ALBERTA OIL SANDS INDUSTRY QUARTERLY UPDATE

FALL 2015

Reporting on the period:
June 19, 2015 to Sept. 15, 2015

All about the oil sands

Background of an important global resource

TABLE OF CONTENTS

Canada has the third-largest oil reserves in the world, after Saudi Arabia and Venezuela. Of Canada's 173 billion barrels of oil reserves, 170 billion barrels are located in Alberta, and about 168 billion barrels are recoverable from bitumen. This is a resource that has been developed for decades but is now gaining increased global attention as conventional supplies—so-called "easy" oil—continue to be depleted. The figure of 168 billion barrels of bitumen represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be significantly increased. In fact, total oil sands reserves in place are estimated at 1.8 trillion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, which is located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is Fort McMurray. The second-largest oil sands deposit is referred to as Cold Lake, just south of Athabasca, with the main population centre the City of Cold Lake. The smallest oil sands deposit is known as Peace River, which is located in northwest-central Alberta. A fourth deposit called Wabasca links to the Athabasca and is generally lumped in with that area.

The existence of bitumen in Alberta has been known for a long time. The first mention of it in Canadian history was in 1719, when a Cree named Wapasu brought a sample of the "gum" to a Hudson's Bay trading post. First Nations in what is now the Wood Buffalo area had traditionally used the bitumen, which seeps from outcrops along the Athabasca River, to waterproof their canoes.

For the first time in 2012, in situ oil sands production exceeded mined oil sands production in Alberta. In 2014, 58 per cent of the province's oil sands volumes were produced using in situ methods. Alberta will continue to rely to a greater extent on in situ production in the future, as 80 per cent of the province's proven bitumen reserves are too deep underground to recover using mining methods.

There are essentially two commercial methods of in situ (Latin for "in place," essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam is left to soak in the reservoir for a period, melting the bitumen, and then the same wells are switched into production mode, bringing the bitumen to the surface.

In steam assisted gravity drainage (SAGD), parallel horizontal well pairs are drilled from well pads at the surface. One is drilled near the top of the target reservoir, while the other is drilled near its bottom. Steam is injected into the top well, a steam chamber forms, and the melted bitumen flows into the lower well via gravity and is pumped to the surface using artificial lift.

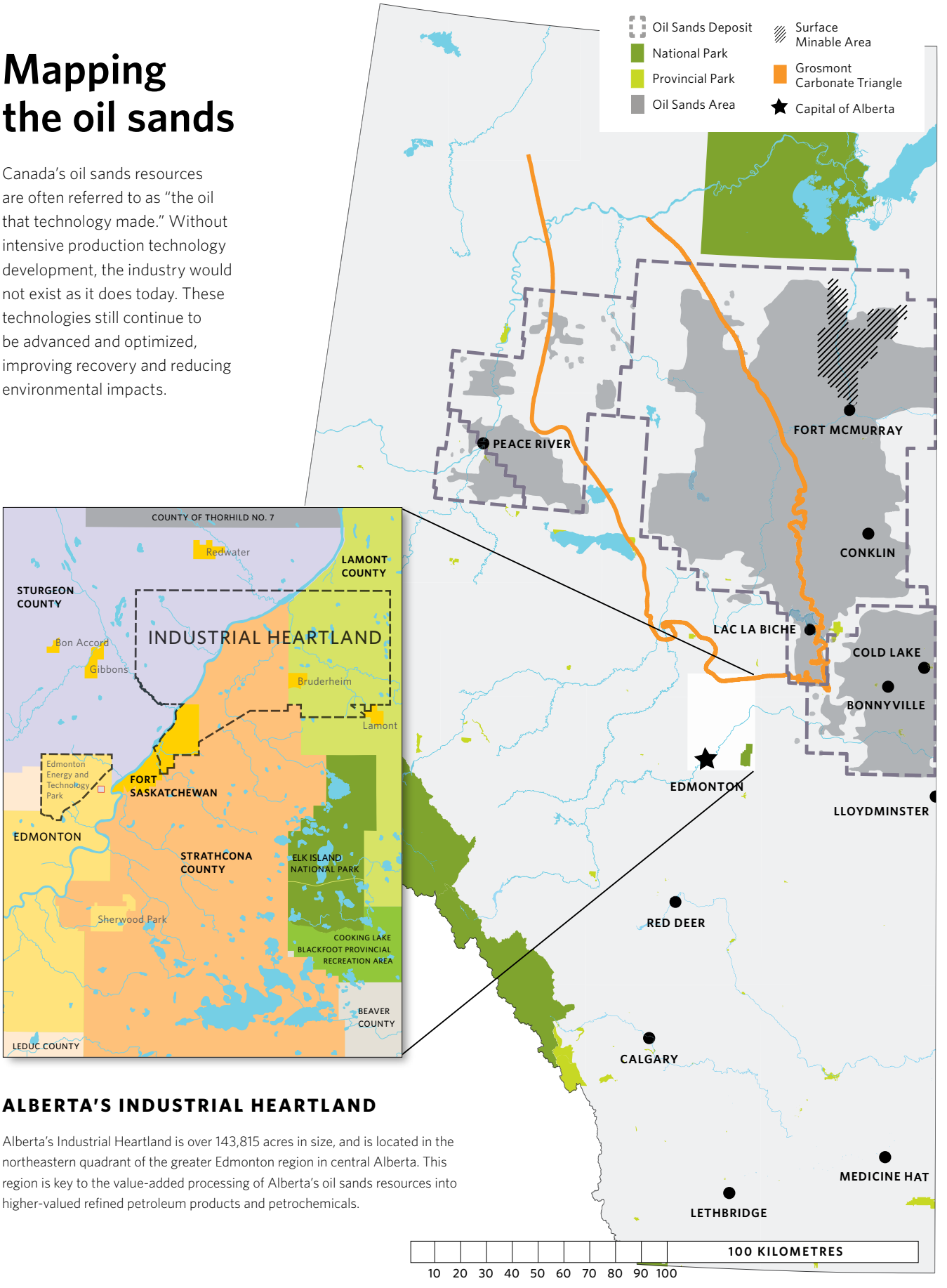
Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The selection is based on a number of factors, including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production, including variations on solvent-assisted SAGD and CSS, recovery using electricity and in situ combustion.

Bitumen that has not been processed, or "upgraded," can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil, which is a refinery feedstock. That can be transformed into transportation fuels and other products. ■

Mapping the oil sands

Canada's oil sands resources are often referred to as "the oil that technology made." Without intensive production technology development, the industry would not exist as it does today. These technologies still continue to be advanced and optimized, improving recovery and reducing environmental impacts.



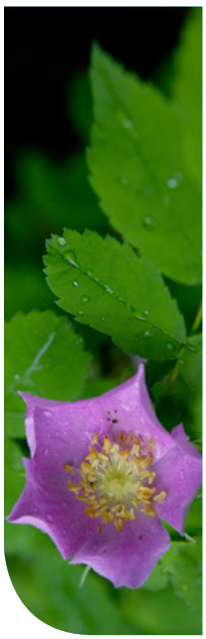
ALBERTA'S INDUSTRIAL HEARTLAND

Alberta's Industrial Heartland is over 143,815 acres in size, and is located in the northeastern quadrant of the greater Edmonton region in central Alberta. This region is key to the value-added processing of Alberta's oil sands resources into higher-valued refined petroleum products and petrochemicals.

SOURCE: DIVESTCO INC./GOVERNMENT OF ALBERTA

GOVERNMENT UPDATE

Alberta Government



CLIMATE CHANGE ADVISORY PANEL HEARS FROM ALBERTANS

Alberta's Climate Change Advisory Panel is hearing from Albertans about their ideas on how the province can do its part to address the global issue of climate change. An online survey was available between late August and mid-September, open houses were held in Calgary and Edmonton. The panel will also hear from industry, municipalities, academics, First Nations and Métis communities. A discussion guide, available online, provides an outline of key issues and areas the panel will explore and investigate.

Input gathered through these Climate Leadership Discussions will be used to help form the foundation of Alberta's new proposal to address climate change, which will be in place in time for the COP 21 world summit in Paris in December.

"Climate change is a threat we all face, affecting everything from our health, food production and fresh water, to biodiversity and our economy. Our government is committed to demonstrating real leadership on the environment and on climate change," said Shannon Phillips, minister of environment and parks. "Over the coming weeks, all Albertans will have an opportunity to contribute to their province's new plan to address this pressing global issue here at home."

The panel, selected by Minister Phillips and chaired by Andrew Leach, includes members with distinct skills, valuable networks and a strong understanding of Alberta's unique economic, environmental and social circumstances.

Panel members:

- Andrew Leach, associate professor and academic director of energy programs, University of Alberta School of Business;
- Gord Lambert, the president and chief collaboration officer of GRL Collaboration for Sustainability, formerly of Suncor Energy;
- Linda Coady, chief sustainability officer, Enbridge;
- Stephanie Cairns, principal of Wrangellia Consulting, Pembina Institute board member and International Institute for Sustainable Development board member; and
- Angela Adams, director of education, Unifor, and trustee, Fort McMurray Public School District.

"I am looking forward to hearing from Albertans, both in person and online," said Leach. "The fact is there are no easy solutions to the climate change challenge. We need to ensure we provide government with sound advice to inform the choices that will be made."

ALBERTA'S OIL AND GAS ROYALTY REVIEW NOW UNDERWAY, PANEL HEARING FROM ALBERTANS

The royalty review advisory panel will begin its work connecting with Albertans as it reviews the province's non-renewable resource royalty framework.

Energy economist Peter Tertzakian, former Alberta Deputy Minister of Finance Annette Trimbee and Mayor of Beaverlodge Leona Hanson will work alongside panel chair Dave Mowat, president of ATB Financial. The group will engage with Albertans, energy-related industries and key stakeholders through a combination of meetings, public sessions and interactive, web-based discussions throughout the fall.

"Albertans deserve a royalty system they can trust. We have to get this review right, and doing it right means having an open, frank discussion about how our royalty system can better serve Albertans, industry and the good jobs industry creates for generations to come," said Minister of Energy Margaret McCuaig-Boyd.

The work of the panel will be guided by a mandate to identify ways to optimize:

- returns to Albertans as owners of the resource;
- industry investment;

- diversification opportunities, such as value-added processing, and other innovation; and
- responsible development of Alberta's resources.

The government also committed that the current royalty framework will remain in place until the end of December 2016. If and when changes are made, any incremental revenue will go to the Alberta Heritage Fund.

"I'm excited about the panel we've brought together to do this work. We are all capable and collaborative people, and we intend to tackle this process with the best interests of Alberta and Albertans always top of mind," said Mowat. "We're eager to ask some important questions and hear what people have to say."

Albertans are encouraged to visit letstalkroyalties.ca, where they can submit comments and engage with the panel. The panel is also gathering input from Albertans through four community engagement sessions: events occurred in Grande Prairie on September 15 and Fort McMurray on September 17, and will be followed by sessions in Calgary on October 5 and Edmonton on October 6. Albertans are being asked to consider the following two initial questions:

- What do you think—or want to understand—about the Alberta royalty framework today?
- What would you like this review to accomplish?

This feedback will help guide the process and identify issues for the panel to include in its findings. The royalty review advisory panel will conclude its work by the end of this year and its advice will be considered by the government prior to any decisions on changes to the current royalty structure. For more information, visit letstalkroyalties.ca.

NEW AIR QUALITY RESULTS CONCERNING, ACTION REQUIRED

Results of the Canadian Ambient Air Quality Standards (CAAQS) report released in September indicate that the Red Deer region has exceeded national standards and four other regions are approaching limits.

CAAQS are national standards for particulate matter and ozone exposure. This is the first year of annual reporting by all provinces and territories.

"These results are concerning. We can't keep going down the same path and expecting a different result," said Environment and Parks Minister Phillips.

"Our government has a responsibility to protect the health of Albertans by ensuring air pollution from all sources is addressed. Without action, Alberta is on track to have the worst air quality in Canada in the coming years."

Under CAAQS, the Red Deer air zone now requires a mandatory response action plan to reduce levels below ambient standards. The Lower Athabasca, Upper Athabasca, North Saskatchewan and South Saskatchewan regions require management plans to protect them from potential future exceedances.

Effective immediately, Alberta will implement action plans developed under the national Air Zone Management Framework. The framework has four levels, each of which requires a different degree of management action and planning.

The government is exploring a number of possible options to reduce air pollution emissions, including more stringent standards for industry, standards for vehicles and increased air monitoring.

In October 2012, the Canadian Council of Ministers of the Environment agreed to new CAAQS for fine particulate matter and ozone. CAAQS are part of a collaborative national Air Quality Management System to better protect human health and the environment. Results are calculated using a three-year average of concentrations over annual, 24-hour and eight-hour periods from air monitoring stations. If a region has multiple stations, the one supplying the highest exceedance is used for the entire air zone.

ALBERTA STRENGTHENS ECONOMIC RELATIONS WITH MISSOURI

Alberta and Missouri have signed a Memorandum of Understanding (MOU) focused on promoting economic development and trade.

The MOU, signed during Missouri Gov. Jay Nixon's visit to Alberta, provides a framework to collaborate on economic development initiatives in areas such as agriculture, environmental policy and research and innovation. The agreement focuses on enhancing economic development, job growth, competitiveness and barrier-free trade for both jurisdictions.

"This agreement strengthens Alberta's ties to an important trade partner. Enhancing trade and investment, and sharing emerging research and information will be mutually beneficial to both jurisdictions," Premier Rachel Notley said.

Alberta and Missouri have an established history of strong economic ties. From 2010-14, Alberta's exports to Missouri averaged $630 million annually. Alberta's top exports to Missouri include energy and wood products, plastics and chemicals. ■

LABOUR UPDATE

WAGE AND SALARY REBALANCING CONTINUES

Over the past 10 years, average weekly earnings in the Alberta oil and gas sector have risen by 56 per cent compared to 48 per cent for all industries in Alberta and 29 per cent for Canadians in all industries, notes Todd Hirsch, chief economist for ATB Financial.

"The reality is that cost containment has been very difficult in the petroleum sector and in this province in particular," said Hirsch. "Companies felt that to get projects going, to get people out there on the rigs, to find and attract the talent, we have to pay the compensation to attract them."

Faced with the need to reduce costs, there now is a long-overdue effort on the part of oil companies to rebalance wages and salaries, which account for an average of 70 per cent of a company's costs, he said. The result has been layoffs, especially in the highly paid, highly skilled professional and technical jobs.

Despite the layoffs, total Alberta employment is up about 40,000 year-over-year as companies in the non-energy sector are picking up employees—but at far lower salaries, said Hirsch. One sector that is seeing an increase in employment is trucking and warehousing, which 18 months ago was having difficulty attracting workers. " Now [those companies] are competitive."

Alberta wages, bonuses, salaries and other costs will also need to come down, not only in the petroleum industry but also in Alberta's overall industry, in order to rebalance the economy, the luncheon heard. That has already been underway for about a year, and the province is likely to see more of that in the coming months, Hirsch predicted.

ROTATIONAL WORKFORCE AND WORK CAMPS INCREASINGLY VITAL

Alberta's rotational workforce is not a temporary business choice, but rather an ongoing business requirement that supports industry growth and Canada's economic well-being, says a newly released Petroleum Labour Market Information (PetroLMI) report, which calls for further research on the subject.

According to *Rotating, Not Relocating: Alberta's Oil and Gas Rotational Workforce*, in the last decade rotational work arrangements have increased in number, becoming commonplace and essential to the energy sector, as well as associated construction and maintenance projects. This nimble workforce can grow and shrink in size depending on the operating requirements and commodity price trends.

While PetroLMI does not have a conclusive number, director Carol Howes says the most recent National Household Survey indicated that approximately 42,000 Canadians, including 30,000 Albertans, were rotational workers as of 2011.

"We think that number is quite conservative, and certainly there has been an increase in the number of rotational workers since then," she said, adding the Regional Municipality of Wood Buffalo conducted a telephone survey in 2012 estimating 39,000 rotational workers in that region. A follow-up survey in 2014 determined about 47,000 workers in regional accommodations.

"An ongoing survey of these workers would be very helpful. Regular reporting that compares a place of work and a place of residence would be helpful. In other words, you could get a good sense of if someone is living in Newfoundland and working in Alberta [for example], if we have ongoing, regular reporting of that sort of data." ■

WHAT'S NEW IN THE OIL SANDS

BUSINESS

The Alberta Energy Regulator (AER) predicts in its latest annual supply-demand outlook that total oil sands production will increase from about 2.3 million bbls/d in 2014 to about four million bbls/d in 2024. This compares to the recent annual crude oil forecast issued by the Canadian Association of Petroleum Producers, which predicts that oil sands production will reach 3.5 million bbls/d in 2025 and four million bbls/d in 2030.

In its latest annual supply-demand outlook, the AER says that production from in situ projects continued to exceed mined production in 2014 and is expected to continue to do so in future.

Imperial Oil has taken the first official steps in developing a new 45,000-bbl/d thermal project at Cold Lake, called Midzaghe, by submitting a project summary table and proposed terms of reference to the AER. Resource delineation, environmental assessment and other work is underway, with potential project sanction and construction to start late in this decade and operations start-up as early as 2022.

Shell Canada says it has decided to adjust the schedule of its Carmon Creek thermal oil sands project in the Peace River region in order to optimize the design of the facility and re-tender some contracts. First oil, originally scheduled for 2017, is now expected in 2019.

First production began at Husky Energy's Sunrise project in mid-March. Steaming is underway on 34 of 55 well pairs, with strong facility performance reported.

Volumes are currently averaging 2,500–3,000 bbls/d, and production is expected to ramp up steadily towards full capacity of about 60,000 bbls/d around the end of 2016. Systems have been filled and shipping is under way.

Southern Pacific Resource Corp. is hibernating its STP-McKay SAGD project. The company says its hibernation plans are thorough and are intended to enable preservation of the assets for an extended period, if required. With the current low-priced crude market, the property continues to generate negative cash flow and "thus this measure was deemed necessary in order to preserve capital."

Baytex Energy's Gemini SAGD pilot will be decommissioned due to the current low-oil price environment and a power-plant outage. Operations commenced over a year ago, and the company says it has captured the key data associated with the pilot's objectives in that time.

In December 2014, the company filed an application requesting an amendment to its existing approval to allow for a 5,000-bbl/d facility. Following regulatory approval, any subsequent sanctioning decision will be considered in the context of the project economics in a higher commodity price environment, Baytex says.

Teck Resources plans to delay its Frontier oil sands mine by five years and to build the project in two phases instead of four, with a slightly smaller disturbance area and production rate.

A project update describes Phase 1A (85,000 bbls/d), Phase 1B (85,000 bbls/d) and Phase 2 (90,000 bbls/d). First oil is expected in the first quarter of 2026. The capital cost of the full development is estimated at about $20.6 billion.

Nexen has submitted a request to the AER to extend the construction start date of Upgrader 2 at the Long Lake SAGD project to Dec. 31, 2020. The company says that Upgrader 2 remains an important component of its long-term integrated strategy, but current production volumes at the Long Lake project fall well within the capacity of Upgrader 1. Additionally, Nexen cites market conditions that are not currently favourable to the development of new upgrading capacity.

Laricina Energy plans to shut in its Saleski carbonate pilot, according to a court-appointed monitor's report. In a report filed with the Alberta Court of Queen's Bench in late June, PricewaterhouseCoopers said Laricina has informed Osum, its 40 per cent partner in Saleski, that it plans to shut in the pilot after sufficient data has been obtained, either by the end of August or September. ■

WHAT'S NEW IN THE OIL SANDS

TECHNOLOGY

Canada's Oil Sands Innovation Alliance (COSIA) marked a milestone at its 2015 Innovation Summit with the announcement of its second performance goal.

"COSIA members are committed collectively to reduce the net water use intensity from the Athabasca River and its tributaries by 30 per cent by 2022," the organization says.

COSIA's members plan to achieve this while "adhering to sustainable water management principles of 'reduce-reuse-return' for all mine sites," including:

- optimizing water reduction and recycling opportunities;
- reducing the amount of water retained in tailings; confirming the technical basis for returning treated water to the Athabasca River; and
- understanding and managing the cumulative effects on the Athabasca River watershed.

COSIA's first performance goal, announced in November 2014, is to reduce fresh water use intensity at in situ projects by 50 per cent by 2022.

A new study has found that technology provides the key to continue oilsands production and production growth while meeting greenhouse gas (GHG) emission targets, whatever they might be.

The report, prepared by the Canadian Energy Research Institute (CERI), says that the growth of the industry is not necessarily limited by environmental policies because there are solutions to meet those policies while continuing growth in the sector.

"We're looking at improving the efficiency of technologies such as pumps and motors and of processes such as moving towards solvent extraction, and putting a number of those various, more efficient technologies and processes in place across the sector will get you some significant reductions in energy use and therefore greenhouse gas emissions," says Allan Fogwill, CERI president and chief executive officer.

For its study, entitled *Oil Sands Industry Energy Requirements And Greenhouse Gas Emissions Outlook (2015-2050)*, CERI developed six scenarios to explore the impact of different parameters. The business-as-usual case sees production increasing to 4.55 million bbls/d by 2050.

Under the constrained-growth scenario, cumulative production volumes for oilsands from 2015 to 2050 are 32.8 per cent lower compared to the business-as-usual scenario, cumulative energy use decreases by 32 per cent and cumulative GHG emissions decrease by 31.7 per cent.

However, in all four other scenarios, oilsands production continues to grow to 4.55 million bbls/d. Most notably, under the increased-energy-efficiency scenario, increasing energy efficiency results in a 29.5 per cent decrease in cumulative energy used compared to the business-as-usual scenario, and subsequently, a 28.7 per cent decrease in cumulative GHG emissions.

Global water treatment operator IDE Technologies has completed the fabrication of two horizontal evaporator units that will be installed in the oilsands this year. IDE has been working with project owners to modify its horizontal evaporators for Alberta, with support from the Government of Israel and Alberta Innovates—Technology Futures and Alberta Innovates—Energy and Environment Solutions (AI-EES), which has contributed $2 million to the upcoming field test.

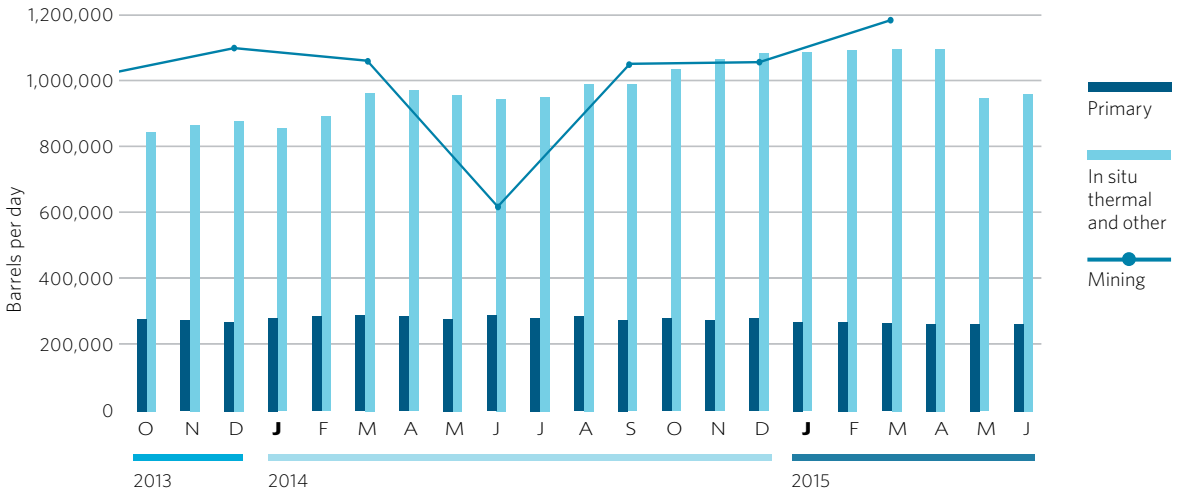
According to Vicki Lightbown, manager of water and environment with AI-EES, the two IDE units will be installed at an operating commercial-scale SAGD project. IDE says the technology can provide a 30 per cent energy reduction for water treatment.

Suncor Energy and partners have begun operations at the Enhanced Solvent Extraction Incorporating Electromagnetic Heating (ESEIEH) pilot at the Dover site. The technology uses a radio frequency to heat the reservoir and adds a solvent that facilitates the movement of the bitumen to the surface. The ESEIEH project partners are Devon, Nexen Energy, Suncor and Harris, with funding in part from the Climate Change and Emissions Management Corporation.

The group has been collaborating on this technology since 2011 with initial physical testing conducted at Suncor's Steepbank Mine in 2012. The Dover pilot is expected to operate for approximately 24 months. ■

OIL SANDS PRODUCTION DATA

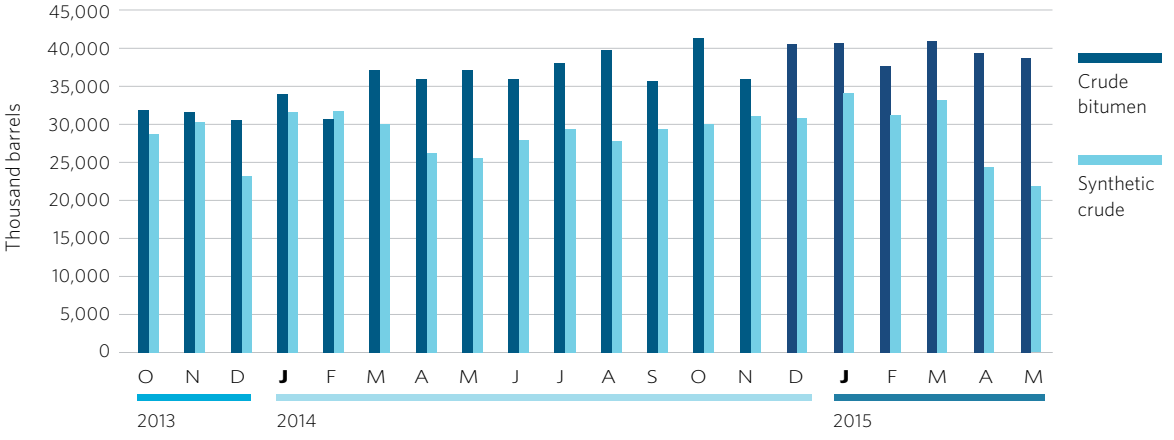
Alberta oil sands production by extraction method



SOURCE: ALBERTA ENERGY REGULATOR

*Mining production data for the second quarter of 2015 not available at time of publishing.

Alberta crude bitumen and synthetic crude production



SOURCE: ALBERTA ENERGY REGULATOR

OIL SANDS TECHNOLOGY LEGEND *See oil sands project status listing on page 10.*

ADC (Upgrading) Accelerated decontamination

AIRINJ Air injection

BEST Bitumen extraction solvent technology

C & SC Cyclic and solvent cyclic

C-SAGD Cyclic steam assisted gravity drainage

CSS Cyclic steam stimulation

ESEIEH Enhanced Solvent Extraction Incorporating Elecromagnetic

ET-DSP Electro-thermal dynamic stripping

HCSS Horizontal cyclic steam stimulation

HTL Heavy-to-light upgrading process

In situ Production technology undisclosed; will use drilling and enhanced recovery

LP-SAGD Low-pressure steam assisted gravity drainage

Mining Truck and shovel mining

Orcrude Primary upgrading process

SAGD Steam assisted gravity drainage

SAP Solvent aided process

SC-SAGD Solvent cyclic steam assisted gravity drainage

TAGD Thermal assisted gravity drainage

THAI Toe to heel air injection

UPG Bitumen upgrading

USP (Upgrading) Ultra-selective pyrolysis

VSD Vertical steam drive

PROJECT LISTINGS *See oil sands project technology legend on page 9.*

Updated status of oil sands projects in Alberta | As of September 2015

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
NORTH ATHABASCA REGION — MINING				
Canadian Natural Resources Limited				
Horizon				
Canadian Natural says that a turnaround scheduled for the second quarter of 2015 was extended from 10 to 15 days to address necessary found work and because the start-up of operations was slower than expected. Overall the Phase 2/3 expansion is 67 per cent complete as at the second quarter of 2015.				
Phase 1	135,000	2008	Operating	**Mining**
Reliability - Tranche 2	5,000	2014	Operating	**Mining**
Phase 2A	12,000	2014	Operating	**Mining**
Phase 2B	45,000	2016	Construction	**Mining**
Phase 3	80,000	2017	Construction	**Mining**
Imperial Oil Limited				
Kearl				
Imperial says the Kearl expansion project has started operations with all three froth trains operational.				
Phase 1	110,000	2013	Operating	**Mining**
Phase 2	110,000	2015	Operating	**Mining**
Phase 3	80,000	TBD	On Hold	**Mining**
Phase 4 Debottlenecking	45,000	TBD	On Hold	**Mining**
Shell Albian Sands				
Jackpine				
Project partner Marathon Oil says that planned turnarounds at the base upgrader and Muskeg River mine were completed on time and on budget in the second quarter, as well as unplanned downtime at the expansion upgrader.				
Phase 1A	100,000	2010	Operating	**Mining**
Phase 1B	100,000	TBD	Approved	**Mining**
Expansion	100,000	TBD	Approved	**Mining**
Muskeg River				
Project partner Marathon Oil says that planned turnarounds at the base upgrader and Muskeg River mine were completed on time and on budget in the second quarter, as well as unplanned downtime at the expansion upgrader.				
Commercial	155,000	2002	Operating	**Mining**
Expansion & Debottlenecking	115,000	TBD	Approved	**Mining**
Pierre River				
Shell has withdrawn its application for the Pierre River project, saying it wants to focus on its existing oilsands operations. The company says it will continue to hold the Pierre River leases and may re-apply in the future.				
Phase 1	100,000	TBD	Cancelled	**Mining**
Phase 2	100,000	TBD	Cancelled	**Mining**
Suncor Energy Inc.				
Base Operations				
Suncor says that oilsands production increased by about 45,000 bbls/d in the second quarter versus the same period in 2014, primarily due to reliable operations resulting in minimal unplanned maintenace. Planned maintenance at Upgrader 1 was completed during the second quarter.				
Millennium Mine	294,000	1967	Operating	**Mining**
Steepbank Debottlenecking Phase 3	4,000	2007	Operating	**Mining**
Millennium Debottlenecking	23,000	2008	Operating	**Mining**
North Steepbank Extension	180,000	2012	Operating	**Mining**
Fort Hills				
Suncor says that at the end of the second quarter, detailed engineering is 89 per cent complete, while construction activities are 34 per cent complete. Spending during the second quarter included engineering, procurement, module fabrication and site construction.				
Phase 1	160,000	2017	Construction	**Mining**
Debottlenecking	20,000	TBD	Approved	**Mining**
Voyageur South				
Suncor considers Voyageur South to be a "longer-term" project and has not confirmed a start-up date.				
Phase 1	120,000	TBD	Application	**Mining**
Syncrude Canada Ltd.				
Mildred Lake/Aurora				
On August 29, a fire occured in the interconnecting piping between the hydrotreating units and the envrionmental units at the Mildred Lake upgrader. Synthetic production has been temporarily suspended. Earlier in 2015, Syncrude filed a regulatory application for the MLX project. Syncrude is focusing on cost reduction to remain profitable during the low oil price environment.				
Base Mine Stage 1 & 2 Expansion	290,700	1978	Operating	**Mining**
Stage 3 Expansion	116,300	2006	Operating	**Mining**
Centrifuge Tailings Management	TBD	TBD	Operating	**Mining**
Aurora SouthTrain 1	100,000	TBD	Approved	**Mining**
Aurora SouthTrain 2	100,000	TBD	Approved	**Mining**
Mildred Lake Mine Extension (MLX)	184,000	2023	Application	**Mining**
Teck Resources Limited				
Frontier				
Teck has filed a project update for the Frontier mining development. The capital cost has been increased to $20.6 billion and the total capacity is now 260,000 bbls/d. Alberta Environment and Parks says that supplemental information responses regarding the Frontier application/ Environmental Impact Assessment are now under review.				
Phase 1a	85,000	2026	Application	**Mining**
Phase 1b	85,000	2027	Application	**Mining**
Phase 2	90,000	2037	Application	**Mining**
Total E&P Canada Ltd.				
Joslyn North Mine				
Total has withdrawn the regulatory applications for the Joslyn North Mine.				
Phase 1	100,000	TBD	On Hold	**Mining**
NORTH ATHABASCA REGION — IN SITU				
Athabasca Oil Corporation				
Birch				
Athabasca lists Birch as one of its long-term assets.				
Phase 1	12,000	TBD	Announced	**SAGD**
Dover West Carbonates (Leduc)				
Athabasca lists Dover West as one of its long-term assets.				
Phase 1 Demonstration	6,000	TBD	Approved	**SAGD**
Phase 2 Demonstration	6,000	TBD	Application	**SAGD**
Dover West Sands & Clastics				
Athabasca lists Dover West as one of its long-term assets.				
Phase 1	12,000	TBD	Application	**SAGD**
Phase 2	35,000	2019	Announced	**SAGD**
Phase 3	35,000	2020	Announced	**SAGD**
Phase 4	35,000	2022	Announced	**SAGD**
Phase 5	35,000	2024	Announced	**SAGD**
BP p.l.c.				
Terre de Grace				
BP says that ongoing appraisal activities continue.				
Pilot	10,000	TBD	Approved	**SAGD**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Brion Energy Corporation				
Dover				
Dover Experimental Pilot	2,000	2017	Approved	**SAGD**
Dover North Phase 1	50,000	TBD	Approved	**SAGD**
Dover North Phase 2	50,000	TBD	Approved	**SAGD**
Dover South Phase 3	50,000	2021	Approved	**SAGD**
Dover South Phase 4	50,000	2023	Approved	**SAGD**
Dover South Phase 5	50,000	2025	Approved	**SAGD**
Mackay River				
A video of the lid of the skim tank being placed at MacKay River can be viewed at https://goo.gl/P4rM06.				
Phase 1	35,000	2015	Construction	**SAGD**
Phase 2	40,000	TBD	Approved	**SAGD**
Phase 3	40,000	2020	Approved	**SAGD**
Phase 4	35,000	2022	Approved	**SAGD**
Canadian Natural Resources Limited				
Birch Mountain				
Canadian Natural says Birch is in the planning stages.				
Phase 1	60,000	2019	Announced	**SAGD**
Phase 2	60,000	2023	Announced	**SAGD**
Cenovus Energy Inc.				
East McMurray				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	Announced	**SAGD**
Steepbank				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	Announced	**SAGD**
Telephone Lake				
Cenovus says it continues to review development options for Telephone Lake after recieving regulatory approval in late 2014.				
Phase A	45,000	TBD	On Hold	**SAGD**
Phase B	45,000	TBD	Approved	**SAGD**
E-T Energy Ltd.				
Poplar Creek				
Bayshore Petroleum says it has entered into an agreement with E-T Energy to raise capital and implement a construction program to restart bitumen production at Poplar Creek during the second half of 2016 using E-T's ET-DSP technology, Bayshore's catalyst-based in situ cold catalytic cracking (CCC) upgrading technology and ultrasonic technology. The partners also plan to construct a CCC upgrader designed to convert bitumen directly into ultra-low sulphur commercial diesel.				
Experimental Pilot	1,000	2012	Suspended	**ET-DSP**
Grizzly Oil Sands Ulc				
Thickwood				
The Alberta Energy Regulator says it will defer decisions on applications for in situ oilsands projects in the new shallow thermal area of the Athabasca region until it has developed formal regulatory requirements. Grizzly Thickwood is one of five impacted projects.				
Phase 1	6,000	TBD	Application	**SC-SAGD**
Phase 2	6,000	TBD	Application	**SC-SAGD**
Husky Energy Inc.				
Saleski				
Husky filed the regulatory application for its Saleski pilot in early May 2013.				
Carbonate Pilot	3,000	TBD	Application	**SC-SAGD**
Sunrise				
Husky says the Sunrise Energy Project is steadily ramping up production towards expected capacity of about 60,000 bbls/day (30,000 bbls/day net to Husky) around the end of 2016. Steam operations have begun at Plant 1B, production is expected late 2015.				
Phase 1A	30,000	2015	Operating	**SAGD**
Phase 1B	30,000	2015	Construction	**SAGD**
Phase 2A	35,000	TBD	On Hold	**SAGD**
Phase 2B	35,000	TBD	Approved	**SAGD**
Future Phases	70,000	TBD	Approved	**SAGD**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Imperial Oil Limited				
Aspen				
Alberta Environment and Parks says that a supplemental information request regarding the project application/Environmental Impact Assessment was sent to Imperial on February 19. On April 15, June 19 and 30, the company submitted information, which is under review.				
Phase 1	45,000	2020	Application	**SAGD**
Phase 2	45,000	TBD	Application	**SAGD**
Phase 3	45,000	TBD	Application	**SAGD**
Ivanhoe Energy Inc.				
Tamarack				
Ivanhoe has announced that despite considerable efforts by the company, its trustee and major creditors, the parties have been unable to reach a viable restructuring proposal under the Bankruptcy and Insolvency Act. The company was deemed bankrupt as of 11:59 PM MDT on June 1.				
Phase 1	20,000	TBD	Application	**SAGD**
Phase 2	20,000	TBD	Application	**SAGD**
Koch Exploration Canada Corporation				
Dunkirk				
Koch has filed the regulatory application for the proposed Dunkirk SAGD project.				
Commercial Demonstration	2,000	2017	Application	**SAGD**
Phase 1	30,000	2018	Announced	**SAGD**
Phase 2	30,000	TBD	Announced	**SAGD**
Marathon Oil Corporation				
Birchwood				
Marathon had anticipated receiving regulatory approval for the Birchwood project by the end of 2014. Upon receiving this approval, the company will further evaluate its development plans.				
Demonstration	12,000	TBD	Application	**SAGD**
Oak Point Energy Ltd.				
Lewis				
Oak Point Energy says the Lewis project is well positioned (no additional work required) for exploitation when oil prices recover.				
Pilot	1,720	TBD	Approved	**SAGD**
Prosper Petroleum Ltd.				
Rigel				
Prosper Petroleum filed its regulatory application for the Rigel SAGD project in November 2013. Regulatory approval is expected in second half of 2015.				
Phase 1	10,000	2017	Application	**SAGD**
Southern Pacific Resource Corp.				
STP-McKay				
Southern Pacific and certain of its subsidiaries have obtained creditor protection under the Companies' Creditors Arrangement Act. The STP-McKay is being suspended to preserve capital until oil prices recover.				
Phase 1	12,000	2012	Suspended	**SAGD**
Suncor Energy Inc.				
Dover				
N-Solv Corporation says its pilot plant produced its 40,000th barrel of oil in early 2015.				
BEST Pilot	300	2014	Operating	**BEST**
ESEIEH Pilot	N/Q	2015	Operating	**ESEIEH**
Firebag				
Suncor says that planned maintenance was completed at Firebag during the second quarter.				
Stage 1	35,000	2004	Operating	**SAGD**
Stage 2	35,000	2006	Operating	**SAGD**
Cogeneration and Expansion	25,000	2007	Operating	**SAGD**
Stage 3	42,500	2011	Operating	**SAGD**
Stage 4	42,500	2012	Operating	**SAGD**
Stage 5	62,500	TBD	Approved	**SAGD**
Stage 6	62,500	TBD	Approved	**SAGD**
Stage 3-6 Debottlenecking	23,000	TBD	Application	**SAGD**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Lewis				
Phase 1	40,000	TBD	Announced	**IN SITU**
Phase 2	40,000	TBD	Announced	**IN SITU**
MacKay River				
Suncor says that spending is currently focused on ongoing wellpad construction to maintain existing production levels.				
Phase 1	33,000	2002	Operating	**SAGD**
Debottlenecking	5,000	2014	Operating	**SAGD**
MR2	20,000	TBD	On Hold	**SAGD**
Sunshine Oilsands Ltd.				
Legend Lake				
Phase A1	10,000	TBD	Application	**SAGD**
Phase A2	30,000	TBD	Announced	**SAGD**
Phase B1	30,000	TBD	Announced	**SAGD**
Phase B2	30,000	TBD	Announced	**SAGD**
Thickwood				
Phase A1	10,000	TBD	Approved	**SAGD**
Phase A2	30,000	TBD	Announced	**SAGD**
Phase B	30,000	2021	Announced	**SAGD**
West Ells				
Sunshine Oilsands says the current board approved schedule for West Ells start-up is targeting first steam commencing in September 2015, and first oil production in December 2015.				
Phase A1	5,000	2015	Construction	**SAGD**
Phase A2	5,000	TBD	Approved	**SAGD**
Phase A3	30,000	TBD	Announced	**SAGD**
Phase B	20,000	TBD	Announced	**SAGD**
Phase C1	30,000	TBD	Announced	**SAGD**
Phase C2	30,000	TBD	Announced	**SAGD**
Value Creation Inc.				
Audet				
Value Creation has acquired SilverWillow Energy and its Audet project.				
Pilot	12,000	TBD	Application	**SAGD**
SOUTH ATHABASCA REGION — IN SITU				
Athabasca Oil Corporation				
Hangingstone				
Athabasca says that during the second quarter, steaming of the initial wells continued as scheduled. Steaming commenced in late March and the circulation phase is expected to last four to six months. Alberta Environment and Parks says that it is awaiting response from Athabasca Oil regarding supplemental information requests for the Hangingstone Expansion application.				
HS-1	12,000	2015	Operating	**SAGD**
HS-2A Debottlenecking (1 and 2)	8,000	2017	Application	**SAGD**
HS-2B Expansion	32,000	2019	Application	**SAGD**
HS-3	30,000	2021	Application	**SAGD**
BlackPearl Resources Inc.				
Blackrod				
BlackPearl says that results from the second pilot SAGD wellpair continue to be positive, producting in excess of 550 bbls/d with an steam to oil ration of 2.6. There have been no new updates regarding the status of its 80,000-bbl/d commercial application, which is under review by the Alberta Energy Regulator.				
Pilot	800	2011	Operating	**SAGD**
Phase 1	20,000	TBD	Application	**SAGD**
Phase 2	30,000	TBD	Application	**SAGD**
Phase 3	30,000	TBD	Application	**SAGD**
Canadian Natural Resources Limited				
Gregoire Lake				
Canadian Natural says Gregoire Lake is in the planning stages.				
Phase 1	60,000	TBD	Announced	**SAGD**
Phase 2	60,000	TBD	Announced	**SAGD**
Grouse				
The Environmental Impact Assessment report for the Grouse project was deemed complete March 6, 2015. The review took 148 weeks.				
Commercial	40,000	2020	Application	**SAGD**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Kirby				
The company says it will defer spending on Kirby North Phase 1 until oil prices improve. Production at Kirby South was reduced in late May and early June to 12,000 bbls/d due to forest fires in the Cold Lake region.				
KS1 - Kirby South	40,000	2013	Operating	**SAGD**
KN1 - Kirby North	40,000	TBD	On Hold	**SAGD**
KN2 - Kirby North	60,000	TBD	Approved	**SAGD**
Cavalier Energy Inc.				
Hoole				
Regulatory approval for the first phase of the Hoole project was granted in June 2014. Development of this phase is dependent upon Cavalier Energy securing financing and sanctioning by its board of directors. In July 2014, Cavalier acquired approximately 23 net sections of undeveloped land contiguous with its Hoole lands for $20 million.				
Phase 1	10,000	TBD	Approved	**SAGD**
Phase 2A	35,000	TBD	Announced	**SAGD**
Phase 2B	35,000	TBD	Announced	**SAGD**
Cenovus Energy Inc.				
Christina Lake				
Cenovus says that its plant optimization at Christina Lake is nearly complete and will ramp up over a period of 12 months. Construction continues at Phase F, where the CPF is expected to be complete by the end of 2015.				
Phase 1A	10,000	2002	Operating	**SAGD**
Phase 1B	8,800	2008	Operating	**SAGD**
Phase C	40,000	2011	Operating	**SAGD**
Phase D	40,000	2012	Operating	**SAGD**
Phase E	40,000	2013	Operating	**SAGD**
Optimization (Phases C,D,E)	22,000	2015	Construction	**SAGD**
Phase F	50,000	2016	Construction	**SAGD**
Phase G	50,000	TBD	On Hold	**SAGD**
Phase H	50,000	TBD	Application	**SAGD**
Foster Creek				
Cenovus says that construction is continuing on Phase G, which is approximately three-quarters complete and expected to start producing in the first half of 2016.				
Phase A	24,000	2001	Operating	**SAGD**
Phase B Debottlenecking	6,000	2003	Operating	**SAGD**
Phase C Stage 1	10,000	2005	Operating	**SAGD**
Phase C Stage 2	20,000	2007	Operating	**SAGD**
Phase D	30,000	2009	Operating	**SAGD**
Phase E	30,000	2009	Operating	**SAGD**
Phase F	30,000	2014	Operating	**SAGD**
Phase G	30,000	2016	Construction	**SAGD**
Phase H	30,000	2017	On Hold	**SAGD**
Future Optimization (Phases F,G,H)	35,000	TBD	Announced	**SAGD**
Phase J	50,000	TBD	Approved	**SAGD**
Future Optimization	15,000	TBD	Announced	**SAGD**
Grand Rapids				
Cenovus says it has completed the dismantling and storage of an existing SAGD facility that it purchased in 2014 and intends to relocate to the Grand Rapids site once the development plan has been finalized and a decision made to start investing in the project, subject to more favourable conditions.				
Pelican Lake Pilot	600	2011	Operating	**SAGD**
Pelican Upper Grand Rapids Phase A	10,000	TBD	On Hold	**SAGD**
Pelican Upper Grand Rapids Phase B	32,000	TBD	Approved	**SAGD**
Pelican Upper Grand Rapids Phase C	29,000	TBD	Approved	**SAGD**
Pelican Upper Grand Rapids Phase D	29,000	TBD	Approved	**SAGD**
Pelican Upper Grand Rapids Phase E	32,000	TBD	Approved	**SAGD**
Pelican Upper Grand Rapids Phase F	29,000	TBD	Approved	**SAGD**
Pelican Upper Grand Rapids Phase G	19,000	TBD	Approved	**SAGD**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Narrows Lake				
Cenovus says that in the second quarter it spent approximately $9 million, primarily due to initial procurement commitments, continued engineering and work to complete a camp facility that was already under construction.				
Phase A	45,000	TBD	On Hold	**SAP**
Phase B	45,000	TBD	Approved	**SAP**
Phase C	40,000	TBD	Approved	**SAP**
West Kirby				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	Announced	**SAGD**
Winefred Lake				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	Announced	**SAGD**
CNOOC Limited				
Long Lake				
Following an order from the Alberta Energy Regulator (AER), Nexen is suspending operations at Long Lake. The company voluntarily self-disclosed non-compliance related to pipeline maintenance and monitoring following a major spill in July. Nexen said on September 2 it expected the suspension would last about two weeks. The AER says it will last until Nexen can prove its Long Lake pipelines can be operated safely.				
Phase 1	72,000	2008	Suspended	**SAGD**
Kinosis (K1A)	20,000	2014	Suspended	**SAGD**
Kinosis (K1B)	37,500	TBD	Approved	**SAGD**
Connacher Oil and Gas Limited				
Great Divide				
Connacher has closed its recapitalization transaction, but the company says that the current economic outlook on global crude oil prices and limited access to available capital may cast significant doubt about its ability to continue as a going concern.				
Pod One	10,000	2007	Operating	**SAGD**
Algar	10,000	2010	Operating	**SAGD**
Expansion 1A	12,000	TBD	Approved	**SAGD**
Expansion 1B	12,000	TBD	Approved	**SAGD**
ConocoPhillips Canada Limited				
Surmont				
ConocoPhillips says that it has achieved first production at the Surmont 2 project. Production is expected to ramp up through 2017. Alberta Environment and Parks says that supplemental information requests regarding the Surmont 3 project application/Environmental Impact Assessment were sent in March and June, and ConocoPhillips submitted information, which is now under review.				
Pilot	1,200	1997	Operating	**SAGD**
Phase 1	30,000	2007	Operating	**SAGD**
Phase 2	118,000	2015	Operating	**SAGD**
Phase 2 Debottlenecking	57,000	TBD	Application	**SAGD**
Phase 3 - Tranche 1	45,000	2020	Application	**SAGD**
Phase 3 - Tranche 2	45,000	2021	Application	**SAGD**
Phase 3 - Tranche 3	45,000	2023	Application	**SAGD**
Devon Canada Corporation				
Jackfish				
Devon says that during the second quarter, ongoing efforts to maximize steam efficiency and well productivity drove capacity utilization to greater than 100 per cent for the fifth straight quarter. At Jackfish 2, the company plans to begin steaming a new well pad in the fourth quarter, which is expected to help the facility achieve peak capacity in 2016. Production at Jackfish 3 is expected to reach nameplate capacity around the end of the year.				
Phase 1	35,000	2007	Operating	**SAGD**
Phase 2	35,000	2011	Operating	**SAGD**
Phase 3	35,000	2014	Operating	**SAGD**
Jackfish East				
Expansion	20,000	2018	Announced	**SAGD**
Pike				
Devon has applied to amend total capacity of the Pike project to 70,000 bbls/d from 105,000 bbls/d, using 52 well pads and 12 once-through steam generators. FEED is expected to be completed in 2015 as well as a cost structure.				
1A	35,000	2019	Approved	**SAGD**
1B	35,000	2020	Approved	**SAGD**
1C	35,000	TBD	Cancelled	**SAGD**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Grizzly Oil Sands Ulc				
Algar Lake				
Grizzly has suspended operations at Algar due to low commodity prices.				
Phase 1	6,000	2014	Suspended	**SAGD**
Phase 2	6,000	TBD	Approved	**SAGD**
May River				
Grizzly responded to a third round of supplemental information requests regarding its May River application in early March. Regulatory approved is expected in 2015.				
Phase 1	6,000	TBD	Application	**SAGD**
Phase 2	6,000	TBD	Application	**SAGD**
Harvest Operations Corp.				
BlackGold				
Harvest says that the CPF was mechanically complete in early 2015 and minor pre-commissioning activities will continue at a measured pace through the year, but first steam is on hold until the heavy oil price becomes favourable.				
Phase 1	10,000	TBD	On Hold	**SAGD**
Phase 2	20,000	TBD	Approved	**SAGD**
Japan Canada Oil Sands Limited				
Hangingstone				
The Hangingstone expansion will receive its diluent from Inter Pipeline's Polaris pipeline. Additionally, Aquatech has been awarded a contract to provide its evaporator technology for OSTG blowdown treatment. First production is expected in 2016.				
Expansion	20,000	2016	Construction	**SAGD**
Hangingstone Pilot				
Pilot	11,000	1999	Operating	**SAGD**
Koch Exploration Canada Corporation				
Muskwa				
Regulatory approval granted in June 2014.				
Pilot	10,000	TBD	Approved	**SAGD**
Laricina Energy Ltd.				
Germain				
Laricina has suspended operations at the Germain SAGD project in order to reduce capital and operating costs as it continues its financial and strategic alternatives.				
Phase 1 CDP	5,000	2013	Suspended	**SC-SAGD**
Phase 2	30,000	TBD	Application	**SC-SAGD**
Phase 3	60,000	TBD	Application	**SC-SAGD**
Phase 4	60,000	TBD	Application	**SC-SAGD**
Saleski				
According to a report by its court-appointed monitor, PricewaterhouseCoopers, Laricina Energy plans to shut in the Saleski pilot by September 2015 in order to reduce costs. The company has been under creditor protection since March.				
Experimental Pilot	1,800	2011	Operating	**Cyclic and SC-SAGD**
Phase 1	10,700	TBD	On Hold	**Cyclic SAGD**
Phase 2	30,000	TBD	On Hold	**IN SITU**
Phase 3	60,000	TBD	Announced	**IN SITU**
Phase 4	60,000	2023	Announced	**IN SITU**
Phase 5	60,000	2026	Announced	**IN SITU**
Phase 6	60,000	TBD	Announced	**IN SITU**
MEG Energy Corporation				
Christina Lake				
MEG's production during the second quarter was impacted by planned major turnaround work at the company's Phase 1, 2 and 2B facilities, as well as unplanned delays to work schedules due to wildfires in northern Alberta. Despite these impacts, second quarter production averaged 71,376 bpd, above the 68,984 bpd recorded for the second quarter of 2014, during which turnaround activities were relatively minor.				
Phase 1 Pilot	3,000	2008	Operating	**SAGD**
Phase 2A	22,000	2009	Operating	**SAGD**
Phase 2B	35,000	2013	Operating	**SAGD**
Phase 3A	50,000	TBD	Approved	**SAGD**
Phase 3B	50,000	TBD	Approved	**SAGD**
Phase 3C	50,000	TBD	Approved	**SAGD**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Surmont				
The Environmental Assessment Director has deemed the Environmental Impact Assessment report complete for MEG Energy's Surmont Project.				
Phase 1	40,000	TBD	Application	**SAGD**
Phase 2	40,000	TBD	Application	**SAGD**
Phase 3	40,000	TBD	Application	**SAGD**
OSUM Oil Sands Corp.				
Sepiko Kesik				
Osum says it anticipates regulatory approval for Sepiko Kesik in 2015. Environmental Impact Assessment report has been deemed complete. The review took 91 weeks.				
Phase 1	30,000	2018	Application	**CSS & SAGD**
Phase 2	30,000	2020	Application	**CSS & SAGD**
PTT Exploration and Production				
Mariana - Thornbury				
PTTEP says that the project is preparing for FEED activities.				
Phase 1	20,000	2021	Application	**SAGD**
Renergy Petroleum (Canada) Co., Ltd.				
Muskwa				
Renergy Petroleum received regulatory approval in January.				
Muskwa Experimental Pilot	TBD	2015	Approved	**Steam co-injection**
Statoil				
Leismer				
Statoil temporarily evacuated 150 workers from the Leismer project in late May due to forest fires in the area.				
Demonstration	10,000	2010	Operating	**SAGD**
Commercial	10,000	2011	Operating	**SAGD**
Expansion	20,000	TBD	Approved	**SAGD**
Northwest	20,000	TBD	Disclosed	**SAGD**
Suncor Energy Inc.				
Chard				
Phase 1	40,000	TBD	Announced	**IN SITU**
Meadow Creek East				
Phase 1	20,000	2020	Approved	**SAGD**
Phase 2	30,000	2022	Approved	**SAGD**
Phase 3	30,000	TBD	Approved	**SAGD**
Surmont Energy Ltd.				
Wildwood				
Surmont is still raising funds to develop the Wildwood project.				
Phase 1	12,000	TBD	Application	**SAGD**
Value Creation Inc.				
Advanced TriStar				
Alberta Environment and Parks says a request for supplemental information regarding the ATS project application/Environmental Impact Assessment was sent in May, and it is awaiting response.				
ATS-1	15,000	TBD	Application	**SAGD**
ATS-2	30,000	TBD	Application	**SAGD**
ATS-3	30,000	TBD	Application	**SAGD**
DOEx (Demonstration of Excellence)				
Value Creation has filed an amendment to its regulatory approval to increase production capacity from 1,000 to 6,000 bbls/d.				
Pilot	6,000	2018	Application	**SAGD/ADC**
COLD LAKE REGION — IN SITU				
Baytex Energy Corp.				
Gemini				
Baytex has made the decision to decommission the Gemini SAGD pilot due to low oil pricing. The company says that since operations started last year the pilot has successfully captured the key data associated with its objectives. The company's primary objective was to confirm reservoir production capacity to support a commercial scale project. Following regulatory approval for the commercial project. Any subsequent sanctioning decision will be considered in the context of the project economics in a higher commodity price environment.				
Pilot	1,200	2014	Suspended	**SAGD**
Commercial	5,000	TBD	Approved	**SAGD**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Birchwood Resources Inc.				
Sage				
Birchwood has until Sept 30. 2015, to submit a response to supplemental information requests related to the Sage regulatory application.				
Pilot	5,000	TBD	Application	**Low pressure SAGD**
Canadian Natural Resources Limited				
Primrose & Wolf Lake				
Canadian Natural says that it continues to progress low pressure steamflood operations at Primrose Ease Area 1 as well as low pressure CSS operations at Primrose East Area 2, and that operations at Primrose East are exceeding expectations.				
Wolf Lake	13,000	1985	Operating	**CSS**
Primrose South	45,000	1985	Operating	**CSS**
Primrose North	30,000	2006	Operating	**CSS**
Primrose East	32,000	2008	Operating	**CSS**
Devon Canada Corporation				
Walleye				
Devon says the Walleye project is currently on hold.				
Phase 1	9,000	TBD	Application	**SAGD**
Husky Energy Inc.				
Caribou				
Demonstration	10,000	TBD	Approved	**SAGD**
Tucker				
Maintenance turnaround planned for the third quarter of 2015. In December 2014, an application was filed for an additional once-through steam generator and high-pressure boiler feedwater pump.				
Phase 1	30,000	2006	Operating	**SAGD**
Imperial Oil Limited				
Cold Lake				
Imperial says that production from the new Nabiye project continues to ramp up following its first quarter start-up. The company has submitted an application to the Alberta Energy Regulator for the expansion of the LASER treatment for implementation in 2017.				
Phase 1-10	110,000	1985	Operating	**CSS**
Phase 11-13	30,000	2002	Operating	**CSS**
Experimental SA-SAGD	TBD	2013	Operating	**SA-SAGD**
Phase 14-16	40,000	2015	Operating	**CSS**
Midzaghe	45,000	TBD	Announced	**SA-SAGD**
OSUM Oil Sands Corp.				
Orion				
OSUM plans to revise the approved well pad development sequence at Orion, deferring two originally planned pads and developing on new sustaining pad as well as three new pads to increase production to the approved 20,000 bbls/d.				
Phase 1	10,000	2007	Operating	**SAGD**
Phase 2	10,000	TBD	Approved	**SAGD**
Taiga				
OSUM says that Taiga Phase 1 will be advanced in 2015-16 subject to financing.				
Phase 1	12,500	TBD	Approved	**CSS & SAGD**
Phase 2	12,500	TBD	Approved	**CSS & SAGD**
Phase 3	20,000	TBD	Approved	**CSS & SAGD**
Pengrowth Energy Corporation				
Lindbergh				
Pengrowth says that it has shipped the first production from Lindbergh on the sales pipeline operated by Husky Energy. Pengrowth retains the option to move production by rail to markets in an effort to maximize revenues and netbacks. The company expects to ramp up to 16,000 bbls/d by the end of the year. Alberta Environment and Parks says that a supplement information request regarding the Lindbergh expansion project application/Environmental Impact Assessment was sent in July, and it is awaiting response.				
Pilot	1,260	2012	Operating	**SAGD**
Phase 1	11,240	2015	Operating	**SAGD**
Phase 1 Optimization	3,500	2015	Construction	**SAGD**
Phase 2 Expansion	34,000	TBD	On Hold	**SAGD**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
PEACE RIVER REGION — IN SITU				
Andora Energy Corporation				
Sawn Lake				
Project partner Deep Well Oil & Gas says that the steam chamber is now expected to reach the top of the Bluesky reservoir by the end of September and maximum oil production is now expected to be reached by the end of November.				
Demonstration	1,400	2014	Operating	**SAGD**
Baytex Energy Corp.				
Cliffdale				
Pilot	2,000	2011	Operating	**CSS**
Dawson				
Touchstone Exploration has disposed of its interest in the Dawson area of Alberta for cash consideration of $2.15 million				
Experimental Demonstration	TBD	2014	Suspended	
Harmon Valley				
Pilot	TBD	2011	Operating	**CSS**
Murphy Oil Company Ltd.				
Seal/Cadotte				
About 250 bbls/d of production is currently shut in at Seal. Murphy says that in the worst case scenario, up to 80 wells could be shut in.				
Pilot	TBD	TBD	Operating	**CSS**
Demonstration	12,450	2019	Application	**CSS**
Northern Alberta Oil Ltd.				
Sawn Lake				
Pilot	700	TBD	Approved	**Horizontal CSS**
Penn West Petroleum Ltd.				
Harmon Valley South				
In collaboration with its partner, Penn West has finalized the budget for the second half 2015 and first half 2016 development program in the area. Penn West's management is pleased to have the full support of its partner allowing for development to be accelerated in the play through the addition of a second rig to the program. The second rig is planned to start in September and carry through to the end of the year. Approximately 90 per cent of Penn West's expenditures continue to be paid for by our partner in the PROP joint venture.				
Pilot	TBD	2014	Operating	**Horizontal CSS**
Seal Main				
In collaboration with its partner, Penn West has finalized the budget for the second half 2015 and first half 2016 development program in the area. Penn West's management is pleased to have the full support of its partner allowing for development to be accelerated in the play through the addition of a second rig to the program. The second rig is planned to start in September and carry through to the end of the year. Approximately 90 per cent of Penn West's expenditures continue to be paid for by our partner in the PROP joint venture.				
Pilot	75	2011	Operating	**Horizontal CSS**
Commercial	10,000	TBD	Application	**Horizontal CSS**
Royal Dutch Shell plc				
Peace River				
Shell says it will delay start-up of the first phase of Carmon Creek from 2017 to 2019 as the company looks to achieve cost reductions.				
Cadotte Lake	12,500	1986	Operating	**CSS**
Carmon Creek - Phase 1	40,000	2019	Construction	**VSD**
Carmon Creek - Phase 2	40,000	TBD	Approved	**VSD**
NORTH ATHABASCA REGION — UPGRADER				
BP p.l.c.				
Terre de Grace				
BP says that ongoing appraisal activities continue.				
Pilot	8,400	TBD	Approved	**CSS**
Canadian Natural Resources Limited				
Horizon				
Canadian Natural says that a turnaround scheduled for the second quarter of 2015 was extended from 10 to 15 days to address necessary found work and because the start-up of operations was slower than expected. Overall the Phase 2/3 expansion is 67 per cent complete as at the second quarter of 2015.				
Phase 1	110,000	2009	Operating	**UPG**
Reliability - Tranche 2	5,000	2014	Operating	**UPG**
Phase 2A	12,000	2014	Operating	**UPG**
Phase 2B	45,000	2016	Construction	**UPG**
Phase 3	80,000	2017	Construction	**UPG**

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Ivanhoe Energy Inc.				
Tamarack				
Ivanhoe has announced that despite considerable efforts by the company, its trustee and major creditors, the parties have been unable to reach a viable restructuring proposal under the Bankruptcy and Insolvency Act. The company was deemed bankrupt as of 11:59 PM MDT on June 1.				
Phase 1	34,784	TBD	Application	**UPG**
Suncor Energy Inc.				
Base Operations				
Suncor says that oilsands production increased by about 45,000 bbl/d in the second quarter versus the same period in 2014, primariliy due to reliable operations resulting in minimal unplanned maintenace. Planned maintenance at Upgrader 1 was completed during the second quarter.				
U1 and U2	225,000	1967	Operating	**UPG**
Millennium Vacuum Unit	35,000	2005	Operating	**UPG**
Millennium Coker Unit	97,000	2008	Operating	**UPG**
Syncrude Canada Ltd.				
Mildred Lake/Aurora				
On August 29, a fire occured in the interconnecting piping between the hydrotreating units and the envrionmental units at the Mildred Lake upgrader, synthetic production has been temporarily suspended. Earlier in 2015 Syncrude filed a regulatory application for the MLX project. Syncrude is focusing on cost reduction to remain profitable during the low oil price environment.				
Base Plant Stage 1 & 2 Debottlenecking	250,000	1978	Operating	**UPG**
Stage 3 Expansion (UE-1)	100,000	2006	Operating	**UPG**
Stage 3 Debottlenecking	75,000	TBD	Announced	**UPG**
SOUTH ATHABASCA REGION — UPGRADER				
CNOOC Limited				
Long Lake				
Following an order from the Alberta Energy Regulator (AER), Nexen is suspending operations at Long Lake. The company voluntarily self-disclosed non-compliance related to pipeline maintenance and monitoring following a major spill in July. Nexen said on September 2 it expected the suspension would last about two weeks. The AER says it will last until Nexen can prove its Long Lake pipelines can be operated safely.				
Phase 1	58,500	2009	Suspended	**UPG**
Value Creation Inc.				
Advanced TriStar				
Alberta Environment and Parks says a request for supplemental information regarding the ATS project application/Environmental Impact Assessment was sent in May, and it is awaiting response.				
ATS-1	12,750	TBD	Application	**UPG**
ATS-2	25,500	TBD	Application	**UPG**
ATS-3	25,500	TBD	Application	**UPG**
DOEx (Demonstration of Excellence)				
Value Creation has filed an amendment to its regulatory approval to increase production capacity from 1,000 to 6,000 bbls/d.				
Pilot	12,000	2018	Application	**UPG**
INDUSTRIAL HEARTLAND REGION — UPGRADER				
North West Upgrading Inc.				
Redwater Upgrader				
The North West Redwater partnership says that while civil and foundation work continues, the most exciting progress at the site continues to be "above anchor bolts" with buildings, piperacks, vessels and equipment now rising skyward. As of August 26, more than 350 modules have been either recieved at site or are standing in various stages of assembly in regional mod yards. Erection of major process equipment onto foundations continues, with the most recent vertical heavy lift being a fully-dressed vacuum tower set in the LC Fining Unit.				
Phase 1	50,000	2017	Construction	**UPG**
Phase 2	50,000	TBD	Approved	**UPG**
Phase 3	50,000	TBD	Approved	**UPG**
Shell Albian Sands				
Scotford Upgrader				
Shell has made a final investment decision on the HCU debottleneck project, which is expected to increase hydrocracking capacity by about 20 per cent. Project partner Marathon Oil says that planned turnarounds at the base upgrader and Muskeg River mine were completed on time and on budget in the second quarter, as well as unplanned downtime at the expansion upgrader.				
Commercial	155,000	2003	Operating	**UPG**
Expansion	100,000	2011	Operating	**UPG**
Scotford HCU Debottlenecking	14,000	TBD	Announced	**UPG**

GLOSSARY of oil sands terms

ASPHALTENES
The heaviest and most concentrated aromatic hydrocarbon fractions of bitumen.

BARREL
The traditional measurement for crude oil volumes. One barrel equals 42 U.S. gallons (159 litres). There are 6.29 barrels in one cubic metre of oil.

BITUMEN
Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oil sand, but saturation varies.

COGENERATION
The simultaneous production of electricity and steam, which is part of the operations of many oil sands projects.

COKING
An upgrading/refining process used to convert the heaviest fraction of bitumen into lighter hydrocarbons by rejecting carbon as coke. Coking can be either delayed coking (semi-batch) or fluid coking (continuous).

CONDENSATE
Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid, and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

CONVENTIONAL CRUDE OIL
Mixture of mainly pentane and heavier hydrocarbons recoverable at a well from an underground reservoir, and liquid at atmospheric pressure and temperature. Unlike bitumen, it flows through a well without stimulation and through a pipeline without processing or dilution.

CRACKING
An upgrading/refining process for converting large, heavy molecules into smaller ones. Cracking processes include fluid cracking and hydrocracking.

CYCLIC STEAM STIMULATION (CSS)
An in situ production method incorporating cycles of steam injection, steam soaking and oil production. The steam reduces the viscosity of the bitumen and allows it to flow to the production well.

DENSITY
The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m^3) or degrees on the American Petroleum Institute (API) gravity scale; in western Canada, oil up to 900 kg/m^3 is considered light-to-medium crude—oil above this density is deemed as heavy oil or bitumen.

DILBIT
Bitumen that has been reduced in viscosity through addition of a diluent such as condensate or naphtha.

DILUENT
A light hydrocarbon blended with bitumen to enable pipeline transport. See Condensate.

EXTRACTION
A process, unique to the oil sands industry, that separates the bitumen from the oil sand using hot water, steam and caustic soda.

FROTH TREATMENT
The means to recover bitumen from the mixture of water, bitumen and solids "froth" produced in hot-water extraction (in mining-based recovery).

GASIFICATION
A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy by-products.

GROUNDWATER
Water accumulations below the Earth's surface that supply fresh water to wells and springs.

HEAVY CRUDE OIL
Oil with a gravity below 22 degrees API. Heavy crudes must be blended or mixed with condensate to be shipped by pipeline.

HYDROCRACKING
Refining process for reducing heavy hydrocarbons into lighter fractions, using hydrogen and a catalyst; can also be used in upgrading bitumen.

HYDROTRANSPORT
A slurry process that transports water and oil sand through a pipeline to primary separation vessels located in an extraction plant.

HYDROTREATER
An upgrading/refining process unit that reduces sulphur and nitrogen levels in crude oil fractions by catalytic addition of hydrogen.

IN SITU
A Latin phrase meaning "in its original place." In situ recovery refers to various drilling-based methods used to recover deeply buried bitumen deposits.

IN SITU COMBUSTION
An enhanced oil recovery method that works by generating combustion gases (primarily CO and CO_2) downhole, which then "push" the oil towards the recovery well.

LEASE
A legal document from the province of Alberta giving an operator the right to extract bitumen from the oil sand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

LIGHT CRUDE OIL
Liquid petroleum with a gravity of 28 degrees API or higher. A high-quality light crude oil might have a gravity of about 40 degrees API. Upgraded crude oils from the oil sands run around 30–33 degrees API (compared to 32–34 for Light Arab and 37–40 for West Texas Intermediate).

MATURE FINE TAILINGS
A gel-like material resulting from the processing of clay fines contained within the oil sands.

OIL SANDS
Bitumen-soaked sand deposits located in three geographic regions of Alberta: Athabasca, Cold Lake and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total in-place deposits of bitumen in Alberta are estimated at 1.7 trillion to 2.5 trillion barrels.

OVERBURDEN
A layer of sand, gravel and shale between the surface and the underlying oil sand in the mineable oil sands region that must be removed before oil sands can be mined.

PERMEABILITY
The capacity of a substance (such as rock) to transmit a fluid, such as crude oil, natural gas or water. The degree of permeability depends on the number, size and shape of the pores and/or fractures in the rock and their interconnections. It is measured by the time it takes a fluid of standard viscosity to move a given distance. The unit of permeability is the Darcy.

PETROLEUM COKE
Solid, black hydrocarbon that is left as a residue after the more valuable hydrocarbons have been removed from the bitumen by heating the bitumen to high temperatures.

PRIMARY PRODUCTION
An in situ recovery method that uses natural reservoir energy (such as gas drive, water drive and gravity drainage) to displace hydrocarbons from the reservoir into the wellbore and up to the surface. Primary production uses an artificial lift system in order to reduce the bottomhole pressure or increase the differential pressure to sustain hydrocarbon recovery, since reservoir pressure decreases with production.

RECLAMATION
Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

STEAM ASSISTED GRAVITY DRAINAGE (SAGD)
An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

SURFACE MINING
Operations to recover oil sands by open-pit mining using trucks and shovels. Less than 20 per cent of Alberta's oil sands resources are located close enough to the surface (within 75 metres) for mining to be economic.

SYNTHETIC CRUDE OIL
A manufactured crude oil comprised of naphtha, distillate and gas oil-boiling range material. Can range from high-quality, light sweet bottomless crude to heavy, sour blends.

TAILINGS
A combination of water, sand, silt and fine clay particles that is a by-product of removing the bitumen from the oil sand through the extraction process.

TAILINGS SETTLING BASIN
The primary purpose of the tailings settling basin is to serve as a process vessel, allowing time for tailings water to clarify and silt and clay particles to settle so that the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

THERMAL RECOVERY
Any in situ process where heat energy (generally steam) is used to reduce the viscosity of bitumen to facilitate recovery.

UPGRADING
The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

VISCOSITY
The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.

OIL SANDS CONTACTS

OIL SANDS PRODUCERS

Athabasca Oil Corporation www.atha.com
Baytex Energy www.baytex.ab.ca
BlackPearl Resources www.blackpearlresources.ca
Brion Energy Corporation www.brionenergy.com
Canadian Natural Resources www.cnrl.com
Cenovus Energy www.cenovus.com
Chevron Canada www.chevron.ca
CNOOC Limited www.cnoocltd.com
Connacher Oil and Gas www.connacheroil.com
ConocoPhillips Canada www.conocophillips.ca
Devon Canada www.dvn.com
Enerplus Resources Fund www.enerplus.com
E-T Energy www.e-tenergy.com
Grizzly Oil Sands www.grizzlyoilsands.com
Harvest Operations Corp. www.harvestenergy.ca
Husky Energy www.huskyenergy.ca
Imperial Oil www.imperialoil.ca
Ivanhoe Energy www.ivanhoeenergy.com
Japan Canada Oil Sands www.jacos.com
Koch Exploration Canada www.kochexploration.ca
Korea National Oil Corporation www.knoc.co.kr
Laricina Energy www.laricinaenergy.com
Marathon Oil www.marathon.com
MEG Energy www.megenergy.com
Nexen www.nexeninc.com
North West Upgrading www.northwestupgrading.com
N-Solv www.n-solv.com
Oak Point Energy www.oakpointenergy.ca
Occidental Petroleum Corporation www.oxy.com
Osum Oil Sands www.osumcorp.com
Pan Orient Energy www.panorient.ca
Paramount Resources Ltd. www.paramountres.com
Pengrowth Energy Corporation www.pengrowth.com
PetroChina www.petrochina.com.cn/ptr
PTT Exploration and Production www.pttep.com
Shell Canada www.shell.ca
Sinopec www.sinopecgroup.com/group/en
Southern Pacific Resource Corp. www.shpacific.com
Statoil Canada www.statoil.com
Suncor Energy www.suncor.com
Sunshine Oilsands www.sunshineoilsands.com
Syncrude www.syncrude.ca
Teck Resources www.teck.com
Total E&P Canada www.total-ep-canada.com
Touchstone Exploration www.touchstoneexploration.com
Value Creation Group www.vctek.com

ASSOCIATIONS/ORGANIZATIONS

Alberta Chamber of Resources www.acr-alberta.com
Alberta Chambers of Commerce www.abchamber.ca
Alberta Energy www.energy.gov.ab.ca
Alberta Energy Regulator www.aer.ca
Alberta Environment and Parks www.aep.alberta.ca
Alberta Innovates www.albertainnovates.ca
Alberta Innovation and Advanced Education www.eae.alberta.ca
Alberta's Industrial Heartland Association www.industrialheartland.com
Building Trades of Alberta www.buildingtradesalberta.ca
Canada's Oil Sands Innovation Alliance www.cosia.ca
Canadian Association of Geophysical Contractors www.cagc.ca
Canadian Association of Petroleum Producers www.capp.ca
Canadian Heavy Oil Association www.choa.ab.ca
In Situ Oil Sands Alliance www.iosa.ca
Lakeland Industry & Community Association www.lica.ca
Natural Resources Conservation Board www.nrcb.ca
Oil Sands Community Alliance www.oscaalberta.ca
Oil Sands Secretariat www.energy.alberta.ca
Petroleum Technology Alliance Canada www.ptac.org

For more information, visit us at www.albertacanada.com

PHOTO: CANADIAN NATURAL RESOURCES