ALBERTA OIL SANDS INDUSTRY QUARTERLY UPDATE

SUMMER 2015

Reporting on the period:
March 21, 2015 to June 18, 2015

All about the oil sands

Background of an important global resource

ON THE COVER

Electrical and steam cogeneration tower at MEG Energy's Christina Lake SAGD project.

COVER PHOTO: MEG ENERGY

TABLE OF CONTENTS

3 **Mapping the oil sands**

4 **Government update**

6 **Labour market update**

7 **What's new in the oil sands: business**

8 **What's new in the oil sands: technology**

9 **Oil sands production data**
Production by extraction method, aggregate synthetic crude oil and bitumen production

Oil sands technology guide

10 **Project listings**

16 **Glossary**

18 **Oil sands contacts**

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.

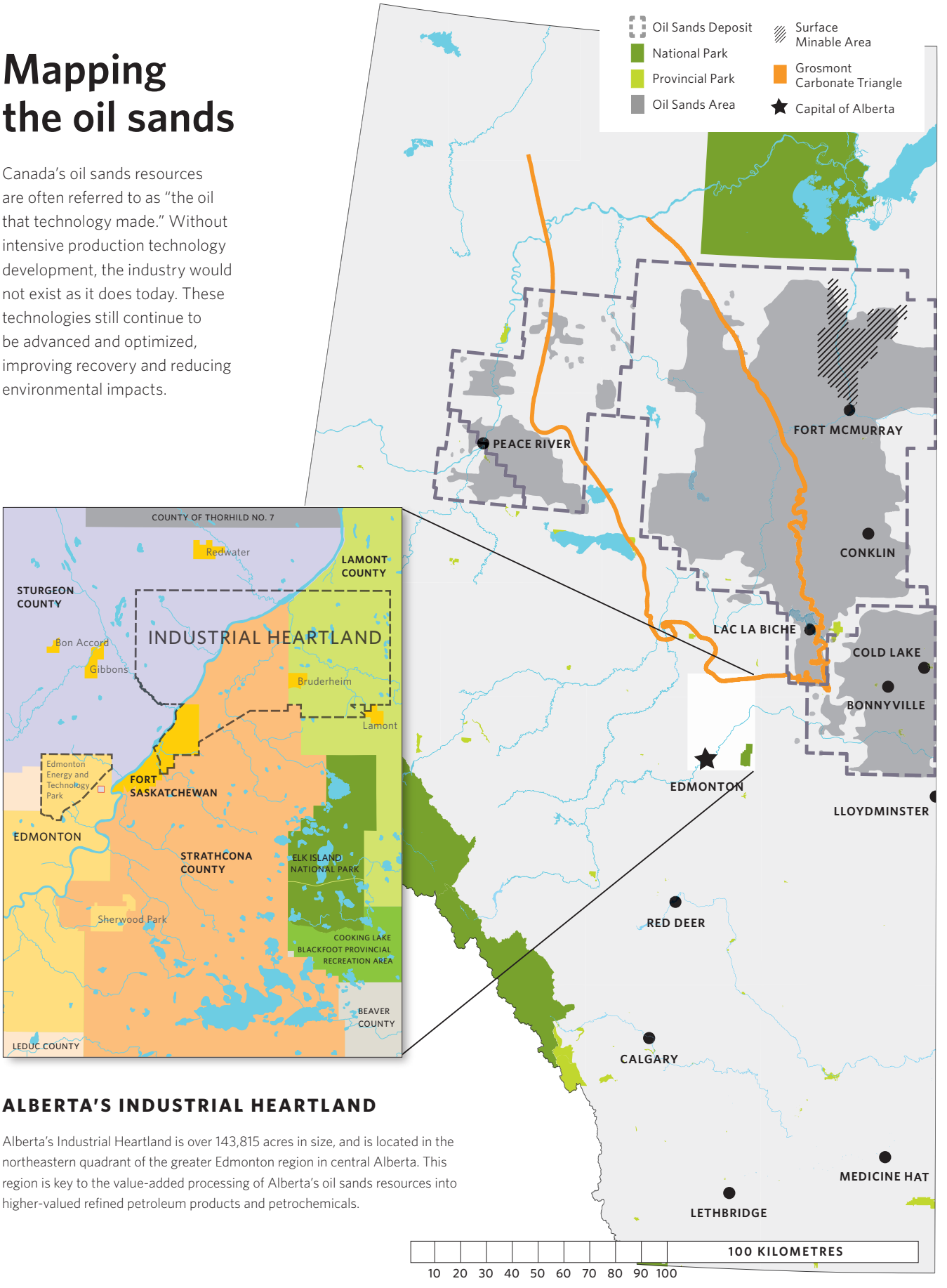
Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The selection is based on a number of factors, including geology. The technologies combined currently produce just over one million barrels per day.

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

A NEW CHAPTER IN THE STORY OF ALBERTA

Alberta's 17th premier, the Honourable Rachel Notley, and her cabinet, were sworn in on the steps of the Alberta Legislature on May 24.

Albertans have chosen a strong, stable majority government that will put the priorities of Albertans first—a government that shares in the very same values that built this province and our prosperity.

"Today, we open a new chapter in the story of Alberta. From our earliest days, Albertans have worked as hard as anyone to forge a brighter future," said Premier Notley. "People from all walks of life and from every part of the world have joined together on a common journey. And on that journey we've been guided by enduring values. Albertans are hard working. We are entrepreneurial. And we are relentlessly optimistic. We believe that tomorrow can be a better day. And that we must work hard to make it happen. That's who we are as Albertans."

The new cabinet is lean and efficient, and is firmly focused on solving the challenges that face Alberta. The newly sworn-in ministers will partner with Alberta's job creators—in energy, forestry, agriculture, high-tech, tourism and small business—to grow and diversify our economy.

PREMIER NOTLEY COMMITTED TO THOUGHTFUL, TRANSPARENT OIL AND GAS ROYALTY REVIEW

Alberta's new government is committed to implementing policies that provide competitive, realistic oil and gas royalty rates to ensure full and fair value for Albertans as owners of the resources. This will require a comprehensive review of the current oil and gas royalty structure.

While full details are forthcoming, Premier Notley is determined to execute the process in a conscientious and transparent manner.

She said, "We have committed to a review, and as part of that I have committed that it will be thoughtful, well informed, and all parties to it will have a clear understanding of what the process itself entails before it unfolds."

MINISTER OF ENVIRONMENT AND PARKS SHANNON PHILLIPS PROMISES NEW CLIMATE CHANGE REGULATIONS WILL BE IN PLACE BY THE END OF JUNE

On June 30, 2015, Alberta has four climate change regulations that are set to expire, including the Specified Gas Emitters Regulation. This legislation, which falls under the Climate Change and Emissions Management Act, was established in 2007 as the first greenhouse gas regulation and compliance carbon pricing system.

Environment and Parks Minister Shannon Phillips has committed that new regulations will be in place before current regulations expire.

"This government will take leadership on the issue of climate change and make sure Alberta is part of crafting solutions with stakeholders, other provinces and the federal government," she said.

Phillips also committed to a broad consultation that will take place over the next few months. First steps will include an energy efficiency strategy and a renewable energy strategy.

ENERGY MINISTER MARG MCCUAIG-BOYD WELCOMES ATTENDEES TO THE GLOBAL PETROLEUM SHOW

In mid-June, Minister of Energy Marg McCuaig-Boyd provided the keynote address at the welcome reception for this year's Global Petroleum Show (GPS) in Calgary. GPS is an annual event that hosts 95 countries, 63,000

PHOTO: JOEY PODLUBNY

SYNCRUDE STARTED OPERATING ITS MILDRED LAKE MINE TRAIN REPLACEMENT PROJECT AT THE END OF 2014. THIS PHOTO SHOWS THE VIEW FROM THE NEW CRUSHER.

PHOTO: SYNCRUDE

attendees and 2,000 exhibiting companies. Minister McCuaig-Boyd stated:

"Alberta's service, manufacturing and technology companies are among the most forward-thinking in the world, with a lot to offer the industry when it comes to innovative gas and oil development, clean technologies and environmental management. That's the kind of thinking we want to encourage, and that's the focus you can expect from our government's approach to resource development.

"For those of you who work and invest in the energy industry, there is obviously some uncertainty in the sector due to the drop in oil prices. At the same time, our province has just undergone a change in government, and there is no denying that change at the top after so long is challenging. But we are working hard to make the transition as smooth as possible to bring stability to the economy as we can and implement our plans.

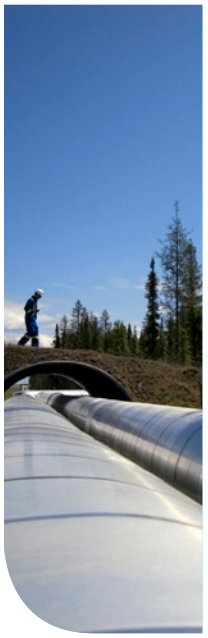
"At the heart of those plans is our promise to Albertans to increase prosperity, to create opportunities for good jobs [and] to build a diversified economy that benefits everyone. This is one way and the only way to succeed.

"Job creators create jobs in the private sector, not government, but we aim to be good partners. Alberta is and will always be a healthy place for private investment under our government; home to a wide range of enterprises and rewarding jobs.

"Quite a lot of these opportunities in Alberta are in the energy sector, which has been a strong driver of provincial and national growth for many years. And under our new government and the leadership of Premier Notley, Alberta will continue to welcome the energy business. We simply want to do it right by developing the province's rich reserves in a manner that is fair to the resource owners—Albertans themselves—and to companies that extract the energy and deserve a reasonable return for their investments. And we want to accomplish all of this as sustainably as possible so that we can protect our environment for generations to come.

"I consider industry to be government's partner in achieving these goals and I want you to know that this government will be an honest, thoughtful partner to the energy sector as we move forward. We are very excited to work together with your industry." ■

LABOUR UPDATE



REDUCED SPENDING COULD RESULT IN 25 PER CENT DECLINE IN ENERGY INDUSTRY JOBS

The Canadian economy could lose up to 185,000 direct and indirect jobs related to the oil and gas industry this year as a result of an anticipated $31-billion reduction in industry capital and operational expenditures in response to low commodity prices, says a new study.

The 25 per cent decline in jobs from 2014 assumes spending patterns would otherwise have remained the same as in previous years, according to the employment impact assessment released in May by the Petroleum Labour Market Information (PetroLMI) division of Enform (formerly the Petroleum Human Resources Council). Last year, the oil and gas industry spent more than $125 billion on exploration, development and production activities in Canada, supporting more than 720,000 direct and indirect jobs, the study notes.

The assessment examines the impacts to both direct jobs, such as geological engineers and plant operators, and indirect jobs, such as drilling contractors and helicopter pilots. It is based on industry expenditure estimates provided by ARC Financial with inputs from the Canadian Association of Petroleum Producers and using Statistics Canada's interprovincial input-output model.

"The industry has already experienced significant impacts to its labour force since the price of oil started its decline last November," said Carol Howes, director of PetroLMI. "If oil prices continue to remain low, we anticipate additional reductions to spending and jobs before things start to turn around."

While the majority of job losses are expected to take place in Alberta, employment impacts would extend across the country. Approximately one-third of jobs could be lost outside of Alberta, with an estimated 20,000 job losses in B.C. and 14,000 job losses estimated in Ontario.

Oil and gas engineering construction firms, which perform the majority of work on development projects, would expect to absorb the largest share of employment impacts, accounting for up to 75,000 jobs. The support services sector, which is involved heavily in exploration and development drilling, would account for the next largest share of potential job losses with an estimated decline of 26,000 jobs.

The estimated employment impacts in this assessment are larger in magnitude but comparable in scale to industry declines reported during the global economic crisis in 2008-09. The most significant spending declines in 2015 are expected in capital expenditures on exploration and development, which are anticipated to decrease by almost $28 billion, down 37 per cent from 2014 but similar to 2009.

Even with Canadian oil production expected to grow modestly in 2015, expenditures related to operations are also projected to decline by almost $3.3 billion, down 6.7 per cent from 2014. After adjusting for inflation, the estimated decline in capital and operational expenditures is almost $10 billion, or 34 per cent, more than in 2009.

"What is clear is that the behaviour of oil and gas companies will be an important factor in determining the actual number of job losses in 2015," said Howes. "Managing labour costs in a time of declining oil prices through creative workforce retention strategies will become more critical in the months ahead."

Howes added that the outlook for 2016 and beyond is unclear.

"It really depends on creative efforts to maintain workforces through things like job sharing and salary reductions," she said. "There have been downturns before, but they seem to be more creative this time than they have been in the past. The ability to maintain that, going forward, is really the next step."

The impact on jobs could also be affected by companies' spending decisions and whether they begin to increase activity if they believe prices have stabilized, she said, noting that the forecast was done in January of this year before prices began to rise slightly. ■

PHOTO: MEG ENERGY

WHAT'S NEW IN THE OIL SANDS

BUSINESS

PHOTO: SYNCRUDE

In mid-June, Imperial Oil announced the startup of its 110,000-bbl/d expansion of its Kearl oil sands mining project, which was originally targeted for year-end 2015. When capacity is reached, Kearl is expected to produce 220,000 bbls/d. Future debottlenecking is forecasted to increase output to reach the regulatory capacity of 345,000 bbls/d.

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 is now expected in 2019, whereas the project was previously expected to start production in 2017. Shell says the current market downturn creates an opportunity to achieve cost reductions.

ConocoPhillips reported the on-schedule start of first steam at the Surmont Phase 2 SAGD project on May 29. Production is expected to ramp-up through 2017, adding approximately 118,000 bbls/d of capacity.

Junior Athabasca Oil Corporation achieved first steam at its 12,000-bbl/d Hangingstone SAGD project at the end of March. The company expects to reach design capacity by late 2016.

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

Southern Pacific Resource Corp. is making plans to hibernate the STP-McKay facility by the end of July 2015. 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 and poor project performance, 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.

Suncor Energy expects to realize $600 million to $800 million in operating budget reductions in 2015, ahead of the previously projected two-year period. Also, the company has largely completed its announced plans to reduce its workforce by 1,000 positions.

Suncor confirmed it is on track to achieve the $1-billion reduction in its 2015 capital budget, while maintaining progress on key growth projects already in construction, including Fort Hills and Hebron.

Sunshine Oilsands is postponing commissioning and start-up of the first phase of its West Ells SAGD project in order to improve productivity and reduce costs. The company has now scheduled first steam at the oil sands project to begin in late June instead of the first quarter of 2015, with first oil slated for September.

Harvest Operations Corp. says that although construction of its 10,000-bbl/d BlackGold SAGD project has been completed, first steam won't occur until oil prices rebound to the $60 WTI range.

Total E&P Canada has withdrawn its regulatory applications to amend the approvals it was granted in 2011 for the Joslyn North Mine, citing "significant changes to global energy market conditions." However, it is open to restarting the oil sands project when its economics improve. Total will continue to participate in building its other oil sands projects, Fort Hills and Surmont, the company says. ■

WHAT'S NEW IN THE OIL SANDS

TECHNOLOGY

THE LAST MODULE IS SET AT SHELL'S QUEST CARBON CAPTURE AND STORAGE PROJECT IN 2014.

With the oil sands expected to play a growing role in global energy supplies, accelerated technological development is required today to address the industry's long-term environmental footprint, an expert panel co-chaired by a retired oil sands company executive has concluded.

"Improvements in environmental performance are not keeping pace with understanding of impacts, or indeed, the growth of the industry," says the report by the Council of Canadian Academies panel co-chaired by Eric Newell, the former chief executive officer of Syncrude Canada Ltd., and Scott Vaughan, president and chief executive officer, International Institute for Sustainable Development.

"Changing the pace of technology deployment will not occur without strong leadership, continued investment and risk-taking by all," the report warns. "Industry, government, academia, Aboriginal peoples and other stakeholders all have key roles to play."

The expert panel identified greenhouse gas emissions, a central cause of global warming, and tailings disposal and related land disturbance as the most serious environmental issues.

Cenovus Energy is seeking regulatory approval for changes to well configurations at its Christina Lake SAGD project near Conklin, Alta., in an attempt to enable steam to access the reservoir more efficiently.

The company is considering three different well configurations that will offer an opportunity to supply steam from a single injector to multiple producers, and consequently improve the drainage length per given injection well.

"This would improve the injector-to-producer ratio per pad, thereby improving the SAGD capital efficiency and overall project economics," the company says. "Also, the enhanced steam-flow pattern combined with NCG [non-condensable gas] from a SAGD chamber may result in more uniform steam-chamber development and possibly additional bitumen recovery."

Sunshine Oilsands has entered into a strategic agreement with Shanghai-based Nobao Renewable Energy to examine integrating Nobao's ground source high temperature heat pump technologies with existing oil sands thermal recovery technologies. The technologies could reduce heat and energy requirements and subsequently also reduce emissions.

Pengrowth Energy is boosting its capital spending at the Lindbergh SAGD project by $20 million, in part because the company feels engineering work for Phase 2 of the thermal project should account for technology modifications to support carbon pricing regulations that might be initiated by the newly elected Alberta NDP government. Pengrowth says that cogeneration technology is probably the most efficient way to capture carbon today at the plant, so that will be part of the ongoing evaluation.

Global water treatment operator IDE Technologies has completed the fabrication of two horizontal evaporator units that will be installed in the oil sands 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, which Lightbown says would be significant.

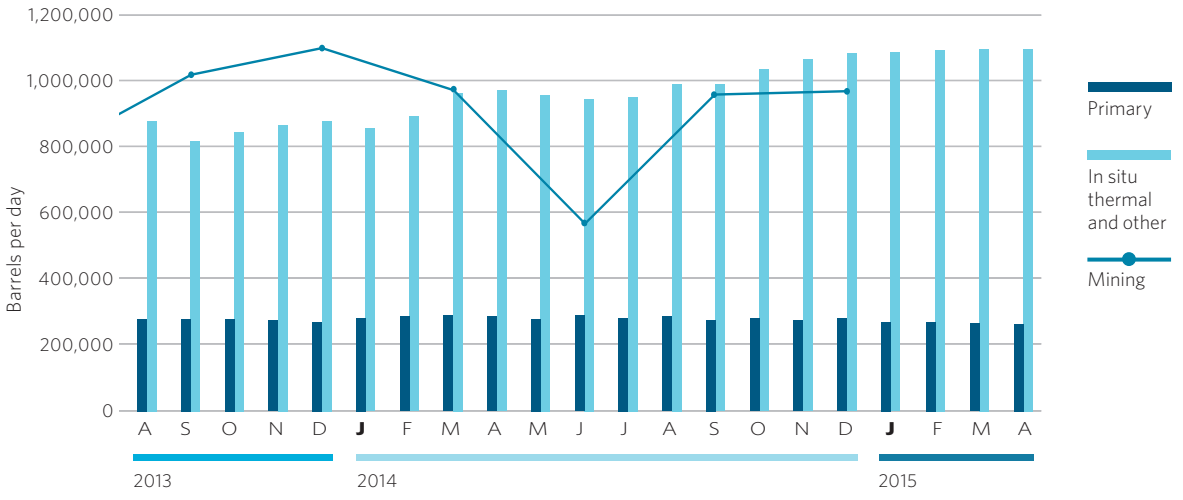
"This is one of those technologies where evaporators can handle a more saline input source and still maintain a high recycle rate, but at a lower energy penalty. That's the real benefit with this one, especially as more SAGD facilities are moving away from a freshwater makeup to more of a saline or brown water makeup."

Husky Energy has started using a new custom mobile drilling rig at the Sunrise SAGD project to achieve drilling efficiencies. The rig provides for closer spacing of wellheads, smaller drilling pads and fewer pad facilities. Husky says that this, along with the incorporation of new technologies such as multi-phase metering, will result in well-cost savings of about 30 per cent compared to the initial pads. ■

PHOTO: SHELL CANADA

OIL SANDS PRODUCTION DATA

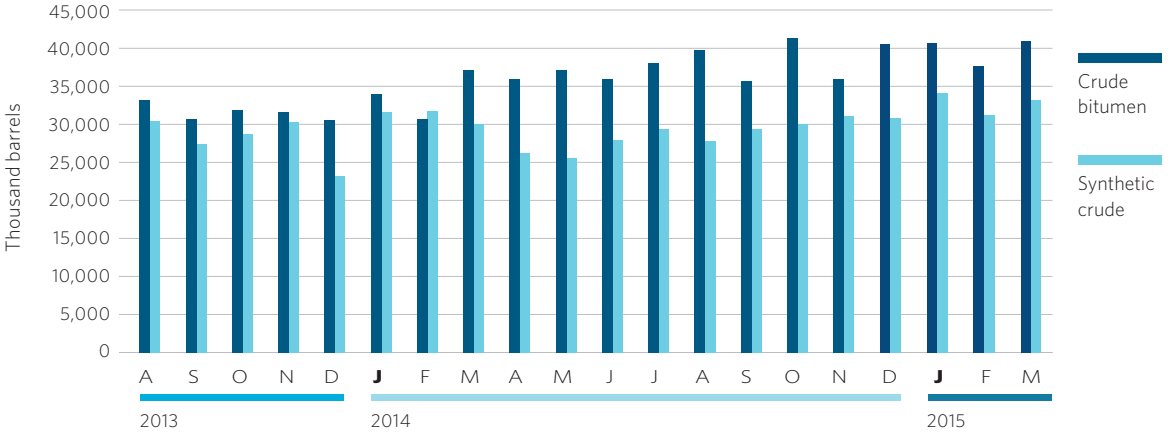
Alberta oil sands production by extraction method



SOURCE: ALBERTA ENERGY REGULATOR

*Mining production data for 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

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 June 2015

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
NORTH ATHABASCA REGION — MINING				
Canadian Natural Resources Limited				
Horizon				
Canadian Natural says that its 2015 maintenance turnaround has been accelerated to June from the fall. Overall, the company says its Phase 2/3 expansion is approximately 60 per cent physically complete.				
Phase 1	135,000	2008	OP	Mining
Reliability - Tranche 2	5,000	2014	OP	Mining
Phase 2A	12,000	2014	OP	Mining
Phase 2B	45,000	2016	UC	Mining
Phase 3	80,000	2017	UC	Mining
Imperial Oil Limited				
Kearl				
Imperial says that production averaged 95,000 bbls/d in the first quarter, and that all three mine trains have been simultaneously operated at capacity. The company started up its cogeneration unit and synchronized to the Alberta grid in the first quarter. The Phase 2 expansion is now operating.				
Phase 1	110,000	2013	OP	Mining
Phase 2	110,000	2015	OP	Mining
Phase 3	80,000	2020	Approved	Mining
Phase 4 Debottlenecking	45,000	TBD	Approved	Mining
Shell Albian Sands				
Jackpine				
Extended planned maintenance during spring/summer 2015.				
Phase 1A	100,000	2010	OP	Mining
Phase 1B	100,000	TBD	Approved	Mining
Expansion	100,000	TBD	Approved	Mining
Muskeg River				
Marathon Oil says that production increased by approximately 35 per cent in the first quarter, primarily as a result of higher reliability compared to the first quarter of 2014 when nine days of planned mine maintenance occurred. A planned turnaround is scheduled for late spring/early summer.				
Commercial	155,000	2002	OP	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 reported record synthetic crude oil production in the first quarter due to strong upgrader reliability. Production is expected to decrease in the second quarter due to planned coker maintenance.				
Millennium Mine	294,000	1967	OP	Mining
Steepbank Debottlenecking Phase 3	4,000	2007	OP	Mining
Millennium Debottlenecking	23,000	2008	OP	Mining
North Steepbank Extension	180,000	2012	OP	Mining
Fort Hills				
Suncor says the project is on schedule and on budget, and the company is starting to see an increase in labour supply and productivity. Construction activities are ramping up and detailed engineering is moving towards completion.				
Phase 1	160,000	2017	UC	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	APPL	Mining
Syncrude Canada Ltd.				
Mildred Lake/Aurora				
Syncrude has filed the regulatory application for the MLX project. During 2015, Syncrude is focusing on cost reduction to remain profitable during the low oil price environment.				
Base Mine Stage 1 & 2 Expansion	290,700	1978	OP	Mining
Stage 3 Expansion	116,300	2006	OP	Mining
Centrifuge Tailings Management	TBD	TBD	OP	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	APPL	Mining
Teck Resources Limited				
Frontier				
Teck says that the regulatory review process for the Frontier project is expected to continue through 2015, making 2016 the earliest an approval decision and receipt of required permits is expected.				
Phase 1	74,600	2021	APPL	Mining
Phase 2	84,000	2024	APPL	Mining
Phase 3	79,300	2027	APPL	Mining
Phase 4 Equinox	39,400	2030	APPL	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	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	ANN	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	APPL	SAGD
Dover West Sands & Clastics				
Athabasca lists Dover West as one of its long-term assets.				
Phase 1	12,000	TBD	APPL	SAGD
Phase 2	35,000	2019	ANN	SAGD
Phase 3	35,000	2020	ANN	SAGD
Phase 4	35,000	2022	ANN	SAGD
Phase 5	35,000	2024	ANN	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
BP p.l.c.				
Terre de Grace				
BP says that ongoing appraisal activities continue.				
Pilot	10,000	TBD	Approved	SAGD
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	UC	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	ANN	SAGD
Phase 2	60,000	2023	ANN	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	ANN	SAGD
Steepbank				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	ANN	SAGD
Telephone Lake				
Cenovus will significantly reduce spending at its emerging oilsands assets, including Telephone Lake, in 2015. The company has deferred planned development at Telephone Lake to preserve cash.				
Phase A	45,000	TBD	HOLD	SAGD
Phase B	45,000	TBD	Approved	SAGD
Grizzly Oil Sands Ulc				
Thickwood				
The Alberta Energy Regulator says it will defer decisions on applications for in situ oil sands 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	APPL	SC-SAGD
Phase 2	6,000	TBD	APPL	SC-SAGD
Husky Energy Inc.				
Saleski				
Husky filed the regulatory application for its Saleski pilot in early May 2013.				
Carbonate Pilot	3,000	TBD	APPL	SC-SAGD
Sunrise				
Husky says it achieved first production from the Sunrise SAGD project in mid-March.The company says that production will be ramped up gradually to achieve optimum results, with volumes currently between 2,500 and 3,000 bbls/d. Husky is now using a custom mobile drilling rig to drill sustaining pads.				
Phase 1A	30,000	2015	OP	SAGD
Phase 1B	30,000	2015	UC	SAGD
Phase 2A	35,000	TBD	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 has issued the final terms of reference for Imperial's Aspen project.				
Phase 1	45,000	2020	APPL	SAGD
Phase 2	45,000	TBD	APPL	SAGD
Phase 3	45,000	TBD	APPL	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 p.m. MDT on June 1.				
Phase 1	20,000	TBD	APPL	SAGD
Phase 2	20,000	TBD	APPL	SAGD
Koch Exploration Canada Corporation				
Dunkirk				
Koch has filed the regulatory application for the proposed Dunkirk SAGD project.				
Commercial Demonstration	2,000	2017	APPL	SAGD
Phase 1	30,000	2018	ANN	SAGD
Phase 2	30,000	TBD	ANN	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	APPL	SAGD
Oak Point Energy Ltd.				
Lewis				
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	APPL	SAGD
SilverWillow Energy Corporation				
Audet				
Until the Alberta Energy Regulator develops and implements its new regulatory requirements, SilverWillow can provide no guarantee that it will be able to meet them or issue a revised project schedule. SilverWillow is optimistic that new regulations pertaining to shallow SAGD development would be established in 2015, however, with the change in government at the provincial level in Alberta the timing of such regulatory changes is less certain.				
Pilot	12,000	TBD	APPL	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	SUSP	SAGD
Suncor Energy Inc.				
Dover				
N-Solv Corporation says its pilot plant produced its 40,000th barrel of oil in early 2015.				
Demonstration Plant	500	2014	OP	SAGD
Firebag				
Suncor says that it achieved record production at Firebag during the first quarter, with volumes reaching 188,700 bbls/d. Suncor does not currently intend to pursue Stages 5 and 6.				
Stage 1	35,000	2004	OP	SAGD
Stage 2	35,000	2006	OP	SAGD
Cogeneration and Expansion	25,000	2007	OP	SAGD
Stage 3	42,500	2011	OP	SAGD
Stage 4	42,500	2012	OP	SAGD
Stage 5	62,500	TBD	Approved	SAGD
Stage 6	62,500	TBD	Approved	SAGD
Stage 3-6 Debottlenecking	23,000	TBD	APPL	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Lewis				
Phase 1	40,000	TBD	ANN	IN SITU
Phase 2	40,000	TBD	ANN	IN SITU
MacKay River				
Suncor says that spending is currently focused on ongoing wellpad development that is expected to maintain existing production levels.				
Phase 1	33,000	2002	OP	SAGD
Debottlenecking	5,000	2014	OP	SAGD
MR2	20,000	TBD	HOLD	SAGD
Sunshine Oilsands Ltd.				
Legend Lake				
Awaiting project sanctioning.				
Phase A1	10,000	TBD	APPL	SAGD
Phase A2	30,000	TBD	ANN	SAGD
Phase B1	30,000	TBD	ANN	SAGD
Phase B2	30,000	TBD	ANN	SAGD
Thickwood				
Awaiting project sanctioning.				
Phase A1	10,000	TBD	Approved	SAGD
Phase A2	30,000	TBD	ANN	SAGD
Phase B	30,000	2021	ANN	SAGD
West Ells				
Sunshine Oilsands says it is postponing commissioning and start-up to improve productivity and reduce costs. First steam is now expected in late June instead of during the first quarter. The company says it continues to look for opportunities for joint ventures to reduce capital commitments and to accelerate increased production.				
Phase A1	5,000	2015	UC	SAGD
Phase A2	5,000	TBD	Approved	SAGD
Phase A3	30,000	TBD	ANN	SAGD
Phase B	20,000	TBD	ANN	SAGD
Phase C1	30,000	TBD	ANN	SAGD
Phase C2	30,000	TBD	ANN	SAGD
SOUTH ATHABASCA REGION — IN SITU				
Athabasca Oil Corporation				
Hangingstone				
On March 23, 2015, Athabasca commenced steaming the first three well pairs, and 15 well pairs were steaming by mid-April. First production from Phase 1 is expected to be achieved in the third quarter of 2015. Final costs for Phase 1 are expected to fall between $740 million and $750 million.				
HS-1	12,000	2015	OP	SAGD
HS-2A Debottlenecking (1 and 2)	8,000	2017	APPL	SAGD
HS-2B Expansion	32,000	2019	APPL	SAGD
HS-3	30,000	2021	APPL	SAGD
BlackPearl Resources Inc.				
Blackrod				
BlackPearl reports that production is expected to ramp-up to peak rates in 2015. During the first quarter of 2015, the pilot wells produced an average of 406 bbls/d of bitumen.				
Pilot	800	2011	OP	SAGD
Phase 1	20,000	TBD	APPL	SAGD
Phase 2	30,000	TBD	APPL	SAGD
Phase 3	30,000	TBD	APPL	SAGD
Canadian Natural Resources Limited				
Gregoire Lake				
Canadian Natural says Gregoire Lake is in the planning stages.				
Phase 1	60,000	TBD	ANN	SAGD
Phase 2	60,000	TBD	ANN	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	APPL	SAGD
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	OP	SAGD
KN1 - Kirby North	40,000	TBD	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	ANN	SAGD
Phase 2B	35,000	TBD	ANN	SAGD
Cenovus Energy Inc.				
Christina Lake				
The optimization project for Phases C, D and E is expected to come on stream in late 2015, and Phase F is expected to come on stream in the second half of 2016. Phases G and H have been deferred to preserve cash.				
Phase 1A	10,000	2002	OP	SAGD
Phase 1B	8,800	2008	OP	SAGD
Phase C	40,000	2011	OP	SAGD
Phase D	40,000	2012	OP	SAGD
Phase E	40,000	2013	OP	SAGD
Optimization (Phases C,D,E)	22,000	2015	UC	SAGD
Phase F	50,000	2016	UC	SAGD
Phase G	50,000	TBD	HOLD	SAGD
Phase H	50,000	TBD	APPL	SAGD
Foster Creek				
Phase G is expected to be onstream in the first half of 2016. Phase H has been deferred until oil prices improve. Production was temporarily shut-in and personnel evacuated in late May due to forest fires in the Cold Lake region.				
Phase A	24,000	2001	OP	SAGD
Phase B Debottlenecking	6,000	2003	OP	SAGD
Phase C Stage 1	10,000	2005	OP	SAGD
Phase C Stage 2	20,000	2007	OP	SAGD
Phase D	30,000	2009	OP	SAGD
Phase E	30,000	2009	OP	SAGD
Phase F	30,000	2014	OP	SAGD
Phase G	30,000	2016	UC	SAGD
Phase H	30,000	2017	HOLD	SAGD
Future Optimization (Phases F,G,H)	35,000	TBD	ANN	SAGD
Phase J	50,000	TBD	Approved	SAGD
Future Optimization	15,000	TBD	ANN	SAGD
Grand Rapids				
Cenovus says it will reduce spending at its emerging oilsands assets in 2015, including Grand Rapids. The company does plan to drill a third well pair at the operating pilot in the first quarter, and says data from these well pairs will help determine the future pace of its Grand Rapids development.				
Pelican Lake Pilot	600	2011	OP	SAGD
Pelican Upper Grand Rapids Phase A	10,000	TBD	HOLD	SAGD
Pelican Upper Grand Rapids Phase B	32,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase C	29,000	TBD	Approved	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Grand Rapids *(continued)*				
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
Narrows Lake				
Cenovus has suspended new construction spending on Phase A until crude oil prices recover.				
Phase A	45,000	TBD	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	ANN	SAGD
Winefred Lake				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	ANN	SAGD
CNOOC Limited				
Long Lake				
An application was filed in early March to amend production capacity at Kinosis 1B to 37,500 bbls/d. Plans for the remaining 12,500 bbls/d (of the 70,000 bbls/d approved) have not been disclosed. Five week shutdown scheduled for the Long Lake Upgrader starting June 1.				
Phase 1	72,000	2008	OP	SAGD
Kinosis (K1A)	20,000	2014	OP	SAGD
Kinosis (K1B)	37,500	TBD	Approved	SAGD
Connacher Oil and Gas Limited				
Great Divide				
In the first quarter of 2015, production increased 12 per cent over the same period in 2014. Connacher has decided to delay completions of the SAGD+ process commercial project at Algar and the mini-steam expansion at Pod One due to depressed commodity prices and liquidity constraints. Connacher has completed its restructuring process. Turnaround is planned for the third quarter of 2015.				
Pod One	10,000	2007	OP	SAGD
Algar	10,000	2010	OP	SAGD
Expansion 1A	12,000	TBD	Approved	SAGD
Expansion 1B	12,000	TBD	Approved	SAGD
ConocoPhillips Canada Limited				
Surmont				
ConocoPhillips has announced that first steam was achieved at Surmont 2 on May 29. Production is expected to ramp up through 2017.				
Pilot	1,200	1997	OP	SAGD
Phase 1	30,000	2007	OP	SAGD
Phase 2	118,000	2015	OP	SAGD
Phase 2 Debottlenecking	57,000	TBD	APPL	SAGD
Phase 3 - Tranche 1	45,000	2020	APPL	SAGD
Phase 3 - Tranche 2	45,000	2021	APPL	SAGD
Phase 3 - Tranche 3	45,000	2023	APPL	SAGD
Devon Canada Corporation				
Jackfish				
Devon says that beginning in June, Jackfish 1 will have a 21-day maintenance shutdown.				
Phase 1	35,000	2007	OP	SAGD
Phase 2	35,000	2011	OP	SAGD
Phase 3	35,000	2014	OP	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Jackfish East				
Expansion	20,000	2018	ANN	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
Grizzly Oil Sands Ulc				
Algar Lake				
Grizzly has suspended operations at Algart due to low commodity prices.				
Phase 1	6,000	2014	SUSP	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	2016	APPL	SAGD
Phase 2	6,000	TBD	APPL	SAGD
Harvest Operations Corp.				
BlackGold				
Harvest says that production at Phase 1 will be delayed until oil prices recover. Phase 2 project costing is underway.				
Phase 1	10,000	2015	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	UC	SAGD
Hangingstone Pilot				
Pilot	11,000	1999	OP	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	SUSP	SC-SAGD
Phase 2	30,000	TBD	APPL	SC-SAGD
Phase 3	60,000	TBD	APPL	SC-SAGD
Phase 4	60,000	TBD	APPL	SC-SAGD
Saleski				
Laricina says that while the Saleski pilot continues to operate, it has suspended development activities on future phases as the company and its partner continue to evaluate available financing alternatives and opportunities within a minimized capital spending program.				
Experimental Pilot	1,800	2011	OP	Cyclic and SC-SAGD
Phase 1	10,700	TBD	HOLD	Cyclic SAGD
Phase 2	30,000	TBD	HOLD	IN SITU
Phase 3	60,000	TBD	ANN	IN SITU
Phase 4	60,000	2023	ANN	IN SITU
Phase 5	60,000	2026	ANN	IN SITU
Phase 6	60,000	TBD	ANN	IN SITU

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
MEG Energy Corporation				
Christina Lake				
Despite significantly cutting its capital budget, MEG continues to target a production increase to up to 82,000 bbls/d from the Christina Lake project in 2015. The company is considering a series of brownfield expansions of Phase 2B. Non-essential staff were evacuated from the Christina Lake project due to forest fires in the region in late May, with MEG also temporarily suspending operations, including a planned turnaround.				
Phase 1 Pilot	3,000	2008	OP	SAGD
Phase 2A	22,000	2009	OP	SAGD
Phase 2B	35,000	2013	OP	SAGD
Phase 3A	50,000	TBD	Approved	SAGD
Phase 3B	50,000	TBD	Approved	SAGD
Phase 3C	50,000	TBD	Approved	SAGD
Surmont				
The Environmental Assessment Director has deemed the Environmental Impact Assessment report complete for MEG Energy's Surmont Project.				
Phase 1	40,000	TBD	APPL	SAGD
Phase 2	40,000	TBD	APPL	SAGD
Phase 3	40,000	TBD	APPL	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	APPL	CSS SAGD
Phase 2	30,000	2020	APPL	CSS SAGD
PTT Exploration and Production				
Mariana - Thornbury				
Phase 1	40,000	TBD	Approved	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 evaucated 150 workers from the Leismer project in late May due to forest fires in the area.				
Demonstration	10,000	2010	OP	SAGD
Commercial	10,000	2011	OP	SAGD
Expansion	20,000	TBD	Approved	SAGD
Northwest	20,000	TBD	Disclosed	SAGD
Suncor Energy Inc.				
Chard				
Phase 1	40,000	TBD	ANN	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	APPL	SAGD
Value Creation Inc.				
Advanced TriStar				
The Alberta Energy Regulator says it will defer decisions on applications for in situ oil sands projects in the new shallow thermal area of the Athabasca region until it has developed formal regulatory requirements. Advanced TriStar is one of five impacted projects.				
ATS-1	15,000	TBD	APPL	SAGD
ATS-2	30,000	TBD	APPL	SAGD
ATS-3	30,000	TBD	APPL	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	APPL	SAGD/ADC

COLD LAKE REGION — IN SITU

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Baytex Energy Corp.				
Gemini				
Baytex has made the decision to decomission the Gemini SAGD pilot due to low oil pricing. The company says that since operations started last year, the pilot has successfullly 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	SUSP	SAGD
Commercial	5,000	TBD	Approved	SAGD
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	APPL	low presssure SAGD
Canadian Natural Resources Limited				
Primrose & Wolf Lake				
Relating to the four sites of surface release discovered in May and June 2013, Canadian Natural says it has full containment of each site and has fully cleaned up all of the flow to these sites. The company has completed the groundwater drilling program on the land sites of the seepages to surface and has confirmed that there is no ongoing contamination of the aquifer away from the sites. The causes of the release have been identified, and a final report is being prepared. A steamflood at Primrose East is expected to add 13,000–15,000 bbls/d by the end of 2015. Candian Natural evacuated 250 workers from its Primrose operations due to forest fires in the Cold Lake region in late May.				
Wolf Lake	13,000	1985	OP	CSS
Primrose South	45,000	1985	OP	CSS
Primrose North	30,000	2006	OP	CSS
Primrose East	32,000	2008	OP	CSS
Devon Canada Corporation				
Walleye				
Devon says the Walleye project is currently on hold.				
Phase 1	9,000	TBD	APPL	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	OP	SAGD
Imperial Oil Limited				
Cold Lake				
Imperial has submitted an application to the Alberta Energy Regulator for the expansion of the LASER treatment for implementation in 2017. The company says that steam injection at the Nabiye expansion project began in January. Bitumen production has started on schedule.				
Phase 1-10	110,000	1985	OP	CSS
Phase 11-13	30,000	2002	OP	CSS
Experimental SA-SAGD	TBD	2013	OP	SA-SAGD
Phase 14-16	40,000	2015	OP	CSS
OSUM Oil Sands Corp.				
Orion				
OSUM appears to be acheving meanginful progress increasing production and improving efficiency at the Orion project. According to Alberta Energy Regulator data, production in March averaged 9,371 bbls/d with a steam to oil ratio of 2.32:1.				
Phase 1	10,000	2007	OP	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

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Pengrowth Energy Corporation				
Lindbergh				
Pengrowth is increasing its capital spending at Lindbergh in 2015 by $20 million. The budget is now $220 million to $240 million for the year.				
Pilot	1,260	2012	OP	SAGD
Phase 1	11,240	2015	OP	SAGD
Phase 1 Optimization	3,500	2015	UC	SAGD
Phase 2 Expansion	34,000	TBD	HOLD	SAGD
PEACE RIVER REGION — IN SITU				
Andora Energy Corporation				
Sawn Lake				
Andora majority owner Pan Orient Energy says the well is still in its ramp-up phase. During March 2015, bitumen sales averaged 319 bbls/d with a steam to oil ratio of 5.4:1. The company expects the steam chamber to reach the top of the Bluesky Formation sandstone reservoir in April 2015, and maximum production is anticipated to occur in approximately September 2015, corresponding to the end of the first year of production.				
Demonstration	1,400	2014	OP	SAGD
Baytex Energy Corp.				
Cliffdale				
Pilot	2,000	2011	OP	CSS
Harmon Valley				
Pilot	TBD	2011	OP	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	OP	CSS
Demonstration	12,450	2019	APPL	CSS
Northern Alberta Oil Ltd.				
Sawn Lake				
Pilot	700	TBD	Approved	Horizontal CSS
Penn West Petroleum Ltd.				
Harmon Valley South				
Pilot	TBD	2014	OP	Horizontal CSS
Seal Main				
Pilot	75	2011	OP	Horizontal CSS
Commercial	10,000	TBD	APPL	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	OP	CSS
Carmon Creek - Phase 1	40,000	2019	UC	VSD
Carmon Creek - Phase 2	40,000	TBD	Approved	VSD
Touchstone Exploration Inc.				
Dawson				
Touchstone announced in October 2014 that it has suspended its project.				
Experimental Demonstration	TBD	2014	SUSP	CSS
NORTH ATHABASCA REGION — UPGRADER				
BP p.l.c.				
Terre de Grace				
BP says that ongoing appraisal activities continue.				
Pilot	8,400	TBD	Approved	UPG

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Canadian Natural Resources Limited				
Horizon				
Canadian Natural says that its 2015 maintenance turnaround has been accelerated to June from the fall. Overall, the company says its Phase 2/3 expansion is approximately 60 per cent physically complete.				
Phase 1	110,000	2009	OP	UPG
Reliability - Tranche 2	5,000	2014	OP	UPG
Phase 2A	12,000	2014	OP	UPG
Phase 2B	45,000	2016	UC	UPG
Phase 3	80,000	2017	UC	UPG
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 p.m. MDT on June 1.				
Phase 1	34,784	TBD	APPL	UPG
Suncor Energy Inc.				
Base Operations				
Suncor reported record synthetic crude oil production in the first quarter due to strong upgrader reliability. Production is expected to decrease in the second quarter due to planned coker maintenance.				
U1 and U2	225,000	1967	OP	UPG
Millennium Vacuum Unit	35,000	2005	OP	UPG
Millennium Coker Unit	97,000	2008	OP	UPG
Syncrude Canada Ltd.				
Mildred Lake/Aurora				
Syncrude has filed the regulatory application for the MLX project. During 2015, Syncrude is focusing on cost reduction to remain profitable during the low oil price environment.				
Base Plant Stage 1 & 2 Debottlenecking	250,000	1978	OP	UPG
Stage 3 Expansion (UE-1)	100,000	2006	OP	UPG
Stage 3 Debottlenecking	75,000	TBD	ANN	UPG
SOUTH ATHABASCA REGION — UPGRADER				
CNOOC Limited				
Long Lake				
An application was filed in early March to amend production capacity at Kinosis 1B to 37,500 bbls/d. Plans for the remaining 12,500 bbls/d (of the 70,000 bbls/d approved) have not been disclosed. Five week shutdown scheduled for the Long Lake Upgrader starting June 1.				
Phase 1	58,500	2009	OP	UPG
Value Creation Inc.				
Advanced TriStar				
The Alberta Energy Regulator says it will defer decisions on applications for in situ oil sands projects in the new shallow thermal area of the Athabasca region until it has developed formal regulatory requirements. Advanced TriStar is one of five impacted projects.				
ATS-1	12,750	TBD	APPL	UPG
ATS-2	25,500	TBD	APPL	UPG
ATS-3	25,500	TBD	APPL	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	APPL	UPG
INDUSTRIAL HEARTLAND REGION — UPGRADER				
North West Upgrading Inc.				
Redwater Upgrader				
Gemini Corporation has been awarded a $21-million contract by TR Canada for the assembly of certain process modules. Assembly will take place at Gemini's Ponoka, Alta., facility.				
Phase 1	50,000	2017	UC	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.				
Commercial	155,000	2003	OP	UPG
Expansion	100,000	2011	OP	UPG
Scotford HCU Debottlenecking	14,000	TBD	ANN	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

Alberta Oilsands www.aboilsands.ca
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 Sustainable Resource Development www.esrd.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