



**ALBERTA
OIL SANDS
INDUSTRY**

QUARTERLY
UPDATE

FALL 2011

Reporting on the period: June 4, 2011 to Sept. 2, 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.

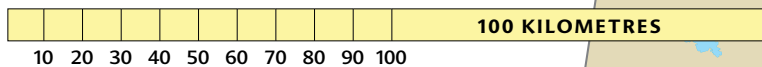
Right now there are essentially two commercial methods of in situ (Latin for “in place,” essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam 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 including variations on solvent-assisted SAGD and CSS, recovery using electricity, and in situ combustion.

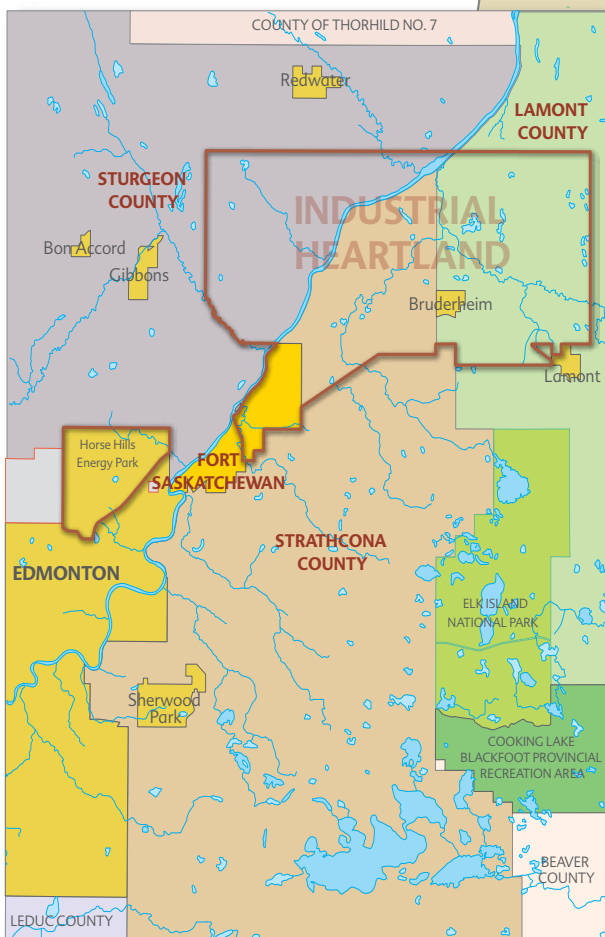
Bitumen that has not been processed, or “upgraded,” can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil (SCO), which is a refinery feedstock. At these refineries it can be transformed into transportation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



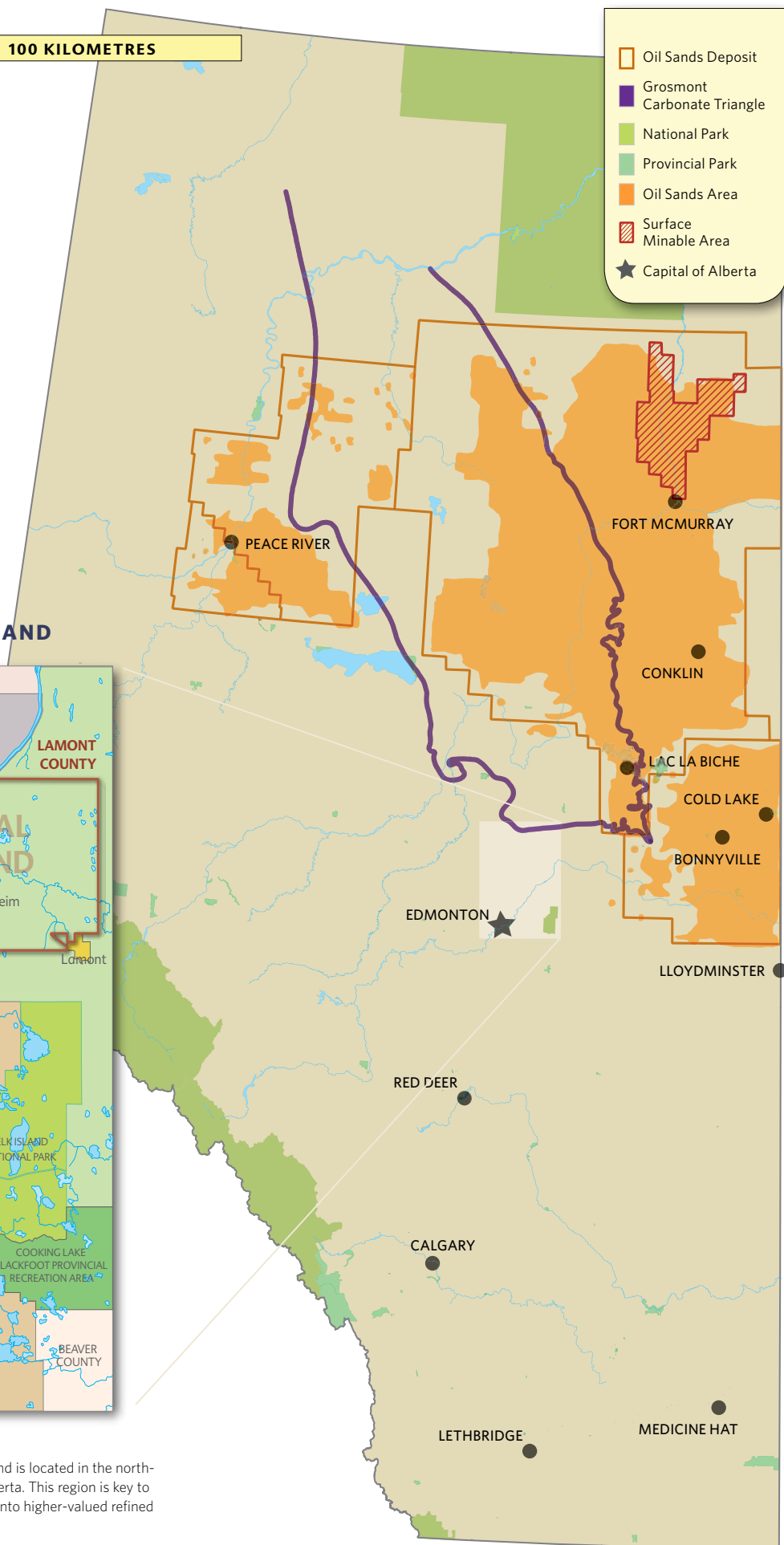
Mapping the oil sands

Canada's 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 north-east 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



CLEAN ENERGY PROJECT AGREEMENT IN PLACE

The Government of Alberta and Swan Hills Synfuels have signed a final funding agreement for a carbon capture and storage (CCS) project that will capture CO₂ from a deep-coal gasification process.

The in situ coal-gasification project will tap into a deep, unminable coalbed near Swan Hills and turn the coal into a synthetic gas or "syngas" while underground. The syngas will then be recovered and used to generate electricity for Albertans. The project will also capture up to 1.3 million tonnes of CO₂ per year that will be used for enhanced oil recovery in the area.

The province has committed \$285 million to the Swan Hills Synfuels project as part of the Alberta government's \$2-billion CCS funding program. Construction is expected to begin in 2013 with carbon capture beginning in late 2015.

ALBERTA GOVERNMENT SIGNS FINAL AGREEMENT FOR SHELL QUEST CCS PROJECT

The Government of Alberta has taken another step toward realizing its climate change goals by signing a final agreement with Shell Canada Energy for the Shell Quest CCS project.

The project will capture and store more than one million tonnes of CO₂ per year from the Scotford Upgrader and its expansion. The province has allotted \$745 million in funding for the Quest project over 15 years.

The Government of Canada is contributing \$120 million toward this project through the Clean Energy fund to help demonstrate CCS technology and advance Canada's leadership on clean energy technologies, while reducing greenhouse gas emissions from energy production.

As a short-term measure to help ensure large-scale carbon capture facilities can move forward, Alberta is updating its carbon offset program to allow multiple credits. This modification will only apply to projects that are primarily used for straight injection and sequestration—it will not apply to enhanced oil recovery projects, which remain eligible for offset credits under the current system. Under the concept of multiple credits, large-scale, direct injection CCS projects that meet specific criteria will receive a bonus credit for every tonne of offset credit created through the capture and storage of their CO₂.

Shell Canada Energy is undertaking the Quest project on behalf of the Athabasca Oil Sands Project, a joint venture between Shell Canada, Chevron Canada Limited and Marathon Oil Canada Corporation.

The province also signed a final agreement with Enhance Energy Inc. in February 2011 for the construction of the Alberta Carbon Trunk Line, which is also receiving funding from the Government of Canada.

PROVINCE SUPPORTS SIX INNOVATIVE ENERGY PROJECTS

The Government of Alberta is funding six innovative energy projects through the Innovative Energy Technologies Program (IETP) as part of its commitment to establish the province as a world-class centre for responsible energy development.

The successful projects were submitted by Cenovus Energy Inc., Encana Corporation, Laricina Energy, Pengrowth Energy Corporation and Penn West Exploration. The projects address a variety of research interests, such as advancing production technologies to produce bitumen in reservoirs that are not yet commercial, better understanding of coalbed methane production, and expansion of new enhanced oil and gas recovery technologies into previously inaccessible oil and gas deposits.

The six projects will receive royalty adjustments totalling up to \$27.5 million under the fourth and fifth rounds of the IETP. This is in addition to the \$134.3 million already allocated to 31 previously approved projects. The project descriptions and additional information on the IETP can be found at <http://www.energy.alberta.ca/Oil/docs/IETP4and5.pdf>.

With the successful completion of rounds four and five, the IETP is now open for another round of applications (round six). Applications will be accepted until September 30 with the expectation that successful applicants will be notified by the end of the year. Further details, including the application form, can be accessed at <http://www.energy.alberta.ca/Oil/768.asp>.

RESPONSIBLE ACTIONS: A PLAN FOR ALBERTA'S OIL SANDS

Responsible Actions is Alberta's 20-year strategic plan to address the environmental, social, and economic issues and opportunities in the oil sands regions. Over 50 projects and initiatives are reflected in the strategic plan. The 2010 Annual Progress Report was recently released and features stories and key accomplishments from last year. Copies of the report and the strategic plan are available at www.treasuryboard.alberta.ca/ResponsibleActions.cfm.

Some of the accomplishments include:

Easing housing pressures in Fort McMurray: The Government of Alberta is investing \$166 million to support the development of more housing in the Fort McMurray area through the new Parsons Creek community. Parsons Creek will be home to an estimated 24,000 residents in 8,000 homes when completed. Approximately 1,000 of the homes will be affordable housing.

\$2 billion for carbon capture and storage: To reduce the impacts of industrial greenhouse gas emissions and meet the goals of Alberta's Climate Change Strategy, \$2 billion in



funding has been committed for carbon capture and storage, funding four commercial-scale breakthrough projects.

Tougher rules on tailings ponds: The new Tailings Management Framework now in development aims to minimize the storage of fluid tailings in ponds, to optimize water management and to reclaim existing tailings ponds more quickly. Stringent new tailings management regulations were released by the Energy Resources Conservation Board (ERCB) in 2009, in order to reduce the inventory of fluid tailings at oil sands mining operations.

Support for promising environmental technology: Through Alberta Innovates and other programs, the Government of Alberta collaborates with research and technology providers to find ways to reduce greenhouse gas emissions and other environmental impacts from oil sands development. The government supports oil sands-related recovery, upgrading and environmental technology initiatives, including funding for carbon capture and storage.

Increased information: The Office of Statistics and Information has increased the volume and diversity of the province's official statistics, providing better information on topics that impact oil sands development, such as aboriginal issues, energy, environment, labour and population information. Specific examples include the Alberta River Water Quality Index, which comes from official Alberta Environment statistics and the employment rates for off-reserve Aboriginal people, which come from official labour statistics.

ERCB RELEASES ALBERTA'S RESERVES 2010 AND SUPPLY/DEMAND OUTLOOK 2011-2020

The ERCB has released its annual report, *Alberta's Reserves 2010 and Supply/Demand Outlook 2011-2020*. The ERCB report is a source of information on the state of reserves and the supply and demand outlook for Alberta's diverse energy resources: crude bitumen, crude oil, natural gas, natural gas liquids, coal and sulphur.

According to the report, in 2010 Alberta produced 256,300 cubic metres (1.6 million barrels) per day of raw crude bitumen from the oilsands. The 2010 yearly total of 93.5 million cubic metres (589 million barrels) produced from the oil sands represents an eight per cent increase over Alberta's 2009 oil sands production.

The ERCB also forecasts Alberta's annual raw crude bitumen production will total 549,600 cubic metres (3.5 million barrels)

per day for a total of 201 million cubic metres (1.3 billion barrels) per year by 2020.

The report also notes that, since 1967, Alberta has produced 1.2 billion cubic metres (7.5 billion barrels) of raw crude bitumen from the oil sands and crude oil production has produced 2.6 billion cubic metres (16 billion barrels) of crude oil since the industry began.

Also in 2010, Alberta's crude oil production totalled 73,000 cubic metres (459,000 barrels) of oil per day with a yearly total of 26.6 million cubic metres (168 million barrels). This is a 0.4 per cent reduction from 2009.

ERCB ISSUES CONDITIONAL APPROVAL FOR THE RESUMPTION OF PIPELINE OPERATIONS TO PLAINS MIDSTREAM CANADA

On Aug. 16, 2011, following a comprehensive review and assessment and a third-party engineering review of the incident, the ERCB issued conditional approval to Plains Midstream Canada (Plains) to resume operations of the NPS 20 Rainbow Pipeline, following the failure on April 28, 2011. On Aug. 26, 2011, the ERCB subsequently issued final approval for Plains to resume operations after the company demonstrated that it had met the conditions set out by the ERCB.

Plains is responsible for ensuring that the pipeline carrying light sweet crude oil can be safely operated within all regulatory requirements. The ERCB requires Plains to submit monthly progress reports and attend monthly meetings with ERCB personnel to ensure effective implementation of conditions of approval and regulatory requirements.

The ERCB also directed Plains that the interim maximum operating pressure of the pipeline will be limited. Operating pressure will be determined subject to ERCB review of pressure values within 30 days of the time of the failure.

The engineering assessments concluded that the April 28, 2011 failure was due to high stress on an existing crack in a fillet weld that was made on a weld-on sleeve. Plains has committed to excavating and inspecting all sections of the pipeline containing these types of weld-on sleeves on an expedited schedule. The ERCB continues its official investigation into the incident and will issue a full report at a later date.

A start-up date has not been confirmed. ■

What's new in the oil sands

Key updates from fall 2011



■ Royal Dutch Shell plc has announced the successful start of production from its Scotford upgrader expansion. The 100,000-barrel-per-day project takes capacity at Scotford to 255,000 barrels of bitumen per day.

"This start-up is an important milestone for our heavy oil business," said Marvin Odum, Shell Upstream Americas' director, in a news release. "And it adds new capacity from an important source of oil in a world requiring more secure energy."

■ Technip says it has been awarded by Canadian Natural Resources Limited a 100-million-Euro engineering procurement and construction support services contract for the Horizon project. The contract covers the expansion of the existing delayed coking unit, completed by Technip in 2008. The new contract—to be executed by Technip's operating centre in Rome, Italy—is scheduled to be complete by 2013.

Technip also reports that its wholly owned subsidiary, KTI Corporation, was awarded a purchase order by Snamprogetti Canada Inc. to design and supply 10 once-through steam generators (OSTGs) for the first phase of Husky Energy Inc.'s Sunrise steam assisted gravity drainage (SAGD) project.

KTI's engineering centre in Houston, Texas, will execute the OTSG contract. Final fabrication and assembly of the OTSGs will occur in Tofield, Alta. Final delivery and completion of these units is scheduled for the second half of 2012.

■ Cenovus Energy Inc. has received Alberta Energy Resources Conservation Board (ERCB) approval to proceed with a major expansion at its Christina Lake SAGD project, more than doubling the current approved capacity.

The approval covers three expansion phases (E, F and G) each 40,000 barrels per day for a total of 120,000 barrels per day. Once complete, the expansions would increase gross production capacity to 218,000 barrels per day, up from the current approved capacity of 98,000 barrels a day.

The first phase of the expansion is expected to be sanctioned by Cenovus and partner ConocoPhillips Canada by the end of 2011. Cenovus expects to submit an application for an additional 40,000-barrel-per-day expansion, Phase H, at Christina Lake in 2013, increasing the project's total

gross production capacity to 258,000 barrels per day by 2019.

■ Strata Oil & Gas Inc. says its board of directors has unanimously approved the allocation of up to \$10 million of the company's capital plan towards proving up the known resource of its 100 per cent owned Cadotte West project in the Peace River area of Alberta. The company said its \$250-million capital plan to develop its Cadotte main project is expected to result in commercial production of up to 56,000 barrels per day by 2017.

■ Osum Oil Sands Corp. has acquired a total of 51 sections (32,640 acres) of oil sands leases in the Saleski Grosmont carbonate region. The new lease is contiguous to Osum's existing carbonate holdings, complementing the previous 100 per cent owned Saleski land and the company's joint-venture lands.

Osum continues to drive forward on its existing holdings in the Grosmont carbonate play at Saleski. The company is partnered with Laricina Energy Inc. in a Saleski SAGD pilot project, which began operations in December.

"Depending on the degree of success at the [Saleski] pilot and the follow-up commercial expansion that Laricina has announced, we could be putting operated projects in the field during this decade," says Osum president and chief executive officer Steve Spence.

In the company's other core area, in Cold Lake, a commercial application and environmental impact assessment was filed for the 35,000-barrel-per-day Taiga project in December 2009, and Osum is targeting regulatory approval in 2011. First oil from the Taiga project is anticipated in 2014.

■ Laricina Energy Ltd. says that production began in the first quarter at its SAGD pilot in the Grosmont carbonate formation at Saleski. Steaming of the first well pair began Dec. 23, 2010, with steaming of the second pair commencing Jan. 30, 2011. The length of the heating phase is within the benchmark of 90-120 days, seen in typical McMurray formation SAGD projects, says the company.

The ability to inject steam directly into the reservoir during the heating period has allowed start-up to progress with less steam than in most McMurray SAGD projects, Laricina says.



As production in the first two of the three wells pairs ramps up over the upcoming quarters, Laricina will be monitoring the development of each zone's SAGD production performance curve under sustained operations. Once this ramp-up to the targeted 600 barrels per day per producing well is achieved, the second stage—SC-SAGD, consisting of the injection of solvents—will commence.

■ ■ ■ Perpetual Energy Inc. has announced results from an independent evaluation of discovered bitumen in place and contingent bitumen resources prepared by McDaniel & Associates Consultants Ltd. for a portion of the corporation's acreage in the Panny area of northeastern Alberta.

Three vertical wells and a horizontal well were drilled in the area in the first quarter of 2011 to evaluate the reservoir quality and bitumen characteristics of the Bluesky formation, and to further define the extent of the bitumen resource and extraction potential.

Gross recoverable contingent resources are estimated to range from a low of 35.18 million barrels, to a high of 235.3 million barrels, with a best estimate of 108.17 million barrels.

■ ■ ■ Observing Aboriginal Awareness Week in June, Shell Canada Ltd. announced that in six years of operations the Athabasca Oil Sands Project has spent more than \$1 billion with aboriginal contractors.

Shell said the milestone has been reached through work with more than 70 aboriginal businesses providing a range of goods and services to support the project. Since 2005, the number of contracts with aboriginal businesses has grown significantly, the company said. Local businesses provide a broad range of services and products including facilities management, technical expertise, bussing, camps, catering and waste management.

■ ■ ■ H2O Innovation Inc. says it has been awarded a \$9.4-million contract by Fort Hills Energy L.P. for the

planned Fort Hills oilsands project, operated by Suncor Energy Operations Inc.

This contract will see H2O Innovation design, build, install and commission a water treatment package that will provide potable water for the workers of Fort Hills project, which is currently in early development 90 kilometres north of Fort McMurray, Alta. This contract brings H2O Innovation's sales backlog to a record high level of \$29.2 million as of June 8, 2011.

■ ■ ■ Opsens Inc. says it has received an order to instrument one high-temperature SAGD well and two high-temperature observation wells. In the SAGD well, Opsens' OPP-W high-temperature optical pressure and temperature sensor will be combined to a high-temperature Distributed Temperature Sensing System (DTS) to be encased in coil tubing for deployment to the toe of the horizontal well.

In the two observation wells, a combination of Opsens' high-temperature optical temperature sensor, the OTP-W, and a high-temperature DTS will be deployed. The company says that orders of combined OPP-W and DTS installations are becoming increasingly popular as they provide a complete profile to optimize and improve well management.

■ ■ ■ In situ bitumen production from Alberta's oil sands last year grew by 13.8 per cent for the second consecutive year, and is expected to overtake mined bitumen production by 2015, says a new report from the ERCB.

By 2020, in situ bitumen production from Athabasca, Cold Lake and Peace River is projected to rise to 1.92 million barrels per day, comprising 55 per cent of total bitumen output, according to the board's 2010 reserves and supply/demand outlook. In contrast, mined bitumen volumes are forecast to increase to 1.54 million barrels per day or 45 per cent of total oil sands output by the end of the forecast period. ➤



■ ■ ■ Cenovus Energy Inc. is accelerating development of its oil sands assets with a 10-year plan to boost output sixfold and a five-year plan to nearly double conventional oil volumes compared to current production with capital spending to average a total of \$3 billion to \$3.5 billion per year over the next decade.

The company is targeting oil sands production of more than 400,000 barrels per day net by the end of 2021, and conventional oil volumes of 120,000–130,000 barrels per day by the end of 2016, nearly twice current conventional production of about 70,000 barrels per day.

On top of that, Cenovus plans to enter into a strategic transaction by the end of 2011 to bring forward value from its oil sands holdings not currently included in near-term development plans. This could include a potential partnership, farmout, swap or divestiture. Companies from around the world have shown interest in this opportunity, Cenovus says.

■ ■ ■ Canadian Natural Resources Limited will apply for regulatory approval for its proposed 50,000-barrel-per-day Grouse in situ oilsands project, located within Lac La Biche County.

The company said it is planning to submit the integrated application and environmental impact assessment for the Grouse project to the ERCB, Alberta Environment and other relevant regulatory agencies early in the first quarter of 2012.

Pending regulatory approval, construction is expected to start in the third quarter of 2014 and first steam is scheduled for the fourth quarter of 2017. The company said Grouse is expected to operate for approximately 20 years.

■ ■ ■ In another Chinese foray into the Canadian oilpatch, CNOOC (China National Offshore Oil Corporation) Limited has agreed to take over troubled oilsands developer Opti Canada Inc. in its US\$2.1-billion deal. The move came just after Opti, which is a 35 per cent working interest partner in Nexen Inc.'s Long Lake SAGD project, filed for creditor protection to ease the burden of its crushing debt. The Opti board has voted unanimously in favour of the deal.

■ ■ ■ Flint Energy Services Ltd. has signed a letter of intent covering MEG Energy Corp.'s Christina Lake Phase 2B SAGD project near Conklin, Alta. The agreement includes both field construction and pipe fabrication, the latter of which will be manufactured

at the company's fabrication facilities in Sherwood Park, Alta. Construction will begin in the third quarter of 2011 with completion in the first quarter of 2013. Flint anticipates its work on the project will employ over 600 people at peak.

The company also reported it has received additional field construction work on Suncor Energy Inc.'s Firebag in situ project since the first quarter of 2011. Including the new agreement with MEG Energy, the total value of the added backlog for company's Facility Infrastructure segment is approximately \$300 million.

■ ■ ■ SilverBirch Energy Corporation reports the current capital cost estimate for the 159,000-barrel-per-day Phases 1 and 2 of the Frontier and Equinox oilsands mining project is \$14.5 billion on a fourth-quarter 2010 basis. SilverBirch expects the regulatory application will be submitted to the Alberta government in the fourth quarter of 2011.

Corporate sanction projects could occur as early as 2014-15, with construction beginning in 2016 and commercial oil production in 2020-21. SilverBirch said it will not be proceeding with construction until a suitable partnership agreement and funding solutions are in place.

■ ■ ■ GS Engineering & Construction has selected GE to supply the produced water evaporation and zero liquid discharge (ZLD) system for the Blackgold in situ project near Conklin, Alta.

GE said its integrated evaporator and ZLD system enables the facility to cost-effectively produce 10,000 barrels per day of bitumen, and maximize recycled-water use.

■ ■ ■ Suncor Energy Inc. has applied for an amendment to its regulatory approvals to increase the approved project area at the North Steepbank Extension (NSE) mining area to allow for an expanded mine pit limit and an increase to the external overburden dump area and associated infrastructure footprint.

The original mining area was approved in 2007 and was based upon a consolidated tailings management plan, and meeting the regulator's minimum requirement for ore recovery based upon a total volume to bitumen in place ratio of 12:1. The NSE mine plan, but not the footprint, was amended as part of Suncor's tailings reduction operations mine plan. Suncor says that by expanding mining limits, it can recover an additional 65.4 million barrels of bitumen. ■

Project listings

Updated status of oil sands projects in Alberta

As of Sept. 2, 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				
Canadian Natural is reporting that synthetic crude oil shipments from Horizon resumed at the end of August post-fire repairs.				
Phase 1	135,000	2008	Operating	Mining
Tranche 1	--	2007	Complete	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				
Imperial Oil says construction is 68 per cent complete. It is evaluating the recent Montana court decision barring transport of its modules on Highway 12. Efforts to reduce the size of modules in Lewiston, Idaho, are complete and Imperial began moving these into Alberta in mid-July.				
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 bpd, 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	40,000	TBD	Announced	Mining

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
SUNCOR ENERGY INC.				
Base Operations				
Suncor says that with major maintenance now behind it at its oil sands facilities, it is looking forward to a strong second half of the year.				
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 the Fort Hills mine, targeting a 2016 start-up. Project still must be sanctioned and does not include upgrader portion.				
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				
Production volumes were impacted during the second quarter due to unplanned maintenance at the vacuum distillation unit and the LC finer.				
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	2017	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 reports that it is on track to submit regulatory applications for its Dover West projects before year-end 2011.				
Phase 1	12,000	2015	Announced	SAGD
Phase 2	35,000	2018	Announced	SAGD
Phase 3	35,000	2021	Announced	SAGD
Dover West Leduc Carbonates				
AOSC says that its first test (steam injection) last winter has added 140 million barrels of contingent resource to its profile. Construction of a thermal assisted gravity drainage (TAGD) heating test pilot is complete. Heating—using electrical cables—is underway and observation wells indicate that the heat is spreading, confirming predictions. Production results are expected once the area can be accessed on winter roads.				
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 bpd application and plans to file an updated application for an 80,000 bpd project in the fourth quarter of 2011. It has reported that it may seek transactions related to this asset area.				
Phase A	35,000	TBD	Application	SAGD
Phase B	15,000	TBD	Announced	SAGD
DOVER OPERATING CORP.				
Dover				
AOSC filed its regulatory application for a 250,000-barrel-per-day project at Dover in December 2010. Approval anticipated in 2012.				
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	TBD	2007	Operating	ET-DSP
HUSKY ENERGY INC.				
Sunrise				
Husky says that the Sunrise project continues to achieve its milestones, with the first 12 of 49 SAGD well pairs recently completed on schedule. The full drilling program is forecast to be complete in the third quarter of 2012. A full field development plan including Sunrise expansions is expected by the end of the year.				
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				
Ivanhoe has been issued a new Canadian patent for its heavy-to-light oil technology, broadening and expanding its IP in Canada.				
Phase 1	20,000	2014	Application	SAGD
Phase 2	20,000	TBD	Application	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
OAK POINT ENERGY LTD.				
Lewis				
Pilot	1,720	2013	Application	
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 says construction is advancing on budget, with a number of milestones achieved including completion of central plant site and well pad civil work, procurement of all major equipment. Drilling of the first well pad is complete and the second is about 50 per cent complete.				
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				
First oil from Firebag Stage 3 achieved as planned in July. Production volumes expected to ramp up to capacity of 62,500 barrels per day over the next 24 months. In July it also started production from infill wells. 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.				
MR2	40,000	2016	Announced	SAGD
Phase 1	33,000	2002	Operating	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 Elks				
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

ALBERTA OILSANDS INC.

Clearwater West

Alberta Oilsands reports that Alberta Sustainable Resource Development has cancelled a company lease application that would have been used as a construction staging site for Clearwater Phase 1. AOS has identified another potential site. Alberta SRD cancelled a number of lease applications in the Fort McMurray area in order to facilitate commercial development.

Phase 2	25,000	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 begin the procurement process for long-lead equipment. Regulatory approval anticipated in 2012, at which point construction will begin. As of late July, AOSC says this is progressing as planned.

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
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BLACKPEARL RESOURCES INC.

Blackrod

BlackPearl says that steam injection began in May and is now in the two- to four-month warm-up phase. After that, the well pair will be converted to SAGD. The company also continues to work on the regulatory application for its commercial project, which will be filed in the first half of 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
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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	2017	Announced	SAGD
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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
Phase 2	40,000	2019	Announced	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Kirby (South)				
Construction is approximately 19 per cent complete, reportedly progressing on time and on budget. All major equipment has been ordered and drilling has commenced.				
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

Cenovus reports that, a few weeks early, first oil has been achieved from Phase C. Currently processing about 5,000 barrels per day, it expected to ramp up to full 40,000-barrel-per-day capacity sometime next year.

Phase 1A	10,000	2002	Operating	SAGD
Phase 1B	8,800	2008	Operating	SAGD
Phase C	40,000	2011	Operating	SAGD
Phase D	40,000	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

Cenovus has received partner approval for phases F, G and H. The company is starting steaming of new well pairs and starting up new wedge wells.

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	35,000	2014	Approved	SAGD
Phase G	35,000	2015	Approved	SAGD
Phase H	35,000	2016	Approved	SAGD
Phase I	25,000	2017	Announced	SAGD

Grand Rapids

Single well pair SAGD pilot underway. Steaming began in December and Cenovus says it continues to monitor the pilot to gain a better understanding of the reservoir. It plans to file a commercial application by the end of the year.

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

Connacher says it is considering deploying infill wells at Pod 1 in 2012 to capitalize on an opportunity to enhance productivity. The company has initiated the injection of solvent with steam on two well pairs at Algar. If the field trial is successful, the technique could be deployed across the entire pad by the end of the year. It could also be expanded to two other Algar well pads and to Great Divide. Connacher has also engaged Rothschild as advisor to secure a joint-venture partner for the Algar expansion project.

Algar Pod 2	10,000	2010	Operating	SAGD
Expansion	24,000	2014	Application	SAGD
Pod 1	10,000	2007	Operating	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
CONOCOPHILLIPS CANADA LIMITED				
Surmont				
ConocoPhillips says it has received regulatory approval to increase production capacity of Phase 2 to 109,000 barrels per day, up from the previously approved 83,000 barrels per day.				
Phase 1	27,000	2007	Operating	SAGD
Phase 2	109,000	2015	Construction	SAGD
Pilot	1,200	1997	Operating	SAGD
DEVON CANADA CORPORATION				
Jackfish				
Devon reports that it has achieved first oil production from Jackfish 2 and predicts the ramp-up to capacity of 35,000 barrels per day will occur over the next 18 months.				
Phase 1	35,000	2007	Operating	SAGD
Phase 2	35,000	2011	Operating	SAGD
Phase 3	35,000	2015	Application	SAGD
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.				
1A	35,000	2016	Announced	SAGD
1B	35,000	2017	Announced	SAGD
1C	35,000	2017	Announced	SAGD
GRIZZLY OIL SANDS ULC				
Algar Lake				
Grizzly has awarded a \$4-million+ contract to Rockwell Automation for a process automation system for the Axe Lake project.				
Phase 1	5,000	2013	Application	SAGD
Phase 2	5,000	2014	Application	SAGD
HARVEST OPERATIONS CORP.				
BlackGold				
Harvest says the BlackGold project has experienced cost and schedule pressure and it is evaluating possibilities to minimize impact. Construction, drilling and detailed engineering remain underway.				
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	2012	Construction	SAGD
JAPAN CANADA OIL SANDS LIMITED				
Hangstone				
Expansion	35,000	2014	Application	SAGD
Hangstone Pilot				
JACOS owner JAPEX says regulatory approval for expansion is anticipated this fall and an investment decision will follow.				
Pilot	11,000	1999	Operating	SAGD
LARICINA ENERGY LTD.				
Germain				
Laricina says the Germain project remains on track for first steam at the end of 2012. All major equipment has been procured and four fabricators are now under contract. The next stage of construction will be drilling of piles for the modules. Construction of contracted slant drilling rig complete and in position to begin drilling.				
Commercial Demonstration Phase 1	5,000	2012	Construction	SAGD
Phase 2	30,000	2014	Announced	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Saleski				
Laricina says initial results from the Saleski pilot say SAGD continues to work well in the Grosmont carbonate. Production is expected to steadily increase through 2011. Supplementary information requests regarding the 10,700 bpd commercial Phase 1 have been completed and provided to the regulator. Design basis memorandum for Phase 1 is now complete.				
Phase 1	10,700	2013	Announced	SAGD
Pilot	1,800	2011	Operating	SAGD
MEG ENERGY CORPORATION				
Christina Lake				
MEG reports that detailed engineering for Phase 2B is 71 per cent complete and capital commitments for major equipment and materials were 75 per cent complete. Overall construction is 15 per cent complete.				
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	2017	Announced	SAGD
Phase 2	50,000	TBD	Announced	SAGD
N-SOLV CORPORATION				
Hangstone				
N-Solv and partner Suncor Energy have been granted funding from the Government of Canada under Sustainable Development Technology Canada to develop the N-Solv pilot.				
Demonstration Plant	500	2012	Announced	N-SOLV
NEXEN INC.				
Long Lake				
Nexen says it has achieved a 9 per cent production increase between Q1 and Q2, and during June successfully ran the upgrader at 65 per cent of capacity with an on-stream factor of 95 per cent. The company continues to drill and develop new well pairs and is accelerating the development of a portion of the Kinosis lease to access resource to fill the upgrader. Partner Opti Canada has declared bankruptcy and will be acquired by CNOOC for \$2.1 billion.				
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	TBD	Announced	SAGD
PARAMOUNT RESOURCES LTD.				
Hoole				
Paramount has received an updated resource evaluation, pegging economic contingent bitumen resources increased to 763 million barrels. During the remainder of 2011, it plans to complete engineering design and environmental analysis. Conceptual and pre-FEED engineering being conducted by IMV Projects, reportedly including new technologies that have never been tried anywhere else in the world.				
Commercial	35,000	TBD	Announced	SAGD
PETROBANK ENERGY AND RESOURCES LTD.				
Conklin (Whitesands)				
With the Kerrobert and Dawson projects moving forward, Petrobank is evaluating options for the Conklin site to become predominantly a field-scale testing site for technology improvements to the THAI process. Approval has been received to test a wet combustion process and an application has been submitted to drill another air injector further along one of the wellbores to test the new multi-THAI configuration.				
Expansion	1,900	TBD	On Hold	THAI
Pilot	1,900	2006	Operating	THAI
May River				
A regulatory hearing relating to the May River project is expected in late 2011 or early 2012.				
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 barrels per day in November 2010.				
Corner	40,000	2015	Application	SAGD
Corner Expansion	40,000	TBD	Application	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Hangstone	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
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 says that production wells are currently being drilled on pads at Primrose East and South, contributing to strong thermal oil production for the company.				
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 reports continued progress enhancing its understanding of how to develop the Tucker reservoir. It continues to remediate older wells with new stimulation techniques and develop new well pairs, and is seeing an increase in production rates.				
Phase 1	30,000	2006	Operating	SAGD
IMPERIAL OIL LIMITED				
Cold Lake				
Cold Lake achieved production record of 158,000 bpd in Q2/2011, attributed to contributions of new wells steamed in 2011, but offset by cyclic nature of 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				
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

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
PENGROWTH CORPORATION				
Lindbergh				
The Lindbergh pilot has received all regulatory approvals to begin construction. First steam is targeted for the first half of 2012. Drilling of SAGD well pairs and facility construction will begin in Q3/2011.				
Commercial	12,000	2016	Announced	SAGD
Pilot	2,500	2012	Approved	SAGD
ROYAL DUTCH SHELL PLC				
Orion				
Phase 1	10,000	2007	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's strategic review process to enhance shareholder value that could result in a sale or merger was expected to be closed in June, but this did not occur. The process is ongoing with a number of parties that have expressed interest.				
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				
Surface facilities from the first two wells at the Kerrobert project are being decommissioned and will be moved to Dawson during Q3. Civil work underway, drilling expected to commence mid-September. Pre-ignition heating cycle to commence in the fourth quarter, with air injection targeted before year-end.				
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				
In June, Southern Pacific commenced steaming wellbores at Red Earth. The project will be tested throughout the remaining summer and fall, after which the test information will be interpreted and go-forward plans will be prepared.				
Commercial	10,000	TBD	Announced	CSS
Pilot	1,000	2009	Operating	CSS
Pilot Expansion	3,000	TBD	Announced	CSS
NORTH ATHABASCA REGION — UPGRADE				
SYNTHETIC CRUDE OIL PRODUCTION CAPACITY				
CANADIAN NATURAL RESOURCES LIMITED				
Horizon				
Canadian Natural is reporting that synthetic crude oil shipments from Horizon resumed at the end of August post-fire repairs.				
Phase 1	135,000	2008	Operating	Mining
Tranche 1	--	2007	Complete	Engineering/Design

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
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
IVANHOE ENERGY INC.				
Tamarack				
Ivanhoe has been issued a new Canadian patent for its heavy-to-light oil technology, broadening and expanding its IP in Canada.				
Phase 1	34,784	TBD	Application	Upgrader
SUNCOR ENERGY INC.				
Base Operations				
Suncor says that with major maintenance now behind it at its oilsands facilities, it is looking forward to a strong second half of the year.				
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				
Suncor expects to progress with engineering and site preparation work at the Fort Hills mine, targeting a 2016 start-up. Project still must be sanctioned and does not include upgrader portion.				
Phase 1	145,000	2016	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				
Production volumes were impacted during the second quarter due to unplanned maintenance at the vacuum distillation unit and the LC finer.				
Base Plant Stage 1 & 2 Debottlenecking	250,000	1978	Operating	Upgrader
Stage 3 Debottlenecking	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

NEXEN INC.

Long Lake

Nexen says it has achieved a 9 per cent production increase between Q1 and Q2, and during June successfully ran the upgrader at 65 per cent of capacity with an on-stream factor of 95 per cent. The company continues to drill and develop new well pairs and is accelerating the development of a portion of the Kinosis lease to access resource to fill the upgrader. Partner Opti Canada has declared bankruptcy and will be acquired by CNOOC for \$21 billion.

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	TBD	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	TBD	Application	Upgrader

INDUSTRIAL HEARTLAND REGION — UPGRADER SYNTHETIC CRUDE OIL PRODUCTION CAPACITY

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/m³) or degrees on the American Petroleum Institute (API) gravity scale; in western Canada, oil up to 900 kg/m³ 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. CO₂ 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 CO₂) 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
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Associations/Organizations

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• Alberta Energy	www.energy.gov.ab.ca
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