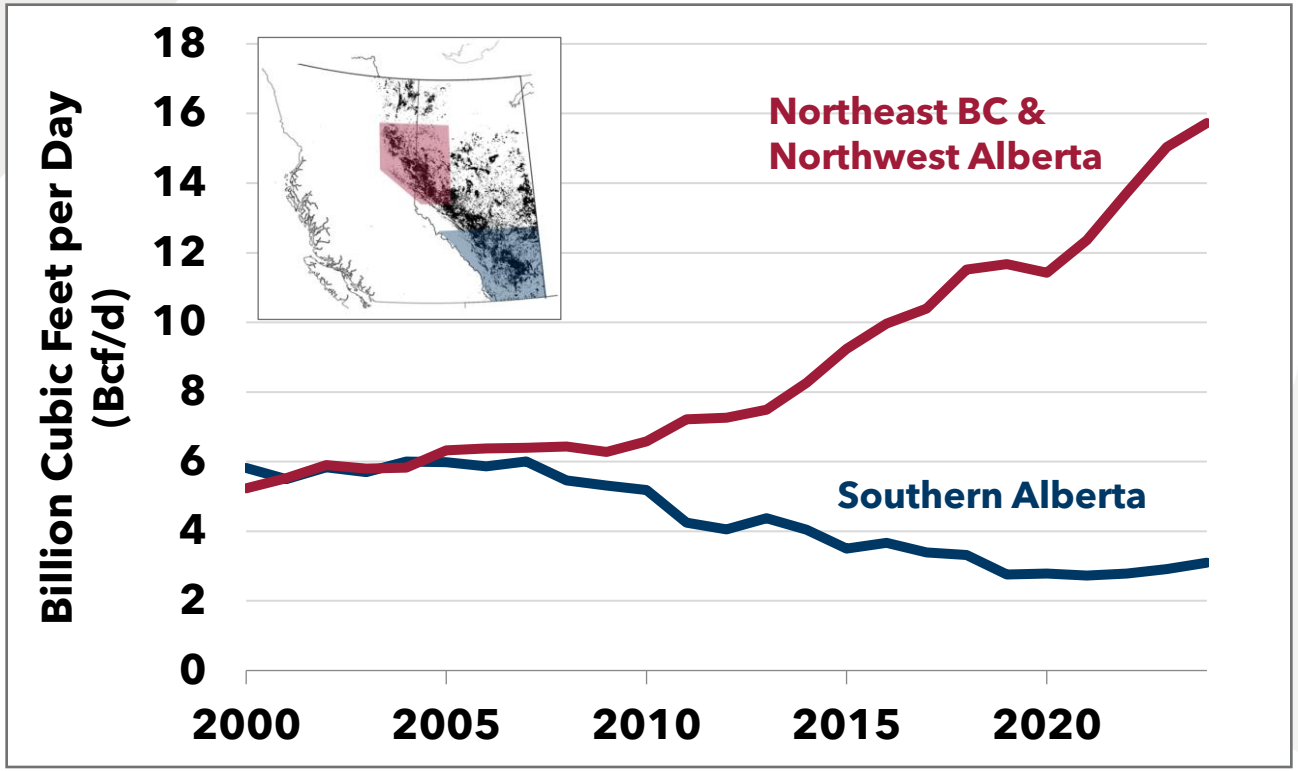
Annual Marketable Natural Gas Production by Province | 2000 to 2024*



- With the proliferation of shale gas production in BC, Alberta's gas production as a percentage of total Canadian natural gas production decreased from 80% in 2000 to 61% in 2023.
- Meanwhile, BC's share of Canadian natural gas production increased from roughly 13% in 2000 to 37% in 2023, more than doubling production since 2010.
- The discovery of shale gas boosted both BC and Alberta's production.

Source: CAPP (1950-2017), Canada Energy Regulator and Provincial Regulators (2018 to Current); *2024 is YTD average from Jan-Sep

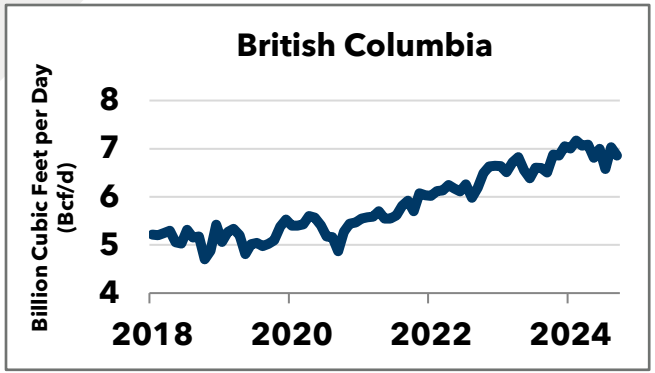
Avg. Annual Raw Natural Gas Production by Select Region | 2000 to 2024*

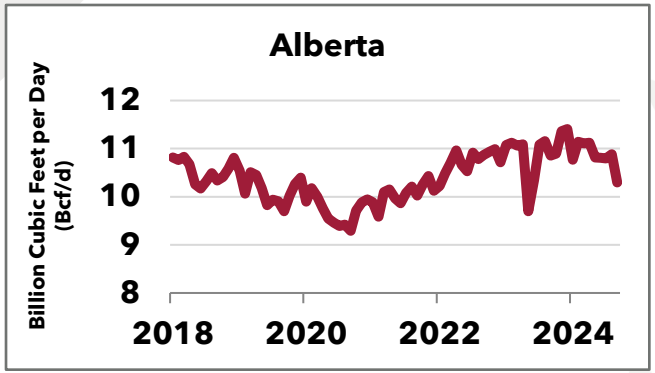


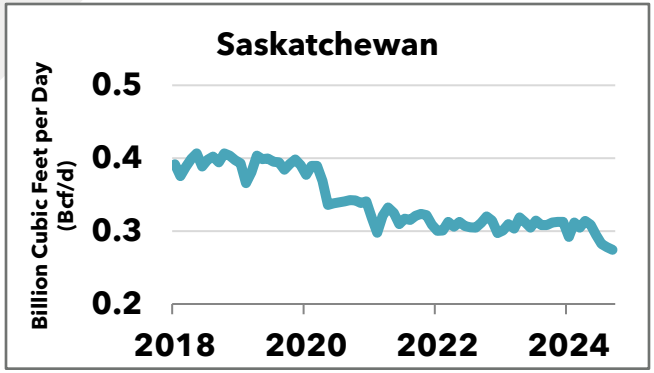
- Since 2010, the discovery of shale gas plays in Northeast BC and into Alberta has attracted capital investment and created strong production growth.
- Certain conventional gas regions have declined as they cannot compete with shale gas economics.
- Shale gas wells are also a source of liquids, including NGLs, condensates and pentanes plus, primarily, but not exclusively used in oil sands operations.

Source: geoSCOUT; *2024 is YTD average from Jan-Nov

Monthly Marketable Natural Gas Production by Province | 2018 to 2024*





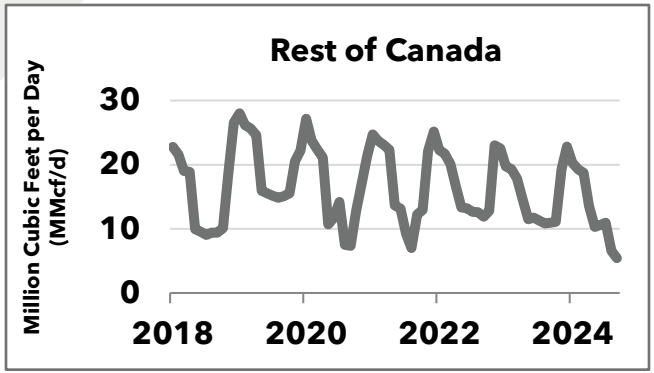


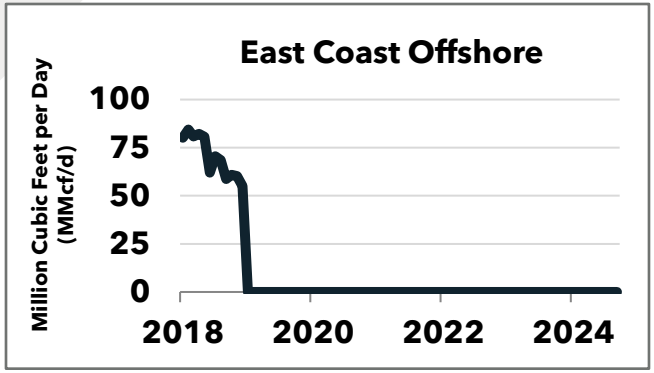
Manitoba does not have any marketable natural gas production.

- Since 2018, BC production has grown over 1.5 Bcf/d. The BC Montney will be the primary supply source for LNG exports off the BC coast. As a result, BC production is expected to grow in tandem with LNG exports.
- Alberta's natural gas production surpassed pre-COVID levels in mid-2021. In May 2023, companies temporarily shut-in production in response to wildfires, however, production has since recovered.
- Saskatchewan's natural gas is largely a byproduct of oil production.

Source: Canada Energy Regulator, Provincial Regulators; *2024 is YTD average from Jan-Sept

Monthly Marketable Natural Gas Production by Province | 2018 to 2024*



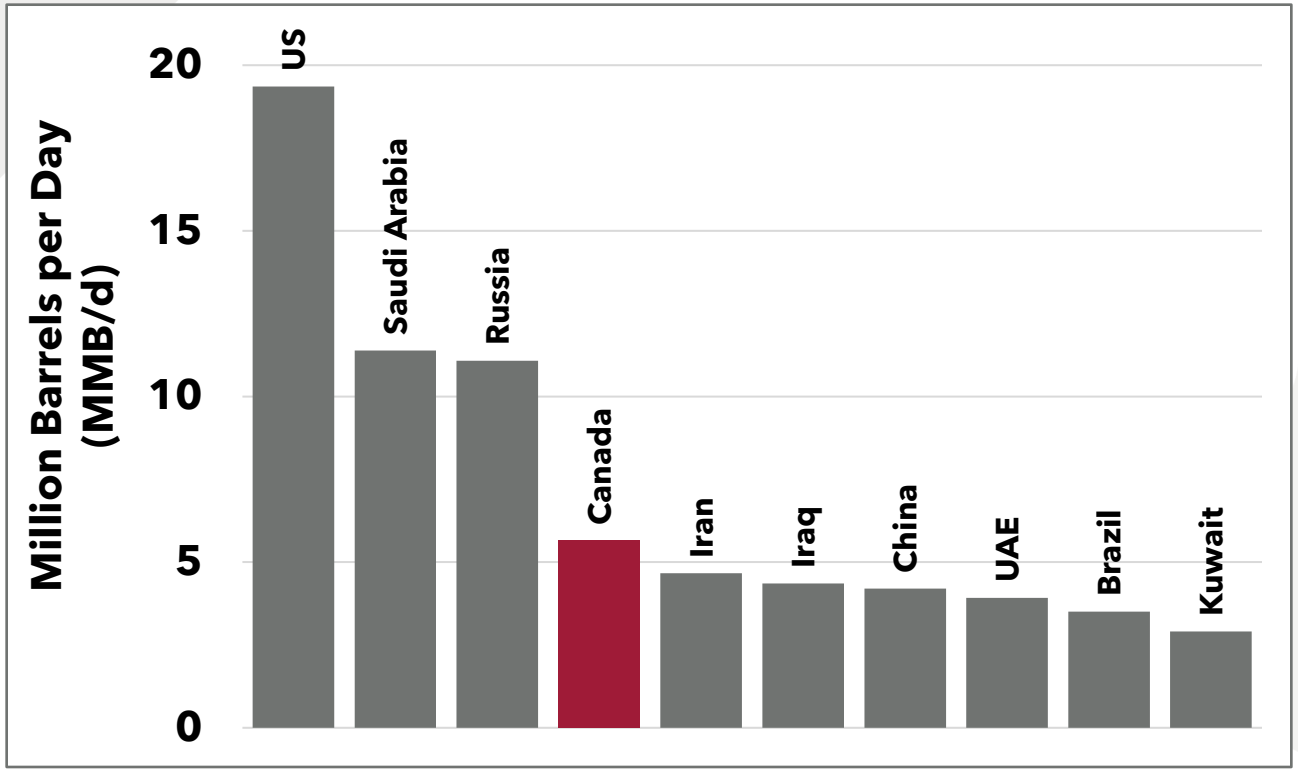


- Due to lower production levels, the scaling for these graphs is in MMcf/d, not Bcf/d as in the previous slide.
- Rest of Canada includes Ontario, Northwest Territories, and New Brunswick.
- Currently, marketable natural gas production outside the Western Canadian Sedimentary Basin (WCSB) is approximately 10 MMcf/d.
- Note: At the time of publication, data for Northwest Territories is only available to July 2024.
- East Coast Offshore includes production from Nova Scotia only. Nova Scotia currently has no producing natural gas projects.
- Encana's Deep Panuke field was permanently shuttered in May 2018.
- After almost 20 years of producing natural gas, the Sable Offshore Energy Project (SOEP) ceased production in December 2018.

Source: Canada Energy Regulator, Provincial Regulators; *2024 is YTD average from Jan-Sep

Crude Oil

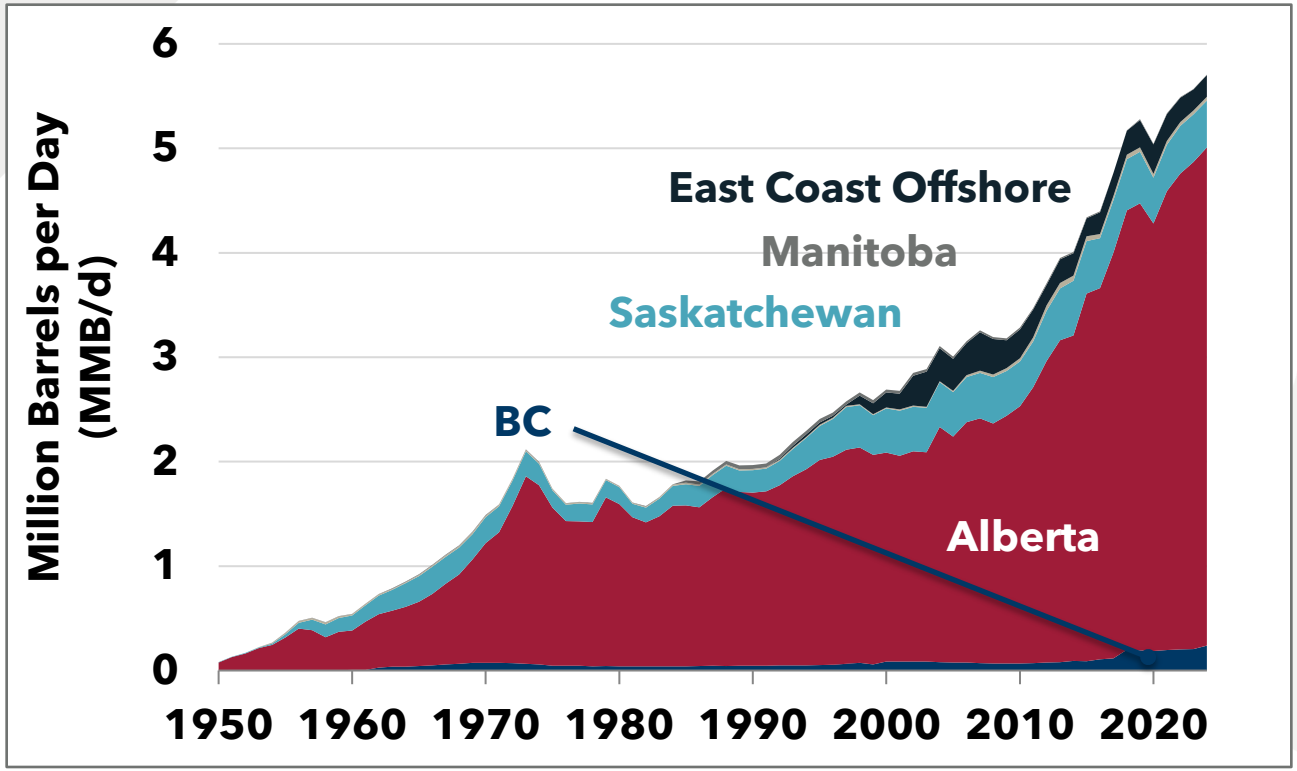
Canada is the World's Fourth Largest Oil Producer | 2023



- In 2018, the US passed Saudi Arabia and Russia as the largest producer of oil in the world.
- US production doubled between 2009 and 2019 driven by the shale oil boom.
- Canada is a major supplier of secure, reliable oil and accounts for 6% of world supply.
- The oil sands have been the main source of Canadian production growth since the mid-2000s.

Source: Energy Institute Statistical Review of World Energy (2024)
Note: Production includes crude oil, shale oil, oil sands, condensates and NGLs.

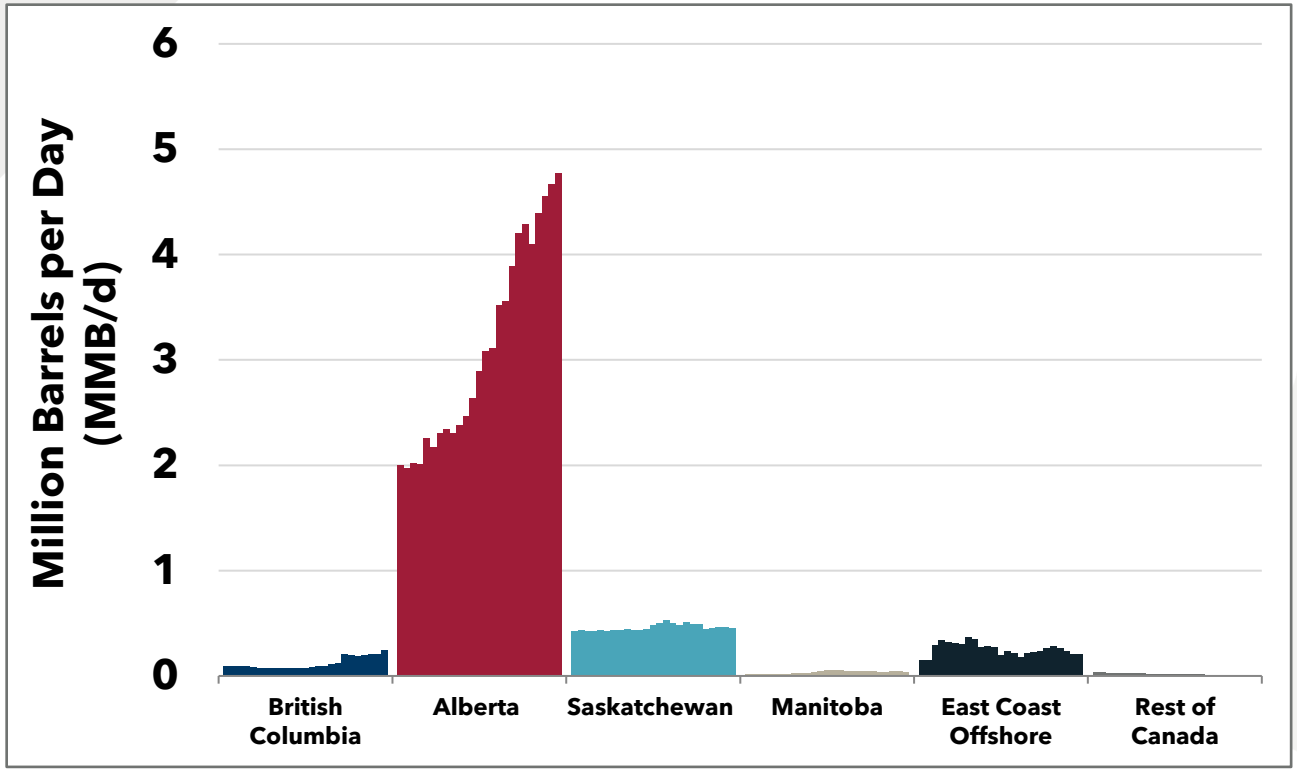
Annual Oil Production by Province | 1950 to 2024*



- For the most part, oil production in Canada has been on an upward trajectory.
- The Rest of Canada only adds up to less than 10,000 B/d and is too small to see on the graph.

Source: CAPP (1950-2017), Canada Energy Regulator and Provincial Regulators (2018 to Current); *2024 is YTD average from Jan-Sep
Note: Oil includes crude oil, oil sands, condensates, pentanes plus and NGLs.

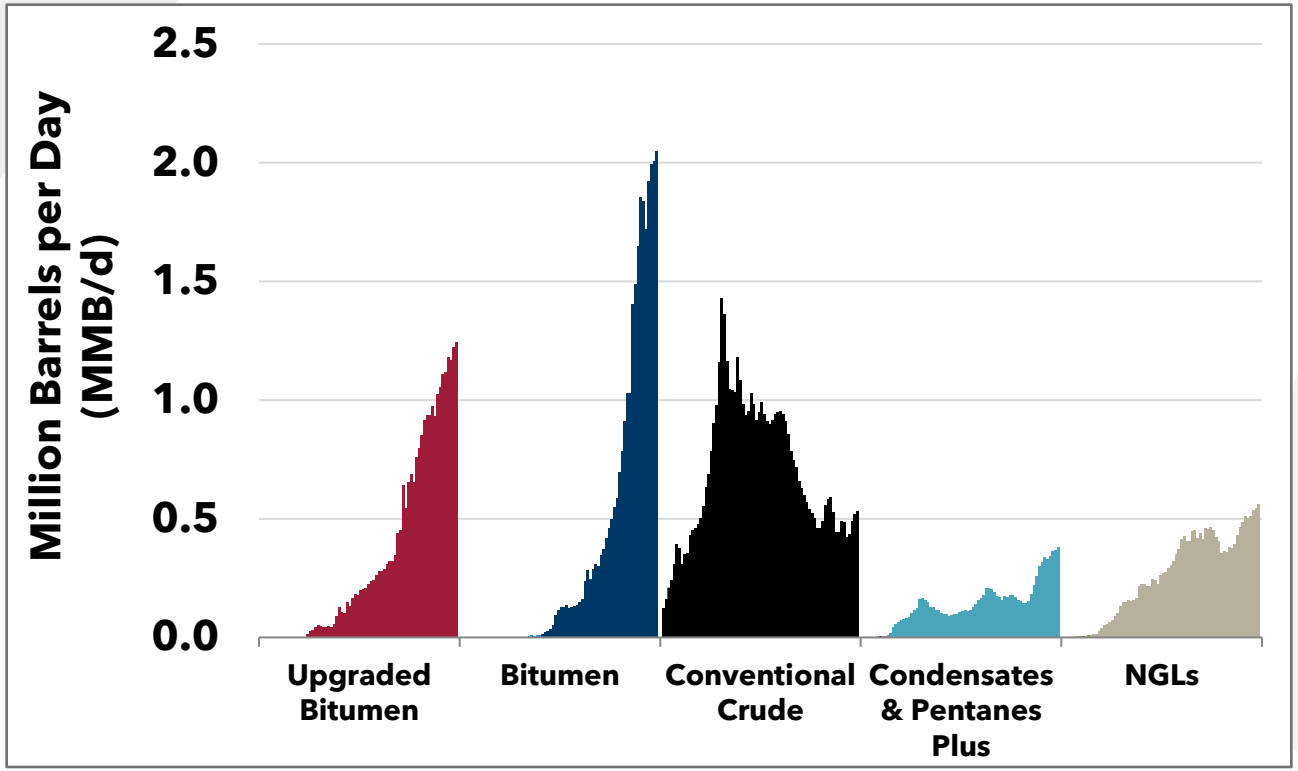
Annual Oil Production by Province | 2000 to 2024*



- Over 80% of Canada's oil comes from Alberta.
- Since 2005, oil sands production has tripled to 3.3 MMB/d. Growth moderated after 2018, with production relatively stable in 2021 and 2022, with growth picking back up in 2023.
- Saskatchewan is the 2nd largest in Canada producing just under 0.5 MMB/d.
- All of Canada's East Coast Offshore production comes from Newfoundland and Labrador.

Source: CAPP (2000-2017), Canada Energy Regulator and Provincial Regulators (2018 to Current); *2024 is YTD average from Jan-Sep
Note: Oil includes crude oil, oil sands, condensates, pentanes plus and NGLs.

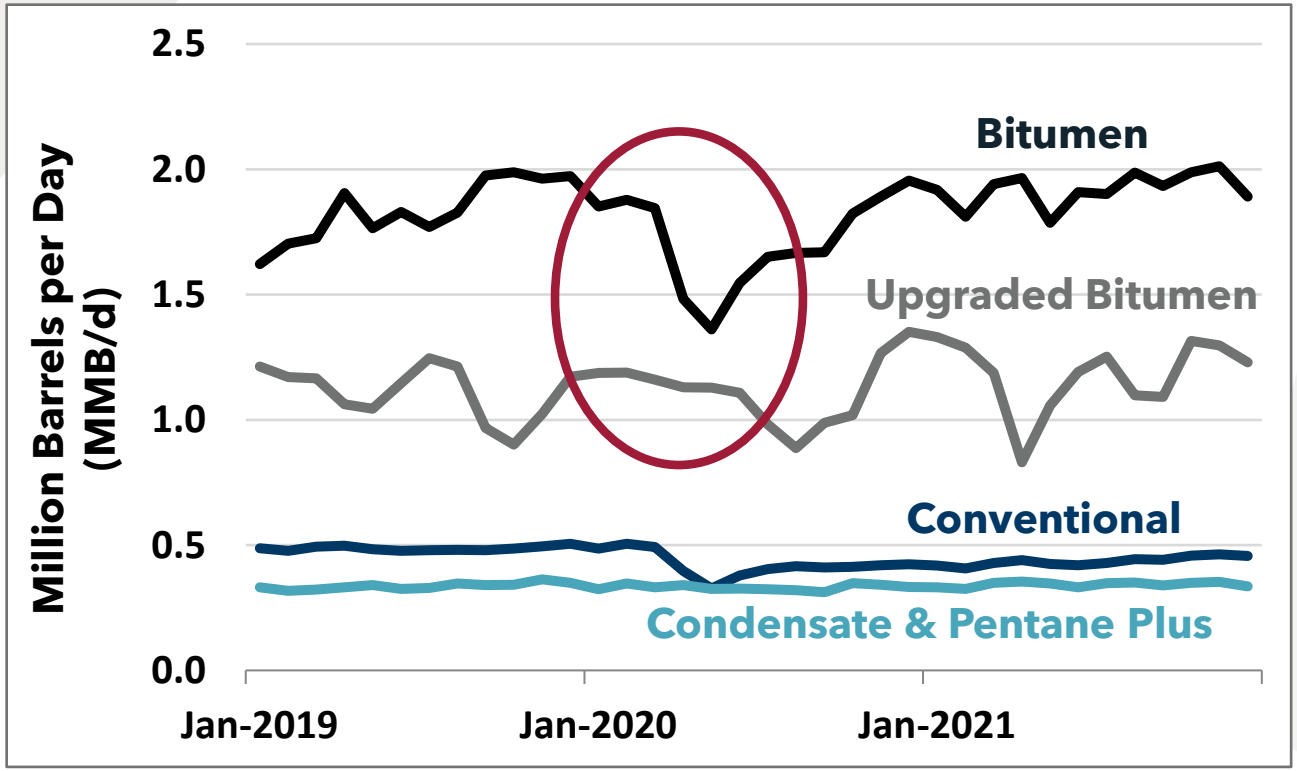
Alberta | Annual Oil Production | 1950 to 2024*



- Alberta production growth has been dominated by the oil sands. The oil sands are reflected in the 'Upgraded Bitumen' and 'Bitumen' categories.
- Alberta's conventional production has been in decline. The loss has partly been offset by growth in NGLs, condensates, and pentanes plus, which have grown with the development of shale oil and shale gas.

Source: CAPP (1950-2017), Canada Energy Regulator and Provincial Regulators (2018 to Current); *2024 is YTD average from Jan-Sep

Alberta | Monthly Oil Production During COVID | 2019 to December 2021

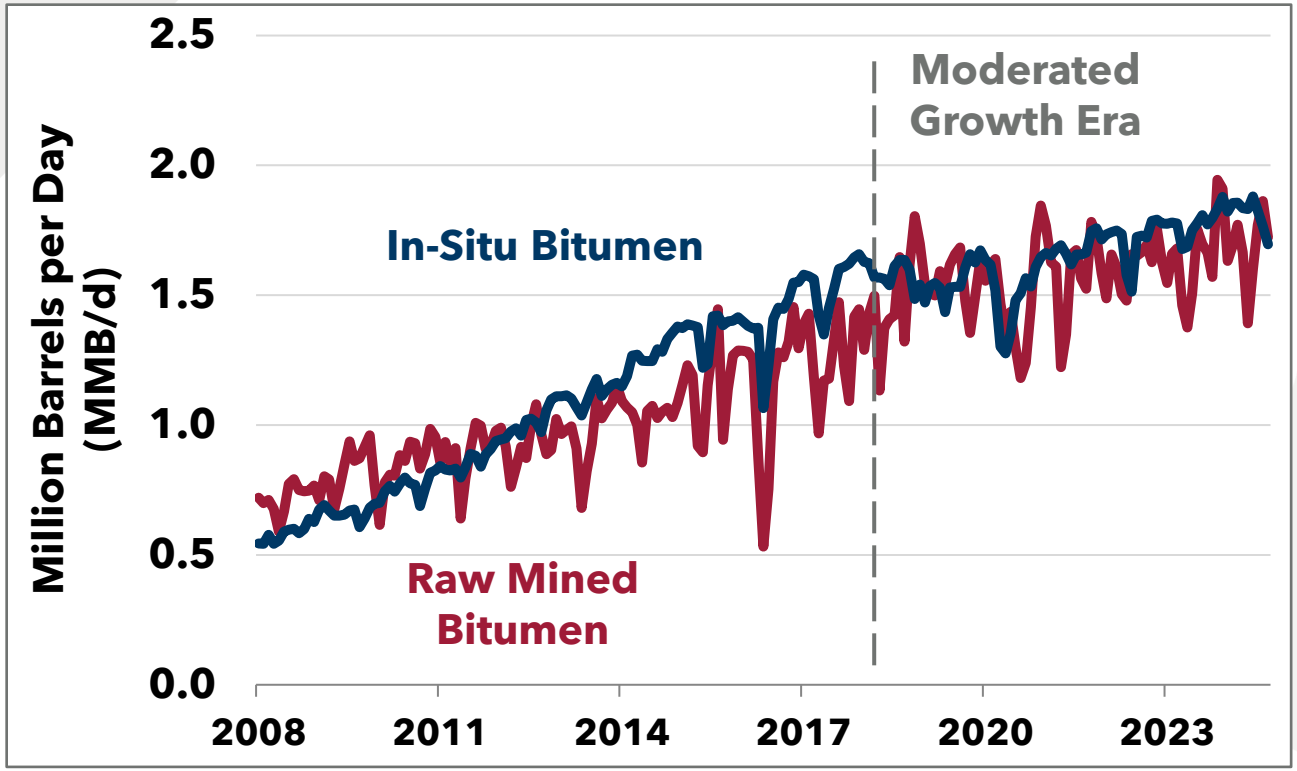


- Due to lower demand during COVID, Canada's oil output was temporarily cut by 850,000 B/d, or 20%.
- This was the single largest contraction in Canada's oil-producing history.
- By the end of 2020, oil sands had recovered to pre-COVID levels; total production from conventional, condensates, and pentane plus took until the second half of 2022.
- US oil declined 25% from COVID and took until summer 2023 to return to those levels.
- By comparison, Canada's relatively fast COVID recovery shows greater resiliency vs. the US, partly driven by lower base declines associated with oil sands production.

CAPP

Source: Canada Energy Regulator and Provincial Regulators, US Energy Information Administration
Does not include NGLs

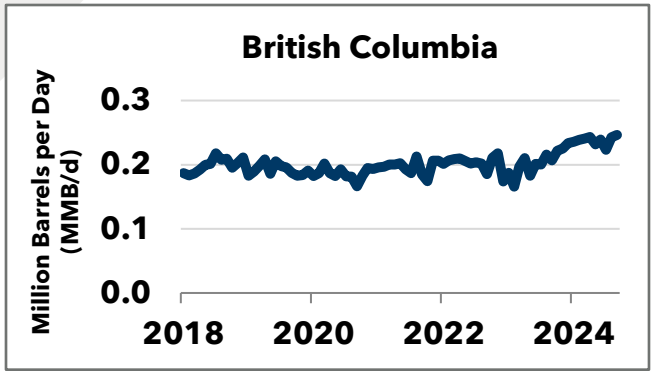
Alberta | Monthly Raw Bitumen Production | 2008 to 2024*

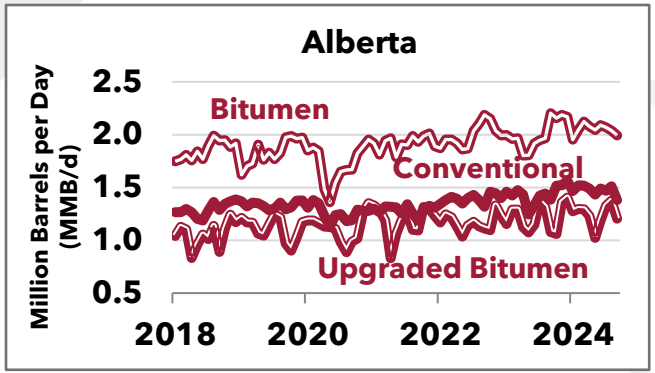


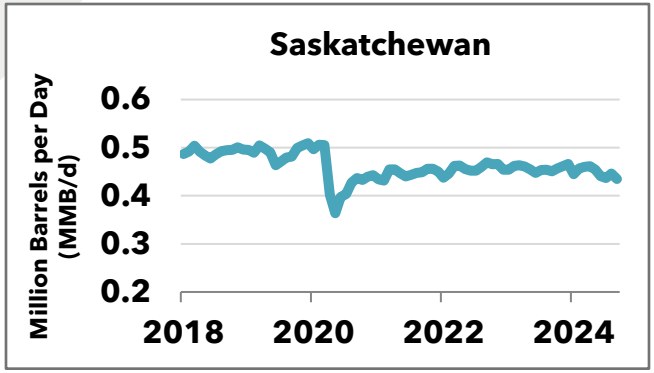
- Bitumen is mined or, for deep reserves, it is produced from wells using steam (in-situ).
- Both production types have grown in tandem since 2008. However, a leveling out of production began in 2018 due to the lack of new projects and egress out of the basin.
- Production (before upgrading) is about equal, with 1.7 MMB/d (mined) and 1.8 MMB/d (in-situ) YTD in 2024.

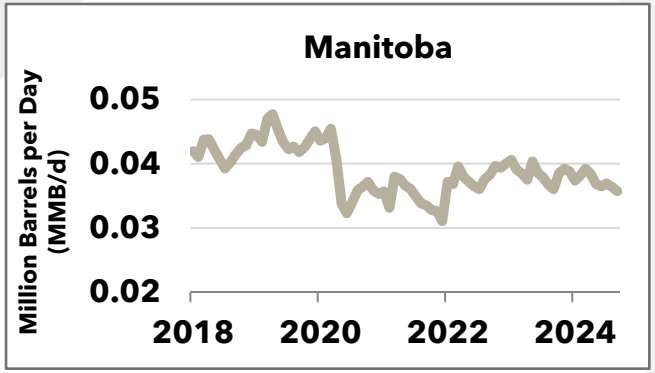
Source: Canada Energy Regulator, Alberta Energy Regulator; *2024 is YTD average from Jan-Sep

Monthly Oil Production by Province | 2018 to 2024*







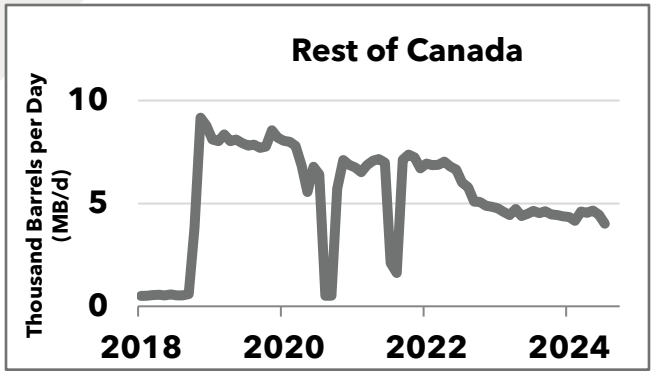


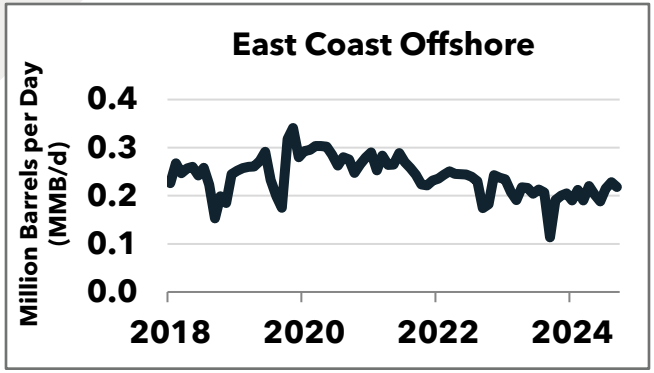
- BC's oil production is mostly from NGLs, condensates, and pentane plus, primarily from natural gas production.
- Saskatchewan and Manitoba's oil production have not yet recovered to pre-COVID levels.
- Saskatchewan production averaged 448 MB/d in 2024 YTD, however, condensate volumes are not included as data is not yet available for 2024. The province has stated a goal to reach 600 MB/d by 2030[1].

Source: Canada Energy Regulator, Provincial Regulators; *2024 is YTD average from Jan-Sep

[1] Saskatchewan's Growth Plan: The Next Decade of Growth, 2020-2030

Monthly Oil Production by Province | 2018 to 2024*

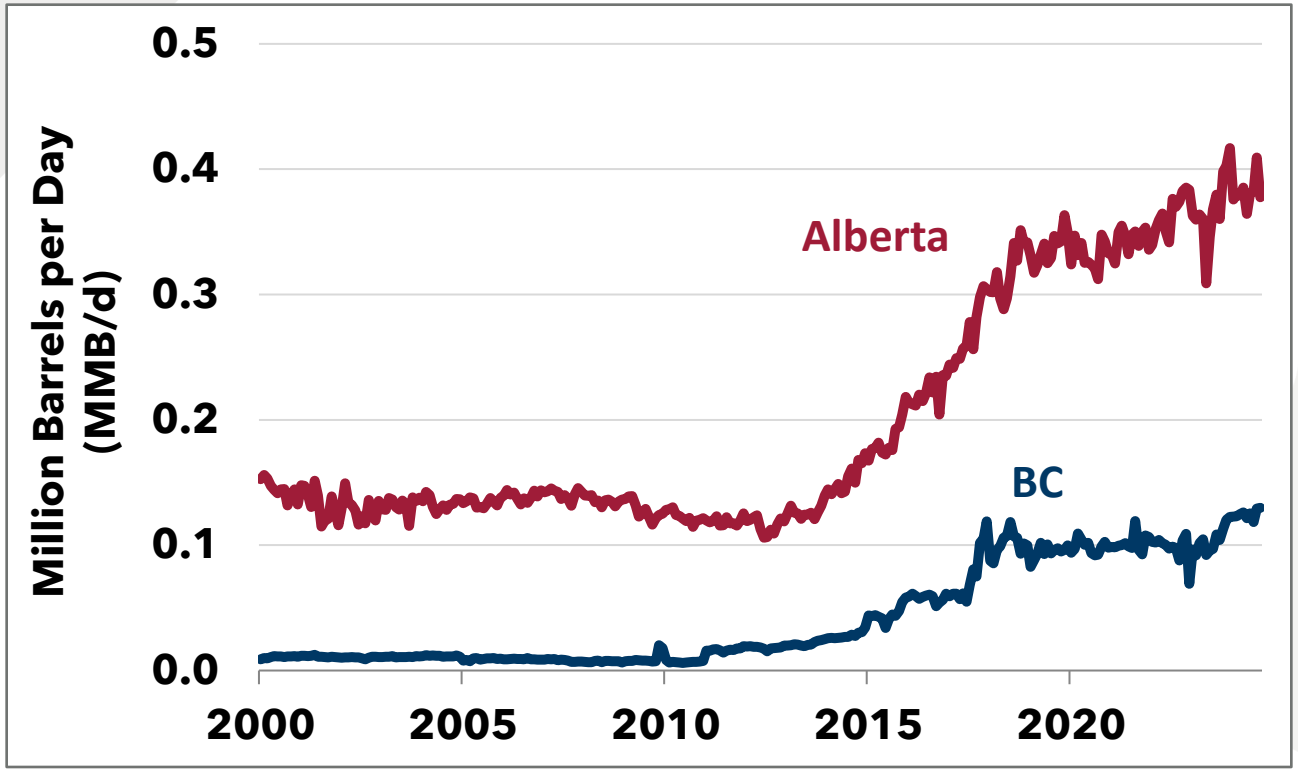




- Due to lower production levels, the scaling for "Rest of Canada" is in MB/d, not MMB/d.
- Rest of Canada includes Ontario, New Brunswick, and Northwest Territories. Production is minimal at less than ~5,000 B/d and mainly from the Northwest Territories.
- East Coast Offshore includes production from Newfoundland and Labrador. Production from the Terra Nova floating oil production and storage offloading (FPSO) vessel was restarted in November 2023. Production is expected to ramp up over the coming months.

Source: Canada Energy Regulator, Provincial Regulators; * 2024 is YTD average from Jan-Sep
Ontario is YTD to July 2024; New Brunswick is YTD to August 2024; NWT is YTD to July 2024

Monthly Condensate and Pentanes Plus Production | 2000 to 2024*



- Shale plays produce condensate and pentanes plus, primarily from natural gas production.
- As shale gas and shale oil output have grown, so has the production of these light liquids.
- Condensate and pentanes plus are sources of diluent for Canada's oil sands, among other uses.
- Revenue from condensate has also greatly helped the economics of Canadian shale gas.

Source: Canada Energy Regulator, Provincial Regulators; *2024 is YTD average from Jan-Sep