



**ALBERTA
OIL SANDS
INDUSTRY**

QUARTERLY
UPDATE

SUMMER 2009
(Reporting on the period: March 24 to June 18, 2009)

All about the oil sands

Background of an important global resource



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Alberta has the second-largest deposit of oil in the world—only Saudi Arabia can claim a larger stockpile of crude. But 173 billion of Alberta's 179 billion barrels of oil have the special quality of being bitumen, 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 173 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 Wapasa 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.

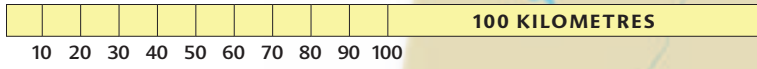
Right now there are essentially two commercial methods of in situ (Latin for “in place,” essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam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

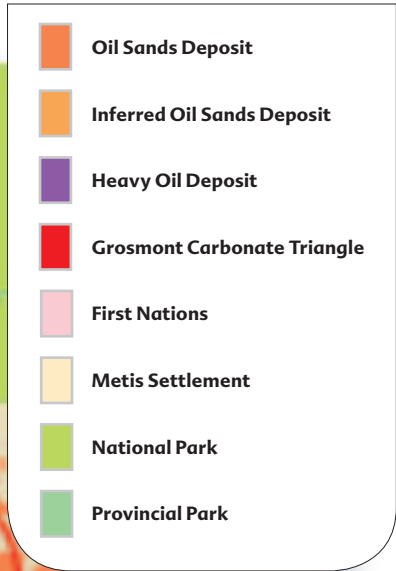
Research is underway on a number of other production technologies designed to optimize production and minimize water and energy use, including vapour extraction (VAPEX), and a form of in situ combustion known as toe to heel air injection (THAI).

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

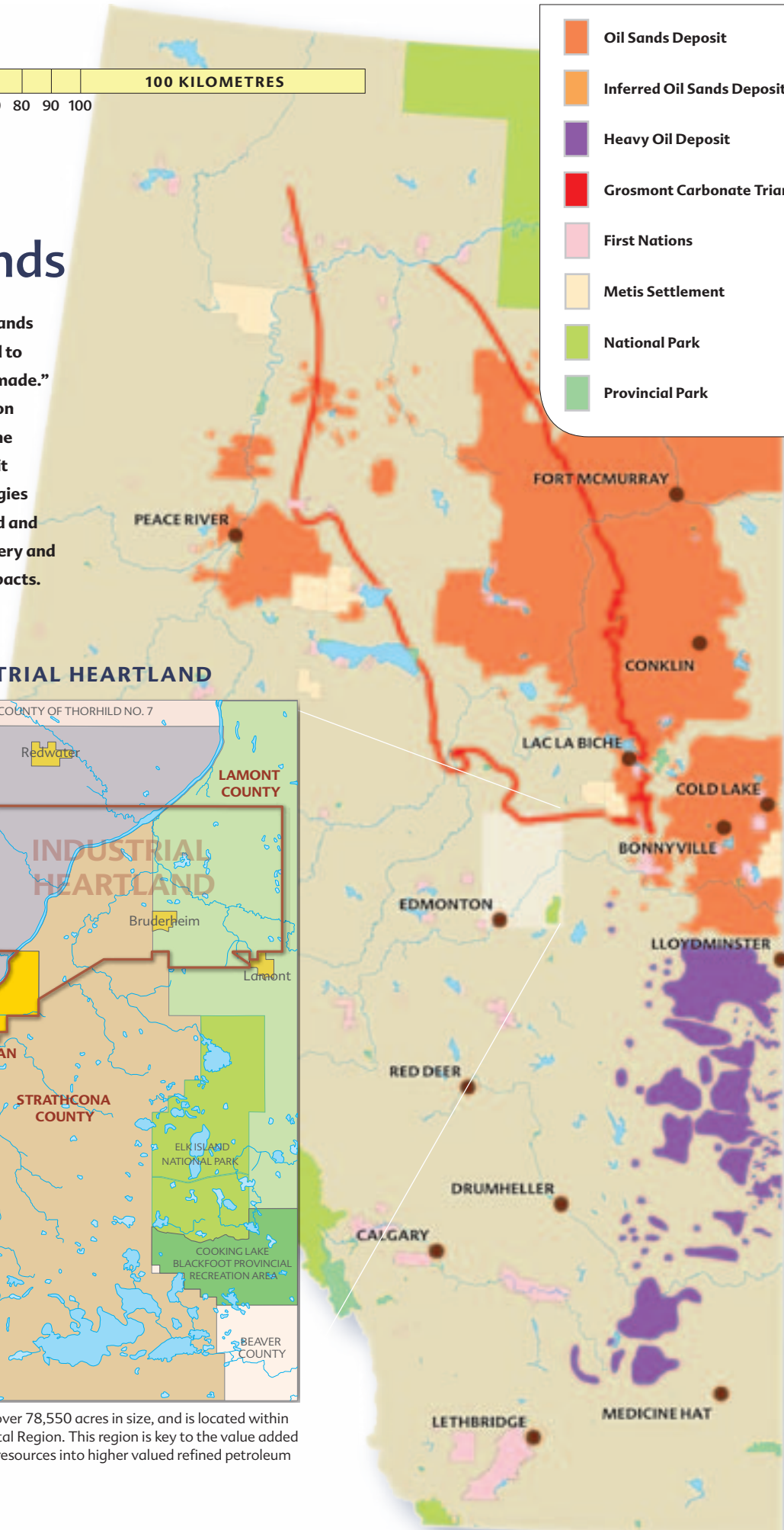
Canada's heavy oil and oil sands resources are often referred to as "the oil that technology made." Without intensive production technology development, the industry would not exist as it does today. These technologies still continue to be advanced and optimized, improving recovery and reducing environmental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



ALBERTA'S INDUSTRIAL HEARTLAND



Alberta's Industrial Heartland is over 78,550 acres in size, and is located within Metro Edmonton, Alberta's Capital Region. 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

BUDGET 2009

The Alberta government has reinforced its commitment to responsible development in Budget 2009 with significant funding to provide stronger environmental protection and support sustainable growth.

Highlights of the budget include:

More than \$22 million has been allocated across government this year in operating support for the Water for Life strategy. In addition, \$100 million in capital support is included in the 2009-12 Capital Plan for Water for Life projects. Water for Life initiatives in 2009-10 include finalizing and implementing the provincial wetlands policy, reviewing the water allocation and management system, and expanding water monitoring, evaluation and public reporting and cumulative effects management.

Up to \$30 million will be allocated in 2009-10 to support reclamation efforts of older, depleted and abandoned oil and gas wellsites. In addition, \$13 million—fully supported by an industry levy to the Energy Resources Conservation Board (ERCB)—will be allocated to the Orphan Well Abandonment Program.

The Alberta government has also allocated \$102 million for environmental management in 2009-10, which includes approvals, compliance, and enforcement activities to reduce and manage cumulative effects of activity on the environment. An additional \$55 million for biofuel initiatives will be committed in 2009-10 to further support the development of renewable energy and offer additional economic opportunities for rural Alberta and the agriculture and forestry industries. Clean energy production is a key objective of the Provincial Energy Strategy, and this funding will help produce the capacity needed to meet Alberta's Renewable Fuels Standard of five per cent ethanol in gasoline and two per cent biodiesel by 2010. This standard has the potential to reduce CO₂ emissions by about one million tonnes annually—equivalent to taking about 200,000 vehicles off the roads each year.

In addition to other capital commitments in the oil sands regions, Budget 2009 provides \$210 million this year and \$171 million the following year to

provide new or upgraded infrastructure in the Fort McMurray area of Alberta, including a new bridge over the Athabasca River, and new interchanges at Thickwood Boulevard and Confederation Way. This follows recommendations developed in *Responsible Actions: A Plan for Alberta's Oil Sands*, which calls for timely investment in infrastructure in oil sands regions.

RESEARCH AND TECHNOLOGY

The Government of Alberta, through Genome Alberta, is supporting a project that looks at new ways to use microbes in energy production, with the potential of reducing the use of water and natural gas in oil sands extraction and improving the management of tailings ponds.

Researchers will examine Alberta's energy reserves for microbes that exist naturally in oil sands and coal seams. These living organisms cause the natural breakdown of hydrocarbons and the project will look into how these processes could be used in energy production. For example, this science could speed up the settling rate of tailings ponds so the water can be recycled sooner.

Genome Canada and Alberta's research community are also contributing to the \$11.6 million project, which was announced at Bio 2009, the world's largest biotechnology gathering, which took place in Atlanta, Georgia.

SUPPLY AND DEMAND FORECAST

The ERCB has released its annual report *Alberta's Reserves 2008 and Supply/Demand Outlook 2009-2018*. Based on the ERCB's own geological and technical analysis, this report presents information on the state of reserves and the supply and demand for Alberta's diverse energy resources: bitumen, crude oil, natural gas, natural gas liquids, coal, and sulphur. It includes estimates of reserves at Dec. 31, 2008, and a 10-year supply/demand forecast for each resource. A supply/demand forecast of electricity in Alberta is also provided. The report also includes historical data for energy resources production. *Alberta's Reserves 2008 and Supply/Demand Outlook 2009-2018* is available on the ERCB website at www.ercb.ca or from ERCB Information Services, Main Floor, 640-5 Avenue SW, Calgary, Alberta, T2P 3G4.





What's new in the oil sands

Key updates from summer 2009

Other information sources of interest

The Construction Owners Association of Alberta, in cooperation with the Construction Industry Institute at the University of Texas, has developed a benchmarking system that assesses project performance by looking at certain characteristics of major industrial (oil sands) construction projects in Alberta. Using quantitative evidence, the report dispels common myths regarding industrial project execution in Alberta while establishing a solid footing for the future study of additional projects. The report can be found at www.coaa.ab.ca.

Upcoming events

Oil Sands Tradeshow and Conference
Sept. 22-23, 2009, Edmonton, Alberta

Global Petroleum Career Exposition Edmonton
Sept. 22-23, 2009, Edmonton, Alberta

World Heavy Oil Congress
Nov. 3-5, 2009, Puerto Ordaz, Venezuela

National Buyer Seller Forum
March 23-25, 2010, Edmonton, Alberta

■■■ Shareholders of both Suncor and Petro-Canada have approved the merger of the two companies, which would create Canada's largest oil company and an oil sands giant. Interestingly, this merger would also give the "new Suncor" Petro-Canada's 12 per cent stake in Syncrude, Suncor's long-time competitor. The transaction is expected to close in the third quarter.

■■■ Imperial Oil has approved the first phase of Kearl, an \$8 billion oil sands mining project 70 kilometres northeast of Fort McMurray, Alberta, estimated to ultimately produce more than 300,000 barrels per day of bitumen starting in late 2012. The first phase will produce an average 110,000 barrels per day.

All regulatory requirements are in place and construction will now begin in earnest, said spokesman Gordon Wong. "It's a very exciting time for the company. Work has been underway in terms of pre-development, and now we'll be looking forward toward construction."

Imperial has spent about \$800 million on the project so far, and 1,000 employees and contractors have been working on it. According to its regulatory application, peak construction will see about 3,000 employees and contractors at the site for the first phase.

Development plans do not include any on-site upgrading facilities. Bitumen will be blended with diluent and shipped to market through third-party pipeline systems.

■■■ Royal Dutch Shell plc's expansion of its Athabasca Oil Sands Project, which will add 100,000 barrels per day of bitumen production through construction of another mine and upgrader, is still on track for completion in 2010-11, says a company spokesman.

Paul Hagel said the last of the materials have been delivered and there is now a big push to advance the mechanical and electrical instrumentation work.

It's no longer cyclic steam stimulation (CSS), and it's 20,000 barrels per day smaller than the original project, but a new design for Shell's Carmon Creek expansion at Peace River, Alberta, is on the table.

Shell filed a regulatory application in December 2006 to expand the existing site by 100,000 barrels per day from current capacity of 12,500 barrels per day, but withdrew the application last November, citing planned changes.

continued next page

What's new in the oil sands *continued*

■ Shell is working towards submitting a new Carmon Creek application by year's end, which would employ steam drive rather than CSS, says spokeswoman Adrienne Lamb. The company expects the regulatory review to take more than 18 months from the date of submitting the new application.

"Pending the timing and outcome of the regulatory review process, we could be in a position to make an investment decision in 2011," she said. "Our decision to proceed would take a number of factors into consideration, including the outcome of the regulatory process, project costs, markets conditions, consultation with stakeholders, etc."

A notional, or theoretical, timeframe in Shell's new public information document suggests that the project wouldn't be on stream before the end of 2014.

As a matter of company policy, Royal Dutch Shell doesn't disclose cost estimates.

In preparation for the new application, the company has issued a public disclosure document (a broad overview of the project) and the proposed terms of reference for a new environmental impact assessment.

■ Syncrude Canada will deploy deterrents year-round on its settling basins and has improved its waterfowl protection system in advance of this year's bird migration, the company said as it announced that duck mortality at its ponds a year ago was three times as high as originally declared. The number is up to 1,606 from 500.

Syncrude said it has purchased a radar-based migration monitoring system, which will help with ongoing research of migration patterns. The pilot project will analyze trends and help adjust the deterrent system to ensure the best protection measures are in place, said Syncrude. The system is in operation at some of North America's largest airports.

Alberta Environment Minister Rob Renner told a news conference that he is satisfied with Syncrude's promise of increased measures and that everyone is doing their utmost to ensure it does not happen again.

He said the province is increasing its monitoring of all oil sands operators during spring migrations. This will include unannounced spot checks as well as scheduled visits.

■ After nearly four months of back and forth between Total and UTS, the French giant has terminated its offer to acquire the oil sands junior, whose board rejected the offer as inadequate.

Total has also sold a 10 per cent interest in the proposed Northern Lights oil sands project to SinoCanada Petroleum Corporation (Sinopec), a subsidiary of China Petroleum & Chemical Corporation.

Northern Lights will now be owned 50-50 by Total and Sinopec.

■ Suncor Energy says it accepts its Alberta provincial court-imposed penalties for two environmental offences at its oil sands facilities and has taken measures to ensure they don't happen again.

The company pleaded guilty on April 2 to the violations and was sentenced to paying a total of \$850,000, including \$175,000 for failing to properly supervise its camp operator, Compass Group, for non-compliance offences.

"While the fine was substantial, we do accept it. We did enter a guilty plea and we acknowledge that we fell short of the regulations and of our own expectations of ourselves," said Suncor spokesman Brad Bellows.

Suncor Energy has recognized the achievement of a \$1 billion goods and services spending milestone with Aboriginal business partners in the Wood Buffalo region.

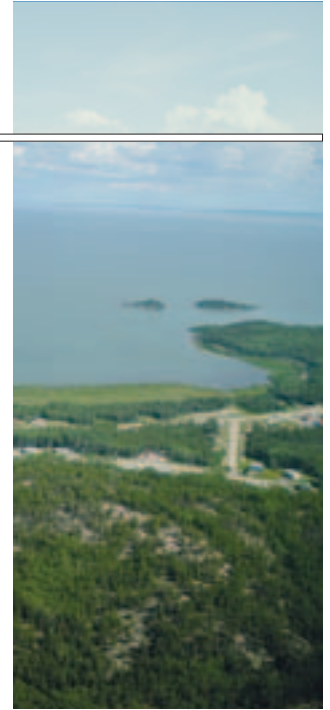
The company has been collecting data since 1992 on its spending with Aboriginal companies in the Regional Municipality of Wood Buffalo near its oil sands operations in northeastern Alberta. With Aboriginal business-related spending of \$220 million in 2008, the company surpassed a \$1 billion goods and services spending milestone with these companies.

■ On April 21, 2009, Finning achieved a significant milestone with the delivery of its 200th Caterpillar 797—one of the largest mining trucks in the world—to the oil sands industry. The 797 was first introduced in 1999.

It took Finning eight years to reach the 100th truck delivery mark, and just two more to double it.

■ Husky is reporting the costs for its proposed Sunrise project have fallen by about \$2 billion. The project was unveiled during Alberta's oil sands construction boom when some projects saw 100 per cent cost overruns.

But in recent months, oil sands operators have delayed tens of billions of dollars in spending, which—combined with the global economic slowdown—has driven down costs such as steel and labour.



■ ■ ■ North Peace Energy says it has allocated capital to advance front-end engineering work and the regulatory approval process for a 3,000 barrel per day pilot expansion, which it considers more viable than the previously planned 10,000 barrel per day first-phase commercial project in the current economic conditions. But even the 3,000 barrel per day option would still require higher commodity prices, the company said.

North Peace now expects the project to start up in 2012, after it submits an application later this year.

■ ■ ■ Devon Energy began injecting steam into the final pair of wells at its Jackfish steam assisted gravity drainage (SAGD) project in March, and all 24 well pairs are now operational.

The company says production reached 28,000 barrels per day in March, and it expects Jackfish to reach its design capacity of 35,000 barrels per day later this year. As well, construction at Jackfish 2 continues.

“During the second quarter, we will focus on completing the construction camp and transporting plant modules to the site,” said David Hager, executive vice-president, exploration and production.

Jackfish 2 is sized to produce another 35,000 barrels per day. Devon expects to invest about US\$1 billion in Jackfish 2 by the time it’s operational in 2011.

■ ■ ■ Although Flint Energy Services is reducing its head count and streamlining operations due to the slowdown in oil sands activity and conventional drilling, the company will be well positioned to capitalize when commodity prices recover, says its top executive.

President and chief executive officer Bill Lingard told the company’s annual meeting that Flint continues to take appropriate measures to tough out current industry conditions, including laying off about 1,000 employees and reducing the salaries of both retained employees and management.

Lingard said that while the company will be negatively affected by reduced capital spending in the oil sands this year, as the price of crude strengthens he expects activity will slowly begin to rebound.

“What we see going forward is that some clients will have a long-term horizon of what the oil price looks like and will commit to either re-starting projects that were delayed or start up new project...and we think with oil getting close to \$60, we’re going to get there fairly quickly.”

■ ■ ■ The resumption in the ramp-up of Connacher Oil and Gas’ Great Divide Pod One SAGD project is proceeding as planned after production was curtailed in December in response to low oil prices, says the company’s top official.

“We have weathered the storm,” Dick Gusella, president and chief executive officer, said in a conference call to discuss first-quarter results. Gusella says the plant is expected to achieve stable and sustainable production at or near capacity of 20,000 barrels per day in the second half of 2009.

Connacher has also re-instated construction of its Algar SAGD project, a second 10,000 barrel per day installation it put on hold in December 2008 due to economic conditions.

■ ■ ■ Excelsior Energy says it will file a regulatory application in the second quarter to test a new bitumen fireflood technique once economic conditions improve.

The company said it is fully funded to submit its Hangingstone combustion overhead gravity drainage (COGD) pilot project application, reprocess seismic data for the North Sea and cover general and administration costs through 2010. (Excelsior is targeting 2011 for its pilot start-up.)

Southern Pacific Resource has submitted an application to the Alberta Energy Resources Conservation Board and Alberta Environment for the development of a 12,000 barrel per day SAGD project in northeastern Alberta.

■ ■ ■ Tulsa, Oklahoma-based Williams Companies has announced plans to build a US\$283 million pipeline to transport natural gas liquids and olefins from its extraction plant in Fort McMurray, Alberta, to its processing facility in Redwater, Alberta.

Williams currently processes off-gas from Suncor Energy’s oil sands facility, extracts the natural gas liquids and olefins and transports them via a Suncor pipeline. Current production is 14,000 barrels per day. The new 12-inch proposed pipeline will provide additional capacity for Suncor liquids, as well as natural gas liquids from other oil sands producers’ off-gas.

Construction is expected to begin in 2010, with an anticipated in-service date of April 2012. Initial capacity is to be 43,000 barrels per day, with future capability of up to 125,000 barrels per day.



Project listings

Updated status of oil sands projects in Alberta

As of June 18, 2009 with files from Strategy West.

TECHNOLOGY LEGEND

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

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
ATHABASCA REGION – IN SITU						
ALBERTA OILSANDS						
Clearwater	Commercial Project	10,000	TBD	Announced	Company says it is on track to file an application in 2009.	SAGD
ATHABASCA OIL SANDS						
Dover	Pilot	1,000-2,000	TBD	Applied	Regulatory application submitted Oct. 22, 2008.	SAGD
MacKay River	Pilot	2,200	TBD	Applied	Regulatory application submitted Jun. 2, 2008.	SAGD
	Commercial Phase 1	35,000	2014	Announced	The company expects to file a regulatory application towards the end of 2009.	SAGD
CANADIAN NATURAL RESOURCES						
Birch Mountain	Phase 1	60,000	TBD	Announced		TBA
Gregoire Lake	Phase 1	60,000	TBD	Announced		TBA
Grouse	Phase 1	60,000	TBD	Announced		TBA
Kirby	Phase 1	45,000	TBD	Applied	Canadian Natural will decide in late 2009 or early 2010 when to proceed.	SAGD
Leismer	Phase 1	30,000	TBD	Announced		TBA
CHEVRON CANADA						
Ells River		100,000	2015	Announced	Chevron is looking at “a range of thermal and enhanced recovery technologies.”	TBA
CONNACHER OIL AND GAS						
Great Divide	Pod 1	10,000	2007	Operating	Ramp-up reinstated.	SAGD
	Pod 2 (Algar)	10,000	2010	Under construction	Board of directors has authorized the re-activation of Algar.	SAGD
	Expansion	24,000	2012	Disclosed	Public disclosure issued March 2009.	SAGD
CONOCOPHILLIPS CANADA						
Surmont	Phase 1	27,000	2008	Operating		SAGD
	Phase 2	83,000	2013	Approved	Engineering underway.	SAGD
DEVON CANADA						
Jackfish	Phase 1	35,000	2008	Operating	Steam injection has been initiated into final well pair. All 24 well pairs now operational. Full capacity expected to be reached in Q2 or Q3.	SAGD
	Phase 2	35,000	2011	Approved	Devon reports construction continues on schedule.	SAGD
ENCANA						
Borealis	Phase 1	35,000	TBD	Applied		SAGD
	Phase 2	32,500	TBD	Announced		SAGD
	Phase 3	32,500	TBD	Announced		SAGD
Christina Lake	Phase 1A	10,000	2002	Operating		SAGD
	Phase 1B	8,800	2008	Operating		SAGD
	Phase 1C	40,000	2011	Under construction		SAGD
	Phase 1D	40,000	TBD	Approved		SAGD
	Phase 1E	40,000	TBD	Announced	EnCana has filed its proposal terms of reference with Alberta Environment for phases 1E-1G.	SAGC
	Phase 1F	40,000	TBD	Announced		SAGD
	Phase 1G	40,000	TBD	Announced		SAGD
Foster Creek	Phase 1A	24,000	2001	Operating		SAGD
	Debottlenecking	6,000	2003	Operating		SAGD
	Phase 1C – Stage 1	10,000	2005	Operating		SAGD
	Phase 1C – Stage 2	20,000	2007	Operating		SAGD
	Phase 1D	30,000	2009	Operating	Commissioning nearing completion. Production ramping up.	SAGD
	Phase 1E	30,000	2009	Operating	Commissioning nearing completion. Production ramping up.	SAGD
	Phase 1F	30,000	TBD	Application		SAGD



COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
ENERPLUS RESOURCES						
Kirby	Phase 1	10,000	TBD	Application	Enerplus has deferred the Kirby project, but will continue resource assessment.	SAGD
	Phase 2	25,000	TBD	Announced		SAGD
E-T ENERGY						
Poplar Creek		10,000	2011	Approved	Expanded field test of ET-DSP complete.	ET-DSP
EXCELSIOR ENERGY						
Hangingstone	Phase 1	10,000	2011	Announced	Excelsior says it will test a proprietary process called combustion overhead gravity drainage (COGD) on its leases. Application to be filed in Q2.	COGD
GRIZZLY OIL SANDS						
Algar Lake		10,000	TBD	Announced		SAGD
HUSKY ENERGY						
McMullen	Pilot	775	TBD	Application		SAGD
Sunrise	Phase 1	50,000	TBD	Approved	Husky reports the cost estimate for Sunrise's first phase has dropped from an estimated \$4.5 billion to \$2.5 billion, citing other project delays and the global economic slowdown.	SAGD
	Phase 2	50,000	TBD	Approved		SAGD
	Phase 3	50,000	TBD	Approved	Sunrise is in "optimization" mode, to simplify its scope and take advantage in the recent downturn in the demand for goods and services.	SAGD
	Phase 4	50,000	TBD	Approved		SAGD
IVANHOE ENERGY						
Tamarack	SAGD with HTL upgrading	20,000	2013	Announced	Ivanhoe reports successful processing of Athabasca bitumen at its new feedstock test facility in Texas. Regulatory application to be filed in 2010.	SAGD
JAPAN CANADA OIL SANDS						
Hangingstone	Pilot	10,000	2002	Operating		SAGD
	Phase 1	35,000	TBD	Disclosed		SAGD
KOREA NATIONAL OIL CORPORATION						
BlackGold	Phase 1	10,000	TBD	Application		SAGD
	Phase 2	20,000	TBD	Announced		SAGD
LARICINA ENERGY						
Germain	SAGD pilot	1,800	2012	Application	Laricina reports the pilot is "development ready."	SAGD
	Phase 1	10,000	TBD	Announced		SAGD
Saleski	Carbonate SAGD demonstration	1,800	2011	Approved	ERCB approval in hand. Alberta Environment approval expected shortly.	SAGD
	Phase 1	10,000	TBD	Announced		SAGD
MEG ENERGY						
Christina Lake	Phase 1	3,000	2008	Operating	Production commenced April 2008.	SAGD
	Phase 2	22,000	2009	Approved	Construction nearing completion.	SAGD
	Phase 2B	35,000	TBD	Application		SAGD
	Phase 3A	75,000	TBD	Application		SAGD
	Phase 3B	75,000	TBD	Application		SAGD
NEXEN						
Long Lake	Phase 1	72,000	2007	Operating	Nexen says the reservoir is performing well and bitumen production is reflecting the amount of steam injected into the reservoir. Modifications have been made to accelerate steam injection capability. Volumes ramping up.	SAGD
	Phase 2	72,000	TBD	Announced		Sanctioning deferred until late 2009.
	Phase 3	72,000	TBD	Announced		SAGD
	Phase 4		TBD	Announced		SAGD
Long Lake South	Phase 1	70,000	TBD	Approved		SAGD
	Phase 2	70,000	TBD	Approved		SAGD
N-SOLV						
	Pilot plant	2,000	2010	Announced		N-SOLV
PATCH INTERNATIONAL						
Ells River		10,000	TBD	Announced	The company has indicated it is for sale.	SAGD

COMPANY	CURRENT PROJECT	CAPACITY (tbi/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
PEARL EXPLORATION						
Blackrod	Pilot	500	2009	Application		SAGD
PETROBANK ENERGY AND RESOURCES						
Whitesands	Pilot	1,900	2006	Operating	Petrobank reports production volumes have reached as high as 404 tbi/d, with produced gas volumes and rates confirming the toe to heel process.	THAI
	Expansion	1,900	2008	Approved		THAI
May River	Phase 1	10,000	TBD	Applied	Engineering firm Vista Projects has been awarded FEED services to Petrobank for the wellpad and pipeline package of May River.	THAI
	Subsequent Phases	90,000	TBD	Disclosed		
PETRO-CANADA						
Chard	Phase 1	40,000	TBD	Announced	Petro-Canada and Suncor Energy have agreed to merge, a transaction to be completed in Q3.	SAGD
Lewis	Phase 1	40,000	TBD	Disclosed		SAGD
	Phase 2	40,000	TBD	Disclosed	SAGD	
MacKay River	Phase 1	33,000	2002	Operating	Sanction on hold until commodity prices and financial markets stabilize, and the proposed merger with Suncor is completed.	SAGD
	Phase 2	40,000	2012	Approved		SAGD
Meadow Creek	Phase 1	40,000	TBD	Approved	SAGD	
	Phase 2	40,000	TBD	Approved	SAGD	
SOUTHERN PACIFIC RESOURCE						
STP McKay		10,000	TBD	Announced	Southern Pacific is currently having its McKay asset evaluated by McDaniel and Associates.	SAGD
STATOILHYDRO CANADA						
Kai Kos Dehseh-Leismer	Demonstration	10,000	2009	Under construction	Construction over 50 per cent complete.	SAGD
Leismer	Commercial	20,000	TBD	Applied		SAGD
	Expansion	20,000	TBD	Applied		SAGD
Corner		40,000	TBD	Applied		SAGD
Thornbury		40,000	TBD	Applied		SAGD
Corner	Expansion	40,000	TBD	Applied		SAGD
Hangingstone		20,000	TBD	Applied		SAGD
Thornbury	Expansion	20,000	TBD	Applied		SAGD
Northwest Leismer		20,000	TBD	Applied		SAGD
South Leismer		20,000	TBD	Applied		SAGD
SUNCOR ENERGY						
Firebag	Phase 1	33,000	2004	Operating	Suncor has agreed to merge with Petro-Canada, a transaction to be complete in Q3.	SAGD
	Phase 2	35,000	2006	Operating		SAGD
	Cogeneration and Expansion	25,000	2007	Operating		SAGD
	Phase 3	52,500	TBD	Suspended	Construction being wound down into "safe mode," waiting out economy.	SAGD
	Phase 4	62,500	TBD	Application	Construction of the Firebag sulphur plant, originally targeted for completion in Q2-09 is now scheduled to be finished in Q3-09. Delay is due to delivery schedule of modules from vendors.	SAGD
	Phase 5	62,500	TBD	Application		SAGD
	Phase 6	62,500	TBD	Application		SAGD
	Stages 3-6 Debottlenecking	23,500	TBD	Application		SAGD
SUNSHINE OIL SANDS						
West Ells	Phase 1	10,000	TBD	Announced		SAGD
	Phase 2	30,000	TBD	Announced		SAGD
	Phase 3	25,000	TBD	Announced		SAGD
Thickwood	Phase 1	10,000	TBD	Announced		SAGD
	Phase 2	30,000	TBD	Announced		SAGD
	Phase 3	25,000	TBD	Announced		SAGD
TOTAL E&P CANADA						
Joslyn	Phase 1	2,000	2004	Suspended	Production suspended reportedly due to failure to reach target levels. Total will remove the installation. Reserves debooked.	SAGD
	Phase 2	10,000	2006	Suspended		SAGD
	Phase 3A	15,000	TBD	Withdrawn		SAGD
	Phase 3B	15,000	TBD	Disclosure		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (tbb/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
VALUE CREATION GROUP						
Terre de Grace	Pilot	10,000	TBD	Application		SAGD
	Phase 1	40,000	TBD	Applied		SAGD
	Phase 2	40,000	TBD	Announced		SAGD
ATHABASCA REGION – MINING						
ATHABASCA OIL SANDS PROJECT						
Jackpine	Phase 1A	100,000	2010/11	Under construction	Shell says the project is at peak construction, with about 12,000 workers on the combined mine and upgrader sites.	Mining
	Phase 1B	100,000	TBD	Approved		Mining
	Phase 2	100,000	TBD	Application		Mining
Muskeg River	Existing Facilities	155,000	2002	Operating	Final investment decision delayed.	Mining
	Expansion and Debottlenecking	115,000	TBD	Approved		Mining
Pierre River	Phase 1	100,000	TBD	Applied		Mining
	Phase 2	100,000	TBD	Applied		Mining
CANADIAN NATURAL RESOURCES						
Horizon	Phase 1	135,000	2008	Operating	First synthetic crude oil production achieved. Construction and commissioning of final unit completed in late March. Canadian Natural expects production volumes to stabilize in Q2, with a steady ramp-up to full production by the end of 2009.	Mining
	Phases 2 and 3	135,000	TBD	Approved		Mining
	Phase 4	145,000	TBD	Announced		Mining
	Phase 5	162,000	TBD	Announced		Mining
IMPERIAL OIL						
Kearl	Phase 1	100,000	TBD	Approved	Imperial's board has sanctioned Kearl. Site access clearing and muskeg drainage underway.	Mining
	Phase 2	100,000	TBD	Approved		Mining
	Phase 3	100,000	TBD	Approved		Mining
PETRO-CANADA						
Fort Hills	Phase 1	165,000	TBD	Approved	Final investment decision delayed. Expected now some time in 2009.	Mining
	Debottlenecking	25,000	TBD	Approved		Mining
SUNCOR ENERGY						
	Millennium	294,000	1967	Operating		Mining
	Steepbank Debottleneck Phase 3	4,000	2007	Operating		Mining
	Millennium Debottlenecking	23,000	2008	Operating		Mining
	North Steepbank Extension		2010	Under construction		Mining
Voyageur South	Phase 1	120,000	TBD	Applied		Mining
SYNCRUDE (MILDRED LAKE AND AURORA)						
	Stages 1 and 2	290,700	1978	Operating	Syncrude has been constrained in the supply of bitumen feed to the upgrader, so it has expanded its mining equipment fleet and hired additional people, reportedly now seeing improvements in exposed bitumen levels. It is implementing a targeted maintenance program under its master services agreement with Imperial/Exxon Mobil.	Mining
	Stage 3 Expansion	116,300	2006	Operating		Mining
	Stage 3 Debottleneck	46,500	TBD	Announced		Mining
	Stage 4 Expansion	139,500	TBD	Announced		Mining
TOTAL E&P CANADA						
Joslyn	Phase 1 (North)	50,000	TBD	Applied		Mining
	Phase 2 (North)	50,000	TBD	Applied		Mining
	Phase 3 (South)	50,000	TBD	Announced		Mining
	Phase 4 (South)	50,000	TBD	Announced		Mining
Northern Lights	Phase 1	57,250	TBD	Application	Total has sold a further 10 per cent of Northern Lights to Sinopec, making the two 50/50 owners of the proposed venture.	Mining
	Phase 2	57,250	TBD	Application		Mining
UTS/TECK COMINCO						
Equinox (previously known as Lease 14)		50,000	TBD	Public disclosure	UTS and Teck have established a test facility to develop paraffinic bitumen froth treatment, which would reduce diluent requirements and make bitumen more compatible with upgraders.	Mining
Frontier	Phase 1	100,000	TBD	Public disclosure	Alberta Environment has approved the Final Terms of Reference for the Environmental Impact Assessments for both Equinox and Frontier.	Mining
	Phase 2	60,000	TBD	Public disclosure		Mining

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
COLD LAKE REGION – IN SITU						
BR OIL SANDS (SHELL)						
Orion	Phase 1	10,000	2008	Operating		SAGD
	Phase 2	10,000	TBD	Approved		SAGD
CANADIAN NATURAL RESOURCES						
	Wolf Lake	13,000	1985	Operating		CSS
	Wolf Lake SAGD	5,500	TBD	Application		SAGD
	Primrose South	45,000	1985	Operating		CSS
	Primrose North	30,000	2006	Operating		CSS
	Primrose East (Burnt Lake)	32,000	2009	Operating	After initial steaming in Q1, Canadian Natural identified oil seepage at the surface on one of the new multi-well pads, but believes it has identified the issue and the remedial action required.	CSS
	CSS Follow-up Process	25,000	TBD	Application		CSS
HUSKY ENERGY						
Caribou	Demonstration Project	10,000	TBD	Approved		SAGD
Tucker	Phase 1	30,000	2006	Operating	Additional drilling will most likely not continue until market conditions improve.	SAGD
IMPERIAL OIL						
	Phases 1-10: Leming, Maskwa, Mahihkan	110,000	1985	Operating		CSS
	Phases 11-13: Mahkeses	30,000	2003	Operating		CSS
	Phases 14-16: Nabiye, Mahihkan North	30,000	TBD	Approved	Imperial will re-submit its Nabiye project after design modifications to improve environmental performance.	CSS
KOCH EXPLORATION CANADA						
Gemini	SAGD Project	10,000	TBD	Application	Permit application filed on June 15, 2009. Koch is performing detailed engineering design work and public consultation is ongoing.	SAGD
OSUM OIL SANDS						
Taiga	SAGD Project	25,000-35,000	2014	Disclosed	Application anticipated by year-end. FEED is complete and an environmental impact assessment is underway.	SAGD
PENGROWTH ENERGY TRUST						
Lindbergh	SAGD Pilot	2,500	TBD	Application	Delineation wells drilled in Q1 reportedly met or exceeded expected bitumen reservoir thickness estimations. Detailed design engineering continues. Team is working with ERCB and Alberta Environment on supplemental information requests.	SAGD
PEACE RIVER REGION – IN SITU						
ANDORA ENERGY (PAN ORIENT)						
Sawn Lake	SAGD Demonstration	1,400	TBD	Application		SAGD
NORTH PEACE ENERGY						
Red Earth	CSS Pilot	1,001	2008	Operating	First steam achieved.	CSS
	Expansion	3,000	TBD	Announced	North Peace is re-assessing its capital budget for the second half of 2009 and exploring various alternatives for obtaining funds to progress future capital requirements.	CSS
PENN WEST ENERGY TRUST						
Seal	CSS Pilot	75	TBD	Application		CSS
SHELL CANADA						
Carmon Creek	Cadotte Lake	12,501	1986	Operating		CSS
	Phase 1	37,500	TBD	Announced	Shell has re-initiated stakeholder consultation, by way of a public information document. It is preparing an environmental impact assessment for a new application targeted for later this year.	CSS
	Phase 2	50,000	TBD	Announced		CSS
ATHABASCA REGION – UPGRADING						
CANADIAN NATURAL RESOURCES						
Horizon	Phase 1	135,000	2008	Operating	First production of synthetic crude oil achieved. Construction and commissioning of final unit completed in late March. Canadian Natural expects production volumes to stabilize in Q2, with a steady ramp-up to full production by the end of 2009.	Upgrader
	Phases 2 and 3	135,000	TBD	Approved		Upgrader
	Phase 4	145,000	TBD	Announced		Upgrader
	Phase 5	162,000	TBD	Announced		Upgrader

COMPANY	CURRENT PROJECT	CAPACITY (tbi/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
NEXEN						
Long Lake	Phase 1	72,000	2008	Operating	Opti Canada reports upgrader reliability is improving, expecting that capacity during ramp-up will be capable of processing all of the forecasted SAGD volumes.	Upgrader
	Phase 2	72,000	TBD	Approved	Sanction deferred until late 2009.	Upgrader
	Phase 3	72,000	TBD	Announced		Upgrader
	Phase 4	72,000	TBD	Announced		Upgrader
	Phase 5	72,000	TBD	Announced		Upgrader
	Phase 6	72,000	TBD	Announced		Upgrader
SUNCOR ENERGY						
	Base U1 and U2	281,000	1967	Operating	Suncor has agreed to merge with Petro-Canada, a transaction to be complete in Q3.	Upgrader
	Millennium Vacuum Unit	43,000	2005	Operating		Upgrader
	Millennium Coker Unit	116,000	2008	Operating		Upgrader
Voyageur	Phase 1	156,000	TBD	Approved	Voyageur construction being wound down to "safe mode," waiting out the economy.	Upgrader
	Phase 2	78,000	TBD	Approved		Upgrader
SYNCRUDE						
Mildred Lake	Stages 1 and 2	290,700	1978	Operating	Syncrude has been constrained in the supply of bitumen feed to the upgrader, so it has expanded its mining equipment fleet and hired additional people, reportedly now seeing improvements in exposed bitumen levels. It is implementing a targeted maintenance program under its master services agreement with Imperial/Exxon Mobil.	Upgrader
	Stage 3 Expansion	116,300	2006	Operating		Upgrader
	Stage 3 Debottleneck	46,500	TBD	Announced		Upgrader
	Stage 4 Expansion	139,500	TBD	Announced		Upgrader
VALUE CREATION						
Terre de Grace Upgrader	Pilot	10,000	TBD	Application		Upgrader
	Phase 1	2,000	TBD	Announced		Upgrader
	Phase 2	10,000	TBD	Announced		Upgrader
INDUSTRIAL HEARTLAND REGION – UPGRADING AND REFINING						
ATHABASCA OIL SANDS PROJECT						
Scotford Upgrader 1		155,000	2003	Operating	Shell says the project is at peak construction, with about 12,000 workers on the combined mine and upgrader sites.	Upgrader
	Expansion	90,000	2010	Under construction		Upgrader
Scotford Upgrader 2	Phase 1	100,000	TBD	Applied		Upgrader
	Phase 2	100,000	TBD	Application		Upgrader
	Phase 3	100,000	TBD	Application		
	Phase 4	100,000	TBD	Application		
BA ENERGY						
Heartland Upgrader	Phase 1	54,400	TBD	Approved	BA Energy owner Value Creation has shelved the Heartland Upgrader and says it will be up to four years before it will revisit the project. BA Energy has been granted court protection from its creditors.	Upgrader
	Phase 2	54,400	TBD	Approved		Upgrader
	Phase 3	54,400	TBD	Approved		Upgrader
NORTH WEST UPGRADING						
Upgrader	Phase 1	50,000	TBD	Approved	Site preparation complete. Focus is on commercial agreements.	Upgrader
	Phase 2	50,000	TBD	Approved		Upgrader
	Phase 3	50,000	TBD	Approved		Upgrader
PETRO-CANADA						
Fort Hills Upgrader	Phase 1	165,000	TBD	Approved	Construction decision on Fort Hills upgrader has been deferred.	Upgrader
	Phases 2 and 3	175,000	TBD	Approved	Petro-Canada has agreed to merge with Suncor, a transaction to be complete in Q3.	Upgrader
Strathcona Refinery Conversion		135,000	2008	Approved	Construction complete. Ramp-up continues.	Upgrader
STATOILHYDRO CANADA						
StatoilHydro Upgrader	Phase 1	75,000	TBD	Withdrawn		Upgrader
	Phase 2	175,000	TBD	Withdrawn		Upgrader
TOTAL E&P CANADA						
Northern Lights Upgrader	Phase 1	56,600	TBD	Withdrawn		Upgrader
	Phase 2	56,600	TBD	Withdrawn		Upgrader
Total Upgrader	Phase 1	150,000	TBD	Application		Upgrader
	Phase 2	95,000	TBD	Application		Upgrader
	Debottlenecking	50,000	TBD	Application		



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 $900 \text{ kg}/\text{m}^3$ 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 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
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- 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
- Alberta Environment www.environment.alberta.ca
- Alberta Research Council www.arc.ab.ca
- 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
- Lakeland Industry and Community Association www.lica.ca
- Natural Resources Conservation Board www.nrcb.gov.ab.ca
- Oil Sands Developers Group www.oilsandsdevelopers.ca
- Petroleum Technology Alliance Canada www.ptac.org

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