



## Oil Sands Environment Fact Sheet

October 2009

Few other industries have environmental performance, social performance and business performance so closely linked as they are in oil sands development. According to the latest edition of *World Energy Outlook*, global demand for energy is increasing and will grow by 50 per cent by 2030. The demand for greater environmental responsibility is also increasing. Oil sands developers believe energy production and environmental responsibility are demands that can be balanced within our industry. It simply makes good business, social and environmental sense to do so. In general, the less oil sands projects emit and consume, the more productive and efficient they become.

Oil sands developers have invested in solutions to reduce emissions, to return the land it borrows to a self-sustaining state, and to minimize the use of fresh water. The industry has a proven history of incremental and step-change environmental improvements even as production volumes have increased. The industry is monitored through unique multi-stakeholder processes that include government, environmental groups, First Nations and Métis communities. The Government of Alberta, and in some cases the Government of Canada, regulates the development and activities of oil sands operators. The oil sands industry also continues to pioneer research and invest in technology aimed at improving current and future environmental performance.

### Size and scope

**Fact: The oil sands are an enormous resource but development is limited by accessibility and feasibility. Oil sands mining will disturb a comparatively small portion of the Boreal Forest.**

- Alberta's oil sands deposits cover about 140,000 square kilometres, which is some 4 per cent of the Boreal Forest in Canada.
- An area of 3,450 square kilometres is mineable from the surface. This only represents approximately 0.1 per cent of the Boreal Forest in Canada. The remaining oil sands deposits are extractable using in-situ techniques.
- In-situ techniques are similar to conventional oil development and cause significantly less surface disturbance for shorter periods of time.

- In-situ operations do not have mines or tailings ponds and do not take water from the Athabasca River.
- After 40 years of operating, only some 530 square kilometres have been disturbed by existing mining activity. This is an area about two-thirds the size of the city of Edmonton.
- This area currently supplies approximately 50 per cent of Canada's crude oil requirements.
- Of the disturbed land, about 65 square kilometres are under active reclamation. This is an area approximately twice the size of Fort McMurray.
- Operating approvals from the government of Alberta for oil sands facilities expire every 10 years. Developers must reapply to ensure reclamation plans and other environmental controls and operating limits remain current to changing performance expectations. The process for reviewing and approving these applications is transparent and open to the public.

## Climate change

**Fact: Oil sands operations create greenhouse gases (GHGs). The impact of development and the industry's role as a contributor is important to discuss and understand.**

- Canada is responsible for about 2 per cent of global GHG emissions.
- Oil sands make up about 4.6 per cent of Canada's overall GHG emissions.
- Oil sands account for about 0.1 per cent of global GHG emissions.
- About 20 per cent of GHG emissions from a barrel of oil are created during the production, refining and transportation to market of the product while 80 per cent comes from consumption of the oil, mostly through the tail pipes of vehicles.
- The full life-cycle GHG emissions from Alberta's oil sands are higher than those from light, sweet conventional crude.
- Light, sweet conventional crude is declining by 4.5 per cent each and every year.
- The full cycle GHG emissions from oil sands are similar to the full life-cycle GHG emissions of oil from many other regions of the world and are less than Venezuela or Nigeria. These countries are the sources of crude to which Canada would have to turn to replace the decline of light sweet crudes if we did not have access to the oil sands.

**Fact: The oil sands industry is reducing its GHG emissions.**

- Oil sands projects have reduced their carbon dioxide emissions by 38 per cent per barrel since 1990. They continue to work at reducing their emissions intensity even further, mostly through improving energy conservation.
- In 2007, Alberta was the first jurisdiction in North America to legislate GHG reductions on large industrial facilities.
- In the first year of legislated GHG reduction, companies made the equivalent of 2.6 million tonnes of reductions, which is similar to taking 550,000 cars off the road.

**Fact: Industry and government are investing time, expertise and funding to find new ways to further reduce GHG emissions.**

- The Integrated CO<sub>2</sub> Network (ICO<sub>2</sub>N) developed by industry is a proposed carbon capture and storage (CCS) system for Canada, which would move carbon dioxide (CO<sub>2</sub>) from industrial sites via pipeline to storage sites deep underground.
- Studies show the ICO<sub>2</sub>N proposal has the potential to reduce Canada's CO<sub>2</sub> emissions by 20 million tonnes - the equivalent of annually removing four million cars from the road.
- In July 2008, the government of Alberta announced a \$2-billion fund to assist in the construction of CCS projects with a target of removing some five megatons of GHGs per year.

## Air

**Fact: The Wood Buffalo regional air-shed is closely monitored and is consistently found to be of high quality.**

- The Wood Buffalo Environmental Association (WBEA) monitors about 70,000 square kilometres around the oil sands region. Its monitoring network includes more than three dozen stations.
- WBEA conducts a *Terrestrial Environmental Effects Monitoring Program* to monitor the impact of oil sands emissions on terrestrial ecosystems.
- Air quality data for the oil sands region is available in real time from the WBEA web site <http://www.wbea.org/content/view/56/111/> along with historic air quality information and the results of the *Terrestrial Environmental Effects Monitoring Program*.

- The Wood Buffalo Environmental Association (WBEA) operates 15 active, continuous air monitoring stations in the oil sands region and 27 passive, interval air monitoring stations. There are about 10 times more air monitoring stations in the Wood Buffalo region as there are for the United States on a per capita basis.
- Air quality around oil sands operations is better than all North American cities benchmarked by the Alberta Clean Air Strategic Alliance (<http://www.casahome.org/>).

The Alberta Clean Air Strategic Alliance studies indicate air quality has consistently improved and continues to improve in the Fort McMurray Wood Buffalo region.

**Fact: The industry is working to further improve the already high air quality in the region.**

- The oil sands industry has continually reduced nitrogen dioxide (NO<sub>2</sub>) and sulphur dioxide (SO<sub>2</sub>) emissions on a per barrel basis since production first began.
- New guidelines will reduce nitrogen oxides (NO<sub>x</sub>) emissions from future stacks, boilers and heaters by as much as 50 per cent.
- Producers in the oil sands are investing, and have invested, billions of dollars to reduce SO<sub>2</sub> emissions even further.

**Fact: The air quality in the region compares favorably to other metropolitan centres in Alberta and even North America.**

- In comparison to other Canadian communities, Fort McMurray ranked better than centres such as Toronto, Winnipeg, Edmonton, Calgary and Fort Saskatchewan in annual average concentrations of NO<sub>2</sub> and SO<sub>2</sub>.
- New York City has about 12 times the annual average concentrations of SO<sub>2</sub> in the air as Fort McMurray, and Dallas has more than twice the amount of NO<sub>2</sub>.

## Land

**Fact: Mining requires land disturbance.**

- Surveys from early 2008 indicate that approximately 530 square kilometres of land, an area about two-thirds the size of Edmonton, have been disturbed by oil sands mining in the region. This area currently provides 50 per cent of Canada's crude oil requirements.

- Oil sands operations are required to reclaim the land they disturb.

**Fact: Reclamation takes many years.**

- The reclamation process involves monitoring, seeding, fertilizing, tree planting, seed collecting, topsoil salvaging and replacing. It also involves significant landform creation and contouring.
- Significant research has been conducted and continues in the oil sands region, producing notable advancements in land reclamation technology. Research is being conducted in such diverse fields as landform creation, nutrient flows, soil reconstruction, wetland construction, re-establishment of peat and fen vegetation and the propagation of native tree and shrub species.
- Reclamation is progressive. As land becomes available, it is reclaimed, but much of the land is still in active use to support operations.
- It takes time to reclaim land in the boreal forest. For example, it can take some 80 years for a conifer tree to grow to maturity in the oil sands region.

**Fact: Regulations ensure land will eventually be reclaimed.**

- Industry is required by law to file a *Conservation and Reclamation Plan* as part of its initial application to develop an oil sands project. It must update the plan as its development proceeds.
- The *Conservation and Reclamation Plan* must be formally re-approved every 10 years.
- The *Conservation and Reclamation Plan* must detail the scope and timing of all surface disturbances and resulting reclamation activities throughout the life of the project through to the completion of the final reclaimed landscape.
- Industry is required to post financial security equivalent to the cost of reclamation to ensure all land is reclaimed irrespective of the project's economic performance.

**Fact: Land has been reclaimed and will continue to be reclaimed.**

- Reclamation activities have been underway for decades.
- In March 2008, Alberta issued its first-ever oil sands land reclamation certificate.
- A reclamation certificate can only be issued once vegetation is mature enough to demonstrate long-term productivity.
- Operators may be reluctant to apply for certification if the reclaimed land is adjacent to ongoing industrial activity for reasons of safety and security. Once land is certified, it becomes open to public access.

- About 65 square kilometres, an area twice the size of Fort McMurray, is being reclaimed.

**Fact: Tailings ponds must meet strict environmental standards.**

- All tailings ponds are constructed with groundwater monitoring wells and seepage control facilities surrounding their perimeters and are closely monitored for seepage and impact to groundwater.
- Interceptor ditches are constructed around tailings ponds to prevent seepage from entering water systems or waterways and any collected water is returned to the tailings pond.
- *Conservation and Reclamation Plans* must define how and when tailings ponds will ultimately be reclaimed.
- Tailings ponds and other structures on oil sands operations must comply with *Canadian Dam Safety Regulations* to ensure the integrity of the containment structures.

**Fact: Tailings ponds are being reclaimed and technology related to tailings management is improving.**

- Consolidated tailings technology was developed as a step change process in managing mature fine tailings in the industry.
- The first tailings pond will be reclaimed to a solid surface and ready for replanting by 2010.
- New technologies that could speed the process of settling and reclaiming ponds are currently being investigated.
- The oil sands industry is actively researching drier tailings technologies that would allow future oil sands plants to have smaller tailings pond areas.
- In-situ oil sands developments do not generate tailings.

**Fact: Low-impact seismic testing and exploration drilling has reduced land disturbance.**

- Switching to low-impact seismic testing and exploration drilling has led to a 60 per cent smaller footprint by the exploration industry resulting in less timber loss and less impact on wildlife habitat.
- Unlike the straight cut lines of the past, low-impact seismic lines and core-hole access routes are routed around natural features and habitats such as trees, animal dens or creeks.

- At an average width of about three metres, today's low-impact seismic lines and exploration access routes are much narrower than the up-to-eight-metre lines of the past.
- Many newer seismic lines are as narrow as 1.75 to 2.5 metres.
- Narrow, meandering seismic lines currently employed, preserve habitats by reducing predator sightlines and human access.
- The oil sands, exploration and forestry industries work together to coordinate access routes to minimize land disturbance.

## Water

### **Fact: Water in the area is closely monitored.**

- The Regional Aquatics Monitoring Program (RAMP) is the multiparty environmental monitoring program that assesses the health of rivers and lakes in the region.
- RAMP has concluded that there has been no significant impact from oil sands development on the Athabasca River. RAMP's information and technical reports may be reviewed on its website [www.ramp-alberta.org/RAMP.aspx](http://www.ramp-alberta.org/RAMP.aspx).
- The quality of the surface waters in the region has always been impacted by the naturally occurring bitumen from the ground. Ground water that has been in natural contact with oil sands seeps naturally into local rivers and has done so for millennia.
- Aboriginal people first discovered the oil sands as they observed bitumen flowing directly into rivers and other water bodies in the region. European explorers also remarked how the oil sands interacted directly with surface water.

### **Fact: Much more of the flow of rivers outside the region are allocated for use when compared to the Athabasca River.**

- The Athabasca River has one of the lowest water allocations of any river in Alberta and one of the largest flows.
- The total annual allocation of water from the Athabasca River for all uses (e.g. municipal, industrial and oil sands) is less than 3.2 per cent of flow, compared to:
  - 37 per cent North Saskatchewan River (Edmonton)
  - 60 per cent Oldman River (Southern Alberta)
  - 65 per cent Bow River (Calgary)

**Fact: The industry limits its use of fresh water and relies heavily on recycled water for its operations.**

- Up to 90 per cent of the water used for in-situ oil sands extraction is recycled while over 80 per cent of that used for surface mining is recycled.
- Remaining portions of water that cannot be recycled return to the hydrological cycle through evaporation as steam from facilities and ground absorption.
- Current oil sands mining projects use about one per cent of the total annual water flow of the Athabasca River.
- Should all existing, approved and announced oil sands projects proceed, industry would use 2 per cent of the Athabasca river flow.
- Industry's withdrawal of water from the Athabasca River is capped during periods of low river flow to protect the aquatic ecosystem.
- Research on drier tailings is aimed at reducing the amount of water used and increasing water recycling.

**Fact: In-situ operations also require water but are using less than ever before.**

- For in-situ projects, the largest use of water is for generating steam to be injected into the underground ore body, providing the necessary heat to loosen and extract bitumen.
- The water used to make steam is primarily drawn from underground aquifers. In most cases, it is saline or brackish, non-potable water.
- In-situ water technology has improved considerably, and in some cases, water use is one-seventh of what it was 20 years ago.
- Up to 90 per cent of the water used by in-situ operations is recycled.

## The rules and the regulators

**Fact: The oil sands industry operates under some of the most stringent and comprehensive regulations in the world.**

- Alberta Environment regulates all operations that impact air, land and water or that generate industrial waste.
- Alberta Sustainable Resource Development oversees access to land, timber harvest and wildlife management.

- The Energy Resource Conservation Board regulates access to the bitumen resource and manages the processes that consider development applications and determine if they are in the public interest.
- Once a project has been approved by regulators, its operating approvals must be reassessed and approved again every 10 years.
- Alberta Ambient Air Quality Objectives are some of the strictest in the world and apply to oil sands development.
- Best Available Technology Economically Achievable (BATEA) is required for all activities that produce air emissions in new oil sands facilities.
- Alberta Environment and the Department of Fisheries and Oceans have developed a water management plan for the lower Athabasca River to ensure water withdrawals do not result in significant impacts to the Athabasca River and its tributaries.

*Sources for all facts available upon request*