ALBERTA OIL SANDS INDUSTRY

QUARTERLY UPDATE

SUMMER 2011

Reporting on the period: Mar. 5, 2011 to June 3, 2011

Government of Alberta

All about the oil sands

Background of an important global resource

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Canada has the third-largest oil reserves in the world, next to Saudi Arabia and Venezuela. Of Canada's 179 billion barrels of oil reserves, 170 billion barrels are located in Alberta, and have the special quality of being bitumen. This is a resource that has been developed for decades but is only now coming into the forefront of the global energy industry, as conventional supplies — so-called "easy" oil — continue to be depleted. The figure of 170 billion barrels represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be increased to as much as 315 billion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is the City of 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.

Today bitumen is produced as an energy source by two means — mining and in situ. The majority of oil sands production is done by surface mining, but this will likely change in the future, as 80 per cent of Alberta's bitumen deposits are too deep underground to economically employ this technology.

Right now 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 via gravity, the melted bitumen flows into the lower well and is pumped to the surface using artificial lift.

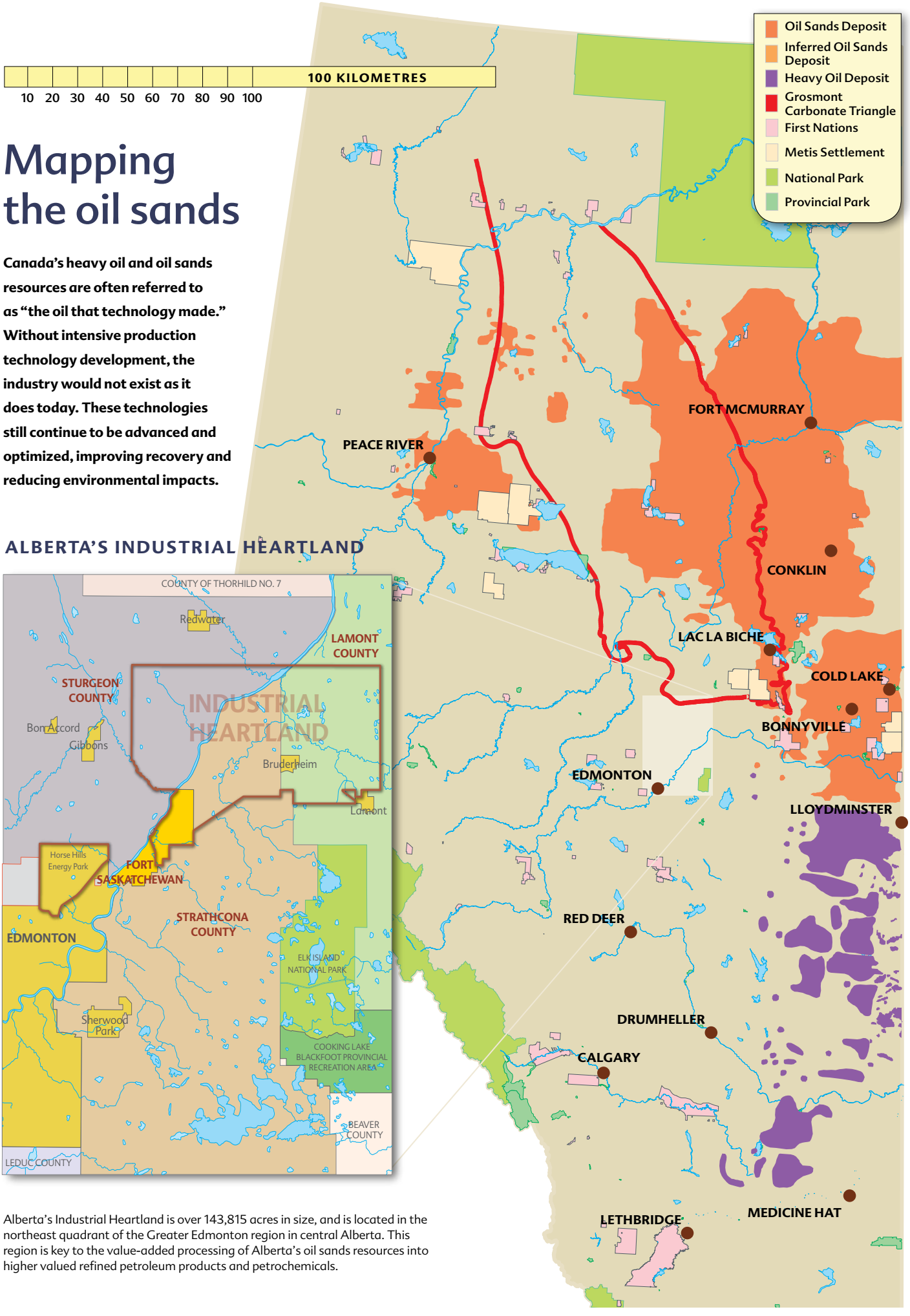
Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The choice is based on a number of things including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production and minimize water and energy use, including vapour extraction (VAPEX), and a form of in situ combustion known as toe to heel air injection (THAI).

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 (SCO), which is a refinery feedstock. At these refineries it can be transformed into transportation fuels and other products. ■

Mapping the oil sands

Canada's heavy oil and 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 is over 143,815 acres in size, and is located in the northeast 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.

Government update

PRODUCTIVITY, INNOVATION AND EXPANDING WORKFORCE ARE KEY TO MAKING ALBERTA'S ECONOMY MORE COMPETITIVE

A partnership of government and business leaders has identified 18 priority actions to make Alberta's economy more competitive. In its report, *Moving Alberta Forward*, the Alberta Competitiveness Council recommends 13 sector-specific actions, as well as five general actions to improve Alberta's overall competitiveness:

- Increase participation and employment of groups under-represented in Alberta's economy.
- Remove barriers to employing workers from other parts of Canada and abroad.
- Leverage and promote productivity networks like Productivity Alberta so that employers know where to go to find out what tools, services and programs are available to them.
- Assess the ability to increase weight limits to allow transportation of higher density components and heavier loads of equipment to Alberta's oil sands projects.
- Establish measures to regularly assess Alberta's regulatory performance.

The catalyst for *Moving Alberta Forward* was the Competitiveness Forum held in June 2010, where more than 120 government and industry stakeholders provided input on how to attract investment in the province, and increase innovation and productivity. The forum served as the official kickoff to work on the Alberta Competitiveness Act and solidified the partnership between industry and government to strengthen Alberta's competitive position in the global economy. In December 2010, the council released a benchmarking report that compared Alberta's performance against 14 other jurisdictions across 60 indicators.

ALBERTA TO EXPAND ETHANE INCENTIVE

A program to increase extraction of ethane to support continued growth of Alberta's petrochemical sector is being expanded.

The Incremental Ethane Extraction Program was initially designed to encourage extraction of ethane from natural gas to be used as a feedstock for Alberta's petrochemical industry. Revisions to the program will encourage ethane extraction from off-gases that result from bitumen refining and upgrading processes.

Capturing these off-gases not only provides a significant opportunity for increased ethane supplies to grow the industry in Alberta, but it also reduces the level of greenhouse gas emissions from the oil sands by up to one million tonnes annually.

The program requires companies to submit an application to Alberta Energy for credits that can be applied to specific projects for value-added processing in Alberta (e.g. consumed by petrochemical companies).

As a result of this program change, Alberta has already seen announcements for projects that will benefit from the credit. One example is The Williams Companies Inc.'s recent announcement regarding signing a long-term agreement to produce up to 17,000 barrels per day of ethane and ethylene for NOVA Chemicals Corporation. Williams plans to invest C$311 million to expand its two primary facilities in Alberta to support the new agreement. The expansions, which are expected to begin operating in the first quarter of 2013, will allow the company to produce ethane and ethylene from its operations that process off-gas from the Alberta oil sands.

PROVINCE ADVANCES LAND RECLAMATION PROGRAMS

To improve clarity, security and environmental performance within the oil sands and coal mining sectors, the Alberta government is moving forward with a number of enhanced reclamation initiatives.

Currently, the security amount operators post as financial security for reclamation each year is based on the following year's estimated land disturbance. The security is returned when the land is reclaimed. The new mine financial security program takes an asset-to-liability approach, which recognizes the resource value—whether bitumen or coal—as an asset in terms of cash flow. For new mines, a base security will be collected early in the mine's life, when the risk of mine closure or abandonment is at a minimum. Full financial security will be collected later in the mine's life, but before assets are completely reduced. For mines already operating, existing security held by the province will be held as base security.

Over the long term, the total security amount collected will be considerably higher than with the previous approach. All oil sands mines, including those previously providing security at older rates, will now provide security based on full reclamation costs. Oil sands processing plants located on mine sites are also now covered under the program.

Government is also enhancing reclamation reporting by boosting the number of milestones used to track reclamation. Previously, only three reporting milestones were used—disturbed, reclaimed and

certified. Recognizing that reclamation occurs over long periods of time and goes through many stages, both the province and industry will use eight milestones. This will result in greater transparency and consistency of reporting.

Reclamation data will soon be made more accessible to Albertans with the creation of an interactive, map-based website that will bring together provincial monitoring, reclamation and approvals data for the oil sands region. This information hub is expected to be online this summer.

The province's reclamation certificate program is also being updated. These modifications will provide industry with greater clarity on the application process and on provincial expectations on reclamation performance, objectives and outcomes. Updates began in 2010 and should be complete by 2012.

REGIONAL PLAN SUPPORTS CONSERVATION AND ECONOMIC GROWTH

The draft Lower Athabasca Regional Plan provides a blueprint for vigorous economic growth, vibrant communities and a healthy environment in northeastern Alberta for decades to come.

With oil sands production expected to double within the decade, the draft regional plan will conserve more than two million hectares of habitat for native species. It will increase recreation and tourism opportunities, plan for infrastructure and put strict environmental limits in place for air, land disturbance and water.

The draft plan also identifies strategic directions to improve our ability to balance economic, environmental and social outcomes in the region:

- Improving the integration of industrial activities on the landscape
- Reclaiming disturbed lands in a more timely and progressive manner
- Managing air, water and biodiversity through management frameworks that take proactive approaches and set limits and triggers, and manage land disturbance in the region
- Designating new conservation areas that are interconnected and support biodiversity
- Strengthening infrastructure planning to support future growth of the region
- Designating new recreation and tourism areas to provide more diverse recreation opportunities to local residents and tourism products for visitors to the region
- Including Aboriginal Peoples in land-use planning.

For more information on the draft Lower Athabasca Regional Plan, please visit http://environment.alberta.ca/03422.html.

A NEW APPROACH TO INFRASTRUCTURE PLANNING IN ALBERTA'S OIL SANDS

Comprehensive Regional Infrastructure Sustainability Plans (CRISPs) are a long-term and collaborative approach to planning infrastructure in Alberta's three oil sands areas. Each plan is developed through stakeholder and community consultation and will establish a long-term blueprint for future infrastructure development based on possible future oil sands production rates and associated population growth. Each plan will also enhance the way provincial and municipal governments work and plan together. The development of each CRISP assists in achieving the province s vision for oil sands as outlined in *Responsible Actions: A Plan for Alberta's Oil Sands,* strategy two.

A CRISP for the Athabasca Oil Sands Area has been completed and is now available at www.treasuryboard.alberta.ca. An implementation plan is being developed, which is closely aligned with the Land-use Framework and the draft Lower Athabasca Regional Plan. The development of a CRISP for the Cold Lake Oil Sands Area is currently in progress, and a CRISP for the Peace River Oil Sands Area will be completed over the next two years.

NEW REGULATION HELPS ENABLE CARBON STORAGE

A new regulation establishes the process for companies to seek tenure rights to evaluate potential deep carbon storage sites for storing CO_2. The regulation for this greenhouse gas reduction technology will guide how large-scale carbon capture and storage projects will proceed in Alberta.

Under the Carbon Sequestration Tenure Regulation, companies will apply for pore space tenure ➤

PHOTO: SUNCOR ENERGY

following the same model that is currently in place for petroleum and natural gas rights. Companies will need to continue to work with landowners to obtain surface access and the Energy Resources Conservation Board (ERCB) to obtain necessary approvals required by law.

The regulation sets out several administrative details and processes that include:

- Establishing a five-year evaluation permit to determine storage site suitability;
- Establishing a 15-year sequestration lease for longer-term commercial needs;
- Requiring permit and lease holders to submit monitoring, measurement and verification plans, which must be approved by the minister and updated every three years;
- Outlining the requirements for closure plans and requiring lease holders to submit closure plans, which must be approved by the minister and updated every three years;
- Setting annual rental rates of $1 per hectare and application fees of $625 for both permits and leases;
- Setting the minimum CO_2 injection depth at one kilometre; and
- Setting the maximum area for permits and leases at 73,728 hectares (eight townships).

The Carbon Sequestration Tenure Regulation is similar to other regulations under the Mines and Minerals Act that grant tenure for oil, natural gas, oil sands, mines and minerals.

ALBERTA RESULTS DEMONSTRATE RESPONSIBLE, CLEAN ENERGY PRODUCTION

In 2010, Alberta's emissions reduction program reduced greenhouse gases by 6.5 million tonnes from expected levels—the equivalent of removing 1.3 million cars from the road for a year.

This year, the program also saw an additional $70 million invested in the Climate Change and Emissions Management Fund, which provides financial support to projects aimed at more renewable forms of energy and cleaner energy development. The fund has collected $257 million—with nearly $100 million invested in emissions-reducing technologies to date. The Conference Board of Canada's report on clean energy technology investment identified Alberta as making the largest total investment among the provinces at $6.1 billion from 2010 to 2014, more than all the other provinces combined.

Alberta remains the only North American jurisdiction with regulations that require mandatory greenhouse gas reductions across all large industrial sectors. Facilities emitting more than 100,000 tonnes of CO_2 equivalent per year must improve emissions performance by 12 per cent per unit compared to a baseline measurement.

For more information on how Alberta regulates greenhouse gases, visit www.environment.alberta.ca.

ERCB AND GOVERNMENT OF ALBERTA LAUNCH ENHANCED TOLL-FREE ENERGY INFORMATION LINE: 1-855-297-8311

The ERCB and the Government of Alberta have launched an enhanced, toll-free ERCB Customer Contact Centre information line. This new toll-free line will act as a single point of contact for Albertans' oil and gas–related inquiries.

The ERCB's Customer Contact Centre addresses close to 20,000 inquiries each year in an effective and streamlined manner. Call-centre professionals are trained to assist callers on a variety of matters pertaining to oil and gas development in Alberta.

These enhancements were made in collaboration with Alberta Environment, Alberta Energy, Alberta Sustainable Resource Development, Alberta Transportation and Service Alberta. Inquiries will be directed to technical experts or referred to the appropriate agency for response.

It is important to note that the new toll-free information line should not be used in place of 24-hour emergency lines, as it is only staffed Monday to Friday, 8 a.m. to 4:30 p.m. (MST). The ERCB's main telephone line (403-297-8311) and general email (inquiries@ercb.ca) remain fully functional. ■

What's new in the oil sands

Key updates from summer 2011

Laricina Energy Ltd. has begun injecting steam into the Grosmont carbonate formation at its Saleski pilot project in northern Alberta.

The company believes the pilot, which has an approved capacity of up to 1,800 barrels a day, is the world's first steam assisted gravity drainage (SAGD) project in the Grosmont carbonate formation, one of Alberta's largest in situ bitumen resources.

Other pilots were done in the northern Alberta bitumen carbonates in the 1970s and 1980s using cyclic steam stimulation. But at the time oil prices were too low and steam-assisted bitumen recovery was in its early days.

Saleski is in the west Athabasca region about 195 kilometres northeast of Slave Lake. The pilot is unique in that it is designed to enhance industry's proven SAGD extraction method by combining steam with solvents—a process called solvent-cyclic SAGD (SC-SAGD).

Athabasca Oil Sands Corp. (AOSC) says its subsidiary, Dover Operating Corp., has submitted the application to the regulatory authorities for AOSC's 40 per cent owned Dover commercial project, 70 kilometres northwest of Fort McMurray.

AOSC has set a target to become one of the leading in situ bitumen producers. To help achieve this ambitious goal, the board of directors approved a 2011 annual capital budget of $302 million (net) to execute its exploration and development program including: purchasing certain long-lead items for the Hangingstone project, thermal assisted gravity drainage and SAGD testing of the Dover West carbonates, drilling up to 140 wells, acquiring up to 60 square kilometres of 3-D seismic and acquiring up to 130 kilometres of 2-D seismic.

It also expects to hire 100 new employees during the next 15 months to expand its technical and operating capabilities.

AOSC recently acquired strategic infrastructure—gas supply pipelines, roads, an airstrip, work camp and other necessities—in the Dover and Dover West areas. The company says this will enable it to more efficiently move drilling, testing and seismic equipment onto key locations and to perform the upcoming winter tests at Dover West.

Strata Oil & Gas Inc. has announced its potential contingent resource on its 100 per cent owned Cadotte project in the Peace River area of Alberta, where it owns 29 sections.

A Norwest Corporation evaluation estimated the contingent resource in the Debolt carbonate formation at 245 million barrels (low case) to 571 million barrels (high case) with a most likely (P50) estimate of 390 million barrels.

In the coming months, Strata says it intends is to forge ahead with securing financing for its production testing phase and it will focus manpower and resources on bringing the Cadotte project to reserve status. A pilot plant application is planned for 2012 with construction of a 1,000-barrel-per-day pilot plant in 2013-14.

Canadian Natural Resources Limited says preliminary target timelines indicate that following a major fire at site in January, the first set of coke drums (2A and 2B) at its Horizon project should resume production in the second quarter, enabling on-stream production of about half plant capacity or 55,000 barrels per day of synthetic crude oil.

The second set of coke drums (1A and 1B) is currently targeted to be on production in the third quarter. All production restarts will be commissioned for service after all required regulatory reviews are complete

Labour shortages and inflationary pressures shouldn't be as severe for the oil sands sector as they were during the boom five years ago due to fewer players and less competition from the natural gas side, according to the head of Cenovus Energy Inc.

Brian Ferguson, president and chief executive officer, told the recent Credit Suisse Energy Summit in Vail, Colo., that there's still potential, with stronger oil prices and a recognition of the value of the oil sands, to see higher activity and some congestion.

"[But] there's a number of things that are quite different [this time]," he said, adding that maintaining cost discipline and using a manufacturing approach will be important.

"We're certainly not forecasting the kinds of peaks that we saw in terms of labour or other projects. There's a much fewer number of oil sands players. We don't have a period where we had several mining ➤

projects trying to come on stream at the same time.... Industry has evolved much more to the [in situ] model where there is much more phased growth, and we also don't have the same competition for capital and for labour from natural gas that we had in the past. We're not forecasting to see the same kind of inflationary pressure that was experienced three or four years ago."

SilverBirch Energy Corporation has announced an increase to its contingent bitumen resource estimates following an independent review attributable to its major mining projects, Frontier and Equinox.

Sproule Unconventional Limited has prepared an independent opinion of the contingent bitumen resources of SilverBirch effective as of Dec. 31, 2010. Sproule's work on the Frontier and Equinox projects included a geological evaluation and a technical review of the mine, tailings and extraction plans.

The best estimate contingent bitumen resource has increased to 2.45 billion barrels for the Frontier project, from 1.45 billion barrels, and to 375 million barrels from 330 million barrels for the Equinox project.

Aecon Group Inc. has announced that change order negotiations on Suncor Energy Inc.'s Firebag Stage 3 central plant facilities (CPF) project will result in significant losses.

While negotiations have not yet concluded, total operating losses on the project will be in the range of $56 million to $59 million ($40 million to $42 million after tax), leading to an operating loss in Aecon's industrial segment for the year ended Dec. 31, 2010.

Aecon turned over the Firebag Stage 3 CPF project to Suncor at 2010 year-end, and assisted Suncor with transitioning from completing construction to pre-commissioning mode. As such, the impact of project losses is limited to the 2010 fiscal year, and will not affect Aecon's financial results this year.

The Canadian Association of Petroleum Producers (CAPP) is no longer reporting that Canada has the second-largest reserve of crude oil in the world, second only to Saudi Arabia. Canada's reserves are holding steady at approximately 175 billion barrels (170 billion of which are oil sands), while Venezuela's estimate has jumped significantly, from 99 billion barrels previously to 211 billion barrels today. This stacks Venezuela as number two, flanked by Saudi Arabia (260 billion barrels) on one end and Canada on the other.

CAPP spokesman Travis Davies explains that the change in its reporting is a direct result of a recent reserves estimate update by the *Oil & Gas Journal (OGJ)*, the source upon which CAPP bases its own global reserves data. The estimate increase of 112 billion barrels is most likely in response to a January 2010 reserves update for Venezuela made by the U.S. Geological Survey.

"It's important to note that the *OGJ* numbers are based on a survey of government agencies. In Canada, it's CAPP," says Davies, adding that the drop from second to third place doesn't have significant implications for Canada's unconventional oil industry. "The most important thing to bear in mind is that unlike the Canadian oil sands, Venezuelan reserves are not open to free market investment. Fifty-two per cent of reserves available to capital in the world are in the Canadian oil sands. That fact remains the same."

Cenovus Energy is reporting that late in 2010, it started steam injection at a pilot project testing the viability of SAGD in the Grand Rapids formation. This resource, located largely in the southwest Athabasca deposit, has never been tapped for commercial SAGD before—and the potential prize for industry is up to 55 billion barrels of oil in place.

For Cenovus, the single well pair Grand Rapids project is located adjacent to operations at Pelican Lake, and supported by existing infrastructure. The company says it expects first oil during the first quarter of 2011.

"Results from the six- to 24-month pilot will give us a better understanding of the performance of SAGD in the formation," Cenovus reports. "If successful, this pilot could lead to a regulatory application for a commercial SAGD operation at Grand Rapids with potential capacity of producing 180,000 barrels of oil per day."

To meet deadlines and cut costs, 33 of the 200-plus Korea-made modules destined for the Kearl mining project are being disassembled so they are not stuck at a port in Idaho awaiting two states' go-ahead for trucking to the mine site north of Fort McMurray, Alta.

Imperial Oil Limited's modules are being taken apart and reassembled into 60 pieces that can fit under overpasses on interstate highways through Idaho and Montana, then into Canada. Also, they won't block traffic in the passing lanes, says Imperial spokesman Pius Rolheiser.

The company is still working with regulators in those states to get the permits the company needs to move future modules. The 60 smaller truckloads will still require permits, but those will be like the thousands of oversize permits issued every year. Their size can be compared to that of wind turbine blades and grain silos. "They're still large pieces of equipment," says Rolheiser.

Osum Oil Sands Corp. had 359 million barrels of probable reserves at the end of 2010, a 40-million-barrel or 12 per cent rise from a year earlier.

The evaluation was conducted by GLJ Petroleum Consultants, examining the private in situ firm's identified project areas: Taiga (Cold Lake), the Saleski joint venture, the 100 per cent owned Saleski property and Liege.

Last year's increase in reserves was driven primarily by the optimization of the Taiga project at Cold Lake from a three-phase to a two-phase development scheme. ■

Project listings

Updated status of oil sands projects in Alberta

As of June 3, 2011.

TECHNOLOGY LEGEND

COGD	Combustion overhead gravity drainage
CSS	Cyclic steam stimulation
ET-DSP	Electro-thermal dynamic stripping process
N-SOLV	Heated solvent vapour extraction
SAGD	Steam assisted gravity drainage
THAI	Toe to heel air injection

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
NORTH ATHABASCA REGION — MINING BITUMEN PRODUCTION CAPACITY				
CANADIAN NATURAL RESOURCES LIMITED				
Horizon *Synthetic crude oil production capacity				
Subsequent to the major fire that occurred at the Horizon upgrader in January, Canadian Natural anticipates production to reach half of capacity (55,000 bbls/d) by the second quarter and full capacity (110,000 bbls/d) by the third quarter. The fire repairs are expected to cost up to $450 million. While Canadian Natural completes the repairs it is completing maintenance previously scheduled for a 2012 turnaround.				
Phase 1	135,000	2008	Operating	Mining
Tranche 1	--	2007	Operating	Engineering/design
Tranche 2	5,000	2011/2012	Construction	Mining
Phase 2A	10,000	2013/2014	Approved	Mining
Phase 2B	45,000	TBD	Approved	Mining
Phase 3	80,000	TBD	Approved	Mining
IMPERIAL OIL LIMITED				
Kearl				
Construction nearly 60 per cent complete, on target for completion in late 2012. Imperial is reconfiguring loads to avoid transportation delays in the United States, where legal action has been launched against the heavy transport.				
Phase 1	110,000	2012	Construction	Mining
Phase 2	235,000	TBD	Approved	Mining
SHELL ALBIAN SANDS				
Jackpine				
Mining operations successfully started up in September 2010. Now that the integrated project capacity has been expanded to 255,000 bbls/d, engineers will focus on improving operating efficiencies and adding capacity through debottlenecking.				
Expansion	100,000	TBD	Application	Mining
Phase 1A	100,000	2010	Operating	Mining
Phase 1B	100,000	TBD	Approved	Mining
Muskeg River				
Commercial	155,000	2002	Operating	Mining
Expansion & Debottlenecking	115,000	TBD	Approved	Mining
Pierre River				
Phase 1	100,000	2018	Application	Mining
Phase 2	100,000	TBD	Application	Mining
SILVERBIRCH ENERGY CORPORATION				
Frontier				
SilverBirch has arranged a banking facility with the Toronto Dominion Bank and Royal Bank of Canada of $10 million, to use as an operating line of credit, if required. Project regulatory approval possible in 2014. SilverBirch has identified in situ potential on its leases. More details to come by Q4/2011.				
Phase 1	80,000	2020	Announced	Mining
Phase 2	80,000	TBD	Announced	Mining
Phase 3	80,000	TBD	Announced	Mining
Phase 4 Equinox	50,000	TBD	Announced	Mining

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
SUNCOR ENERGY INC.				
Base Operations				
Suncor says it has seen steady improvement in its operations over the last year, with Q4/2010 and Q1/2011 showing the highest production volumes on record.				
Millennium Debottlenecking	23,000	2008	Operating	Mining
Millennium Mine	294,000	1967	Operating	Mining
North Steepbank Extension	180,000	2012	Construction	Mining
Steepbank Debottleneck Phase 3	4,000	2007	Operating	Mining
Fort Hills				
Suncor expects to progress with engineering and site preparation work at Fort Hills, targeting a 2016 start-up. Project still must be sanctioned.				
Debottleneck	25,000	TBD	Approved	Mining
Phase 1	165,000	2016	Approved	Mining
Voyageur South				
Phase 1	120,000	TBD	Application	Mining
SYNCRUDE CANADA LTD.				
Mildred Lake/Aurora North & South				
The joint venture is reporting a number of major projects ongoing: Syncrude Emissions Reduction Project ($1.6B) to be complete in Q4; one mine train to be replaced, another relocated (combined $4.5B) to be complete in 2014; new tailings plant ($0.8B) to be complete in 2013.				
Aurora South Train 1	100,000	2016	Approved	Mining
Aurora South Train 2	100,000	2018	Approved	Mining
Base Mine Stage 1 & 2 Expansion	290,700	1978	Operating	Mining
Stage 3 Expansion	116,300	2006	Operating	Mining
TOTAL E&P CANADA LTD.				
Joslyn North Mine				
Subject to regulatory approval and sanction, Total and new partner Suncor Energy will proceed with Joslyn, targeting a 2018 start-up.				
Phase 1	100,000	2018	Approved	Mining
Joslyn South Mine				
Phase 1	100,000	TBD	Announced	Mining
Northern Lights Mine				
Phase 1	57,250	TBD	On Hold	Mining
Phase 2	57,250	TBD	On Hold	Mining

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
NORTH ATHABASCA REGION — IN SITU BITUMEN PRODUCTION CAPACITY				
ATHABASCA OIL SANDS CORP.				
Dover West Clastics				
AOSC anticipates filing a regulatory application for the 12,0000 bbl/d first phase during the first half of 2011.				
Phase 1	12,000	2015	Announced	SAGD
Phase 2	25,000	2018	Announced	SAGD
Phase 3	35,000	2021	Announced	SAGD
Dover West Leduc Carbonates				
During Q1, AOSC conducted two tests in the Dover West Leduc Carbonates, observing a "good" steam chamber and concluding that SAGD is a viable technology for the resource. AOSC also drilled the well pair for its TAGD test in the carbonates, turning the heaters on for a period of six to 10 months. The lower well will be turned into a producer in fall or early winter.				
Phase 1 Demonstration	12,000	2014	Announced	SAGD
CANADIAN NATURAL RESOURCES LIMITED				
Birch Mountain				
Phase 1	60,000	2022	Announced	SAGD
Phase 2	60,000	2026	Announced	SAGD
CENOVUS ENERGY INC.				
Telephone Lake Borealis				
Cenovus will be revising its initial 35,000 bbl/d application and plans to file an updated application for an 80,000 bbl/d project in Q4/2011. During Q1/2011 Cenovus drilled 40 strat wells at Telephone Lake to better assess resources and support the regulatory application.				
Phase A	35,000	TBD	Application	SAGD
Phase B	15,000	TBD	Announced	SAGD
DOVER OPERATING CORP.				
Dover				
Phase 1	50,000	2015	Application	SAGD
Subsequent Phases	200,000	TBD	Application	SAGD
Mackay River				
AOSC anticipates commercial approval for full gross 150,000 bbl/d project in 2011. Approval anticipated in 2012.				
Phase 1	35,000	2014	Application	SAGD
Phase 2	40,000	2017	Application	SAGD
Phase 3	40,000	2019	Application	SAGD
Phase 4	35,000	TBD	Application	SAGD
E-T ENERGY LTD.				
Poplar Creek				
E-T has announced a deal (undisclosed value) with Total E&P Canada for ongoing testing, as well as $6.86 million in funding from the Climate Change and Emissions Management Corporation. E-T anticipates regulatory approval for commercial project in 2011.				
Phase 1	10,000	2014	Application	ET-DSP
Pilot	N/Q	2007	Operating	ET-DSP
HUSKY ENERGY INC.				
Sunrise				
During Q1/2011 Husky spudded 12 horizontal wells and drilled seven horizontal wells. The company reports it also made several significant equipment purchases including steam generators, vessels, the water treatment plant and camp.				
Phase 1	60,000	2014	Construction	SAGD
Phase 2	50,000	2016	Approved	SAGD
Phase 3	50,000	TBD	Approved	SAGD
Phase 4	50,000	TBD	Approved	SAGD
IVANHOE ENERGY INC.				
Tamarack				
Application filed November 2010. Ivanhoe is reporting an updated 2010 independent resource assessment of up to 345 million barrels of best-estimate contingent resources at Tamarack. The company says that currently a stand-alone upstream project provides superior economics than one that integrates its field upgrading technology, but it will continue to monitor market conditions and will be able to respond quickly should indicators show that building the upgrader is an economic advantage.				
Phase 1	20,000	2014	Application	SAGD
Phase 2	20,000	TBD	Application	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
ROYAL DUTCH SHELL PLC				
Grosmont				
The project, which would incorporate electrical heaters, has been delayed. Laricina Energy's May purchase of additional leases in the Grosmont carbonate zone included "non-core" portions of Shell Canada's Grosmont acreage.				
Pilot	TBD	TBD	On Hold	SAGD
SOUTHERN PACIFIC RESOURCE CORP.				
STP McKay				
Southern Pacific has completed the financing agreements for full funding for Phase 1 of the STP McKay thermal project. Construction and SAGD drilling underway. Based on drilling results the company has decided to proceed with an expansion of 24,000 bbls/d, in two phases of 12,000 bbls/d. Application to be filed in Q3/2011.				
Phase 1	12,000	2012	Construction	SAGD
Phase 2A	12,000	2015	Announced	SAGD
Phase 2B	12,000	TBD	Announced	SAGD
SUNCOR ENERGY INC.				
Firebag				
Steam injection into Stage 3 well pads has begun, with first oil expected in July 2011. Construction of infrastructure, well pads, and central plant and cogeneration facilities continues on Firebag Stage 4.				
Cogeneration and Expansion	25,000	2007	Operating	SAGD
Stage 1	35,000	2004	Operating	SAGD
Stage 2	35,000	2006	Operating	SAGD
Stage 3	62,500	2011	Operating	SAGD
Stage 3-6 Debottleneck	23,000	TBD	Application	SAGD
Stage 4	62,500	2013	Construction	SAGD
Stage 5	62,500	2018	Approved	SAGD
Stage 6	62,500	2019	Approved	SAGD
Lewis				
Phase 1	40,000	TBD	Application	SAGD
Phase 2	40,000	TBD	Application	SAGD
MacKay River				
Suncor says that higher bitumen supply from its in situ and mining projects and greater upgrader reliability resulted in record production rates in the fourth quarter of 2010. The company has confirmed that the MacKay River expansion is a key part of its near-term plans, and will spend $70 million on the project in 2011.				
Phase 1	33,000	2002	Operating	SAGD
Phase 2	40,000	2016	Announced	SAGD
SUNSHINE OILSANDS LTD.				
Harper				
Sunshine Oilsands has raised $230 million and secured significant investments including from China Life Overseas and Bank of China Group. At Harper, it reports it has successfully conducted a single-well CSS test. Results from the test were presented to the ERCB, which subsequently encouraged the company to continue investigation of the formation through extension of its pilot permit.				
Carbonate Pilot	1,000	2010	Operating	SAGD
Legend Lake				
The 2010/2011 winter program included additional caprock tests at Thickwood and Legend Lake, showing the suitability of the overlying shale for SAGD. 76 exploration and delineation wells drilled at the two areas.				
Phase 1	10,000	2013	Announced	SAGD
Phase 2	10,000	TBD	Announced	SAGD
Phase 2 Expansion	10,000	TBD	Announced	SAGD
Phase 3	20,000	TBD	Announced	SAGD
Phase 3 Expansion	10,000	TBD	Announced	SAGD
Thickwood				
Phase 1	10,000	2014	Announced	SAGD
Phase 2	20,000	2017	Announced	SAGD
Phase 2 Expansion	20,000	2020	Announced	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
West Ells				
Sunshine says that ongoing formal dialogue with regulators indicates that its regulatory application is technically sound and that environmental and stakeholder concerns have been addressed. Approval timing for final permit depends on resolution of gas-over-bitumen hearing. FEED has begun.				
Phase 1	5,000	2012	Application	SAGD
Phase 2	5,000	2013	Application	SAGD
Phase 3	40,000	2018	Announced	SAGD
Phase 4	40,000	2024	Announced	SAGD
TOTAL E&P CANADA LTD.				
Joslyn				
Phase 2	10,000	2006	Suspended	SAGD
VALUE CREATION INC.				
Terre de Grace				
Phase 1	40,000	TBD	Announced	SAGD
Phase 2	40,000	TBD	Announced	SAGD
Pilot	10,000	TBD	Approved	SAGD

SOUTH ATHABASCA REGION — IN SITU
BITUMEN PRODUCTION CAPACITY

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
ALBERTA OILSANDS INC.				
Clearwater West				
Alberta Oilsands submitted a substantive project update to the ERCB and Alberta Environment in late December 2010, also providing responses to supplemental information requests. The update includes details on stakeholder consultation, and technical work on reservoir and caprock characteristics that have been completed since regulatory filing. The company expects to receive regulatory approval in 2011.				
Phase 2	10,000	2016	Announced	SAGD
Pilot	4,500	2012	Application	SAGD
ATHABASCA OIL SANDS CORP.				
Hangingstone				
With the first phase application filed in March 2011, AOSC will now continue engineering and will begin the procurement process for long-lead equipment. Regulatory approval anticipated in 2012, at which point construction will begin.				
Phase 1	12,000	2013	Application	SAGD
Phase 2	25,000	2016	Announced	SAGD
Phase 3	25,000	2019	Announced	SAGD
Hangingstone Pilot				
Excelsior Energy was acquired by Athabasca Oil Sands Corp. in November 2010.				
Experimental Combustion Pilot	1,000	TBD	Application	COGD
BLACKPEARL RESOURCES INC.				
Blackrod				
Facility construction complete, and commissioning underway. BlackPearl says it will take 6-12 months before initial assessments can be made regarding pilot performance. The company is also preparing a regulatory application for a commercial 40,000 bbl/d project, to be developed in phases. Target filing is Q1/2012.				
Commercial	40,000	TBD	Announced	SAGD
Pilot	500	2011	Operating	SAGD
CANADIAN NATURAL RESOURCES LIMITED				
Gregoire Lake				
Phase 1	60,000	2024	Announced	TBA
Grouse				
Canadian Natural has released its proposed terms of reference for the Grouse project for a period of public comment ending July 22, 2011.				
Commercial	50,000	2018	Announced	SAGD
Kirby (North)				
Canadian Natural has combined the approved 10,000 bbl/d project it acquired from Enerplus with its own assets to create a two-stage, ultimately 80,000 bbl/d project now called Kirby North. Proposed terms of reference have been released.				
Phase 1	40,000	2016	Application	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Kirby (South)				
Construction underway. Drilling of production-capable wells slated to commence in May 2011. Canadian Natural has released the proposed terms of reference for 15,000 bbl/d expansion to the Kirby South project.				
Phase 1	45,000	2013	Construction	SAGD
Phase 2	15,000	2020	Announced	SAGD
Leismer				
Commercial	30,000	2020	Announced	SAGD
CENOVUS ENERGY INC.				
Christina Lake				
Christina Lake production averaged 18,000 bbls/d during Q1/2011, stronger due to increased production from Phase B, well optimization and production from the site's first wedge well. Maintenance scheduled for Q2. Construction of Phase C is now in final stages, and construction on Phase D is just over 50% complete.				
Phase 1A	10,000	2002	Operating	SAGD
Phase 1B	8,000	2002	Operating	SAGD
Phase C	40,000	2011	Construction	SAGD
Phase D	40,000	2013	Construction	SAGD
Phase E	40,000	2014	Approved	SAGD
Phase F	40,000	2016	Approved	SAGD
Phase G	40,000	2017	Approved	SAGD
Phase H	40,000	2019	Application	SAGD
Foster Creek				
Production at Foster Creek averaged approximately 116,000 bbls/d in Q1/2011, up 13% from the prior year, with the increase attributed to greater plant efficiency and reduced SORs. Maintenance scheduled for Q2. Detailed engineering and preliminary groundwork for Phase F underway. Assembly of pipe rack and equipment modules anticipated to commence soon.				
Phase A	24,000	2001	Operating	SAGD
Phase B Debottleneck	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	Approved	SAGD
Phase G	30,000	2016	Approved	SAGD
Phase H	30,000	2017	Approved	SAGD
Phase I	25,000	2019	Announced	SAGD
Grand Rapids				
Single well pair SAGD pilot underway. Steaming started in December and early results are expected in the first half of 2011. If successful, Cenovus will file a commercial application in 2011. Cenovus drilled 38 strat wells at Grand Rapids in Q1/2011.				
Phase A	60,000	2017	Announced	SAGD
Phase B	60,000	TBD	Announced	SAGD
Phase C	60,000	TBD	Announced	SAGD
Pilot	600	2011	Operating	SAGD
Narrows Lake				
A total of 41 gross strat wells were drilled during Q1/2011 to further assess the resource at Narrows Lake in preparation for commercial production.				
Phase 1	43,333	2016	Application	SAGD
Phase 2	43,333	TBD	Announced	SAGD
Phase 3	43,334	TBD	Announced	SAGD
CONNACHER OIL AND GAS LIMITED				
Great Divide				
Combined production from Great Divide and Algar averaged 14,050 bbls/d in February 2011, the highest monthly level of bitumen production achieved to date.				
Algar Pod 2	10,000	2010	Operating	SAGD
Expansion	24,000	TBD	Application	SAGD
Pod 1	10,000	2007	Operating	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
CONOCOPHILLIPS CANADA LIMITED				
Surmont				
Earthworks and early construction ongoing for Phase 2. ConocoPhillips says it will spend $1.2 billion on its oilsands developments this year.				
Phase 1	27,000	2007	Operating	SAGD
Phase 2	83,000	2015	Construction	SAGD
Pilot	1,200	1997	Operating	SAGD
DEVON CANADA CORPORATION				
Jackfish				
Initial steaming underway on Jackfish 2. First production expected by the end of the year. Corporate sanction already in hand for Jackfish 3, for which an application was filed during Q4/2010.				
Phase 1	35,000	2007	Operating	SAGD
Phase 2	35,000	2011	Operating	SAGD
Phase 3	35,000	2015	Application	SAGD
Kirby-Pike				
Devon reports successful completion of 135 appraisal wells on its Pike lease, with results consistent with company expectations. Regulatory application anticipated for the first phase of the project in the first half of 2012.				
Commercial	TBD	2016	Announced	SAGD
GRIZZLY OIL SANDS ULC				
Algar Lake				
Grizzly plans lump sum bidding of module fabrication in 2011.				
Phase 1	5,000	2013	Application	SAGD
Phase 2	5,000	2014	Application	SAGD
HARVEST OPERATIONS CORP.				
BlackGold				
Harvest plans to spend $240 million on BlackGold in 2011, with $190 million on the design and construction of the plant, and $50 million on production well pairs and observation wells.				
Phase 1	10,000	2013	Construction	SAGD
Phase 2	20,000	2015	Application	SAGD
HUSKY ENERGY INC.				
McMullen				
Husky received final regulatory approval in Q1. Drilling of the pilot observation wells commenced. Facility construction will proceed in Q2, with air injection scheduled for Q3.				
Air injection pilot	755	2011	Construction	SAGD
JAPAN CANADA OIL SANDS LIMITED				
Hangingstone				
JACOS anticipates regulatory approval for Phase 1 expansion in Q3/2011.				
Expansion	35,000	2014	Application	SAGD
Hangingstone Pilot				
Pilot	11,000	1999	Operating	SAGD
LARICINA ENERGY LTD.				
Germain				
During Q1 at Germain, Laricina reports advancing site preparation, development drilling and detailed engineering for Phase 1.				
Commercial Demonstration Phase 1	5,000	2012	Construction	SAGD
Phase 2	30,000	2014	Announced	SAGD
Saleski				
Laricina commenced steam injection at Saleski in December 2010. The project is designed to help confirm the Grosmont carbonates as an economic foundation for SAGD.				
Phase 1	10,700	2013	Announced	SAGD
Pilot	1,800	2011	Operating	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
MEG ENERGY CORPORATION				
Christina Lake				
MEG reports that Christina Lake facilities operated at 99% reliability in Q1/2011.				
Phase 1 Pilot	3,000	2008	Operating	SAGD
Phase 2	22,000	2009	Operating	SAGD
Phase 2B	35,000	2013	Construction	SAGD
Phase 3A	50,000	2016	Application	SAGD
Phase 3B	50,000	2018	Application	SAGD
Phase 3C	50,000	2020	Application	SAGD
Surmont				
Regulatory application to be filed for 100,000 bbl/d project in Q2/2011.				
Phase 1	50,000	2018	Announced	SAGD
Phase 2	50,000	TBD	Announced	SAGD
N-SOLV CORPORATION				
Hangingstone				
Demonstration Plant	500	2012	Announced	N-SOLV
NEXEN INC.				
Long Lake				
A number of initiatives are underway to support improved operational performance including construction of a new natural gas pipeline to enable more consistent steam generation outside of upgrader operations; initial steaming and first production on seven out of 11 new wells; drilling on 18 new wells to be operational next year; work on the addition of two new once-through steam generators to be operational in 2012; and work on a diluent recovery unit to enable dilbit sales when the upgrader is down. These initiatives increase project cost by 10-15%. Nexen reports it is also advancing Long Lake South (Kinosis).				
Long Lake South Phase 1	40,000	TBD	Approved	SAGD
Long Lake South Phase 2	40,000	TBD	Approved	SAGD
Phase 1	72,000	2008	Operating	SAGD
Phase 2	72,000	TBD	Approved	SAGD
Phase 3	72,000	TBD	Announced	SAGD
Phase 4	72,000	2018	Announced	SAGD
PARAMOUNT RESOURCES LTD.				
Hoole				
During Q1 Paramount drilled an additional 15 evaluation wells at Hoole and has asked for an updated resources evaluation from its independent evaluator. During the remainder of 2011, the company plans to complete the engineering design and environmental analysis for a thermal project, which it plans to apply for by the end of 2011.				
Commercial	TBD	TBD	Announced	SAGD
PETROBANK ENERGY AND RESOURCES LTD.				
Conklin (Whitesands)				
Petrobank has abandoned its original three test wells at Conklin, in addition to P2B and P3B. P1B is still operational, and the company is evaluating a new multi-THAI configuration, adding another air injector futher along this wellbore and drilling a new production well in a better part of the resource. As other projects advance—such as Dawson and Kerrobert—the Conklin site is planned to be a test facility for THAI improvements.				
Expansion	1,900	TBD	On Hold	THAI
Pilot	1,900	2006	Operating	THAI
May River				
May River is in final detailed engineering, and orders have been placed for some long-lead equipment. ERCB project approval remains in process, with a third round of supplemental information requests having been received and responded to in early 2011. During Q1 Petrobank drilled 11 evaluation wells to further delineate the resource for future expansions.				
Phase 1	10,000	2013	Application	THAI
Subsequent Phases	90,000	TBD	Disclosed	THAI
STATOIL				
Kai Kos Dehseh				
First production achieved. According to the ERCB, production averaged about 870 bbls/d in November 2010.				
Corner	40,000	2015	Application	SAGD
Corner Expansion	40,000	TBD	Application	SAGD
Hangingstone	20,000	TBD	Application	SAGD
Leismer	20,000	TBD	Application	SAGD
Leismer Demonstration	10,000	2010	Operating	SAGD
Leismer Expansion	20,000	TBD	Application	SAGD
Leismer Northwest	20,000	TBD	Application	SAGD
Leismer South	20,000	TBD	Application	SAGD
Thornbury	40,000	TBD	Application	SAGD
Thornbury Expansion	20,000	TBD	Application	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
SUNCOR ENERGY INC.				
Chard				
Phase 1	40,000	TBD	Announced	SAGD
Meadow Creek				
Phase 1	40,000	TBD	Approved	SAGD
Phase 2	40,000	TBD	Approved	SAGD
VALUE CREATION INC.				
TriStar				
Value Creation is providing the ERCB with additional information supporting its application.				
Pilot	1,000	2012	Application	SAGD
COLD LAKE REGION — IN SITU BITUMEN PRODUCTION CAPACITY				
CANADIAN NATURAL RESOURCES LIMITED				
Primrose/Wolf Lake				
Canadian Natural is developing new well pads at Primrose South, North and East.				
Primrose East	32,000	2008	Operating	CSS
Primrose North	30,000	2006	Operating	CSS
Primrose South	45,000	1985	Operating	CSS
Wolf Lake	13,000	1985	Operating	CSS
HUSKY ENERGY INC.				
Caribou				
Demonstration	10,000	TBD	Approved	SAGD
Tucker				
Husky completed drilling the final three well pairs of its 16 well pair A Pad development in Q1. Steaming commenced on five well pairs, with production expected in Q2. The remaining well pairs will commence steaming in Q2 and Q3. One well pair was drilled in the Grand Rapids pilot, with production anticipated in Q1/2012.				
Phase 1	30,000	2006	Operating	SAGD
IMPERIAL OIL LIMITED				
Cold Lake				
Cold Lake achieved production record of 157,000 bbls/d in Q1/2011, attributed to contributions of new wells steamed in 2011, but offset by the cyclic nature of the project. Site clearing and road construction underway for Nabiye expansion.				
LASER CSS Follow-up Process	TBD	2007	Operating	CSS
Phase 1-10	110,000	1985	Operating	CSS
Phase 11-13	30,000	2002	Operating	CSS
Phase 14-16	30,000	2015	Approved	CSS
KOCH EXPLORATION CANADA CORPORATION				
Gemini				
According to the *Cold Lake Sun*, the project is nearing the end of the regulatory process and is planning a first phase single well pair SAGD test.				
Commercial	10,000	TBD	Application	SAGD
Pilot	1,200	TBD	Application	SAGD
OSUM OIL SANDS CORP.				
Taiga				
Regulatory approval expected to be received mid-2011. Detailed engineering underway. Osum says it will be ready to execute in late 2011 or early 2012, subsequent to regulatory approval.				
Phase 1	17,500	2014	Application	SAGD
Phase 2	17,500	2016	Application	SAGD
PENGROWTH CORPORATION				
Lindbergh				
In preparation for upcoming two well pair pilot, during Q1 two observation wells were drilled. Subject to regulatory approvals, it is anticipated that SAGD drilling and facility construction will commence in Q3, followed by first steam in Q1/2012. Application submission anticipated in Q1/2012 for a commercial 12,000 bbl/d project, pending a successful pilot program.				
Commercial	12,000	TBD	Announced	SAGD
Pilot	2,500	2012	Application	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
ROYAL DUTCH SHELL PLC				
Orion				
Phase 1	10,000	2008	Operating	SAGD
Phase 2	10,000	TBD	Approved	SAGD
PEACE RIVER REGION — IN SITU BITUMEN PRODUCTION CAPACITY				
ANDORA ENERGY CORPORATION				
Sawn Lake				
Andora Energy owner PanOrient Energy Corp. says Andora will be conducting a strategic review process to enhance shareholder value that could result in a sale or merger.				
SAGD Demonstration	1,400	TBD	Approved	SAGD
NORTHERN ALBERTA OIL LTD.				
Sawn Lake				
CSS Pilot	TBD	TBD	Approved	CSS
PETROBANK ENERGY AND RESOURCES LTD.				
Dawson				
Construction of access roads and leases to begin in Q2. Drilling and completions activities will commence in Q3. Facilities from the first two wells at Kerrobert project will be moved to the Dawson site in Q3 in order to commence pre-ignition heating cycle.				
Phase 2	10,000	TBD	Announced	THAI
THAI Demonstration	TBD	2011	Approved	THAI
ROYAL DUTCH SHELL PLC				
Peace River				
Cadotte Lake	12,500	1986	Operating	CSS
Carmon Creek - Phase 1	40,000	2014	Announced	CSS
Carmon Creek - Phase 2	40,000	TBD	Announced	CSS
SOUTHERN PACIFIC RESOURCE CORP.				
Red Earth				
Southern Pacific said it would restart the Red Earth pilot in June 2011, testing a number of CSS operating strategies in order to determine the best way forward for a larger project on the acreage.				
Commercial	10,000	TBD	Announced	CSS
Pilot	1,000	2009	Operating	CSS
Pilot Expansion	3,000	TBD	Announced	CSS
NORTH ATHABASCA REGION — UPGRADER SYNTHETIC CRUDE OIL PRODUCTION CAPACITY				
CANADIAN NATURAL RESOURCES LIMITED				
Horizon				
Subsequent to the major fire that occurred at the Horizon upgrader in January, Canadian Natural anticipates production to reach half of capacity (55,000 bbls/d) by Q2 and full capacity (110,000 bbls/d) by Q3. The fire repairs are expected to cost up to $450 million. While Canadian Natural completes the repairs, it is completing maintenance previously scheduled for a 2012 turnaround.				
Phase 1	135,000	2008	Operating	Mining
Tranche 1	--	2007	Operating	Engineering/Design
Tranche 2	5,000	2011/2012	Construction	Mining
Phase 2A	10,000	2013/2014	Approved	Mining
Phase 2B	45,000	TBD	Approved	Mining
Phase 3	80,000	TBD	Approved	Mining

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
IVANHOE ENERGY INC.				
Tamarack				
Application filed November 2010. Ivanhoe is reporting an updated 2010 independent resource assessment of up to 345 million barrels of best-estimate contingent resources at Tamarack. The company says that currently a stand-alone upstream project provides superior economics than one that integrates its field upgrading technology, but it will continue to monitor market conditions and will be able to respond quickly should indicators show that building the upgrader is an economic advantage.				
Phase 1	34,784	TBD	Application	Upgrader
SUNCOR ENERGY INC.				
Base Operations				
Suncor says it has seen steady improvement in its operations over the last year, with Q4/2010 and Q1/2011 showing the highest production volumes on record.				
Millennium Coker Unit	97,000	2008	Operating	Upgrader
Millennium Vacuum Unit	35,000	2005	Operating	Upgrader
U1 and U2	225,000	1967	Operating	Upgrader
Fort Hills				
Phase 1	145,000	TBD	Approved	Upgrader
Phase 2 & 3	145,000	TBD	Approved	Upgrader
Voyageur Upgrader 3				
Suncor expects to progress with partner Total E&P Canada on site preparation and engineering for the restart of Voyageur construction. Project still needs to be officially sanctioned.				
Phase 1	127,000	2016	Approved	Upgrader
Phase 2	63,000	TBD	Approved	Upgrader
SYNCRUDE CANADA LTD.				
Mildred Lake/Aurora North & South				
The joint venture is reporting a number of major projects ongoing: Syncrude Emissions Reduction Project ($1.6B) to be complete in Q4; one mine train to be replaced, another relocated (combined $4.5B) to be complete in 2014; new tailings plant ($0.8B) to be complete in 2013.				
Base Plant Stage 1 & 2 Debottlenecking	250,000	1978	Operating	Upgrader
Stage 3 Debottlecking	75,000	TBD	Announced	Upgrader
Stage 3 Expansion (UE-1)	100,000	2006	Operating	Upgrader
VALUE CREATION INC.				
Terre de Grace				
Phase 1	33,600	TBD	Announced	Upgrader
Phase 2	33,600	TBD	Announced	Upgrader
Pilot	8,400	TBD	Approved	Upgrader

SOUTH ATHABASCA REGION — UPGRADER
SYNTHETIC CRUDE OIL PRODUCTION CAPACITY

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
NEXEN INC.				
Long Lake				
A number of initiatives are underway to support improved operational performance including construction of a new natural gas pipeline to enable more consistent steam generation outside of upgrader operations; initial steaming and first production on seven out of 11 new wells; drilling on 18 new wells to be operational next year: work on the addition of two new once-through steam generators to be operational in 2012; and work on a diluent recovery unit to enable dilbit sales when the upgrader is down. These initiatives increase project cost by 10-15%. Nexen reports it is also advancing Long Lake South (Kinosis).				
Phase 1	58,500	2008	Operating	Upgrader
Phase 2	58,500	TBD	Approved	Upgrader
Phase 3	58,500	TBD	Announced	Upgrader
Phase 4	58,500	2018	Announced	Upgrader

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
VALUE CREATION INC.				
TriStar				
Value Creation is providing the ERCB with additional information supporting its application.				
Pilot	840	2012	Application	Upgrader

INDUSTRIAL HEARTLAND REGION — UPGRADER
SYNTHETIC CRUDE OIL PRODUCTION CAPACITY

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
NORTH WEST UPGRADING INC.				
Upgrader				
Canadian Natural says that project engineering is well advanced and work towards sanction-level completion is ongoing. Sanction is currently targeted for the latter part of 2011 or the first half of 2012.				
Phase 1	77,000	2013	Approved	Upgrader
Phase 2	77,000	TBD	Approved	Upgrader
Phase 3	77,000	TBD	Approved	Upgrader
SHELL ALBIAN SANDS				
Scotford Upgrader 1				
First commercial production from Scotford upgrader expansion announced in May 2011. Engineers will now focus on improving operating efficiencies and adding capacity through debottlenecking.				
Commercial	158,000	2003	Operating	Upgrader
Expansion	91,000	2011	Operating	Upgrader
Scotford Upgrader 2				
Shell withdrew its application for all phases of Scotford Upgrader 2 in fall 2010.				
Phase 1	97,750	TBD	Cancelled	Upgrader
Phase 2	97,750	TBD	Cancelled	Upgrader
Phase 3	97,750	TBD	Cancelled	Upgrader
Phase 4	97,750	TBD	Cancelled	Upgrader
STATOIL				
Strathcona				
Application withdrawn in December 2008.				
Phase 1	65,000	TBD	Cancelled	Upgrader
Phase 2	152,000	TBD	Cancelled	Upgrader
TOTAL E&P CANADA LTD.				
Northern Lights				
Previous project owner Synenco Energy withdrew the Northern Lights upgrader application in June 2008. Total purchased Synenco in August 2008.				
Phase 1	50,600	TBD	Cancelled	Upgrader
Phase 2	50,600	TBD	Cancelled	Upgrader
Strathcona				
Total says it will not proceed with its Strathcona upgrader.				
Debottlenecking	46,000	TBD	Cancelled	Upgrader
Phase 1	138,000	TBD	Cancelled	Upgrader
Phase 2	87,000	TBD	Cancelled	Upgrader
VALUE CREATION INC.				
Heartland				
Construction suspended in September 2008.				
Phase 1	46,300	TBD	On Hold	Upgrader
Phase 2	46,300	TBD	Approved	Upgrader
Phase 3	46,300	TBD	Approved	Upgrader

Glossary of oil sands terms

API
An American Petroleum Institute measure of liquid gravity. Water is 10 degrees API, and a typical light crude is from 35 to 40. Bitumen is 7.5 to 8.5.

Barrel
The traditional measurement for crude oil volumes. One barrel equals 42 US 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 oilsand, but saturation varies.

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.

Cyclic steam stimulation
For several weeks, high-pressure steam is injected into the formation to soften the oilsand before being pumped to the surface for separation. The pressure created in the underground environment causes formation cracks that help move the bitumen to producing wells. After a portion of the reservoir has been saturated, the steam is turned off and the reservoir is allowed to soak for several weeks. Then the production phase brings the bitumen to the surface.

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.

Diluent
see Condensate

Established recoverable reserves
Reserves recoverable under current technology and present and anticipated economic conditions, plus that portion of recoverable reserves that is interpreted to exist, based on geological, geophysical or similar information, with reasonable certainty.

Established reserves
Reserves recoverable with current technology and present and anticipated economic conditions specifically proved by drilling, testing or production, plus the portion of contiguous recoverable reserves that are interpreted to exist from geological, geophysical or similar information with reasonable certainty.

Extraction
A process, unique to the oil sands industry, which separates the bitumen from the oilsand 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 byproducts.

Greenhouse gases
Gases commonly believed to be connected to climate change and global warming. CO_2 is the most common, but greenhouse gases also include other light hydrocarbons (such as methane) and nitrous oxide.

Initial established reserves
Established reserves prior to the deduction of any production.

Initial volume in place
The volume calculated or interpreted to exist in a reservoir before any volume has been produced.

In situ
Latin for "in place." In situ recovery refers to various methods used to recover deeply buried bitumen deposits.

In situ combustion
A displacement enhanced oil recovery method. It works by generating combustion gases (primarily CO and CO_2) downhole, which then "pushes" 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 oilsand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

Muskeg
A water-soaked layer of decaying plant material, one to three metres thick, found on top of the overburden.

Oil sands
Bitumen-soaked sand, located in four geographic regions of Alberta: Athabasca, Wabasca, Cold Lake and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total 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 oilsand. Must be removed before oil sands can be mined. Overburden underlies muskeg in many places.

Pilot plant
Small model plant for testing processes under actual production conditions.

Proven recoverable reserves
Reserves that have been proven through production or testing to be recoverable with existing technology and under present economic conditions.

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

Remaining established reserves
Initial reserves less cumulative production.

Royalty
The Crown's share of production or revenue. About three quarters of Canadian crude oil is produced from lands, including the oil sands, on which the Crown holds mineral rights. The lease or permit between the developer and the Crown sets out the arrangements for sharing the risks and rewards.

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.

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 byproduct of removing the bitumen from the oilsand.

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 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 process by which heat energy is used to reduce the viscosity of bitumen in situ to facilitate recovery.

Toe to heel air injection (THAI)
An in situ combustion method for producing heavy oil and oilsand. In this technique, combustion starts from a vertical well, while the oil is produced from a horizontal well having its toe in close proximity to the vertical air-injection well. This production method is a modification of conventional fire flooding techniques in which the flame front from a vertical well pushes the oil to be produced from another vertical well.

Truck-and-shovel mining
Large electric or hydraulic shovels are used to remove the oilsand and load very large trucks. The trucks haul the oilsand to dump pockets where it is conveyed or pipelined to the extraction plant. Trucks and shovels are more economic to operate than the bucket-wheel reclaimers and draglines they have replaced at oil sands mines.

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).

Vapour extraction (VAPEX)
VAPEX is a non-thermal recovery method that involves injecting a gaseous hydrocarbon solvent into the reservoir where it dissolves into the sludge-like oil, which becomes less viscous (or more fluid) before draining into a lower horizontal well and being extracted.

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

CONTACTS

Oil Sands Producers

- **Alberta Oilsands** www.aboilsands.ca
- **Albian Sands Energy** www.albiansands.ca
- **Andora Energy** www.andoraenergy.com
- **Athabasca Oil Sands** www.aosc.com
- **Baytex Energy** www.baytex.ab.ca
- **Canadian Natural Resources** www.cnrl.com
- **Cenovus Energy** www.cenovus.com
- **Chevron Canada** www.chevron.ca
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- **Teck Cominco** www.teckcominco.com
- **Total E&P Canada** www.total-ep-canada.com
- **UTS Energy** www.uts.ca
- **Value Creation Group** www.vctek.com

Associations/Organizations

- **Alberta Building Trades Council** www.albertabuildingtrades.com
- **Alberta Chamber of Resources** www.acr-alberta.com
- **Alberta Chambers of Commerce** www.abchamber.ca
- **Alberta Energy** www.energy.gov.ab.ca
- **Alberta Energy Research Institute** www.aeri.ab.ca
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- **Alberta Finance and Enterprise** www.finance.gov.ab.ca
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- **Alberta's Industrial Heartland Association** www.industrialheartland.com
- **Canadian Association of Geophysical Contractors** www.cagc.ca
- **Canadian Association of Petroleum Producers** www.capp.ca
- **Canadian Heavy Oil Association** www.choa.ab.ca
- **Canadian Oil Sands Network for Research and Development** www.conrad.ab.ca
- **Energy Resources Conservation Board** www.ercb.ca
- **In Situ Oil Sands Alliance** www.iosa.ca
- **Lakeland Industry and Community Association** www.lica.ca
- **Natural Resources Conservation Board** www.nrcb.gov.ab.ca
- **Oil Sands Developers Group** www.oilsandsdevelopers.ca
- **Oil Sands Leadership Initiative** www.osli.ca
- **Oil Sands Secretariat** www.treasuryboard.alberta.ca
- **Petroleum Technology Alliance Canada** www.ptac.org

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