THE OIL SANDS DEVELOPERS GROUP
Energy From Athabasca

Oil Sands Technology Fact Sheet

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Fact: Oil sands developers and government invest time, talent and billions of dollars in the research and application of new technology.

- Alberta companies spent more than half a billion dollars on research and development in 2007, and some Alberta-based energy companies ranked among the highest spenders in research and development in the country.
- Together, industry and government have each invested more than $1 billion in oil sands research.
- In 2008, 11 Alberta-based companies ranked in the Canadian Top 100 Corporate R&D Spenders list.
- The Alberta government's research and development investments are among the highest in the country on a per capita basis.
- The Innovative Energy Technologies Program provides royalty adjustments of up to $10 million per pilot project that demonstrates the use of new or innovative technologies to increase environmentally sound recovery of reserves and responsible development. Since 2005, $148 million has been invested through this program.
- More than $150 million will be invested in Alberta technology as part of the Canada EcoTrust for Clean Air and Climate Change.
- The Hydrocarbon Upgrading Demonstration Program is a $300-million initiative to demonstrate upgrading integrated with gasification and carbon capture and storage (CCS).
- The Alberta Energy Research Institute, the Centre for Oil Sands Innovation at the University of Alberta and the Alberta Ingenuity Centre for In-Situ Energy at the University of Calgary all use funding to research energy-related technology.

Fact: Extracting the oil from the oil sands was considered an economic impossibility about 50 years ago, but innovation overcame those barriers. Today oil sands account for about half of the country's oil production.

- Dr. Karl A. Clark patented the hot-water extraction process which separated the oil from oil sands in 1929, and this was the foundation for future development.

- Great Canadian Oil Sands (Suncor) opened its commercial surface mining plant in 1967.
- The provincial government created the Alberta Oil Sands Technology and Research Authority (AOSTRA) to help industry access the oil sands that mining could not reach. This led to research breakthroughs that have enabled oil sands developers to create viable in-situ projects.
- Advances in assistive technologies such as horizontal well drilling, multilateral well technology, 3-D and 4-D seismic, pumping systems and reservoir simulation and prediction techniques have also propelled the industry forward.

Fact: There are some specific environmental challenges that industry is working to address with improved technology.

- Currently oil sands operations consume about 5 per cent of Canada's natural gas supply, but new technology and methods may drastically reduce the industry's reliance on natural gas particularly with some of the new in-situ methods that are being developed using solvents, underground combustion, geothermal and, potentially, nuclear energy sources in production.
- Although between 80 and 90 per cent of water used in the oil sands is recycled up to 18 times, there is still great motivation to continue to reduce fresh water use.
- The oil sands account for 4.6 per cent of Canada's greenhouse gas emissions, and one-tenth of one per cent of the world's emission, and industry and government are investing billions in technologies such as carbon capture and storage to keep decreasing emissions.

Fact: The industry and government are investing billions in researching and implementing technology that will assist industry in further reducing GHG emissions.

- The Government of Alberta will invest $2 billion in Carbon Capture and Sequestration Projects in Alberta with the objective of storing some 5 million tonnes per year of carbon dioxide (CO_2) deep underground.
- The Integrated CO_2 Network (ICO_2N) developed by industry is a proposed CCS system for Canada, which will move CO_2 from industrial sites via pipeline to storage sites deep underground.
- Studies show the ICO_2N proposal has the potential to reduce Canada's CO_2 emissions by 20 million tonnes - the equivalent of annually removing four million cars from the road.
- In July 2008, Alberta invested $4 billion to fight climate change.

- An Alberta energy company started injecting CO_2 into one of its oilfields near Weyburn, Saskatchewan, to boost recovery in 2000 and found that it also made an excellent storage site for the gas.
- It is projected that the Western Canadian Sedimentary basic could hold about 4,000 megatonnes of CO_2.

Fact: Advances in technology have aided industry in addressing air quality concerns.

- The oil sands industry has used technological advances to continually reduce nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) on a per-barrel basis since production first began.
- Producers in the oil sands have invested billions of dollars to reduce SO_2 emissions even further.

Fact: The industry is always searching for and evaluating new technology to continue to improve both the environmental and economic performance of in-situ projects.

- Vapour recovery extraction (VAPEX) is an extraction method which does not use heat at all, but used solvents instead to make the bitumen less viscous. This conserves a significant amount of energy and dramatically reduces GHG emissions.
- Toe-to-heel air injection (THAI) is an in-situ process that relies on underground combustion rather than steam to warm the bitumen making it flow more easily. Up to 80 per cent more oil could be recovered with this process, and more reservoirs could be accessed for less cost and with less impact on the environment. The method consumes very little fresh water and only half the greenhouse gases would be emitted.
- Low pressure steam-assisted gravity drainage (SAGD) uses electric submersible pumps to reduce the amount of pressure that is needed from the steam to move the bitumen to the surface.
- Gasification projects rely on petroleum coke (a residue from refining) to supply steam instead of relying on natural gas, and the water from the mining and refining processes can be recycled to the gasifiers as well.
- The use of geothermal energy is being explored for potential use in in-situ projects. The heated layer in the earth's crust could be used to heat the water to generate the steam used to get the bitumen flowing.

- Nuclear energy may also be used to generate steam with zero emissions.

Fact: Evolving technology in mining has also consistently improved both the economic and environmental performances of oil sands developers.

- Trucks and shovels have replaced draglines and bucket wheels resulting in an increase in efficiency.
- Processes such as hydro transport and low-temperature extraction have reduced energy use in mining and extraction by about 45 per cent per barrel since 1990.
- Low Energy Extraction technology separates bitumen from oil sands at 40 degrees centigrade (versus the 80 degree processing temperature that was the norm in the 1990s) extracting just as much bitumen as the hot water process. This improves energy efficiency and decreased CO_2 emissions by about 60 per cent.
- The water used for hydro transport is cooler than that used in the tumblers or conditioning drums, so along with eliminating the energy required to operate the conveyor system, less energy is needed to heat water.
- New technology will reduce the time needed to reclaim tailings ponds and eventually could reduce the volume of tailings or eliminate them altogether.

Fact: Right now much of the oil sands resource is still considered inaccessible with current technology, so investment and research must continue.

- It has been estimated the currently inaccessible bitumen and heavy oil resources in Western Canada amount to about 900 billion barrels.
- Without innovation, about nine-tenths of the bitumen will remain in the ground.
- Inaccessible resources include bitumen in carbonates, in thin or uncontained pay zones, oil remaining in primary production areas, small deposits under tailings and those in more remote areas of Alberta.
- For a mining operation to be economically viable, the maximum depth of overburden that can be removed is about 70 to 75 metres, but in-situ processes can't be used at depths shallower than about 150 metres, so there are some deposits that are inaccessible with today's technology.
- More than 174 billion barrels of the resource is recoverable with the technology now in use, and about 315 billion barrels could be recovered with advanced technology, according to the Alberta Energy Resource Conservation Board.

Sources for all facts available upon request