



## Oil sands 101

Canada has the fourth-largest proven oil reserves in the world, and 97% of them are located in the oil sands.<sup>1</sup> We're Oil Sands Alliance, five of Canada's largest oil sands companies working together to provide energy the world needs while advancing environmental innovation.

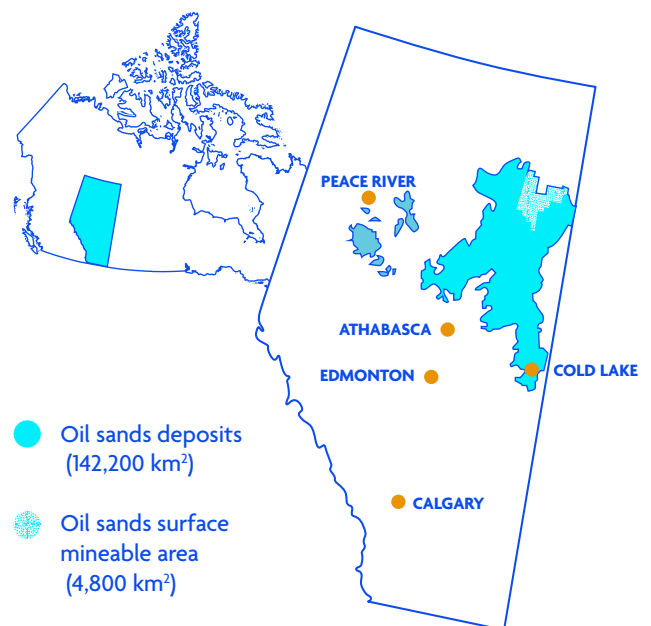


## What are the oil sands?

Oil sands are a naturally occurring mixture of sand, clay, water and bitumen (also called heavy oil). Oil sands can also refer to an area where oil sands exist, e.g., the Alberta oil sands.

## Where are Canada's oil sands?

Canada's oil sands are found in three deposits in Alberta and Saskatchewan: the Athabasca, Peace River and Cold Lake deposits.



<sup>1</sup> "Energy Fact Book 2025-2026." Natural Resources Canada, 2025

# How is oil recovered from the oil sands?

Traditional techniques like pump jacks won't extract bitumen. One challenge is that bitumen is mixed in with sand and clay. Another challenge is that bitumen is almost solid at room temperature (about the same consistency as peanut butter) and doesn't flow.

There are two methods of recovering oil from oil sands.



## Mining

About 20% of Alberta's oil sands reserves are very near to the surface and can be mined<sup>2</sup> (less than 75 metres deep). During mining, large shovels scoop the oil sands ore into heavy haul trucks for transport. The trucks move the oil sands ore to processing facilities where the ore is broken down into smaller pieces, then mixed with hot water and sent to an extraction plant. Once at the plant, the water and oil sands mixture goes through a series of pipelines and vessels that allow the bitumen to separate and be recovered.



## In situ

Otherwise known as in-place extraction, in situ describes a process where bitumen is extracted directly from the underground deposit. This method is used when bitumen in the oil sands is too deep underground to be mined, which is the case in about 80% of all deposits.

Steam-assisted gravity drainage (SAGD) and cyclic steam stimulation (CSS) are two of the technologies used for in-situ extraction. In both cases, steam is injected into the underground bitumen deposit, which heats the bitumen so it becomes less thick and can be pumped to the surface for processing.



### Did you know?

Once dismissed as too challenging to extract, the oil sands have become essential to Canadian energy production. Thanks to innovation and persistence, the oil sands make up the majority of Canada's total crude oil production.<sup>3</sup>

<sup>2</sup> "Oil Sands Discovery Centre: Facts About Alberta's Oil Sands and Its Industry." Government of Alberta, 2016. [open.alberta.ca](https://open.alberta.ca).

<sup>3</sup> "Crude Oil Year in Review 2023." Statistics Canada, 7 March 2024. [statcan.gc.ca](https://statcan.gc.ca).

# Why do oil sands operations produce emissions?

## In-situ emissions

During in-situ oil extraction, steam helps liquefy the bitumen so it can be pumped to the surface. This steam is created in large boilers powered by natural gas, which is the main source of greenhouse gas emissions from these operations.

## Mining emissions

For mining operations, emissions come from equipment like diesel vehicles and shovels, and they also come from the mined surface itself as methane escapes when we dig into the formation. Boilers powered by natural gas are used to heat water for the extraction process — this is the main source of emissions from mining. Once mining has been completed, some emissions also come from tailings ponds. Tailings are materials that remain after bitumen is extracted, which include trace amounts of bitumen. As this bitumen breaks down over time in tailings ponds, methane and carbon dioxide evaporate.



## COSIA

COSIA is the innovation arm of Oil Sands Alliance. It is focused on collaborative action and innovation in oil sands environmental technology. To do this, COSIA brings together thought leaders from industry, government and academia.

### Did you know?

COSIA focuses on four key Environmental Priority Areas, or EPAs: tailings, water, land and greenhouse gases.





Photo location: NAIT

## The role of innovation

Canada has been a trailblazer since the inception of the modern petroleum industry.

### A history of innovation

Since the late 1800s, Canadian energy companies have adopted and developed new technologies and processes to extract oil and gas and adapt to rapidly changing global environments. The industry now routinely develops oil and gas from deposits that were previously considered impossible to produce. That includes the oil sands, which began commercial production in 1967.

### Research, development and collaboration

As a result of investments by Oil Sands Alliance members in new technologies, innovations and operational improvements, CO<sub>2</sub>e per barrel of oil produced dropped about 26% in the Canadian oil sands from 2011 to 2023.<sup>4</sup>

<sup>4</sup> ["Alberta Oil Sands Greenhouse Gas Emission Intensity Analysis." Government of Alberta, June 4, 2025.](#)



**DID YOU KNOW?**

**An environmental impact assessment is a rigorous process that typically takes years to complete.**

## How is the oil sands industry regulated?

Before operations begin, producers develop plans that map out the full life cycle of a planned project, from the first shovel through to reclamation and closure. Once complete, the plans are filed with the Alberta Energy Regulator (AER).

As part of the application process, producers consult with Indigenous groups and local communities in order to identify and mitigate concerns related to the project. Community engagement is an iterative process, which continues throughout the project. Producers may also be required to complete an environmental impact assessment, which gauges the potential environmental effects of the planned project.

Once the AER grants approval, producers must continue to meet all regulations and requirements through the full project life cycle. They must submit annual plans and reports detailing project progress and providing updates about new data, techniques or other information that could inform future practices and approaches.



## How does the oil sands industry consult and engage with Indigenous groups?

Having a strong and constructive relationship with Indigenous groups and communities where we operate is vital to Oil Sands Alliance and its members. We recognize the need to continue meaningful engagement with Indigenous peoples on our environmental performance. Care for the communities where we operate is a core value for Oil Sands Alliance members and we will continue to seek input from Indigenous groups, who have a strong historical connection to the land, air and water.



## Indigenous economic inclusion

Oil Sands Alliance members have a long history of collaborating with Indigenous groups to enable them to acquire equity and share in the benefits of resource development. Indigenous-owned businesses have become an integral part of the oil sands industry over the past four decades.

## Community relations

Oil Sands Alliance members work to support communities in northeast Alberta, near oil sands operations. Through open dialogue, collaboration and meaningful engagement, we support initiatives that enhance social well-being and workforce development. Our approach prioritizes mutual respect, shared values and long-term partnerships that contribute to resilient, thriving communities, whether through local investment, volunteer programs or strategic partnerships.



# Why do we need the oil sands?

Forecasts vary, but what's certain is that global energy demand hasn't peaked yet. To meet demand, oil will continue to be a major part of the energy mix.



## The world needs secure energy

With the fourth-largest proven oil reserves in the world, Canada has an important role to play in the global energy future.

- The global middle class is currently growing at a pace of 100 million people per year.<sup>5</sup>
- Today, worldwide oil consumption is just over 100 million barrels per day.<sup>6</sup>

## Canada's global role

In 2025, Canada's oil sands produced 3.5 million barrels per day.<sup>7</sup> Today, the oil sands remain an immense economic driver for Canada and Alberta, and a secure source of energy for the world.

## An economic driver

The oil sands industry is a key economic driver for Alberta and Canada, contributing billions to the economy annually while helping to provide a secure source of energy here and to the world. Our province and country have long benefited from a strong energy sector that generates thousands of jobs and helps fund essential services, including education and roads. With rising costs, incomes not keeping up and economic uncertainty, Canadian families are struggling. It's important to keep all sectors of our economy going strong — including our oil sands sector.

### Did you know?

- 503,000+ Canadians are directly or indirectly employed by the oil and gas industry.
  - ~11,300 Indigenous people were employed in the oil and gas sector in 2024.<sup>8</sup>
- From 2018–2024 the oil and gas sector contributed \$153.2 billion to federal and provincial governments.<sup>9</sup>

Learn more at  
[OilsandsAlliance.ca](https://OilsandsAlliance.ca) or reach us at  
[contact@oilsandsalliance.ca](mailto:contact@oilsandsalliance.ca).

<sup>5</sup> Agnolucci, Paolo & Makarenko, Nikita. "Growing oil supplies amid moderating demand and geopolitical uncertainty: What lies ahead for oil?" World Bank Blogs, Nov. 5, 2024.

<sup>6</sup> "Oil Analysis and Forecast to 2030." International Energy Agency, 2024.

<sup>7</sup> "Estimated Production of Canadian Crude Oil and Equivalent." Canada Energy Regulator, March 2026.

<sup>8</sup> "Energy Fact Book 2025–2026." Natural Resources Canada, 2026.

<sup>9</sup> "Oil and gas extraction revenues, expenses and balance sheet." Statistics Canada, Sept. 29, 2025.