

ISSUES & INNOVATIONS CARDS

5

EXPERIENCE
FOSSIL FUELS



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Issue

Carbon Dioxide Emissions

Burning fossil fuels (*coal, oil, natural gas*) releases **carbon dioxide** into the atmosphere, which contributes to climate change.

Carbon Capture

Carbon can be captured from emissions to prevent it from entering the atmosphere. Under the umbrella of Carbon Capture, Utilization and Storage, carbon can either be stored by injecting it deep under the ground, or utilized to make carbon-based products (such as carbon fiber, carbonated drinks or even soap!).

The Pathways Alliance, a collaboration between 6 of Canada's largest oil sands companies, is working on a new storage project in Alberta, with the goal of making Alberta's oilsands production net zero by 2050. At the end of 2025, Alberta had two active Carbon Capture projects - Quest (operated by Shell) and the ACTL (Alberta Carbon Trunk Line)

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Carbon Capture

Carbon capture projects involve removing carbon dioxide and either using it or storing it underground.

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Sulphur Dioxide Emissions

Burning fossil fuels releases **sulphur dioxide** into the air, which can form acid rain and have a devastating impact on aquatic and terrestrial ecosystems.

Sulphur Removal

- When sulphur-containing materials such as coal and oil are combusted (burned), sulphur dioxide is released into the atmosphere
- Sulphur scrubbers are able to remove sulphur from the flue gas after combustion. Typically the sulphur gets stored in its solid form instead of being released as a gas into the atmosphere
- Other ways of decreasing sulphur dioxide emissions include washing or gasifying coal or oil before burning it to remove the sulphur

Sulphur Removal

Removing sulphur reduces the amount of sulphur dioxide released into the air.

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Tailings Ponds Impact Water Quality

When oil sands are mined, **tailings ponds** are left behind, which are composed of the remaining sand, water, silt, clay and some leftover bitumen that can be toxic and harmful to aquatic ecosystems.

Cleaning Tailings Water

Alberta Innovates and Emissions Reduction Alberta fund many water-focused projects, some of which are centered around treating tailings water and reclaiming tailings ponds.

Examples of methods used to reclaim tailings include:

- **Centrifuge tailings** - Water is separated from the tailings, then the water is reused and the tailings (*which look like solid clay*) are used for reclamation
- **Composite tailings** - Tailings ponds water is mixed with gypsum and sand, then the area is topped with sand and soil, which allows forests and wetlands to regrow
- **Water-capped tailings in pit lakes** - Water is added to create a lake
- Learn more about tailings management projects at: <https://www.eralberta.ca/projects> and <https://albertainnovates.ca/impact/funded-projects/>

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Cleaning Tailings Water

Treating tailings water and then safely releasing it can reduce the need for tailings ponds and lessen their impact on aquatic ecosystems.

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High Water Use

Oil sands operations **use a lot of water** to produce bitumen.

Blowdown Boiler Technology

- Cenovus' patented blowdown boiler technology allows them to get more steam from each barrel of water used at their oil sands projects, which decreases overall water usage
- 'Blowdown water' is leftover water that typically cannot be reused - this technology developed a process to re-boil the blowdown water and convert it into steam
- This allows for more water to be recycled in the process

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Blowdown Boiler Technology

New blowdown boiler technology allows more water to be reused, which reduces overall water usage at oil sands operations.

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Habitat Fragmentation

Cut lines and roads make deep areas of the forest accessible, allowing predators such as wolves to access endangered woodland caribou.

Reclaiming Habitat

Companies such as Cenovus Energy are working to improve woodland caribou habitat at their operations sites, using methods such as:

- Planting trees on old seismic lines and roads
- Piling mounds of soil on open corridors to make it harder for predators to find and catch caribou
- Mounding soil in swampy areas to create drier conditions for trees to grow, which provides food and shelter for caribou
- Sharing what they do with other companies so they can learn from each other

Reclaiming Habitat

Replanting trees and mounding soil on cut lines and roads can make it harder for predators to travel and find caribou.

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Tailings Ponds Impact Wildlife

When **birds land on tailings ponds** (*storage ponds for waste material left over from the extraction process*), they can be severely harmed or even killed from toxins in the water.

Tailings Ponds Deterrents

Fossil fuel producers are required to take steps to prevent birds from landing on their tailings ponds. Some of the methods to scare birds away include:

- Setting up movement detecting noise makers (*often called 'sound cannons'*)
- Replacing conventional lights with lights that are less attractive to birds (*such as green lights*)
- Putting up large scarecrows or bird of prey replicas (*even robotic ones!*)
- Setting up laser technology to deter wildlife

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Tailings Ponds Deterrents

Methods such as setting up noise makers, scarecrows, and lasers are used to deter birds from landing on tailings ponds.