



Oil Sands

A strategic resource for Canada, North America and the global market

Water Management

All major energy production requires water

Water requirements for oil sands production vary depending on the technology used for extraction.

Water is used in oil sands extraction to help separate extra-heavy crude oil, also known as bitumen, from the sand, clay and water that make up the oil sands. Water is also consumed in hydrogen production, where steam reacts with natural gas to produce hydrogen, which is then used in upgrading processes to convert bitumen into synthetic crude oil (SCO).

Oil sands surface mining uses three to four barrels of new water to produce one barrel of bitumen, while in-situ processes use an average of 0.4 barrels of fresh water¹ for each barrel of production.

Most of the water used is recycled

Most water used in oil sands development is recycled – 80 percent² for established mining operations and approximately 94 percent³ for in-situ recovery. However, some new water is required and comes from a variety of sources, including on-site drainage, collected precipitation (rain and melt water), underground brackish aquifers, and the local watershed such as rivers.

In-situ projects rely largely on groundwater for their new water needs, with an increasing amount being non-potable, brackish water. Mining operations typically withdraw water from the Athabasca River. The Alberta government manages this water use by setting strict river water withdrawal limits.



Less than 1 percent of the Athabasca River's annual flow is used by the oil sands

The Athabasca River Water Management Framework ensures annual withdrawals by oil sands companies never exceed 3 percent of Athabasca River flow. In practice, annual withdrawals are often less than 1 percent.⁴ The framework also limits, monitors and adjusts withdrawals from the river on a weekly basis. These limits maintain flows at or near natural levels taking into account real-time conditions. Regulations control instantaneous flows, based on the given flow in the river, as river flow changes considerably from season to season.

To maximize water reuse and minimize withdrawal from the river, all recovered process water is recycled into the production process. The Alberta government has also established performance criteria for the reduction of tailings that result from the oil sands mining process, with the long term objectives of further increasing the amount of water recovered from tailings for recycling and reducing the amount of water withdrawn from the river.

¹ Canadian Association of Petroleum Producers, *The Facts on Oil Sands, 2014*

² Canadian Association of Petroleum Producers, *Responsible Canadian Energy: 2013 Progress Report Summary*

³ Canadian Energy Research Institute, *Oil Sands Environmental Impacts*

⁴ Government of Alberta, November 2013

Strict water usage regulations apply

Provincial regulations for water use include daily limits for withdrawals from area waterways and limit the use of fresh water from underground aquifers. Industry and governments continue to develop ways to further reduce the amount of water used in the extraction process. For instance, Canada's Oil Sands Innovation Alliance (COSIA) – an alliance of oil sands producers formed to improve environmental performance in the oil sands – is developing several technologies to reduce water use. COSIA also recently committed to a water performance goal – members with in-situ operations will strive to reduce the amount of freshwater they use per barrel of production by 50 percent by 2022.

In Alberta, water use and diversion for commercial, industrial, agricultural, municipal and other purposes requires an allocation licence from Alberta's Ministry of Environment and Sustainable Resource Development. While irrigation and agriculture water allocation accounts for approximately 44 percent of Alberta's total water allocation in 2012, the oil sands industry accounts for only 8 percent.

Water quality is ensured

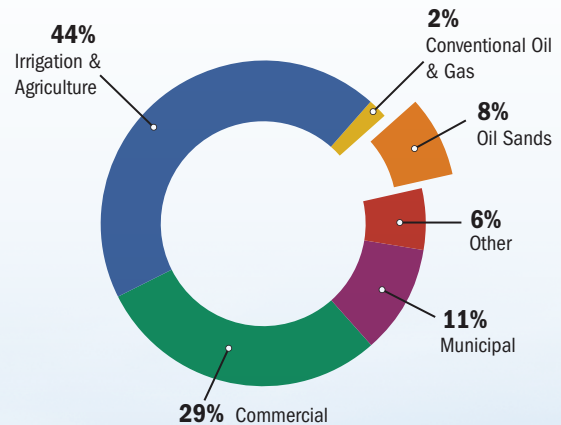
The provincial government ensures the quality of Athabasca River water is maintained and the health of aquatic creatures is protected by holding operators to a "zero discharge policy." This policy requires all oil sands process water be contained on site and disallows the release of process water to the environment. Oil sands companies are also subject to federal rules prohibiting the deposit of substances that are harmful to fish in the river. Producers that fail to follow these rules are subject to various enforcement actions, including fines and prosecution.

Rigorous water monitoring

The governments of Canada and Alberta established a joint oil sands monitoring program in early 2012. The program takes unprecedented steps to enhance the monitoring of air, land, water and biodiversity to improve the ability to detect changes in the environment and manage cumulative impacts.

The water monitoring component of the program has been designed to quantify and assess oil sands contaminants in the Athabasca River system, as well as their effects on key aquatic ecosystem components (both within the oil sands development area and in downstream receiving environments). Water monitoring improvements include monitoring more sites to increase geographic coverage, as well as increasing the frequency of sampling and the number of different substances sampled. These steps will provide an improved understanding of the long-term cumulative effects of oil sands development.

Alberta's Water Allocation in 2012 by Sector



Source : Alberta's Ministry of Environment and Sustainable Resource Development