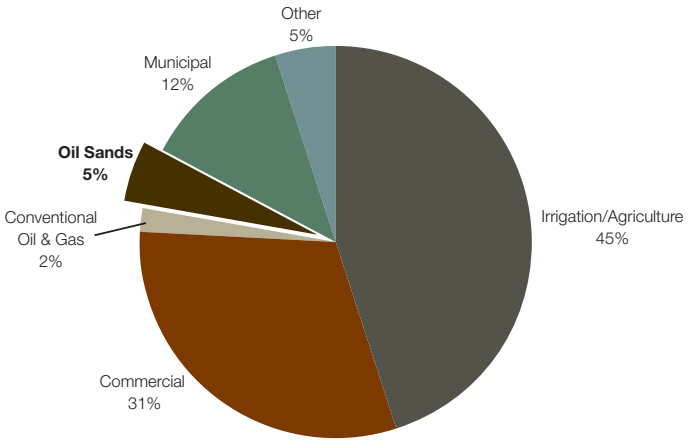
OVERVIEW: WATER USE IN CANADA'S OIL SANDS

Oil sands operations use approximately 176 million cubic metres (m^3) of water per year – about one third of the City of Toronto's annual consumption in 2008. Net fresh water use accounts for approximately four barrels of water for every barrel of oil produced by mining operations, with about two to three of these barrels drawn from the Athabasca River. In situ operations require roughly 0.5 barrels for every barrel of oil produced (no water is directly drawn from the Athabasca River).

Alberta Water Allocations – 2007



Source: Alberta Environment

The oil sands industry accounts for about five per cent of Alberta's total water allocation and conventional oil and gas accounts for another two per cent. The actual amount of water used is significantly less than the allocated amount.

- **Even with forecast oil sands growth, the Athabasca, Peace, and Beaver River basins (where oil sands development occurs) remain among the least utilized river basins in Alberta.**
- **More than half of the water currently used by in situ oil sands developments is saline water from deep underground zones, which is not suitable for human or agricultural use.**
- **Oil sands projects recycle 80 – 95 per cent of the water used.**

The industry is working hard to continue reducing its fresh water usage, increasing recycling, and wherever possible replacing fresh water with saline water or recycled industrial wastewater. The industry also continues to develop new technologies that will greatly reduce or eliminate the need for water.

In situ

In situ operators use water to create steam that heats the bitumen underground, making it less viscous, so it can flow through wells to the surface. Most of the steam condenses in the reservoir and returns to the surface with the oil. This water is then separated, treated, and recycled. Residual wastewater is either injected into approved deep disposal zones or transported to waste handling facilities.

The in situ industry currently uses approximately 16 million m^3 per year of fresh surface or groundwater, and that amount is expected to increase to 25 – 45 million m^3 per year by 2020, depending on improvements in water efficiency. As a comparison, a mid-sized city such as London, Ontario, uses about 50 million m^3 per year. Additionally, the industry is continuing to replace fresh water with saline water. In 2007, more saline water was used for in situ oil sands production than fresh water.

It is expected that by 2020 less than 0.5 per cent of Alberta's current water allocation will be required by the in situ oil sands industry, which by then will be producing almost 40 per cent of Canada's crude oil.

WE WILL CONTINUE TO REDUCE THE AMOUNT OF FRESH WATER REQUIRED PER BARREL OF PRODUCTION BY IMPROVING WATER RECYCLE RATES, USING NON-POTABLE WATER SOURCES WHERE FEASIBLE, AND BY DEVELOPING NEW TECHNOLOGIES.

Mining

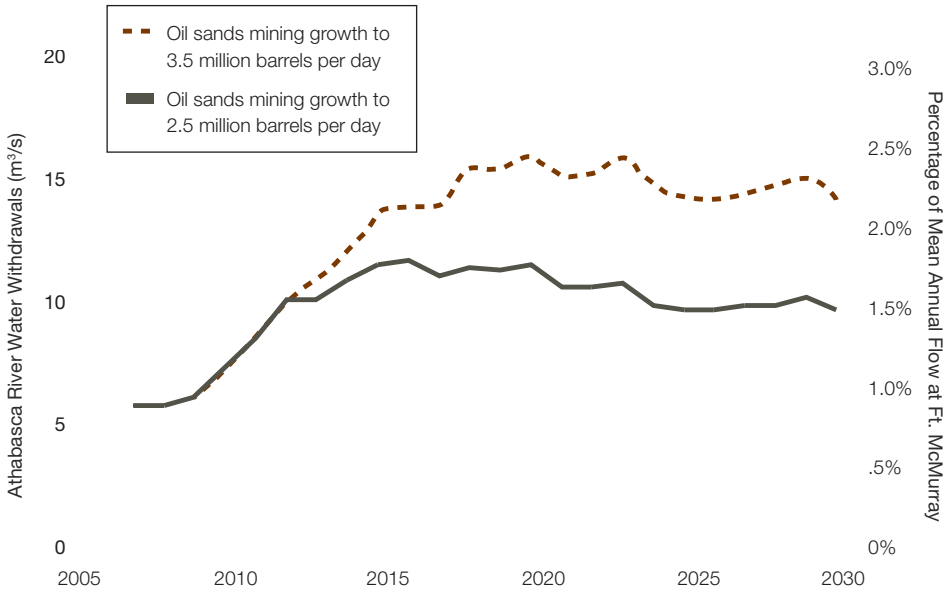
Oil sands mining operations mix oil sands with water to separate the bitumen from the oil sands. Their primary source of water is the Athabasca River. They also use precipitation and groundwater captured in the active mine area, which must be removed to prevent the mines from filling with water.

In 2007, the mining industry withdrew a total of 160 million m^3 of water from the Athabasca River – less than 1 per cent of average total river flows and about 5 per cent of the lowest weekly winter flows.

As oil sands mining production grows, so will water use. As shown in the graph below, current and approved oil sands mining projects, are forecast to use about 2.2 per cent of the natural flow of the river. Since there are few other users of water from the Athabasca System, the Athabasca River will remain one of the least used river basins in Alberta.

There is significant seasonality in the river flows and during winter – the low flow season – regulations restrict the amount of water that can be withdrawn. Because oil sands operators may not be able to withdraw as much water as they need during the low flow period, they store water on site during high flow periods.

Water Use in Oil Sands Mining



Data Source (OSDG, 2009)

Tailings Pond Reclamation

Existing tailings ponds cover approximately 130 square kilometres and can remain part of an active tailings management system for up to 40 years. The first tailings pond to be reclaimed will be Suncor's Pond 1 in 2010.

The industry continues to develop better technologies to reduce the volume of tailings and increase the rate of solidification.

A new government directive requires all oil sands operators to be converting fine tailings into reclaimable landscapes by 2012. This will result in fewer fine tailings, a decrease in the number of new tailings ponds, and faster reclamation of new and existing tailings ponds.

Regional Aquatics Monitoring Program

The Regional Aquatics Monitoring Program (RAMP) is a multi-stakeholder regional initiative established in 1997 to monitor water quality and quantity in the Regional Municipality of Wood Buffalo.

RAMP takes thousands of water samples upstream and downstream of the oil sands operations and also measures fish and microorganism populations.

RAMP has detected localized increases in nitrogen, sulphate, and chloride levels in certain tributaries of the Athabasca River due to oil sands development, but overall there have been no measurable impacts to the Athabasca River ecosystem.

RAMP's reports on water quality in the Athabasca River and delta, 11 tributaries and 50 lakes are available at www.ramp-alberta.org

Tailings ponds

Tailings ponds are common to all surface mining. In the oil sands, the oil is separated from the sand and clay by mixing it with warm water. The oil is sent for further processing and the leftover mixture of water, sand, clay, and residual oil (the tailings) is stored in large ponds – often built in discontinued mine pits.

The sand separates rapidly and sinks to the bottom of the tailings pond. Clarified water from the upper three metres of the pond is recycled. The bottom layer is a combination of clay and water known as fine tailings.

A small amount of residual oil floats to the surface which poses a threat to any waterfowl that land on the pond and, unfortunately, there have been instances of birds landing on tailings ponds and drowning as a result. In order to prevent such occurrences, operators employ various mechanisms to deter waterfowl from landing, including air cannons, scarecrows, decoy predators, and radar controlled laser deterrent systems. Operators also skim and reclaim bitumen from the surface of the ponds.

WE WILL SAFEGUARD THE QUALITY OF REGIONAL SURFACE AND GROUNDWATER RESOURCES.

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