

# ALBERTA OIL SANDS INDUSTRY UPDATE

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Prepared for



# TABLE OF CONTENTS

	<b>Page</b>
1. INTRODUCTION .....	2
2. WHAT'S NEW?.....	3
3. OIL SANDS INDUSTRY OVERVIEW .....	7
3.1 BACKGROUND.....	7
3.2 OIL SANDS INDUSTRY ACTIVITIES.....	10
3.2.1 Athabasca Oil Sands.....	10
3.2.2 Cold Lake Oil Sands.....	21
3.2.3 Peace River Oil Sands .....	23
3.2.4 Neighboring Areas.....	24
3.2.5 Alberta's Industrial Heartland .....	25
3.3 FUTURE OIL SANDS EXPENDITURES.....	27
3.4 CO-OPERATIVE INITIATIVES.....	29
3.4.1 Wood Buffalo Region .....	29
3.4.2 Northeast Region .....	31
4. ECONOMIC REGIONS.....	32
4.1 THE WOOD BUFFALO REGION .....	32
4.1.1 Population Growth .....	32
4.1.2 Aboriginal People .....	32
4.1.3 Traffic.....	33
4.1.4 Housing .....	33
4.1.5 Infrastructure and Services .....	33
4.1.6 Environment .....	33
4.2 NORTHEAST REGION.....	34
4.3 SLAVE LAKE REGION .....	34
4.4 PEACE COUNTRY REGION .....	34
4.5 CAPITAL REGION.....	35

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## LIST OF TABLES

TABLE 1 Major Oil Sands Projects, Athabasca Oil Sands .....	17
TABLE 2 Major Oil Sands Projects, Cold Lake Oil Sands .....	22
TABLE 3 Major Oil Sands Projects, Peace River Oil Sands.....	24
TABLE 4 Major Oil Sands Projects, Neighbouring Areas .....	25
TABLE 5 Major Oil Sands Related Refining Projects, Alberta's Industrial Heartland.....	26

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## LIST OF FIGURES

FIGURE 1 Alberta Oil Sands Deposits .....	9
FIGURE 2 Oil Sands Industry Expenditure Forecast.....	28

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## 1. INTRODUCTION

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The *Oil Sands Industry Update*, which is published twice each year, provides an overview of the current status of the oil sands industry expansion in Alberta.

Oil sands industry expansion is a major driver of economic activity in Alberta. Oil sands projects account for 64% of the value of all major projects listed by Alberta Employment, Immigration and Industry in the December 2007 edition of its *Inventory of Alberta Major Projects*. During the operational phases of these projects (most of them have life spans of 30 years or more), they will contribute to the economic well being of the province through long-term employment creation, purchases of goods and services, and payment of taxes and royalties.

Oil sands industry expansion also places stresses on the social fabric of Alberta communities and on their biophysical environment. These stresses need to be managed and mitigated where possible. Mitigation involves the timely identification of the issues, information sharing among all stakeholders, and the initiation of appropriate and often multi-party initiatives.

The purpose of the *Oil Sands Industry Update* is to facilitate communication and cooperation between oil sands developers, the various departments of the Alberta government, and other stakeholders.

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## 2. WHAT'S NEW?

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### Construction Progress

Construction on major oil sands projects continues, with progress during the second half of 2007 measured as follows:

- **Petro-Canada**, along with partners **UTS Energy** and **Teck Cominco Ltd.** has begun initial site works for the 190,000 barrels per day (bpd) **Fort Hills Oil Sands Mining and Upgrading Project**.
- Construction of the Steam Assisted Gravity Drainage (SAGD) facilities of Phase 1 of the **Long Lake Project**, a joint-venture development between **OPTI Canada** and **Nexen Inc.**, is complete and steaming has commenced. First bitumen production has been delayed until mid-2008. Construction of the Phase 1 upgrader is nearing completion. Total design capacity of the first phase is approximately 60,000 bpd of synthetic crude oil (SCO).
- **ConocoPhillips** has begun production of Phase 1 of its **Surmont Project**, a multi-phased *in situ* project, ultimately designed to produce 100,000 bpd. The project is a 50/50 joint venture with **Total E&P Canada Ltd.** The first 25,000 bpd phase began producing in October 2007.
- **Devon Energy Corporation** has completed construction of its **Jackfish (Phase 1) SAGD Oil Sands Project**, with first steaming achieved in the third quarter of 2007. At full capacity, Phase 1 is expected to produce 35,000 bpd in 2008.
- **Husky Energy** has begun initial site works for Phase 1 of its **Sunrise Project**, a proposed *in situ* development located 60 kilometres to the northeast of Fort McMurray. The project is designed to produce 60,000 bpd in 2012, increasing eventually to 200,000 bpd.
- **Connacher Oil and Gas** has completed construction at Pod One as part of its **Great Divide SAGD Project**. First production was achieved in the fourth quarter of 2007, and the company plans to reach full 10,000 bpd capacity by late 2008.

### Regulatory Filings

- **Suncor Energy** filed for regulatory approval in July 2007 for the **Voyageur South Project**, a 120,000 bpd mine proposed to come on-stream by 2012.

- **Shell Canada Ltd.** filed for regulatory approval in December 2007 regarding two expansion projects: The **Jackpine Mine Expansion**, to produce 100,000 bpd by 2015, and the **Pierre River Mine Project**, to produce 200,000 bpd by 2018.
- **EnCana Energy** filed a regulatory application in October 2007 for the first 35,000 bpd phase of the **Borealis SAGD Project**, which has a total design capacity of 100,000 bpd.
- **Canadian Natural Resources (CNRL)** filed for regulatory approval in September 2007 for the **Kirby In Situ Project**, a 45,000 bpd SAGD project.
- **North American Oil Sands Corporation (NAOSC)**, a wholly owned subsidiary of **StatoilHydro ASA**, has filed a regulatory application in August 2007 to develop the **Kai Kos Dehseh Project**, an *in situ* development designed to produce 220,000 bpd by the end of the next decade. The company also filed an application in November 2007 to construct a 250,000 bpd **Upgrader** in Strathcona County.
- **Shell Canada Ltd.** filed a regulatory application in July 2007 to undertake a four staged expansion of the **Scotford Upgrader**, located in Strathcona County. The expansions are designed to increase production by 400,000 bpd by the year 2022.
- **TOTAL E&P Canada** filed for regulatory approval to construct a 200,000 bpd **Upgrader** in Strathcona County, with first production targeted by 2013 or 2014.

## Approvals

- **North West Upgrading Inc.** received regulatory approval in August 2007 for its **North West Upgrader Project**, located in Sturgeon County. The upgrader will be constructed in three phases to reach a total bitumen processing capacity of 150,000 bpd. Phase one construction is scheduled to begin in 2008, with a capacity of 50,000 bpd expected to come onstream in 2010 or 2011.

## Public Announcements

Several developers have publicly discussed plans for new developments or major expansions over the next ten to fifteen years:

- **CNRL** has announced a number of proposed projects as part of its long-term thermal development plan, which could add up to 200,000 bpd of additional production beyond previously announced projects.

- **Petrobank** has publicly disclosed its new **May River Project**, located adjacent to its **Whitesands Project**. Petrobank intends to begin with a 10,000 - 15,000 bpd commercial phase, with ultimate plans up to 100,000 bpd.
- **MEG Energy** has identified a new project that it plans to develop, entitled the **Surmont Project**, which is estimated to have a potential capacity of 50,000 bpd.
- **OilSands Quest Inc.** is moving towards commercialization of oil sands reserves discovered in northern Saskatchewan, just across the Alberta border.

## Other News

Other events of interest, such as new entrants and acquisitions, have taken place during the period covered by this update:

- **New Royalty Regime:** The Government of Alberta released its new royalty regime in October 2007, which it states represents a fundamental change to current royalty structures. It is expected to increase royalty revenues by approximately 20% in 2010.

The new regime represents a number of changes to the oil sands sector, including: changes to capital cost allowances, tighter rules regarding project definitions and 'ring-fencing', the introduction of a bitumen valuation methodology and the option of the government receiving a bitumen royalty in-kind versus cash royalties.

In terms of royalty calculations, the government increases its royalty share by introducing price-sensitive formulas at both the pre- and post-payout stages. The base royalty rate increases from 1% to up to 9%, based on how the market price of crude ranges between \$55 to \$120 per barrel. The net royalty payout starts at 25% and increases for every dollar that oil is priced above \$55, topping out at 40% at \$120 per barrel or higher. The Province will negotiate with Syncrude and Suncor directly to reach an agreement on transitioning to this new royalty framework from their existing agreements, which are in place until 2015.

The bitumen royalty in-kind option addresses the government's vision for capturing a higher value from the bitumen resource by moving up the value chain to produce refined petroleum and petrochemical products in Alberta.

- **Husky Energy** announced its intentions to form a joint venture partnership with **British Petroleum Plc (BP)**, providing BP with an entry into the oil sands and allowing Husky access to a 155,000 bpd refinery in Toledo, Ohio. The partnership intends to retool the Toledo refinery to process bitumen. This is in addition to the processing capability associated with the Valero refinery that Husky purchased earlier in 2007. Further study of expanding the **Lloydminster Upgrader** has been suspended.
- **Western Oil Sands** was purchased by **Marathon Oil Corporation** in October 2007. Through this deal, Marathon acquires interest in the Athabasca Oil Sands Project and the Ells River Project, as well as direct ownership of five other leases with *in situ* development potential.
- The Koreans have entered the Alberta oil sands, through the purchase of the **BlackGold** lease by **KNOC, the Korea National Oil Corp.** KNOC plans to eventually achieve production of 30,000 bpd.
- **Petrobank Energy** has entered into its first licensing agreement regarding its THAI thermal recovery technology with **Duvernay Oil Corp.** The two companies will apply the technology to increase recovery rates from the **Dawson Property**, located in the Peace River region.

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## 3. OIL SANDS INDUSTRY OVERVIEW

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### 3.1 BACKGROUND

Alberta has massive deposits of oil sands, a mixture of sand, clay, water, and bitumen – a black, asphalt-like hydrocarbon as thick as molasses. These deposits, which account for the majority of the province’s crude oil reserves, are located in three geological regions as defined by the Energy Resources Conservation Board (formerly the AEUB): Athabasca, Cold Lake, and Peace River. A map denoting the three regions and a listing of active projects can be found at:

[www.energy.gov.ab.ca/LandAccess/pdfs/OilSands\\_Projects.pdf](http://www.energy.gov.ab.ca/LandAccess/pdfs/OilSands_Projects.pdf)

In this report, we discuss the oil sands industry by both the three geological regions, previously mentioned, and economic indicator regions. The economic indicator regions include: the Wood Buffalo Region, with Fort McMurray as its population centre, the Slave Lake Region that includes the Wabasca Desmarais area and has the town of Slave Lake as its population centre, the Peace Region with the town of Peace River as the population centre and the Northeast Region that includes the deeper oil sands deposits in the Lloydminster and Cold Lake areas with the cities of Cold Lake and Lloydminster as the largest population centres.

The Capital Region includes Alberta’s Industrial Heartland area in the eastern portion of the region where many of the heavy oil upgrading projects are located.

There are essentially two approaches to bitumen production: mining and *in situ*.

- The mining approach is employed in the Athabasca deposits to the north of Fort McMurray. It exposes the oil sands by stripping the overburden, and then removes the sands using truck and shovel mining methods. The extraction process separates the bitumen from the sands through a process that relies on the addition of warm water and the agitation of the resulting slurry.
- The *in situ* approach removes the bitumen from the sand while the oil sands deposit is still in place underground. The simplest method is primary or “cold” production, which is employed in reservoirs where the oil sands will flow to the surface of wells without the introduction of heat. Many *in situ* projects require the addition of heat to make the bitumen more fluid and allowing it to be pumped up to the surface. Some *in situ* projects use a cyclic steam stimulation (CSS) process, in which steam is injected into the oil sands via vertical wells and the liquefied bitumen is subsequently pumped to the surface using the same well. Other *in situ* projects use variations of the steam assisted gravity drainage (SAGD) process. This process consists of adding steam to the oil sands using a

horizontal well and simultaneously lifting the liquefied bitumen using another horizontal well located just below the steam injection well. Other emerging approaches to *in situ* production include the vapour recovery extraction method (VAPEX), which involves the use of solvents as a supplement or alternative to steam and underground combustion, which is being piloted by Petrobank Energy and Resources (THAI Process).

The Province's Energy Resources Conservation Board (formally the Energy and Utilities Board) indicates in its 2006 Year in Review ([www.ercb.ca/docs/products/STs/st41-2007.pdf](http://www.ercb.ca/docs/products/STs/st41-2007.pdf)) that bitumen production in 2006 reached 1.255 million bpd, up from 1.06 million bpd in 2005. Mining operations accounted for 61% of bitumen output and *in situ* for the remaining 39%.

The bitumen obtained through either mining or *in situ* production methods can be used directly for asphalt, diluted and transported by pipeline to refineries for processing, or upgraded into synthetic crude oil (SCO). SCO itself is a feedstock for refineries, where it can be further processed into gasoline, aviation fuel, or other products.

The commercial development of Alberta's mineable oil sands started in the late 1960s when Great Canadian Oil Sands (now Suncor Energy) built a mine and upgrader north of Fort McMurray. In the 1970s, the Syncrude consortium built another plant in the area. Over the years these facilities have been upgraded, debottlenecked, and expanded on an incremental basis. In early 2003 the Athabasca Oil Sands Project – a joint venture of Shell Canada, Chevron Canada Resources, and Western Oil Sands (now Marathon Oil) – commenced operations. Numerous other projects are in the regulatory approval process, while others have either broken ground or are nearing first production.

Commercial *in situ* production commenced in 1985 when Imperial Oil opened its Cold Lake Production Project and B.P. and Petro-Canada initiated operations at Wolf Lake, also in the Cold Lake region. In the following year, Shell commenced operations at its Peace River Project. Since then, Encana, Canadian Natural, Petro Canada and others have started a number of *in situ* projects in the Athabasca, Cold Lake, and Peace River deposits.

The provincial upgrading capacity is growing, with the existing Syncrude, Suncor, Husky and Athabasca Oil Sands Project upgraders all expanding and/or debottlenecking and three new ones under construction: Canadian Natural Horizon, Opti-Nexen Long Lake and the BA Heartland Upgrader. Additional upgrader expansions and new facilities are being planned, particularly in the Alberta's Industrial Heartland region near Edmonton.

**FIGURE 1 ALBERTA OIL SANDS DEPOSITS**



Source: Alberta Energy, Alberta's Oil Sands - Overview, 2006

## 3.2 OIL SANDS INDUSTRY ACTIVITIES

The following information, including production levels, is drawn from publicly available sources, including project applications, company press releases, and financial reports. Production information may refer to bitumen or synthetic crude oil, depending on the project.

The oil sands industry activities are presented by geological (oil sands deposit) region, and in the case of Capital Region upgraders, by economic region.

### 3.2.1 Athabasca Oil Sands

Industry activities in the Athabasca oil sands can be summarized as follows:

- **Suncor Energy** reported third quarter 2007 average synthetic crude production of 239,100 bpd, down from the third quarter 2006 average of 242,800 bpd. Work continues on the next stage of expansion including the addition of a third coker to the Millennium Upgrader, which will serve to increase oil sands production to 350,000 bpd in 2008 or 2009. The project is on schedule and budget, with tie-in activities substantially complete. On the *in situ* side, work continues on the **Firebag** Phase 3 expansion. Firebag Phase 4-6 is currently under regulatory review, with a regulatory decision targeted for early 2008.

Suncor received approval for its planned **Voyageur Project** in October 2006, which consists of construction of a third upgrader and the opening of the Steepbank North Mine Extension. The company has released plans for a further expansion project, called **Voyageur South**, which consists of a 120,000 bpd mine, located immediately south of the proposed Voyageur upgrader. Voyageur South is part of the company's overall strategy of achieving an output of 500,000-550,000 bpd by 2010-2012. The company filed for regulatory approval of the Voyageur South Project in July 2007.

- **Synchrude Canada Ltd.** continues efforts in integrating **Stage 3 facilities** into its overall operations. These facilities are designed to increase the company's production capacity to 350,000 bpd. Two incidents in the second-half of the year involving the new coker 8-3 constrained output, with the company estimating average production of 304,000 bpd for 2007. This does reflect an increase over the average production level of 263,000 bpd, as recorded in the second quarter of 2007.

- The **Athabasca Oil Sands Project (AOSP)** – a joint venture between **Royal Dutch Shell, Chevron Canada Resources, and Marathon Oil** (formerly **Western Oil Sands**) – consists of a number of upstream mining projects and downstream upgrading facilities.

Albian Sands Energy Inc, a company owned by the AOSP partners, operates the **Muskeg River Mine**, which achieved third quarter production of 136,000 bpd in 2007, down from 163,000 bpd during the same period last year. Construction is underway on the **Muskeg River Mine (MRM) Expansion Project**, which is set to add an additional 100,000 bpd by 2010.

AOSP is also moving ahead on the first of the two-phased **Jackpine Mine Project**, a mining and extraction facility to be located east of the Muskeg River Mine. The Jackpine Mine project has a design capacity of 200,000 bpd.

AOSP filed regulatory applications regarding further upstream expansion plans, in the form of the **Jackpine Mine Expansion Project** and the **Pierre River Mine Project**. The Jackpine expansion represents an additional 100,000 bpd, while the Pierre River mine is designed to produce 200,000 bpd. The joint venture filed for regulatory approval in December 2007, with a target construction start date of 2009/10.

Altogether, AOSP's upstream development plans amount to a combined production of 770,000 bpd, which based on current industry capacity, would make it the largest oil sands producer. In order to accommodate this volume of bitumen, the **Shell Scotford Upgrader** in Fort Saskatchewan is currently undergoing and planning for further expansions (see section 2.2.4 for more details).

- **Petro-Canada** reported average bitumen production of 22,000 bpd during the third quarter of 2007 at its **Mackay River *in situ*** project, down from 25,000 bpd during the same period in the previous year. The Project has a design capacity of 33,000 bpd. The company is anticipating regulatory approval in the first quarter of 2008 for the **Mackay River Expansion Project**. The expansion is designed to increase the production capacity of the facility by 40,000 bpd.

Petro-Canada, along with partners **UTS Energy** and **Teck Cominco Ltd.**, is proceeding with plans to develop **Fort Hills Oil Sands Mining and Upgrading Project**. In September 2007, UTS sold 5% of its interest each to Petro-Canada and Teck Cominco. Under the terms of the partnership agreement, Petro-Canada holds a 60% interest in the project and is designated as the operator. The company and its partners have

regulatory approval for production of up to 190,000 bpd of bitumen, as well as an amendment that enables them to change the timeline and scope of the first phase of the Project. The partnership conducted further resource delineation and has begun site clearing.

- **EnCana Energy's *in situ* SAGD Christina Lake Thermal Project** is currently producing in the 6,000 bpd range, consistent with production throughout 2007. Production is shared 50/50 with **ConocoPhillips** as part of their heavy oil partnership. The design capacity of Phase 1 is 10,000 bpd, and expansion is currently underway to bring production up to 18,000 bpd by 2008. The revised long term target is for the facility to produce 190,000 bpd by 2015.

Encana filed a regulatory application in October 2007 for the first phase of its proposed **Borealis SAGD Project**. Located north of Fort McMurray, phase 1 of the Borealis project is to produce 35,000 bpd by 2015. Peak production, involving subsequent phases, is targeted at 100,000 bpd. Total planned developments in the Wood Buffalo and Cold Lake area (see below) and including those involved in the ConocoPhillips joint venture, amount to a targeted output for Encana of 500,000 bpd by the end of the next decade.

- **ConocoPhillips** has begun production of Phase 1 of its **Surmont Project**, a multi-phased *in situ* project, ultimately designed to produce 100,000 bpd. The project is a 50/50 joint venture with **Total E&P Canada Ltd.** The first 25,000 bpd phase began producing in October 2007 and is scheduled to achieve full production by 2012. The partnership has combined the original phases 2-4 together, submitting a regulatory application for a combined 75,000 bpd second phase. Subject to approval, Phase 2 would begin construction in 2009. The partnership also speaks of a possible third phase, which could see production levels reach 200,000 bpd in the long term.
- **Japan Canada Oil Sands (JACOS)** operates a SAGD Pilot Plant at its Hangingstone lease. Current production is averaging 8,000-8,500 bpd. The company intends to submit an application for a 30,000 bpd commercial project on the Hangingstone lease. The timing of the submission is yet to be determined.
- Progress continues on Phase 1 of the **Long Lake Project**, an integrated SAGD *in situ* project with upgrading facilities. The 60,000 bpd facility, a joint venture between **Nexen Inc.** and **Opti Canada**, is now steaming on all well-pads. The target date of first oil has been delayed by one year, and is now expected by mid-2008.

Opti and Nexen have regulatory approval for a second upgrader phase with a design capacity of an additional 70,000 bpd. The companies have stated that they will likely wait until 2008 before making a decision on proceeding with the expansion. OPTI and Nexen are moving forward with plans to reach 240,000 bpd production over the next decade by means of a staged development. Each future phase is planned to be of a similar size and design to the Long Lake Project and anticipated to consist of integrated SAGD and Upgrader elements.

- Construction continues on the **Horizon Project**, an integrated mine and upgrader being developed by **Canadian Natural Resources Ltd. (CNRL)**. Production from the 110,000 bpd Phase 1 is targeted to begin in the third quarter of 2008. CNRL has indicated its intention to carry on with development plans for the combined Phases 2/3, indicating that site works and major long-lead procurements have already been undertaken. Staged production associated with Phase 2/3 is expected to increase production to levels between 232,000 to 250,000 bpd by 2013.

The company has previously unveiled its long-term vision of the Horizon Project, which includes an additional two phases that would increase capacity of the Horizon Project to approximately 500,000 over the next 10-15 years. The company has not yet pursued regulatory approval for this portion of their long-term plan, and has indicated a potential slow down in their expansion schedule in light of the new royalty regime.

CNRL filed a regulatory application in September 2007 for the **Kirby In-Situ Project**, which consists of a 45,000 bpd SAGD bitumen processing facility to be located close to the southern boundary of the Regional Municipality of Wood Buffalo (RMWB). The company has announced a number of other projects, associated with their thermal growth plan, which looks to develop approximately an additional 200,000 bpd in the southern RMWB.

- **Devon Energy Corporation** has completed construction of its **Jackfish (Phase 1) SAGD Oil Sands Project**, with first steaming achieved in the third quarter of 2007. Phase 1 is expected to reach full capacity in 2008, producing 35,000 bpd. Devon has filed a regulatory application for the **Jackfish 2 (J2) Project**, a 35,000 bpd expansion, proposed to come on-stream in 2010.
- **Synenco Energy** joined with **Sinopec** to form the **Northern Lights Partnership** for the purpose of developing the **Northern Lights Project**. The proposed project consists of a mine and extraction facility located approximately 80 kilometres north of Fort McMurray, and an upgrader located in Sturgeon County near Edmonton.

The upgrader project has currently been put on hold in the regulatory process as the company focuses on the upstream project. A regulatory application for the mine was filed in 2006. One option being investigated in terms of developing the 100,000 bpd mine project includes fabricating significant portions of the mining and extraction modules offshore and shipping them to the project site using a northern river/lake route.

- **Imperial Oil** and partner **ExxonMobil** are working together in developing the **Kearl Oil Sands Project**, consisting of a three-phased 300,000 bpd mine. The Project received regulatory approval in February of 2007. Imperial expects to make a funding decision on whether to proceed with the project by the end of 2008. If approved, first production would be targeted by 2011 or 2012.
- **Husky Energy** has completed front-end engineering and design work this year on its **Sunrise Project**, a proposed *in situ* development located 60 kilometres to the northeast of Fort McMurray. The project is designed to produce 60,000 bpd in 2012, increasing eventually to 200,000 bpd. Initial site works for Phase 1 have begun and are scheduled to continue into the second quarter of 2008.

In December 2007 Husky announced intentions to form an oil sands joint venture with **British Petroleum Plc (BP)**, providing Husky with 50% of BP's 155,000 bpd refinery in Toledo, Ohio. The alliance states that the refinery will be retooled to process bitumen. The acquisition of this refinery is additional to Husky's Lima, Ohio 160,000 bpd refinery, which was purchased from **Valero Energy Corp** earlier in 2007. The Lima refinery will be retrofitted to process heavy crude and bitumen from Husky's operations in Alberta and Saskatchewan.

Husky has further oil sands projects in the early stages of development. A regulatory application for a 10,000 bpd pilot plant for the **Caribou Project** was filed in 2006, while conceptual planning is underway for the **Saleski** lease.

- **Total E&P Canada Ltd.** together with **Enerplus** are developing the **Joslyn Oil Sands Project**, which has both a mine and *in situ* component. The SAGD *in situ* component began commercial production in November 2006 and targets a production level of 10,000 bpd by 2008 or 2009, with an additional production of 15,000 bpd planned.

In 2006, **Deer Creek Energy Ltd. (DCEL)** – a fully owned subsidiary of Total – submitted a regulatory application for the initial 100,000 bpd phase of the **Joslyn North Mine Project**. The application, which calls for startup in 2012 or 2013, is still under review. DCEL is in the project definition

phase for a second mining project located on the southern part of the Joslyn lease. The south mine would likely produce 100,000 bpd, with start-up projected four years after the Joslyn North Mine is in operation.

- **Chevron Corp.** is planning to further delineate the resource associated with the **Ells River Project**, located approximately 50 kilometres northwest of Fort McMurray. Co-developers **Marathon Oil Corporation** and **Shell Canada** have both exercised options to participate in this project. Early estimates call for 100,000 bpd staged production by the middle of the next decade. Chevron is currently investigating extraction technologies to achieve *in situ* production.
- **Western Oil Sands** was purchased by **Marathon Oil Corporation** in October 2007. Through this deal, Marathon acquires interest in the Athabasca Oil Sands Project and the Ells River Project, as well as direct ownership of five other leases with *in situ* development potential.
- **Petrobank** is continuing combustion operations associated with the **Whitesands Project**, the first field-scale application of the Toe-to-Heel Air Injection (THAI) *in situ* heavy oil recovery technology. Production from the first three sets of well pairs was expected to reach full capacity by the end of 2007. The company is awaiting regulatory approval to further increase pilot phase production to 10,000 bpd.

Petrobank has publicly disclosed its new **May River Project**, located adjacent to the Whitesands Project. May River is to consist of an initial 10,000 – 15,000 bpd phase, followed by future phases to ultimately bring Whitesands production up to 100,000 bpd. The company plans to file for regulatory approval for the first phase by mid-2008.

- **MEG Energy** has begun construction of a 3,000 bpd bitumen SAGD pilot facility, the first phase of its **Christina Lake Regional Project**. The company has also applied for regulatory approval for the second or commercial phase of the Christina Lake project, which is designed to produce 22,000 bpd. The company has stated that it could ultimately see production levels of 210,000 bpd for the Christina Lake Project.

MEG Energy is also targeting to file a regulatory application in late 2008 for its **Surmont Project**, which is estimated to have a total production capacity of 50,000 bpd.

- **Connacher Oil and Gas** has completed construction at Pod One as part of its **Great Divide SAGD Project**. First production was achieved in the fourth quarter of 2007, and the company plans to reach full 10,000 bpd capacity by late 2008.

Connacher has filed for regulatory approval for its Algar Project, which represents the second stage of their Great Divide development. Similar to the project underway, Algar is a 10,000 bpd *in situ* project. If approved, construction would likely be scheduled to begin in 2008.

- **North American Oil Sands Corporation (NAOSC)**, a wholly owned subsidiary of **StatoilHydro ASA** of Norway, filed a regulatory application in August 2007 to develop the **Kai Kos Dehseh Project**, an *in situ* development located 75 kilometres south of Fort McMurray. Construction is already underway for the 10,000 bpd Leismer demonstration plant, which is targeted to reach full production by 2010. Subject to regulatory approval, four subsequent phases of commercial production will bring production up to 220,000 bpd by the end of the next decade. The company has also filed an application to construct an upgrader in Strathcona County to process the bitumen.
- **Value Creation Inc.** has announced plans to develop an upstream oil sands extraction and upgrading project. The **Terre de Grace Project**, located to the northwest of Fort McMurray, will be developed in phases of 40,000 – 80,000 bpd each, with potential to grow up to 300,000 bpd. First production is scheduled to come on-stream by 2011. The company has applied for regulatory approval to construct a 10,000 bpd test facility at the Terre de Grace site and is working towards filing an application for the larger project in either late 2008 or early 2009.
- **UTS Energy Corp.** is pursuing other developments besides the Fort Hills Project. Alongside its partner **Teck Cominco**, UTS is continuing to delineate the resources associated with a number of leases held on the west side of the Athabasca, north of Fort MacKay. Initial estimates for the **Lease 14 Project** indicate a potential capacity of 50,000 bpd, and estimates are being generated as well regarding the potential for the **Lease 13 Project**.
- **KNOC (Korea National Oil Corp.)** has entered the Alberta oil sands through purchasing the **BlackGold** concession from Newmont Mining Corp in 2006. The property is situated in the Christina Lake region of southern RMWB. KNOC plans to develop a 10,000 bpd first phase by 2010, with eventual plans to increase production to 30,000 bpd.
- **SURE Northern Energy Ltd.**, a subsidiary company of **Shell EP Americas Unit**, has been formed to evaluate and potentially develop heavy oil resources in Canada. In May 2006, the company acquired ten properties in the Wabasca-Desmarais region of the province, west of Fort McMurray. The company states that these properties will provide a good opportunity to assess new and emerging technologies.

- **EnCana Energy** produced 24,000 bpd of bitumen from its *in situ* primary (cold) production **Pelican Lake Project** during the third quarter of 2007, up slightly from 23,000 bpd recorded during the same period in 2006. The Pelican Lake project is located in the Wabasca-Desmarais region of Alberta.
- **Canadian Natural Resources Limited** averaged 35,000 bpd of production from its **Pelican Lake Project** during the third quarter of 2007, up from 30,000 bpd during the same period last year. The company is piloting enhanced oil recovery techniques for this field and anticipates production increases to 45,000 bpd by 2010.

Table 1 provides a summary of the major oil sands projects in the Athabasca Oil sands.

**TABLE 1 MAJOR OIL SANDS PROJECTS, ATHABASCA OIL SANDS**

Organization	Project	Type	Status
Suncor <a href="http://www.suncor.com/">www.suncor.com/</a>	Steepbank and Millennium Mines	Mine/ Upgrader	Producing 239K bpd during Q3 of 2007.
	Millennium Coker Unit Expansion, increasing production to 350,000 bpd by 2008.	Coker Unit Expansion	Regulatory approval obtained. Construction near completion. Tie-in activities to the Millennium Upgrader substantially complete.
	Firebag 1-4	<i>In situ</i> project with 4 phases	Phase 3 under construction.
	Firebag 5-6	<i>In situ</i> project	Application in process.
	Voyageur Project	Mine/ Upgrader	Regulatory approval received in October 2006.
	Voyageur South Project (120K bpd).	Mine	Regulatory application filed in July 2007.
Syncrude <a href="http://www.syncrude.ca/">www.syncrude.ca/</a>	Syncrude current operations, including North Mine, Aurora Mine Train 1 and Train 2, and UE 1.	Mine/Upgrader	Producing 304K bpd YTD 2007.
	Syncrude 21, Stage 3 debottleneck	Upgrader	Work in progress for additional 30-50K bpd SCO output.
	Syncrude 21, Stage 4: Aurora Mine Train 3 and Upgrader Expansion 2	Mine/Upgrader	EUB approval in place for Aurora Train 3, construction planned for 2012 to 2017.
Athabasca Oil Sands Project Shell <a href="http://www.shell.com/">www.shell.com/</a> Chevron <a href="http://www.chevron.com/">www.chevron.com/</a> Marathon Oil <a href="http://www.marathon.com/">www.marathon.com/</a> Albian Sands <a href="http://www.albiansands.com/">www.albiansands.com/</a>	Muskeg River Mine (150K bpd capacity)	Mine and Extraction Plant	Producing 136K bpd during Q3 2007.

Organization	Project	Type	Status
	Muskeg River Mine Expansion (designed to increase production by 120K bpd 2009/10)	Mine and Extraction Plant	Under construction.
	Jackpine Mine, (with design capacity of 200K bpd)	Mine and Extraction Plant	Phase1 is under construction.
Shell <a href="http://www.shell.com/">www.shell.com/</a>	Jackpine Mine Expansion (with design capacity of 100K bpd)	Mine and Extraction Plant	Regulatory application filed December 2007. Tentatively planned for the 2010-2015 period.
Shell <a href="http://www.shell.com/">www.shell.com/</a>	Pierre River Mine Project (design capacity 200K bpd)	Mine and Extraction Plant	Regulatory application filed December 2007. Tentatively planned for the 2015 to 2018 period.
Petro-Canada <a href="http://www.petro-canada.ca/">www.petro-canada.ca/</a>	MacKay River (with design capacity of 33K bpd)	<i>In situ</i> SAGD	Production averaged 22K bpd during Q3 2007.
	MacKay River Expansion Project (with design capacity of 40K bpd)	<i>In situ</i> SAGD	Regulatory application filed.
	Meadow Creek	<i>In situ</i> SAGD	Application approved; Project under review.
	Lewis	<i>In situ</i> SAGD	Disclosed.
Petro-Canada <a href="http://www.petro-canada.ca/">www.petro-canada.ca/</a> UTS Energy Corp. <a href="http://www.uts.ca/">www.uts.ca/</a> Teck Cominco Ltd <a href="http://www.teckcominco.com/">www.teckcominco.com/</a>	Fort Hills (with Phase 1 production capacity of 100K bpd and total production capacity of 190K)	Mine and Extraction Plant	Engineering work is proceeding along with initial construction works. Phase 1 production of 100K bpd anticipated by 2011.
EnCana Energy <a href="http://www.encana.com/">www.encana.com/</a> ConocoPhillips <a href="http://www.conocophillips.com/">www.conocophillips.com/</a>	Christina Lake (with total design capacity of 60K bpd)	<i>In situ</i> SAGD	Currently producing 6K bpd, with production expected to increase to 18K bpd by the first quarter of 2008.
	Christina Lake Expansion (with potential to bring total Christina Lake production to 150K bpd)	<i>In situ</i> SAGD	Publicly discussed, with production potential of 150K bpd possible by 2015.
	Borealis (with production potential of 100K bpd)	<i>In situ</i> SAGD	Regulatory application for 35K bpd Ph 1 filed October 2007. Total planned production of 100K bpd by 2015.
ConocoPhillips <a href="http://www.conocophillips.com/">www.conocophillips.com/</a> Total E&P Canada Ltd. <a href="http://www.total-ep-canada.com/">www.total-ep-canada.com/</a>	Surmont (25K bpd Phase 1 and 75 K bpd Phase 2)	<i>In situ</i> SAGD	Phase 1 complete, with first production reached end of 2007. Ph 2, subject to regulatory approval, to begin construction in 2009.
Japan Canada Oil Sands (JACOS) <a href="http://www.jacos.com/Company.htm">www.jacos.com/Company.htm</a>	Hangingsstone Pilot	<i>In situ</i> SAGD	Currently producing 8K-9K bpd.
	Hangingsstone Commercial Project (with design capacity of 30K bpd)	<i>In situ</i> SAGD	Disclosed, with timing of application uncertain.
OPTI Canada and Nexen <a href="http://www.longlake.ca/">www.longlake.ca/</a>	Long Lake Phase 1 (design capacity of 70K bpd)	<i>In situ</i> SAGD with Upgrader	Steaming in progress, with first production delayed to mid-2008.
	Long Lake Upgrader Phase 2 (design capacity of 70K bpd)	Upgrader	Regulatory approval in place.

Organization	Project	Type	Status
	Long Lake SAGD Phase 2 (design capacity of 70K bpd)	<i>In situ</i> SAGD	Regulatory application in progress.
	Long Lake Phase 3 and 4	<i>In situ</i> SAGD	Application for Phases 3 & 4 expected to follow earlier phases' regulatory approval filing by approximately 24 months
Canadian Natural Resources <a href="http://www.cnrl.com/">www.cnrl.com/</a>	Horizon, Phase 1 (with design capacity of 110K bpd)	Mine/Upgrader	Construction in progress, with initial production targeted for Q3 2008.
	Horizon, Phase 2 (designed to increase Horizon production capacity to 155K bpd by 2010)	Mine/Upgrader	Regulatory approval in place.
	Horizon, Phase 3 (designed to increase Horizon production capacity to 232K bpd by 2013)	Mine/Upgrader	Regulatory approval in place. Company examining potential of combining Phases 2 & 3 for joint operation by 2013.
	Horizon, Phases 4 & 5 (designed to increase total Horizon Project production to over 500K bpd)	Mine/Upgrader	Publicly discussed, with total Horizon Project production of 500K anticipated in 2015-2020 period.
	Kirby (with design capacity of 45K bpd)	<i>In situ</i> SAGD	Regulatory application filed in September 2007, first production in 2011.
	Various other projects announced (approx. capacity 200K bpd)	<i>In situ</i> SAGD	Announced.
Devon Energy Corporation <a href="http://www.devonenergy.com/">www.devonenergy.com/</a>	Jackfish, Phase 1 (capacity of 35K bpd)	<i>In situ</i> SAGD	Construction completed, targeting full production in 2008.
	Jackfish, Phase 2 (capacity of 35K bpd)	<i>In situ</i> SAGD	Application filed late 2006. Production planned by 2010.
Synenco Energy <a href="http://www.synenco.com/">www.synenco.com/</a>	Northern Lights, Phases 1 and 2 (with production capacity of 50K bpd each) Joint project with Sinopec.	Mine and Extraction Facility. Proposed upgrader in Sturgeon County on hold.	Application filed. Construction scheduled for 2008, first production date unknown.
Fort McKay First Nation <a href="http://www.fortmckay.com/">www.fortmckay.com/</a>	Fort McKay Mining Project	Mine	Potential mining development on Fort McKay reserve lands
Imperial Oil <a href="http://www.imperialoil.ca">www.imperialoil.ca</a>	Kearl (3 phases with total design capacity of 300K bpd)	Mine and Extraction Facility	Received regulatory approval. Construction planned for 2009-2018 with first production scheduled for 2011/12.
Husky Energy <a href="http://www.husky-oil.com/">www.husky-oil.com/</a> British Petroleum Plc <a href="http://www.bp.com/">www.bp.com/</a>	Sunrise (with design capacity of 200K bpd) Linked with Lima and Toledo, Ohio refineries.	<i>In situ</i> SAGD	60K bpd Phase 1 under construction, planned completion by 2012.
	Saleski and Caribou	<i>In situ</i> SAGD	Regulatory application for Caribou 10,000 bpd pilot plant filed.

Organization	Project	Type	Status
Total E&P Canada Ltd. <a href="http://www.total-ep-canada.com/">www.total-ep-canada.com/</a> Enerplus Resources Fund <a href="http://www.enerplus.com/">www.enerplus.com/</a>	Joslyn SAGD Phase 1&2 (with design capacity of 12K bpd)	<i>In situ</i> SAGD	Production of 10K bpd targeted by 2008/09.
	Joslyn SAGD Phase 3A (with design capacity of additional 15K bpd)	<i>In situ</i> SAGD	Application filed in early 2005.
	Joslyn Mine Phase 1 (with design capacity of 100K bpd)	Mine/Extraction Facility	Application under review. Production targeted for 2012/13.
	Joslyn Mine Phase 2 (with design capacity of 100K bpd)	Mine/Extraction Facility	Publicly Announced. Production targeted for 4 years after Ph 1.
Chevron Corp. <a href="http://www.chevron.com/">www.chevron.com/</a> Shell <a href="http://www.shell.com/">www.shell.com/</a> Marathon Oil <a href="http://www.marathon.com/">www.marathon.com/</a>	Ells River (capacity estimate of 100K bpd)	<i>In situ</i> SAGD	Resource delineation underway.
Marathon Oil (formerly Western Oil Sands) <a href="http://www.marathon.com/">www.marathon.com/</a>	In-Situ Project (5 leases)	<i>In situ</i> SAGD	Resource delineation underway.
Petrobank Energy <a href="http://www.petrobank.com/">www.petrobank.com/</a>	Whitesands Pilot Project (with design capacity of 18K bpd of partially upgraded bitumen)	<i>In situ</i> THAI (Toe-To-Heel Air Injection) technology tested	First production underway. Awaiting regulatory approval to expand to 10K bpd.
	May River Project Phase 1 (10-15K bpd); potential capacity of 100K bpd.	<i>In situ</i> SAGD	Publicly Disclosed.
MEG Energy <a href="http://www.megenergy.com/">www.megenergy.com/</a>	Christina Lake Regional Project Phase 1 (with design capacity of 3 K bpd)	<i>In situ</i> SAGD Pilot	Construction in progress.
	Christina Lake Regional Project Phase 2 (with design capacity of 22K bpd) Potential total capacity of 210K bpd.	<i>In situ</i> SAGD	Application for regulatory approval submitted.
	Surmont Project (potential capacity of 50K bpd)	<i>In situ</i> SAGD	Target to file for regulatory approval by end of 2008.
Connacher Oil and Gas <a href="http://www.connacheroil.com/">www.connacheroil.com/</a>	Great Divide (with design capacity of 10K bpd)	<i>In situ</i> SAGD	First production achieved in Q4 2007.
	Algar Project (with design capacity of 10K bpd)	<i>In situ</i> SAGD	Regulatory approval application filed.
Statoil Canada <a href="http://www.statoil.com/">www.statoil.com/</a> North American Oil Sands Corp. <a href="http://www.naosc.com/">www.naosc.com/</a>	Kai Kos Dehseh Ph 1 (Leismer Pilot 10K bpd); full project capacity of 220K bpd.	<i>In situ</i> SAGD	Regulatory application filed in August 2007 for full 220K bpd project. Five phased construction, with first 10k bpd production planned by 2010; full build-out end of next decade.

Organization	Project	Type	Status
The Value Creation Group <a href="http://www.vctek.com/">www.vctek.com/</a>	Terre de Grace Project Pilot phase 10K bpd; subsequent phases of 40- 80K bpd; ultimate potential 300K bpd.	<i>In situ</i> SAGD and Upgrading	Disclosed, regulatory application process initiated. Pilot project application filed December 2007.
UTS Energy Corp. <a href="http://www.uts.ca/">www.uts.ca/</a> Teck Cominco Ltd <a href="http://www.teckcominco.com/">www.teckcominco.com/</a>	Lease 14 / Lease 311 Project (initial estimate 50,00 bpd)	Mine	Resource delineation work ongoing.
KNOC (Korea National Oil Corp). <a href="http://www.knoc.co.kr/">www.knoc.co.kr/</a>	BlackGold Project (10K bpd Phase 1; capacity 30K bpd)	<i>In situ</i>	Resource delineation work ongoing.
SURE Northern Energy Ltd. (Subsidiary of Royal Dutch Shell)	Unnamed. Wabasca- Desmarais region.	<i>In situ</i>	Initial stage of technology testing.
EnCana Energy <a href="http://www.encana.com">www.encana.com</a> ConocoPhillips <a href="http://www.conocophillips.com/">www.conocophillips.com/</a>	Pelican Lake	<i>In situ</i> Primary (Cold)	Producing an average of 24K bpd during Q3 of 2007.
Canadian Natural Resources <a href="http://www.cnrl.com/">www.cnrl.com/</a>	Pelican Lake	<i>In situ</i> Primary (Cold)	Producing an average of 35K bpd during Q3 2007.

### 3.2.2 Cold Lake Oil Sands

Industry activities in the Cold Lake Oil sands can be summarized as follows:

- **Imperial Oil** recorded gross production levels of 160,000 bpd of bitumen from its **Cold Lake Production Project** during the third quarter of 2007, versus 158,000 bpd during the same period in 2006. Imperial is continuing with its phased development plans for the Cold Lake project. The company has obtained approval for two additional phases of the Cold Lake expansion, as follows:
  - the **Nabiye Project (Phases 14-16)**, a Cyclic Steam Stimulation (CSS) project expected to increase production capacity by 30,000 bpd; and
  - the **Mahihkan North Project (an extension of Phases 9 and 10)**, which is designed to replace existing production.

Work is progressing in the Mahihkan North development area, and Imperial is continuing to assess capacity optimization opportunities for the Cold Lake operation as a whole, including options for development of the Nabiye resource.

- **EnCana Energy** reported third quarter production of 52,000 bpd from its *in situ* **Foster Creek Thermal Project**, which is shared 50/50 with **ConocoPhillips**. This reflects an increase from 38,000 bpd produced during the same period in 2006. The current phase of expansion, expected to increase production to 60,000 bpd, has been completed. Two further expansions of 30,000 bpd each are planned to come on

stream in 2008 and 2009 respectively. Foster Creek production is targeted at 210,000 bpd by the year 2015.

- **Shell Canada Energy Ltd.** is currently overseeing construction of the **Orion Project**, an *in situ* development that was part of Shell's purchase of BlackRock Ventures in 2006. Phase 1 was completed by mid-2007, with first production was achieved by the end of the year. The company has plans to add a second 10,000 bpd phase, bringing the total size of the project to 20,000 bpd. Phase 2 is scheduled to commence construction in the fourth quarter of 2008.
- In addition to production of about 75,000 bpd from numerous primary or cold production projects in the Cold Lake region, **Canadian Natural** is producing 60,000 bpd from its **Primrose/Wolf Lake *in situ* CSS Project**. This includes production from the Primrose North Project that was recently brought on-stream.

The Primrose East CSS Expansion Project, which is expected to increase production capacity by an additional 40,000 bpd, received regulatory approval in the first quarter of 2007. Construction is currently underway, with production targeted to commence in 2009.

- **Husky Energy** has begun production at its **Tucker Thermal Project**, a 30,000 bpd SAGD facility. Production started up in the fourth quarter of 2006 and the company is aiming to reach design capacity by 2008.

Table 2 provides a summary of the major oil sands projects in the Cold Lake Oil sands.

**TABLE 2 MAJOR OIL SANDS PROJECTS, COLD LAKE OIL SANDS**

Organization	Project	Type	Status
Imperial Oil <a href="http://www.imperialoil.ca">www.imperialoil.ca</a>	Cold Lake Production Project	<i>In situ</i> CSS	Producing 160K bpd during Q3 2007.
	Nabiye Project (Phases 14-16 Cold Lake Project, with design capacity for 30K bpd)	<i>In situ</i> CSS	Regulatory approval in place. Development options currently under review.
	Mahihkan North Project (Extension of Phases 9 & 10 of Cold Lake Project)	<i>In situ</i> replaces existing production	Work in progress.
EnCana Energy <a href="http://www.encana.com/">www.encana.com/</a> ConocoPhillips <a href="http://www.conocophillips.com/">www.conocophillips.com/</a>	Foster Creek Phase 1&2 (with design capacity of 60K bpd)	<i>In situ</i> SAGD and CSS	Producing 52K bpd during Q3 2007.
	Foster Creek Project Expansion (with potential to increase production to 210K bpd)	<i>In situ</i> SAGD and CSS	Publicly discussed, with peak potential production of 210K bpd anticipated during 2005-2015 period.

Organization	Project	Type	Status
Shell <a href="http://www.shell.com">www.shell.com</a>	Orion Hilda Lake, Phase 1 (with design capacity of 10K bpd)	<i>In situ</i> SAGD	Construction completed, with first production achieved by the end of 2007.
	Orion Hilda Lake, Phase 2 (with design capacity of 10K bpd)	<i>In situ</i> SAGD	Regulatory and company approval obtained, with construction scheduled to commence in Q4 2008.
Canadian Natural Resources <a href="http://www.cnrl.com/">www.cnrl.com/</a>	Cold Lake Primary or "Cold" Production Projects	<i>in situ</i> Primary or "Cold"	Currently producing approximately 75K bpd.
	Primrose/Wolf Lake (80K design capacity)	<i>In situ</i> CSS	Currently producing 60K bpd (including Primrose North Expansion now on-stream).
	Primrose/Wolf Lake Expansion (Primrose East, designed to increase production to 120K bpd)	<i>In situ</i> CSS	The Primrose East Project received regulatory approval in Q1 2007. Construction is underway, first production targeted in 2009.
	Additional Upgrader for <i>in situ</i> production (2 phases of 125K bpd)	Upgrader	Location undetermined, project put on hold.
Husky Energy <a href="http://www.husky-oil.com/">www.husky-oil.com/</a>	Tucker Project (with design capacity of 30K-35K bpd)	<i>In situ</i> SAGD	First production in Q4 2006 and full production expected in 2008.

### 3.2.3 Peace River Oil Sands

Industry activities in the Peace River Oil Sands can be summarized as follows:

- Cold production capacity for **Shell Canada Energy Ltd.'s Peace River Project** as of the end of 2007 was approximately 30,000 bpd. This includes production from the **Seal** operation, which Shell absorbed as part of its acquisition of **BlackRock Ventures Inc.**

Shell filed for regulatory approval in December 2006 for an expansion of its existing **Carmon Creek Project**, located northeast of Peace River. The application is based on a 100,000 bpd capacity recovery facility, increasing from current thermal production of 12,000 bpd. The first phase of 50,000 bpd is scheduled to begin construction in 2010, with production targeted by 2013.

- **Peace River Oil (PRO)**, a new private company, has made a public announcement of plans to construct the **Bluesky Upgrader**, near McLennan. The first stage of the upgrader would provide capacity to process 25,000 bpd of bitumen, with a target completion date of 2011. The total planned capacity of the plant is 100,000 bpd, to be developed in four stages. Regulatory application is targeted for submission in the latter half of 2008.

- **Penn West Energy Trust** saw “cold” production at its **Peace River Oil Sands (Seal) Project** reach 3,200 bpd by the end of 2006. Production levels of 4,000-5,000 bpd were targeted in 2007. The company has plans for additional phases that could expand production to 20,000 bpd by 2011, as well as the potential development of a thermal production pilot plant.
- **Petrobank Energy and Resources Ltd.** has acquired 50% interest in lands held by **Duvernay Oil Corp.** The **Dawson Property** is the first external licensing agreement reached by Petrobank beyond its Whitesands Project, and will seek to achieve increased production of this existing conventional cold heavy oil reservoir.

Table 3 provides a summary of the projects in the Peace River Oil sands.

**TABLE 3 MAJOR OIL SANDS PROJECTS, PEACE RIVER OIL SANDS**

Organization	Project	Type	Status
Shell <a href="http://www.shell.com/">www.shell.com/</a>	Peace River Project (Including BlackRock Seal Project)	<i>In situ</i> CSS and cold production	Currently producing 30K bpd.
	Carmon Creek (design capacity of 100K bpd)	<i>In situ</i> CSS	Regulatory application filed in December 2006
Peace River Oil (PRO) <a href="http://www.energyas.com/proupgrading/home.htm">www.energyas.com/proupgrading/home.htm</a>	Bluesky Upgrader (with design capacity of 100k bpd)	Upgrader	Regulatory application to be submitted by the end of 2008.
Penn West Energy Trust <a href="http://www.pennwest.com/">www.pennwest.com/</a>	Peace River Oil Sands Project (Seal)	In Situ Primary (“Cold”) Production	Currently producing 3K bpd, target of 4-5K bpd for 2007.
Petrobank Energy <a href="http://www.petrobank.com/">www.petrobank.com/</a> Duvernay Oil <a href="http://www.duvernayoil.com/">www.duvernayoil.com/</a>	Dawson Project	<i>In situ</i> THAI (Toe-To-Heel Air Injection) technology tested	Joint venture to test technology application in heavy oil reservoir.

### 3.2.4 Neighboring Areas

Oil sands industry activities in areas near Alberta located outside of the Athabasca, Cold Lake and Peace River Oil sands are summarized as follows:

- **Husky Energy** has completed front-end engineering design for a major throughput expansion program at its **Lloydminster Upgrader**. The expansion was designed to nearly double the production capacity of the facility from 80,000 bpd to 150,000 bpd of synthetic crude oil and diluent. However, the project has been placed on hold in light of Husky’s recent acquisitions of U.S. refineries.
- **OilSands Quest Inc.**, which describes itself as the originator of Saskatchewan’s emerging oil sands industry, is undertaking a program of reservoir testing within its **Axe Lake Discovery**, situated in northwestern Saskatchewan adjacent to the Alberta border. Contingent on regulatory approvals, the company intends to begin initial production tests in 2008, leading to an *in situ* test program of up to 10,000 bpd by 2009.

Table 4 provides a summary of the major oil sands projects located in other areas outside of the Athabasca, Cold Lake and Peace River Oil sands.

**TABLE 4 MAJOR OIL SANDS PROJECTS, NEIGHBOURING AREAS**

Organization	Project	Type	Status
Husky Energy <a href="http://www.husky-oil.com/">www.husky-oil.com/</a>	Lloydminster Upgrader	Upgrader enhancements	Debottleneck project complete. Major expansion project on-hold.
Oil sands Quest <a href="http://www.oilsandsquest.com/">www.oilsandsquest.com/</a>	Axe Lake	<i>In situ</i>	Reservoir testing and resource delineation underway.

### 3.2.5 Alberta's Industrial Heartland

Industry activities related to bitumen upgrading and synthetic crude refining in Alberta's Industrial Heartland (AIH) area of the Capital Region are summarized as follows:

- **Shell's Scotford Upgrader**, an integral part of the **Athabasca Oil Sands Project**, reported average production levels of 136,000 bpd in the third quarter of 2007, as compared to 164,500 bpd during the same period in the previous year. Production was lower due to a fire that took place in November 2007. Repairs have been made and production has resumed to normal levels. Construction has begun on the approved **Scotford Expansion 1 Project**, which will raise the facility's capacity to 290,000 bpd by 2009/10.

In July 2007 Shell filed for regulatory approval to expand the facility, with the next phase of expansion entitled the **Scotford Upgrader 2 (SU2) Project**. The intention is to construct four additional 100,000 bpd upgrading trains, increasing the facility's capacity by an additional 400,000 bpd.

- Construction continues on **Petro-Canada's Strathcona Refinery Conversion Project**, which is designed to enable the refinery to upgrade and refine 135,000 bpd of bitumen-derived feedstock. The targeted completion date has been revised from the third quarter to the fourth quarter of 2008. At that time the Strathcona refinery will be processing only oil sands feedstock. Petro-Canada has signed a long-term agreement whereby Suncor will process a minimum of 27,000 bpd of bitumen from Petro-Canada's MacKay River Project and sell 26,000 bpd of sour crude for processing at the Strathcona refinery.

Petro-Canada has also filed a regulatory application for its **Sturgeon Upgrader**, to be built in three phases with a combined design capacity of 340,000 bpd. Subject to approval, first SCO production is expected in 2011 with full capacity reached by 2013.

- **Synenco Energy**, along with its partner **SinoCanada Petroleum Corporation** (subsidiary of Chinese-owned **Sinopec**) filed a regulatory application in 2006 for its 100,000 bpd **Northern Lights Upgrader**, to be

located in Sturgeon County. In May 2007, the company requested that the regulatory review of the upgrader project be placed on hold until it can examine its development options. Synenco is continuing with the mine application, project planning and testing of appropriate extraction technologies.

- **BA Energy Inc.** (a member of the **Value Creation Group** of companies) is proceeding with construction of the **Heartland Upgrader Project** in Strathcona County. The upgrader will be developed in three phases, each phase producing 50,000 bpd of bitumen. The original project schedule called for operations to begin in 2007, but has been delayed until at least 2008.
- **North West Upgrading Inc.** received regulatory approval in August 2007 for its **North West Upgrader Project**, located in Sturgeon County. The upgrader will be constructed in three phases to reach a total bitumen processing capacity of 150,000 bpd. Phase one construction is scheduled to begin in 2008, with a capacity of 50,000 bpd expected to come onstream in 2010 or 2011.
- **North American Oil Sands**, now a fully owned subsidiary of **StatoilHydro ASA**, filed a regulatory application for its **Upgrader Project** in November 2007. The upgrader, located in Strathcona County, will be constructed using a phased approach, with Phase 1 producing 76,000 bpd by 2012, followed by subsequent phases that will raise production to 250,000 bpd by 2015.
- **Total E&P Canada Ltd.** filed a regulatory application in November 2007 to construct a 200,000 bpd **Upgrader Project** in Strathcona County. Plans call for a 130,000 bpd Phase 1 to be producing by 2013 or 2014, with a subsequent Phase 2 of 70,000 bpd coming on-stream at a later time.

Table 5 provides a summary of the major oil sands related refining projects located in Alberta's Industrial Heartland area of the Capital Region.

**TABLE 5 MAJOR OIL SANDS RELATED REFINING PROJECTS, ALBERTA'S INDUSTRIAL HEARTLAND**

<b>Organization</b>	<b>Project</b>	<b>Type</b>	<b>Status</b>
Athabasca Oil Sands Project Shell <a href="http://www.shell.com/">www.shell.com/</a> Chevron <a href="http://www.chevron.com/">www.chevron.com/</a> Marathon Oil <a href="http://www.marathon.com/">www.marathon.com/</a> Albian Sands <a href="http://www.albiansands.com/">www.albiansands.com/</a>	Scotford Upgrader	Upgrader	Producing an average of 136K bpd, as of Q3 2007.

Organization	Project	Type	Status
Shell <a href="http://www.shell.com/">www.shell.com/</a>	Scotford Upgrader Expansion 1 (SE1) 90K bpd.	Upgrader Expansion	Under construction.
Shell <a href="http://www.shell.com/">www.shell.com/</a>	Scotford Upgrader Expansion 2 (SU2) 400K bpd.	Upgrader Expansions	Regulatory application filed in July 2007.
Petro-Canada <a href="http://www.petro-canada.ca/">www.petro-canada.ca/</a>	Strathcona Refinery Conversion 135K bpd.	Refinery Conversion	Construction in progress. Project completion scheduled for Q4 2008.
	Sturgeon Upgrader 340K bpd.	Upgrader	Regulatory application filed December 2006.
BA Energy <a href="http://www.heartlandupgrader.com">www.heartlandupgrader.com</a>	Alberta Heartland Upgrader 160K bpd.	Upgrader, in three phases.	Construction underway, with Phase 1 startup projected for 2008.
Northwest Upgrading Inc. <a href="http://www.northwestupgrading.com/">www.northwestupgrading.com/</a>	North West Upgrader 150K bpd.	Upgrader in three phases	Regulatory approval received in August 2007. Construction of phase 1 is scheduled to begin in 2008, with first production expected in 2010/11.
Synenco Energy <a href="http://www.synenco.com">www.synenco.com</a>	Northern Lights Upgrader 100K bpd.	Upgrader	Regulatory application submitted in September 2006. Project on hold pending company review.
Statoil Canada <a href="http://www.statoil.com/">www.statoil.com/</a> North American Oil sands Corp. <a href="http://www.naosc.com/">www.naosc.com/</a>	North American Upgrader 250K bpd.	Upgrader	Regulatory application filed in November 2007, first production in 2012.
Total E&P Canada Ltd. <a href="http://www.total-ep-canada.com/">www.total-ep-canada.com/</a>	Total Upgrader 200K bpd.	Upgrader	Regulatory application filed in November 2007, first production in 2013/14.

### 3.3 FUTURE OIL SANDS EXPENDITURES

The Canadian Association of Petroleum Producers (CAPP) and the Regional Issues Working Group (RIWG) cooperate on a survey of capital expenditure forecasts for the oil sands industry. Survey results from early 2007 indicate that the Alberta oil sands industry may spend \$110 billion on new oil sands projects in the 2007 to 2011 period. Not all of the projects included in these projections will necessarily go ahead, but the investment already in place and the caliber of the companies involved provides strong evidence of ongoing oil sands industry expansion. In the 1996 to 2006 period, the oil sands industry spent an estimated \$47 billion on new projects.

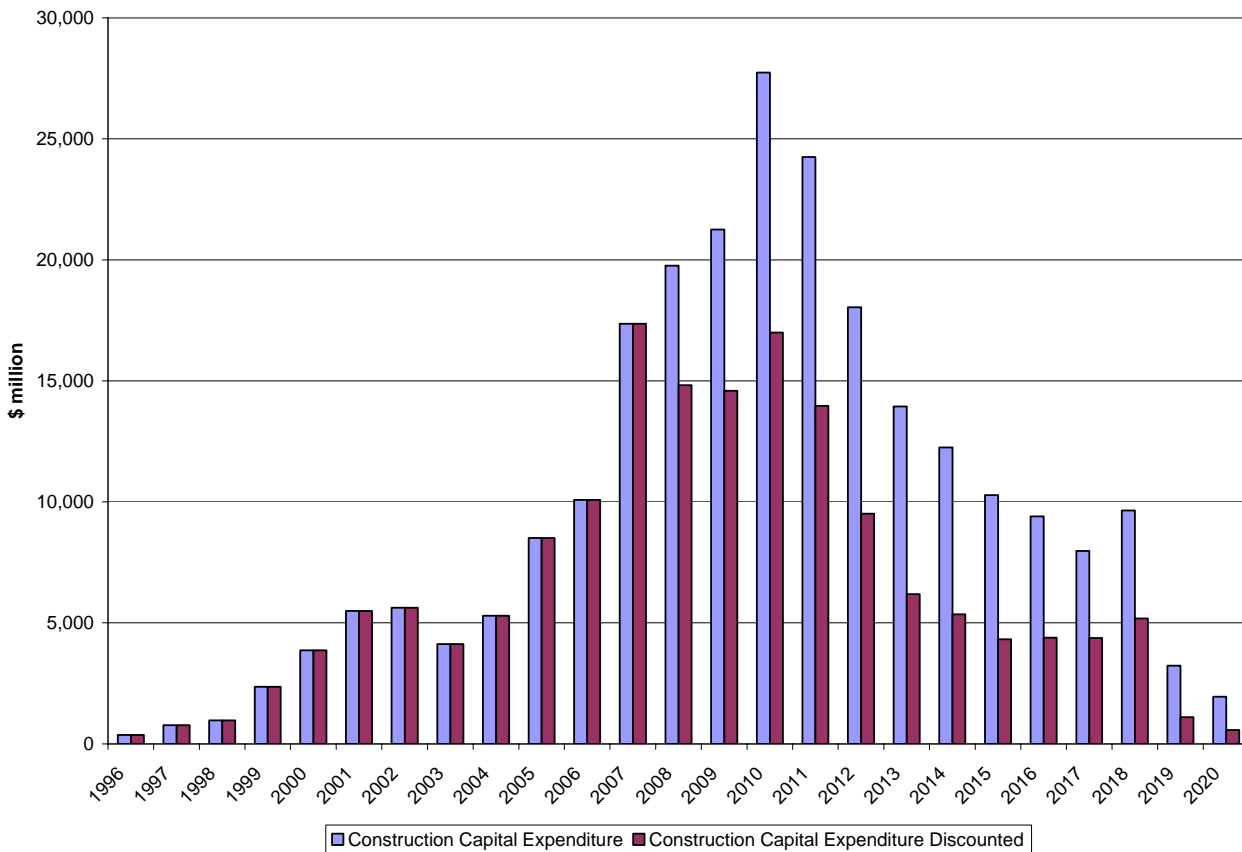
One way in which CAPP and RIWG adjust for the uncertainty of all projects going ahead is to discount them on the basis of their status in the regulatory approval process, as follows:

- No discount if the project is completed, is under construction, or has commercial and regulatory approval;
- 10% discount if the project has regulatory but not yet commercial approval;
- 40% discount if the project's regulatory approval has been filed;

- 75% discount if the project’s regulatory approval process has commenced with a formal project announcement; and
- 90% for projects that have been discussed publicly, but that have not been formally disclosed.

The total discounted or adjusted capital expenditure profile of the industry for the 2007 to 2011 period is estimated at \$77 billion. The figure below gives an overview of the total and discounted capital expenditure profile of the industry in the 1996 to 2020 period.

**FIGURE 2 OIL SANDS INDUSTRY EXPENDITURE FORECAST**



The figure supports the following comments:

- Construction expenditures (on an undiscounted basis) are expected to increase in the 2007-2010 period;
- The anticipated spending in the 2007-2011 period (on an undiscounted basis) is in excess of that experienced in the previous six-year period; and
- Project capital expenditure is forecasted to peak in 2010.

Most of the forecast project spending relates to projects in the Fort McMurray area. However, the Alberta Industrial Heartland accounts for an increasing percentage of the forecasted spending.

### 3.4 CO-OPERATIVE INITIATIVES

#### 3.4.1 Wood Buffalo Region

Rapid oil sands expansion in the Wood Buffalo region has prompted a number of co-operative initiatives to promote orderly growth and minimize adverse impacts, including:

The **Regional Issues Working Group (RIWG)** is a board-governed organization of oil sands-related developers in the Regional Municipality of Wood Buffalo. The main purpose of this group is to identify priority items with respect to physical and social infrastructure, scope out challenges, and identify the authority responsible for addressing those challenges. If appropriate, RIWG works with the responsible authorities to identify options. Much of the work undertaken by RIWG is through committees focussing on specific topics, involving representatives from member companies and other stakeholders.

The RIWG website is [www.oilsands.cc](http://www.oilsands.cc). For further information, contact:

Jacob Irving  
Executive Director  
Phone: (780) 790-1979  
Email: [jacob.irving@riwg.ca](mailto:jacob.irving@riwg.ca)

- The **Cumulative Environmental Management Association (CEMA)** ([www.cemaonline.ca](http://www.cemaonline.ca)) consists of representatives of industry, all levels of government, local First Nations, and environmental groups. CEMA examines cumulative impacts of large-scale industrial development on the environment and makes recommendations to government regulators and industry on how to best manage those impacts to protect the environment. CEMA achieves its objectives through a number of working groups that focus on issues such as reclamation, sustainable ecosystems, surface water, air emissions and traditional knowledge. The key contact is:

Glen Semenchuk  
Acting Executive Director  
Phone: (780) 799-8140  
Email: [glen.semenchuk@cemaonline.ca](mailto:glen.semenchuk@cemaonline.ca)

- The **Wood Buffalo Environmental Association** ([www.wbea.org/](http://www.wbea.org/)), a collaboration of community, industry and government in the Regional Municipality of Wood Buffalo. The chief objective of the association is to monitor the ambient environment. The key contact is:

Carna MacEachern  
Executive Director  
Phone: (780) 799-4420  
Email: [wbea.ed@shawlink.ca](mailto:wbea.ed@shawlink.ca)

- The **Athabasca Tribal Council/Athabasca Resource Developers (ATC/ARD)**, which has the mandate to ensure that First Nations people have an opportunity to take part in and benefit from the industrial development taking place in the area. The ATC/Industry Working Group has a number of subcommittees.

The ATC/ARD All Parties Core Agreement provides for industry funding of **Industry Relations Corporations (IRCs)**, which are designed to assist the five First Nation members of the ATC in engaging with the challenges and opportunities of industrial development in the Wood Buffalo region. The agreement, which includes Standards of Consultation, provides a forum for all parties to work together to resolve issues. The ATC/ARD All Parties Core Agreement has been extended as of April 2007, for an additional 3 years or such time that another agreement supersedes it. Industry signatories to the Agreement include Alberta-Pacific Forest Industries, Albian Sands Energy, ATCO Group of Companies, Canadian Natural Resources, ConocoPhillips, Deer Creek Energy, Devon Canada, Enbridge Pipelines, EnCana Resources, Imperial Oil, Japan Canada Oil Sands, MEG Energy, Nexen Petroleum Canada, OPTI Canada, Petro-Canada, Terasen Pipelines, Suncor Energy, and Syncrude Canada.

The key contact is:

Mr. Roy Vermillion  
Chief Executive Officer, ATC  
Phone: (780) 791-6538  
Email: [roy.vermillion@atc97.org](mailto:roy.vermillion@atc97.org)

- Four Métis Locals have recently established the Wood Buffalo Métis Locals Corporation to provide Métis communities in the Wood Buffalo region with the capacity to consult with industry about development in the region and to develop strategies to deal with impacts and issues relating to this industrial development.

### 3.4.2 Northeast Region

The main cooperative initiative in the Cold Lake area is the **Lakeland Industry and Community Association (LICA)** ([www.lica.ca](http://www.lica.ca)). This board-governed organization seeks to share information and provide a mechanism to resolve conflicts. It maintains a staffed office, but relies extensively on industry and community volunteers to conduct its business. LICA has several committees.

The key contact is: Mr. Robert Deresh, Chair, LICA (780) 812-2182.

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## **4. ECONOMIC REGIONS**

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The province is divided into 14 Economic Indicator Regions (see [www.alberta-canada.com/regionalDev/regionalDevelopment/economicIndicators.cfm](http://www.alberta-canada.com/regionalDev/regionalDevelopment/economicIndicators.cfm)). The following provides a short overview of some of the challenges faced by the regions where the oil sands industry development takes place. The focus is on socio-economic issues in the Wood Buffalo region where most oil sands industry expansion is located. The regions are defined in economic and not geological terms.

### **4.1 THE WOOD BUFFALO REGION**

The RMWB is currently undertaking the development of a regional economic development strategy which it hopes to have completed in the late fall of 2008.

#### **4.1.1 Population Growth**

Population growth in the Wood Buffalo region, especially in Fort McMurray, is driven largely by the employment opportunities created through oil sands industry expansion. The direct employment created at the oil sands plants is augmented by employment creation among suppliers to the industry and in the economy in general. Under the influence of oil sands industry expansion, the population of Fort McMurray has grown from 34,000 in early 1996 to approximately 64,400 in May of 2006. If all planned oil sands projects proceed as envisioned, the population of Fort McMurray may reach over 110,000 in the early years of the next decade, and near 130,000 by 2021. Some of the small communities in the region are also experiencing growth.

#### **4.1.2 Aboriginal People**

Oil sands industry expansion has increased employment and contracting opportunities for First Nations' and Métis individuals and companies, both private and community-owned. It has also altered the landscape used for traditional pursuits. Several initiatives are underway to enhance the employment and contracting opportunities, including company-specific commitments to hire Aboriginal people and company-specific and co-operative initiatives to support education and training of Aboriginal people. Progressive reclamation of disturbed sites is a mitigation measure used to return the landscape to productive use after bitumen extraction.

As noted, the ATC/ARD All Parties Core Agreement has been extended as of April 2007, for an additional 3 years or such time that another agreement supersedes it. The Agreement provides base funding of \$230,000 to each First Nation in the Wood Buffalo region for an Industry Relations Corporation, which will assist each community to consult with industry and identify issues related to industrial development.

### **4.1.3 Traffic**

Traffic in the Wood Buffalo region is increasing. Trucks, buses, and private vehicles associated directly with the oil sands industry create some of this traffic and some is associated with the general population growth. Traffic increases in the region have been substantial during recent years. The section of Highway 63 between Fort McMurray and Suncor, for example, has seen a change from an estimated 4,300 vehicle movements in 1996 to 13,930 in 2006.

### **4.1.4 Housing**

In recent history, housing has been more expensive in Fort McMurray than elsewhere in the province, a fact that has been upheld by the latest housing outlook report from the Canada Mortgage and Housing Corporation (CMHC). The average price of a single-family dwelling in Fort McMurray as of December 2007 was \$632,000, as compared to the average sale price of \$382,000 for single family dwellings in Edmonton. The average rental rate in October 2007 for a two-bedroom apartment in Fort McMurray was \$2,085, compared with Edmonton at \$958.

### **4.1.5 Infrastructure and Services**

High housing costs are one of the key drivers behind the high cost of living in the region, which is, in turn, a major contributor to the difficulty of recruiting and retaining staff for public and private sector service providers. Many agencies and organizations indicate that they face increased workloads while being understaffed, either because positions are not filled or because funding levels are not keeping with the service demands.

A December 2006 report by the Oil Sands Ministerial Strategy Committee entitled *Investing in Our Future: Responding to the Rapid Growth of Oil Sands Development*, commonly referred to as the Radke Report, identifies a range of infrastructure and public service requirements that need to be addressed. The Government of Alberta has accepted a number of the Radke Report's recommendations and has provided funding for a number of initiatives and policy suggestions contained in the report. The Government of Alberta is also investing in highway infrastructure in the region (see, for example, [www.infratrans.gov.ab.ca/Oil\\_sands\\_Infrastructure/index.htm](http://www.infratrans.gov.ab.ca/Oil_sands_Infrastructure/index.htm)).

### **4.1.6 Environment**

All proposed oil sands projects in the region, like projects elsewhere in the province, are required to conduct an Environmental Impact Assessment as part of their regulatory approval process. Work on environmental impact assessment is ongoing. A comprehensive co-operatively planned and integrated air monitoring system is in place. Operated under the authority of the Wood Buffalo Environmental Association (WBEA), the system is part of the Clean Air Strategic Alliance (CASA), which monitors a number of Alberta air sheds to ensure that provincial air standards are met.

Recognizing the increasing importance of the cumulative environmental impacts, the Alberta Department of the Environment has developed a Regional Sustainable

Development Strategy (RSDS) ([www3.gov.ab.ca/env/regions/neb/rsds/](http://www3.gov.ab.ca/env/regions/neb/rsds/)). The stated purpose of the RSDS is "to ensure implementation of adaptive management approaches that address regional cumulative environmental effect, environmental threshold, appropriate monitoring techniques, resource management approaches, knowledge gaps, and research to fill gaps." The strategy document identifies fourteen themes ranging from "sustainable ecosystems" and "soil and plant diversity" to "effects of emissions from tailing ponds" and "cumulative impacts on groundwater quality". For each of these themes, the strategy outlines objectives, options, and management tools available. It also indicates a timeline for action. CEMA is a main forum for action under the umbrella of the RSDS.

## **4.2 NORTHEAST REGION**

The development of the oil sand industry in the Northeast Region has been less intensive than in the Wood Buffalo Region. The municipal and social infrastructure in the area is well placed to meet the challenges posed by the recent upswing in the oil sands activity ([www.coldlake.com/](http://www.coldlake.com/), [www.town.bonnyville.ab.ca/](http://www.town.bonnyville.ab.ca/), [www.md.bonnyville.ab.ca/](http://www.md.bonnyville.ab.ca/), [www.lloydminster.ca/](http://www.lloydminster.ca/)). The area generally has a diversified regional economy based on oil and gas exploration and production, military operations (CFB Cold Lake), agriculture, forestry, and tourism. It has seen swings in economic activity, mostly due to the changing fortunes of the agriculture and heavy oil industry in the region. The municipal and transportation infrastructure in and around the major population centres has sufficient capacity to accommodate growth in the near term.

The Northeast Alberta Information HUB (HUB) is the Regional Economic Development Alliance (REDA) comprised of 35 member communities in the region and addresses regional economic development priorities ([www.albertahub.com/](http://www.albertahub.com/)).

## **4.3 SLAVE LAKE REGION**

The main service centre is the Town of Slave Lake ([www.slavelake.ca/](http://www.slavelake.ca/)). SAGD exploration and development in the Wabasca-Demarais area is growing. The newly formed Lesser Slave Lake Economic Alliance (LSLEA) is the REDA comprised of 6 member communities in the region and addresses regional economic development priorities. The region has recently completed an economic development strategy.

## **4.4 PEACE COUNTRY REGION**

Oil sands activity in the Peace Country in the past has been modest, but activity appears to be increasing. The two major developments operated by Shell Canada (one of which was formerly BlackRock Ventures) are located in Northern Sunrise County ([www.eastpeace.govoffice.com/](http://www.eastpeace.govoffice.com/)). The main service centre in the region is the Town of Peace River ([www.peaceriver.govoffice.com/](http://www.peaceriver.govoffice.com/)). The principal drivers of the economy in the Peace River region are oil and gas, forestry, and agriculture.

The Peace Region Economic Development Alliance (PREDA) is the Regional Economic Development Alliance (REDA), comprised of 22 member communities in the region and addresses regional economic development priorities ([www.peacecountrycanada.com/](http://www.peacecountrycanada.com/)).

#### **4.5 CAPITAL REGION**

Located in the Capital Region, Alberta's Industrial Heartland (AIH) area is adjacent to the City of Edmonton. While this area does not contain deposits of oil sands, it is a site of major development in terms of companies selecting the AIH as the location of choice for upgrading facilities. The AIH is a partnership formed between the municipalities of Strathcona County, Sturgeon County, Lamont County and the City of Fort Saskatchewan, which has been actively targeting industrial development since 1999 ([www.industrialheartland.com/](http://www.industrialheartland.com/), [www.capregion.ab.ca/](http://www.capregion.ab.ca/)).

As growth and cost pressures have mounted for oil sands developments in the Wood Buffalo Region, companies have been responding to AIH's promoted advantages for upgrading, in terms of access to rail and shared pipeline facilities, proximity to the Capital Region and its associated large labour force, housing stock, service companies and other amenities.

Growth in the AIH has been rapid, going from a single operating upgrader in 2003 (Shell Scotford, with a capacity of 155,000 bpd) to the current slate of nine additional new upgraders, expansions or refinery conversions. Of these nine additional projects, three are underway and six are going through the regulatory application process. The total associated capital costs for the full-development case of projects exceeds \$70 billion, based on current industry cost estimates.

Not all of these projects may go ahead as announced, or may not develop as initial plans indicate in terms of final build-out size. These proposed developments do represent a significant impact to the Capital Region's economy, as well as the region's ability to absorb the pressures associated with this amount of cumulative development. Issues such as affordable housing, worker accommodation, traffic mitigation and regional cooperation are coming to the forefront as these developments move from the planning to implementation stage.

In mid-2007, the Province commissioned a three-part study to identify pressure points and assist in planning responses to growth pressures. The Capital Region Integrated Growth Management Plan (CRIGMP) examines linear (hard) infrastructure requirements, social infrastructure requirements and proposes a regional governance model aimed at improving inter-municipal cooperation and planning. The plan will assist the formulation of responses from the Province, the first of which came forward in December 2007 with the announcement of a structure for a regional board. The board will have a mandate over issues that are regional in scope, which require a common approach to planning or delivery that will result in benefits to the entire region.