



# Oil Sands

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

## Global Leadership In Innovation

Canada's oils sands are one of the largest technology projects in the world. What only decades ago was a resource with limited economic potential is now the world's third-largest recoverable oil reserve.

Innovation in the oil sands is spurred by several factors — from strict environmental regulation and industry collaboration to support from governments for research and development.

Together these efforts have steadily improved economic and environmental performance in Canada's oil sands. One measure of success: greenhouse gas (GHG) emissions per barrel fell 26 percent between 1990 and 2011, and the amount of water used in oil sands mining operations decreased 7.4 percent even though oil production increased 65 percent between 2002 and 2011.

### Progress through innovation

New technologies continue to drive environmental performance in the oil sands.

Through technological innovation we are **improving how we manage tailings ponds** – inevitable by-products of mining operations. While most mining operations produce tailings, Canada's oil sands are one of the few working to eliminate its tailings legacy. Advances mean that vegetation can be replanted much sooner, and land can be reclaimed more quickly.

**Hydrotransport** is an improved mining technique that allows oil sands to be transported more safely via pipelines from the mine site to the extraction facility. This method is not only safer, but, coupled with lower water temperatures for extracting the bitumen, creates a much more energy-efficient — and less GHG-intensive — extraction process.

**Horizontal drilling technologies** are another way Canadian innovation is reducing Canada's environmental footprint from the increasing use of in-situ production in the oil sands.<sup>1</sup> Horizontal drilling techniques allow multiple access points to the oil sands from one location and use steam injection to separate bitumen from sand. This approach also uses less natural gas compared to previous in-situ technology and allows for recycling of more than 90 percent of the water, significantly reducing the use of surface fresh water.

Other examples of innovation include replacing river water with brackish water for extraction and a new process to recover heavy minerals, residual bitumen and water from froth treatment tailings.

### Environmental regulation

Canada is one of the few major oil producers with strong environmental regulations on its production, and this regulation is spurring innovation. Strict regulations on water use ensure that industry and governments continue to develop ways to further reduce the amount of water used in the extraction process. Provincial regulations include daily limits for withdrawals from area waterways, limits on the use of water from underground aquifers, and monitoring surface water and groundwater.

<sup>1</sup> Surface mining is the traditional method of oil sands production, and it is well known for its use of large earth-moving equipment and associated land disturbances. The majority of new production is through in-situ techniques where the production is from wells with the injection of steam or solvents to extract the bitumen. It features much less land disturbance, more along the lines of conventional oil production.

The Government of Alberta requires facilities that emit more than 100 000 tonnes (t) of GHG emissions per year to reduce their emissions intensity by 12 percent. Companies that cannot comply through direct emissions reductions can use recognized offsets or pay a C\$15/t fee into a clean energy technology fund used to support technologies and projects that reduce GHG emissions. This fund has collected more than C\$300 million as of March 2012 that is being invested in technologies and demonstration projects that will reduce GHG emissions.

## Support for research and development

The Governments of Canada and Alberta provide additional support for innovation in the sector. Canada has become a leader in carbon capture and storage technology through strong financial and technical support by both governments. The two governments are also working with the University of Alberta at the Oil Sands Tailings Research Facility in Devon, Alberta. The co-location of governments and academia enables knowledge sharing among researchers studying tailings remediation.

## Canadian industry working together

Fourteen Canadian oil sands companies that represent 90 percent of oil sands production have formed the Canadian Oil Sands Innovation Alliance to share intellectual property. Member companies have shared 450 patents that represent more than C\$700 million worth of innovative technologies in the areas of tailings, water, land and GHG emissions – an approach that is unparalleled in the world.

## Looking ahead

Oil will continue to play a dominant role in meeting the world's energy needs even under the most stringent GHG reduction scenario, according to the International Energy Agency.<sup>2</sup> As the more easily accessible and lighter crude oils are depleted around the world, countries are turning to heavier and less accessible oil resources. Through innovation, collaboration and a commitment to improving its environmental performance, Canada is leading the way in advancing technological improvements to environmental performance that will be critical to meeting this global challenge.



<sup>2</sup> International Energy Agency (2012): *World Energy Outlook*

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