Overview of Canada's Oil Sands

An Overview Presentation

"Canada is the leading exporter of oil to the U.S., supplying 15% of all imports." *(Source: U.S. Department of Energy)*

"Alberta's Oil Sands will represent approximately 60% of Canada's crude oil production by 2010." *(Source: Canadian Association of Petroleum Producers)*

"…Canada's recoverable heavy oil sands reserves are substantial, and…their continued development can be a pillar of sustained North American energy and economic security." *(Source: Report of the National Energy Policy Development Group - May 2001)*

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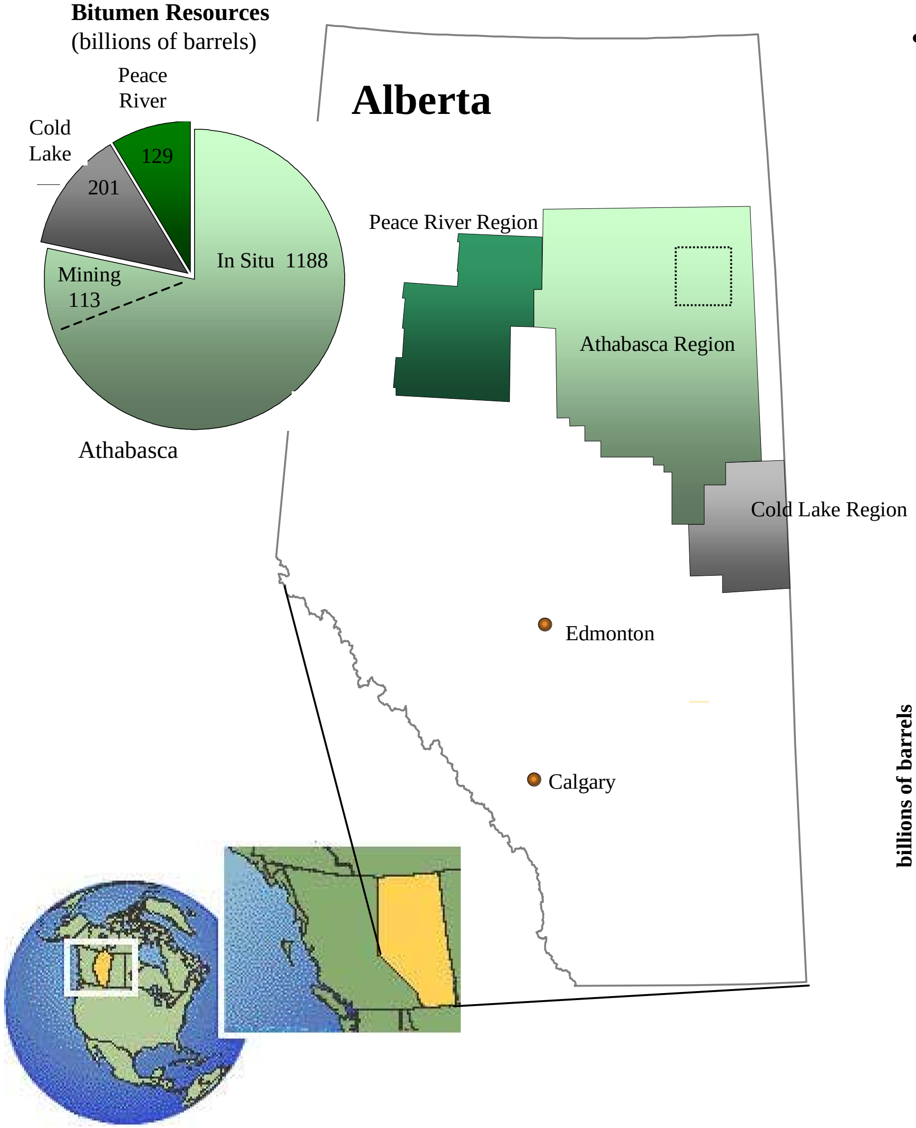
Oil Sands Overview

What Are Oil Sands?

- Oil sands are a mixture of primarily sand, bitumen and water
- Bitumen, in its raw state, is a heavy, viscous crude oil which contains high amounts of sulphur
  - viscosity is a measure of a fluid's resistance to flow. At room temperature, the viscosity of water is 1 whereas bitumen ranges from 100,000 and 1,000,000
  - bitumen is defined as oil that is less than 10º API and will not flow to a well in its naturally occurring state
- Because of this high viscosity, bitumen will not flow at reservoir conditions
  - there are two production techniques currently employed
    - ***Mining***
    - ***In Situ Thermal Recovery*** (in situ is latin for "in-place" and means the oil is separated from its host formation in the subsurface)
- At mining operations, massive open-pit mines are constructed, along with associated extraction facilities to separate the bitumen from the sand
- In situ operations involve drilling wells and injecting steam to heat the bitumen allowing it to flow and to be produced from a well, much like conventional oil production

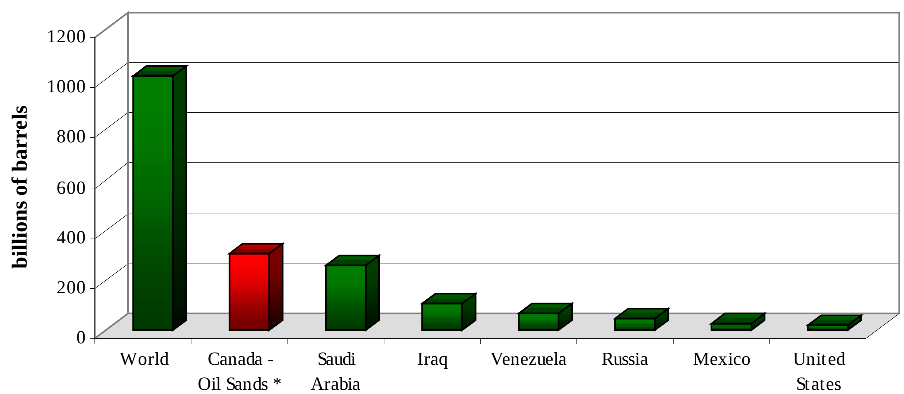
Source: Syncrude Canada

Bitumen Resource



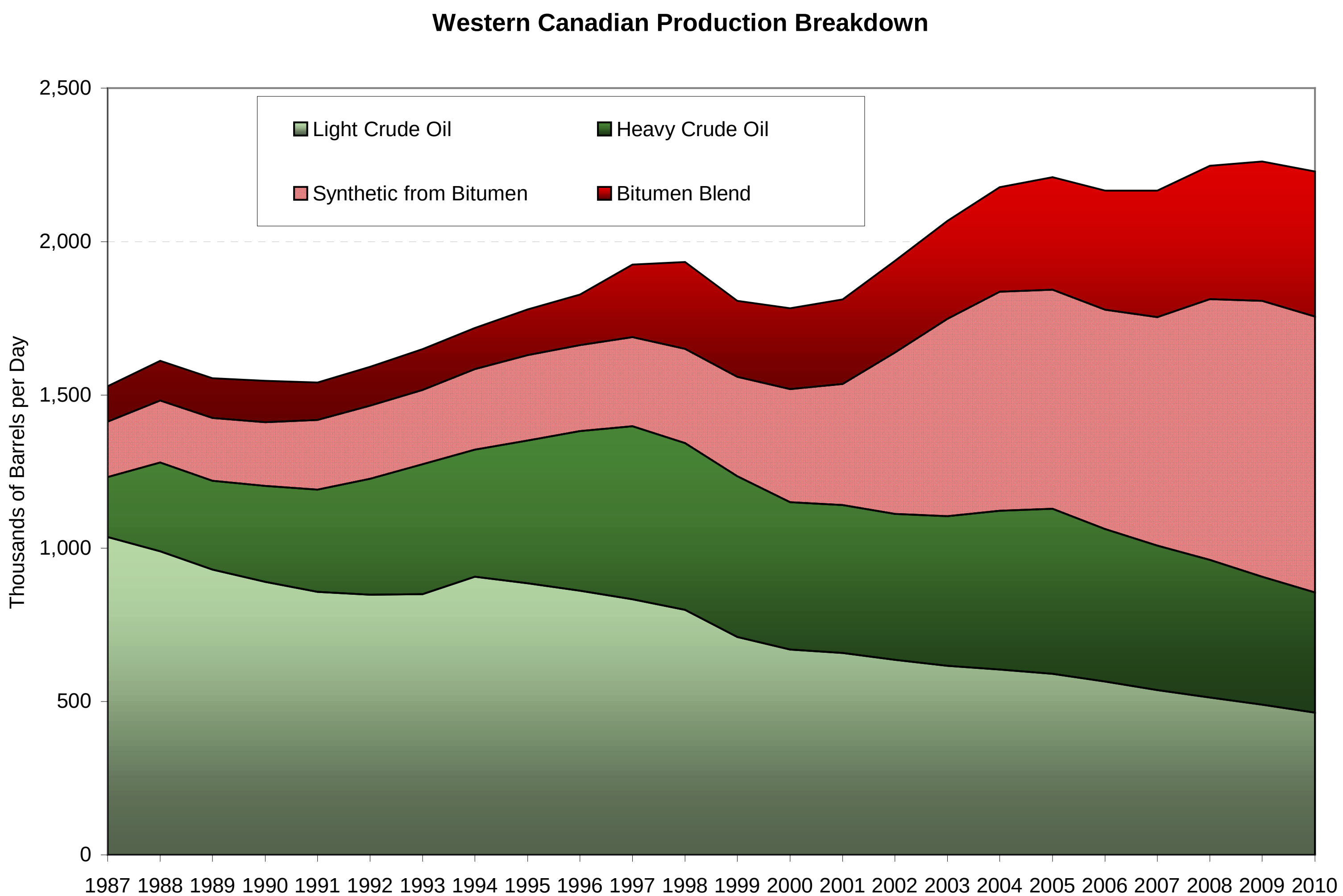
- The Alberta Energy & Utilities Board ("EUB") estimates the currently identified total bitumen volume in place in Alberta to be 1.6 trillion barrels and could eventually reach 2.5 trillion barrels
  - under current technology, over 300 billion barrels are expected to be recoverable
  - by comparison, Saudi Arabia's current proved conventional oil reserves are estimated at 260 billion barrels

World Oil Reserves vs Canadian Oil Sands



Source: National Energy Board, October 2001

Western Canadian Basin Production Forecast



Source: Canadian Association of Petroleum Producers, Canadian Energy Research Institute

Bitumen Blend and Synthetic Crude Oil are expected to grow from approximately 35% of WCSB production to over 60% by the end of the decade…

Bitumen Recovery Techniques

- There are 2 principal techniques employed for recovering bitumen from oil sands:
  - ***Mining***
  - ***In Situ Recovery***
- Mining employs massive open-pit operations to mine the oil sands, then separates the bitumen from the sand using hot water and solvent in large processing facilities
  - most of the current bitumen production (~60%) is produced in this manner, which results in approximately a 95% recovery factor
  - the economics of mining limit it to areas where the oil sands deposits lie close to the surface, generally less than 230 feet (75 metres) from the surface
  - approximately 20% of the currently recoverable bitumen volume is ammenable to surface mining
- In Situ techniques inject steam into wells to heat the bitumen, thereby allowing it to flow into wells and be pumped to the surface
  - there are 2 main processes:
    - ***Cyclic Steam Stimulation*** (CSS), which is utilized by Imperial Oil (an affiliate of ExxonMobil) at its Cold Lake project (currently 130,000 bbl/d)
    - ***Steam Assisted Gravity Drainage*** (SAGD) which is being used by almost all new projects currently under development

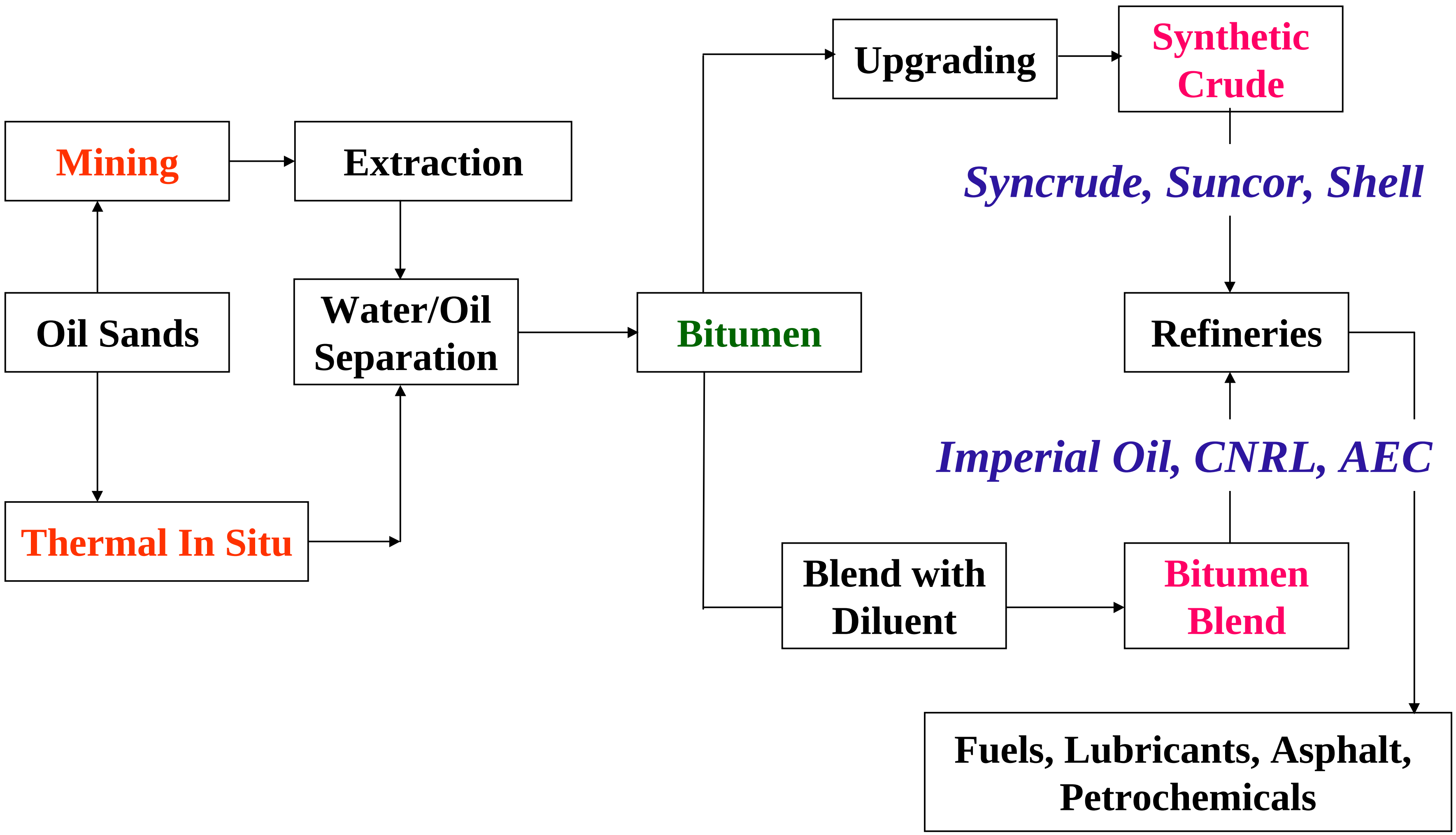
Bitumen Products

- Bitumen is sold in 2 forms:
  - as raw bitumen, after blending with a diluent to produce "Bitumen Blend"; or
  - as a synthetic crude oil ("SCO"), after having been upgraded
- Raw bitumen is too viscous to transport by conventional pipeline, therefore it needs to be blended with a lighter, less viscous hydrocarbon (diluent)
  - the most common diluent utilized currently is a very light natural gas condensate ($C5^+$ or "pentanes plus"), which is a by-product of natural gas processing
  - SCO is expected to also be used as a diluent in the future given an anticipated shortage of $C5^+$
- Diluent typically constitutes 24-50% of the bitumen blend
- Bitumen blend is sold to refiners and competes with conventional heavy oil
- SCO is also sold to conventional refineries and competes with conventional medium and light oils

	WTI	Synthetic Crude Oil	Bitumen Blend	Bitumen
Gravity API	40	29-36	21	8 - 10
Viscosity (approximate)	5	3	325	1,000,000
% Sulphur	< 0.5%	< 0.5%	2-4%	2-4%
Price (US$/bbl)	$20	$18-21	$12-16	$9-14

Production of Oil Sands

Oil Sands Processing Chain



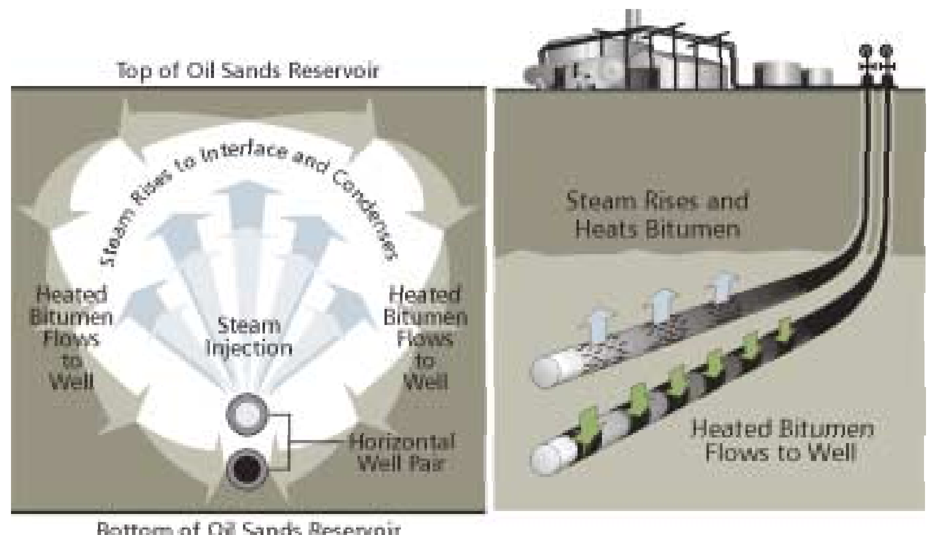
Bitumen Production - Mining

- Most of the bitumen currently produced in Alberta is from 2 large mining projects: Syncrude and Suncor in the Fort McMurray area
  - a typical mine covers dozens of acres
- When the mines were first opened (Suncor in 1967 and Syncrude in 1978) large draglines were utilized to scoop the oil sands onto conveyor belts that transported the oil sands to processing facilities
  - these draglines were cumbersome and expensive to run due mostly to the maintenance costs of the equipment
- The most recent development in mining technique has been to use “smaller” shovels to load the oil sands into large (up to 400 ton) trucks. This has greatly improved the efficiency and operating costs of mining operations
- The mined oil sands are processed to separate the bitumen from the oil sands using hot water and chemicals
  - process improvements have reduced the necessary water temperature from 195°F to 75°F, and the requirement of most chemicals has been mostly eliminated
- Another process called “hydro-transport” allows the oil sands to be mixed with water at the mine site and pipelined to the central plant for processing, thus reducing the amount of trucking and adding synergies to the extraction process

RH400 hydraulic shovel and Haulpak 930E heavy hauler (Syncrude North mine)

Bitumen Production - In Situ

- The bulk of the current in situ thermal production comes from 2 projects:
  - Imperial Oil's Cold Lake Project
  - Canadian Natural Resources' Wolf Lake/Primrose Project
  - both of these projects use ***Cyclic Steam Stimulation (CSS)***
- CSS, also called "huff and puff", injects steam at high pressure (up to 2000 psi) into individual wells to heat the bitumen (the "huff") then later produces the hot water and bitumen from the same well (the "puff")
  - this process has been in use at Cold Lake since the 1960's and has been in commercial use since 1985
- The new standard for in situ projects is ***Steam Assisted Gravity Drainage (SAGD)***, whereby 2 horizontal wells are drilled, one atop the other
  - lower pressure steam is injected into the upper well, and hot water and bitumen are produced from the lower well
  - each well pair can produce up to 1,000 - 1,500^{+} bbl/d and are spaced 100 - 200m apart
  - SAGD has been used in numerous pilot projects since 1987 and is currently in commercial use at AEC's Foster Creek Project



In Situ - CSS vs. SAGD

SAGD offers several significant advantages over CSS:

- CSS will typically recover 25-30% of the original bitumen in place, while SAGD will recover up to 70%
- A key measure of the efficiency, and hence cost, of an in situ process is the Steam-Oil-Ratio (SOR) which measures the volume of steam required to extract the bitumen
  - for CSS, the SOR ranges from 3.0 to 6.0, while SAGD ranges from 2.0 to 3.0
  - approximately 0.5 mmcf of natural gas is required to produce one bbl of steam, hence a SOR of 2.0 requires approximately 1.0 mmcf of fuel gas per barrel of bitumen
    - since natural gas cost is the dominant driver of operating cost, the lower SOR of SAGD is major advantage
- SAGD also operates at lower temperatures and pressures, which allows for the use of less specialized equipment
- Under current technology and experience, SAGD is limited to thick, clean oil sand reservoirs, thus it cannot be applied universally (CSS has been successfully employed in certain reservoirs, such as the Clearwater at Imperial's Cold Lake Project where SAGD would likely be less effective)
- The large majority of new in situ projects will use SAGD

Upgrading

- There are many different variations on upgrading technologies, but they generally fall into one of two broad categories: ***Carbon Removal*** or ***Hydrogen Addition***
- ***"Coking"*** is the most common carbon rejection process, whereby the bitumen is cracked using heat and catalysts to form lighter oils and coke, a solid carbon by-product
  - cokers typically remove approximately 15% of the original volume as coke, which is burned as a fuel or disposed of in the mine
  - de-asphalting is another carbon rejection process that allows for partial removal of the heaviest fraction of bitumen
- ***"Hydrocracking"*** is the general term for hydrogen addition upgrading processes, which similarly crack the bitumen into lighter oils, but because hydrogen is added, does not form coke, and consequently yields a product volume slightly higher than the original volume
  - hydrogen is generated by purchasing natural gas and converting it to hydrogen
- Both Syncrude and Suncor, as well as Albian's (Shell/Chevron/Western) new project, incorporate an upgrader as part of the project
- Currently, Suncor employs coking, Syncrude utilizes both coking and hydrocracking, while Shell et al will use hydrocracking and partial de-asphalting

Oil Sands Projects

Major Oil Sands Projects

MINING Projects	Current / Initial Production	Expanded Production	IN SITU Projects	Current / Initial Production	Expanded Production
	[bbl/d]	[bbl/d]		[bbl/d]	[bbl/d]
Currently Operating					
Syncrude [1]	225,000	560,000	Cold Lake	120,000	180,000
Suncor	115,000	410,000	Primrose / Wolf Lake	40,000	120,000
Under Construction					
Muskeg River (Albian)	155,000	525,000	Foster Creek	25,000	100,000
			MacKay River	30,000	30,000
			Christina Lake	10,000	70,000
			Firebag	35,000	140,000
Under Development					
Fort Hills	95,000	190,000	Tucker Lake	20,000	20,000
Horizon	135,000	270,000	Surmont	25,000	100,000
			Long Lake	70,000	70,000
			Meadow Creek	80,000	80,000
			Lewis	60,000	60,000
			Hangingstone	10,000	60,000
			Horizon	100,000	100,000
			Kirby	30,000	30,000
			Trout / Christina Lake	25,000	25,000
Timing Uncertain					
Northern Lights	100,000	100,000	Orion	10,000	20,000
			Joslyn Creek	30,000	160,000
			Kearl Lake	TBD	TBD

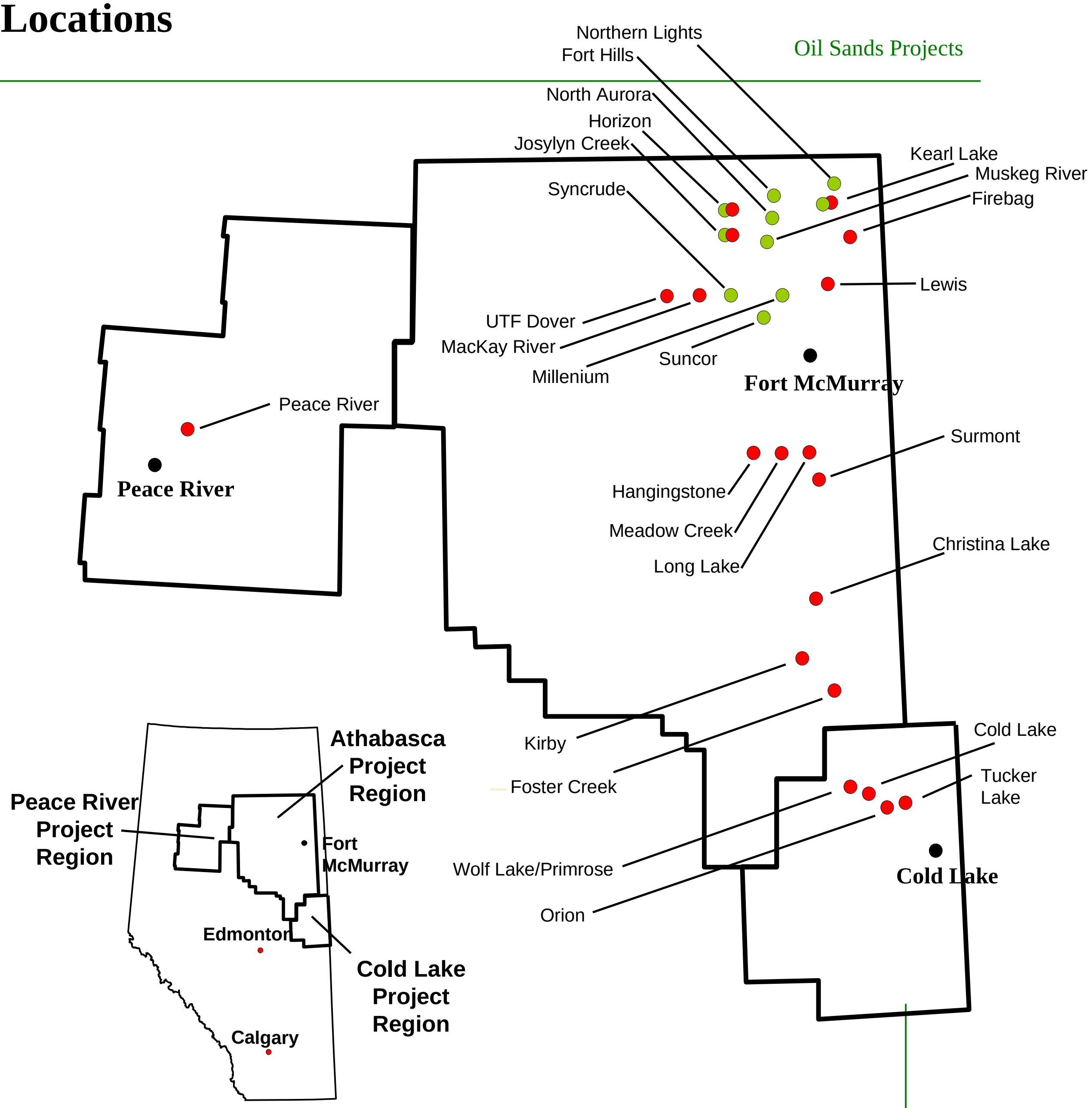
1 Syncrude JV consists of Imperial Oil (an affiliate of ExxonMobil) (25%), Canadian Oil Sands (21.74%), AEC (15%), Petro-Canada (12%), Conoco (9.03%), Nexen (7.23%), Murphy Oil (5%), and Mocal Energy (5%)

Major Oil Sands Project Locations

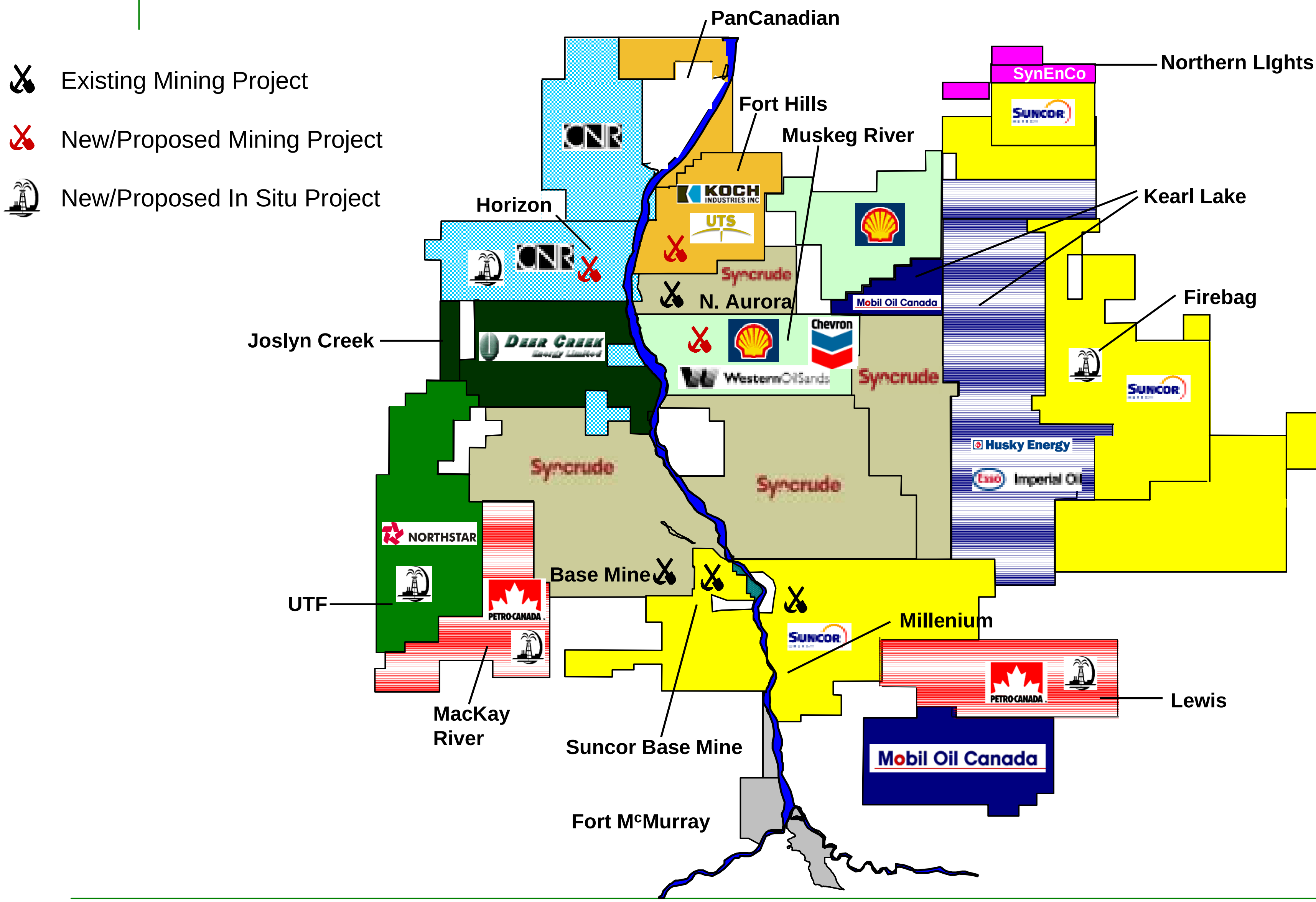
In Situ Projects	Project Sponsor
Wolf Lake / Primrose	Canadian Natural Resources
Cold Lake	Imperial Oil
Orion	Blackrock Ventures
Tucker Lake	Husky Energy
Hangingstone	Japan Oil Sands / Nexen
Surmont	Conoco Canada / Devon
Long Lake	Nexen / OPTI Canada
Christina Lake	EnCana
Foster Creek	EnCana
Peace River	Shell Canada
MacKay River	Petro-Canada
Firebag	Suncor Energy
Lewis	Petro-Canada
Meadow Creek	Petro-Canada / Nexen
Kearl Lake *	Imperial Oil / Husky Energy
UTF (Dover)	Devon Energy
Kirby	Rio Alto Exploration

Mining Projects	Project Sponsor
Syncrude Base Mine	Syncrude Joint Venture
North Aurora	Syncrude Joint Venture
Suncor Base Mine	Suncor Energy
Millenium	Suncor Energy
Muskeg River	Shell / Chevron / Western Oil Sands
Fort Hills	Koch Industries / UTS Energy
Horizon *	Canadian Natural Resources
Northern Lights	SyEnCo
Joslyn Creek *	Deer Creek Energy

* Includes plans for both in situ and mining



Athabasca Region - Lease Holders



Major Mining Projects

PROJECT OWNER (S)	STAGE	CAPEX [C$mm]	STATUS	AEUB STATUS	START-UP	PRODUCTION STAGE	PRODUCTION CUM.	INTEGRATED UPGRADER	PROJECT DESCRIPTION
Syncrude									
Syncrude JV [1]	Base Operations	-	Operating	Approved	1978	225,000	225,000	Yes	Syncrude has been operating since 1978
	Stage 2 `	$1,000	Operating	Approved	2001	35,000	260,000		North Aurora Train 1 - built on budget
	Stage 3	$5,000	Under Development	Approved	2005	110,000	370,000		Aurora Train 2 and phase 1 expansion of base plant
	Stage 4	$3,700	Planning	Not Yet Filed	2008	70,000	440,000		3rd Aurora train and phase 2 expansion of base plant
	Stage 5	$3,000	Planning	Not Yet Filed	2013	120,000	560,000		Stage 5 announced by COS.UN on Dec. 5/01
Suncor									
Suncor	Base Operations	-	Operating	Approved	1967	115,000	115,000	Yes	Suncor has been producing oil sands since 1967
	Millenium	$3,400	Under Development	Approved	Dec '01	110,000	225,000		Expansion of its mining, extraction and upgrading facilties. Total cost 70% & over original budget of $2.0 billion
	Voyageur	$6,000	Planning	Public Disclosure Filed	2010	185,000	410,000		Upgrader expansion to support 450,000 bbls/d by 2008, expansion to 550,000 bbls/d by 2010. (includes Firebag SAGD production)
Muskeg River (Albian)									
Shell (60%)	Muskeg River	$5,100	Under Development	Approved	2003	155,000	155,000	Yes	Current cost estimate 30% above original $5.1 bln estimate
Chevron (20%)	Debottlenecking	$750	Planning	Not Filed	2005	70,000	225,000		Project includes upgrader adjacent to Shell Scotford refinery to convert bitumen into VGO and synthetic
Western Oil Sands (20%)	Expansion	$7,000	Planning	Under Review	2010	300,000	525,000		Expansion involves the development of the Jackpine lease
Fort Hills									
True North Energy (78%)	Stage 1	$2,000	Under Development	Under Review	2005	95,000	95,000	No	True North is a wholly-owned subsidiary of Koch Industries
UTS Energy (22%)	Stage 2	$1,500	Planning	Under Review	2008	95,000	190,000		No upgrading planned; plan to sell bitumen blend directly to Pine Bend and N.A market
Horizon									
Canadian Natural Resources	Initial	$8,000	Under Development	Public Disclosure Filed	2007	115,000	115,000	Yes	Plan to utilized mobile crushing technology at the mine and delayed coking upgrading
					2009	40,000	155,000		Planning to find a strategic partner
					2011	77,000	232,000		

TD Securities

Major In Situ Projects

PROJECT OWNER (S)	STAGE	CAPEX [C$mm]	STATUS	AEUB STATUS	START-UP	PRODUCTION STAGE	PRODUCTION CUM.	INTEGRATED UPGRADER	PROJECT DESCRIPTION
Cold Lake									
Imperial Oil (affiliate of Exxon Mobil)	Phases 1-10	$1,700	Operating	Approved	1985	120,000	120,000	No	Additional wells along with steam generation, bitumen processing and H_2O treatment facilities
	Phases 11-13	$650	Under Development	Approved	2003	30,000	150,000		Imperial may build an upgrader; potentially after 2005 when product is displaced from Pine Bend
	Phases 14-16	$1,000	Under Development	Public Disclosure Filed	2007	30,000	180,000		Imperial expects to apply for EUB and AE approvals in early 2002
Wolf Lake / Primrose									
Canadian Natural Resources	Base Operations		Operating	Approved	1987	40,000	40,000	No	Considering upgrading options and ability to burn bitumen for fuel
	Phase 1	$310	Planning	Approved	TBD	20,000	60,000		Plan to optimize existing facilities to add an additional 20,000 bbls/d and later, to add steam facilities for an additional 60,000 bbls/d
	Phase 2	TBD	Planning	Under Review	TBD	60,000	120,000		Submitted regulatory applications in Nov/01 and expect approvals in late '02
Foster Creek									
Alberta Energy Co.	Phase 1	$290	Operating	Approved	Nov '01	25,000	25,000	No	Primrose block expected to contain 28 bln bbls bitumen in place
	Debottleneck	$50	Planning	Approved	2003	5,000	30,000		Planned debottlenecking to 30,000 bbl/d
	Phase 2	$600	Planning	Not Yet Filed	2005	40,000	70,000		Phase 2 & 3 dependent on having a dedicated upgrader market
	Phase 3	$440	Planning	Not Yet Filed	2007	30,000	100,000		Currently preparing regulatory applications
Mackay River									
Petro-Canada	Initial	$300	Under Development	Approved	2003	30,000	30,000	Yes	Plan to convert Edmonton refinery to take bitumen by 2007 ($2,800 million conversion)
									Mackay production will be marketed as bitumen blend until conversion completed in '07
Christina Lake									
PanCanadian	Initial	$200	Under Development	Approved	2002	10,000	10,000	Partial	Working on upgrading technology through a Joint Venture with Value Creation Inc.
	Expansion	$800	Planning	Approved	2008	60,000	70,000		Expansion dependent on upgrader and dedicated upgrader market
Firebag									
Suncor	Initial	$1,000	Under Development	Approved	2005	35,000	35,000	Yes	In-situ project and increased upgrading capacity at the Fort McMurray facility
	Expansion	$3,000	Planning	Approved	2008	105,000	140,000		Three additional expansion phases to reach cumulative in-situ production of 140,000 bbl/d

In Situ Projects Under Development

PROJECT OWNER (S)	STAGE	CAPEX [C$mm]	STATUS	AEUB STATUS	START-UP	PRODUCTION STAGE	PRODUCTION CUM.	INTEGRATED UPGRADER	PROJECT DESCRIPTION
Meadow Creek									
Petro-Canada (75%)	Initial	$800	Planning	Under Review	2007	80,000	80,000	Yes	1st Phase is the 80,000 bbl/d in-situ project
Nexen (25%)									Plan to convert Edmonton refinery to take bitumen by 2007 ($2,800 million conversion). Nexen's production going to Long Lake upgrader
Lewis									
Petro-Canada	Initial	$800	Planning	Public Disclosure Filed	TBD	60,000	60,000	Yes	Extensive delineation drilling and seismic were carried out in '00 and '01 to help map the full extent of the resource
Long Lake									
OPTI Canada (50%)	Phase 1	$2,300	Under Development	Under Review	2006	70,000	70,000	Yes	Nexen to act as operator and develop the SAGD portion; OPTI to operate/develop the upgrader
Nexen (50%)	Phase 2 (Upgrader)	$1,700	Planning	Not Yet Filed	2009	-	70,000		Phase 2 to increase upgrading capacity to 140,000 bbl/d - will process some 3rd party volumes
Kirby									
Rio Alto Exploration	Initial	$300	Under Development	Public Disclosure Filed	2004	30,000	30,000	No	EUB application expected to be filed in Q1/02

In Situ Projects Under Development cont'd

PROJECT OWNER (S)	STAGE	CAPEX [C$mm]	STATUS	AEUB STATUS	START-UP	PRODUCTION STAGE	PRODUCTION CUM.	INTEGRATED UPGRADER	PROJECT DESCRIPTION
Surmont									
Conoco (50%)	Stage 1	$325	Planning	Public Disclosure Filed	TDB	25,000	25,000	No	Surmont estimated to contain 3 bln bbls recoverable reserves
TotalFinaElf (50%)	Stage 2	$325	Planning		TDB	25,000	50,000		Began pilot in 1997 consisting of two well pairs which averaged 580 bbls/d in 2000
	Stage 3	$325	Planning		TDB	25,000	75,000		Decision on commercial project was to be made by Q4/02 prior to Conoco and Phillips deals
	Stage 4	$325	Planning		TDB	25,000	100,000		Stage 1 could start as early as '04-'05
Tucker Lake									
Husky Oil	Initial	$450	Planning	2002 Filing	TBD	20,000	20,000	Yes	No firm decision on proceeding has been made public to date Production likely to be sent to Husky's Lloydminster upgrader
Hangingstone									
Japan Oil Sands (75%)	Initial	$350	Operating	Approved	1997	4,000	10,000	No	Began pilot project in 1997 and announced commercial project in August of 2001
Nexen (25%)	Phase 2	$250	Under Development	Public Disclosure Filed	2006	25,000	35,000		Have spent approx. $350 million in the past 10 years. Will reach 10,000 bbls/d by 2002
	Phase 3	$200	Planning	Public Disclosure Filed	2010	25,000	60,000		Will expand in two phases of 25,000 bbls/d. Ultimate production could reach 100,000 bbls/d
Trout / Christina Lake									
Devon Energy	Initial		Under Development	Not Yet Filed	2007	25,000	25,000		100% WI in the 250 - 300 mmbo recoverable SAGD project

Timing Uncertain Projects

PROJECT OWNER (S)	STAGE	CAPEX [C$mm]	STATUS	AEUB STATUS	START-UP	PRODUCTION STAGE	PRODUCTION CUM.	INTEGRATED UPGRADER	PROJECT DESCRIPTION
Orion									
Blackrock Ventures (75%)	Phase 1	$180	Under Development	Under Review	TBD	10,000	10,000	No	Successful 4-yr pilot project currently producing 700 bbl/d - disclosed to start as early as '03
Anadarko (25%)	Phase 2	TBD	Planning	Under Review	TBD	10,000	20,000		Blackrock currently seeking new partners
Northern Lights									
Synenco Energy	Mining & Upgrading	$4,090	Planning	Not Yet Filed	TBD	100,000	100,000	Yes	Open pit mining operation planned; Plan to upgrade bitumen at site
Joslyn Creek									
Deer Creek	Initial SAGD	$596	Planning	Not Yet Filed	TBD	30,000	30,000	No	Have also identified additional opportunities for 100,000 bbl/d mining project and 2nd 30,000 bbl/d SAGD
	Expansion	$3,513	Planning	Not Yet Filed	TBD	130,000	160,000		Currently seeking capital investment
Kearl Lake									
Imperial Oil (20%)	Phase 1	$1,600	Planning	Not Yet Filed	TBD	TBD	TBD	No	Imperial is 75%/operator of the mining and 20%/non operator of the in situ project
Husky Energy (80%)	Phase 2	$3,200	Planning	Not Yet Filed	TBD	TBD	TBD		Imperial has currently not determined if and when they will go ahead with this project

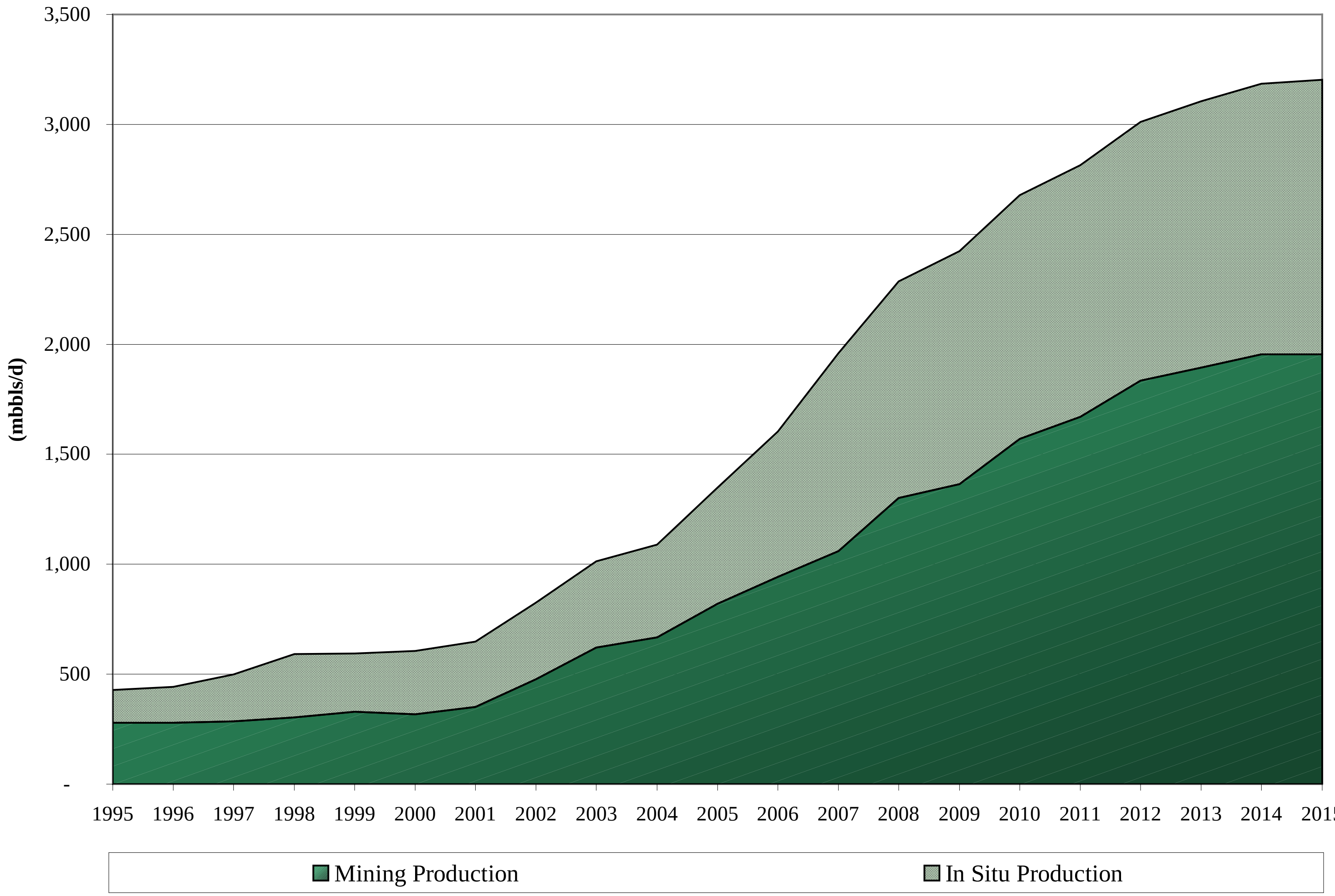
Mining / In Situ Production Forecasts

'000's bbl/d of Bitumen	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mining Projects																					
Syncrude	202	201	206	210	224	204	226	253	258	287	370	370	370	400	440	440	440	440	500	560	560
Suncor	76	78	79	94	106	114	125	225	225	225	250	275	300	350	375	410	410	410	410	410	410
Muskeg River (Albian)	-	-	-	-	-	-	-	-	138	155	180	203	225	225	225	350	450	525	525	525	525
Fort Hills	-	-	-	-	-	-	-	-	-	-	20	95	95	190	190	190	190	190	190	190	190
Horizon	-	-	-	-	-	-	-	-	-	-	-	-	70	135	135	180	180	270	270	270	270
Mining Production	278	279	286	303	329	317	351	478	621	667	820	943	1,060	1,300	1,365	1,570	1,670	1,835	1,895	1,955	1,955
In Situ Projects																					
Cold Lake	94	85	114	137	132	119	125	125	150	155	160	165	170	180	180	180	180	180	180	180	180
Lindbergh/Wabasca/Other *	40	59	74	111	93	131	119	141	121	120	119	115	122	120	113	118	113	113	113	113	111
Primrose / Wolf Lake	10	14	19	30	30	31	40	40	40	40	40	40	60	80	80	80	80	100	100	120	120
Shell Peace River	6	6	6	7	6	4	5	10	12	12	12	12	12	12	12	12	12	12	12	12	12
Hangingstone	-	-	-	3	4	3	4	8	10	10	22	35	35	35	35	48	60	60	80	80	100
Foster Creek	-	-	-	-	-	-	5	20	25	30	30	70	70	100	100	100	100	100	100	100	100
Christina Lake	-	-	-	-	-	-	-	4	10	10	35	35	52	70	70	70	70	70	70	70	70
MacKay River	-	-	-	-	-	-	-	-	25	30	30	30	30	30	30	30	30	30	30	30	30
Tucker Lake	-	-	-	-	-	-	-	-	-	10	20	20	20	20	20	20	20	20	20	20	20
Surmont	-	-	-	-	-	-	-	-	-	5	25	25	50	50	75	75	75	87	100	100	100
Firebag (Suncor)	-	-	-	-	-	-	-	-	-	-	35	35	85	85	140	140	140	140	140	140	140
Kirby	-	-	-	-	-	-	-	-	-	-	-	15	30	30	30	30	30	30	30	30	30
Meadow Creek	-	-	-	-	-	-	-	-	-	-	-	30	80	80	80	80	80	80	80	80	80
Long Lake	-	-	-	-	-	-	-	-	-	-	-	35	70	70	70	70	70	70	70	70	70
Trout / Christina Lake	-	-	-	-	-	-	-	-	-	-	-	-	15	25	25	25	25	25	25	25	25
Lewis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	60	60	60	60	60
In Situ Production	150	164	213	288	265	288	297	348	393	422	528	662	901	987	1,060	1,108	1,145	1,177	1,210	1,230	1,248
Total Bitumen	428	443	499	591	594	605	648	825	1,013	1,089	1,348	1,604	1,961	2,287	2,425	2,678	2,815	3,012	3,105	3,185	3,203

Source: Company reports and TD Securities estimates. Assumes all economic projects with major sponsors reach targeted production levels according to currently disclosed timing

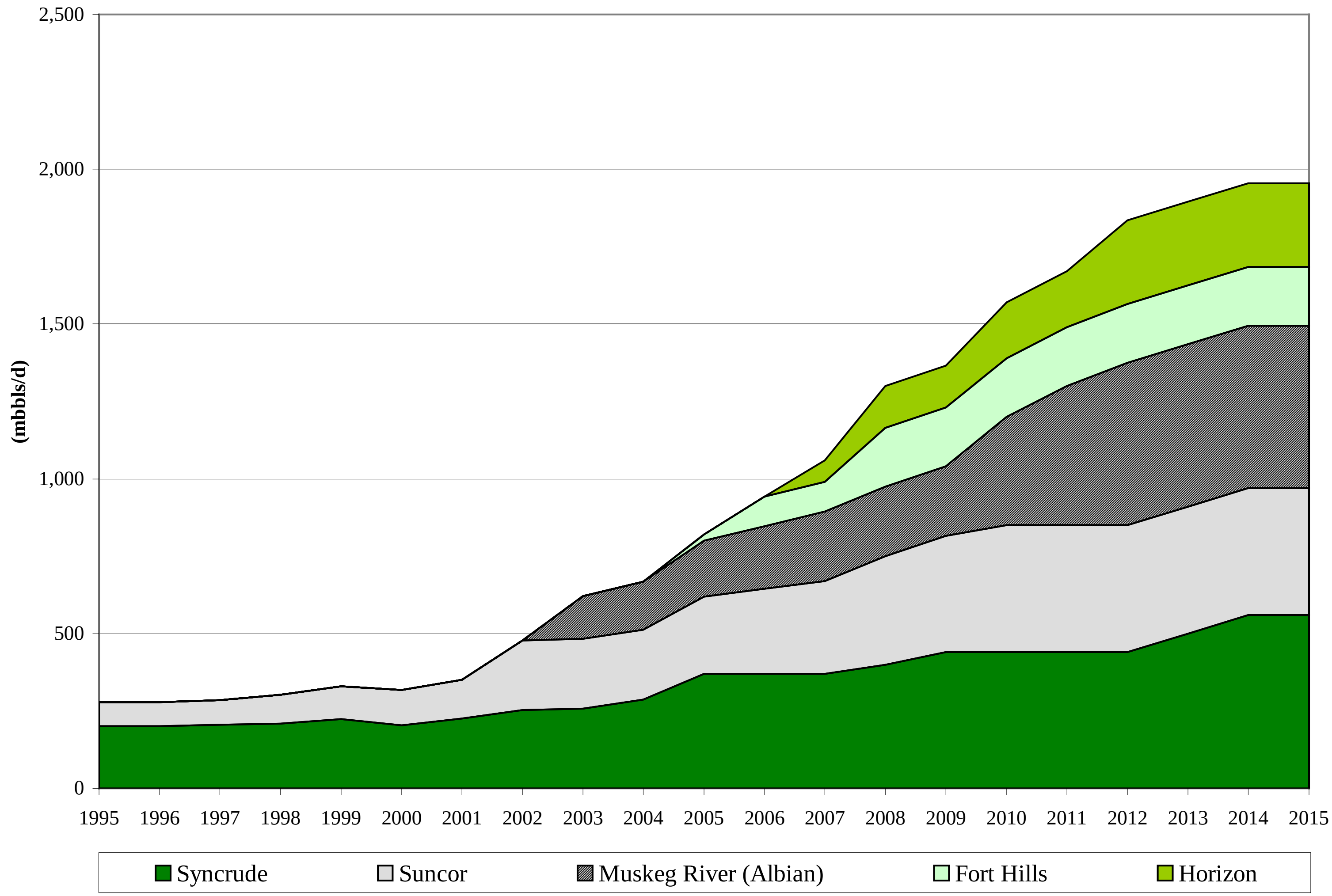
* Various small projects (multiple owners) in Lindbergh, Wabasca and Cold Lake Regions - includes some primary bitumen production

Oil Sands Production Forecast



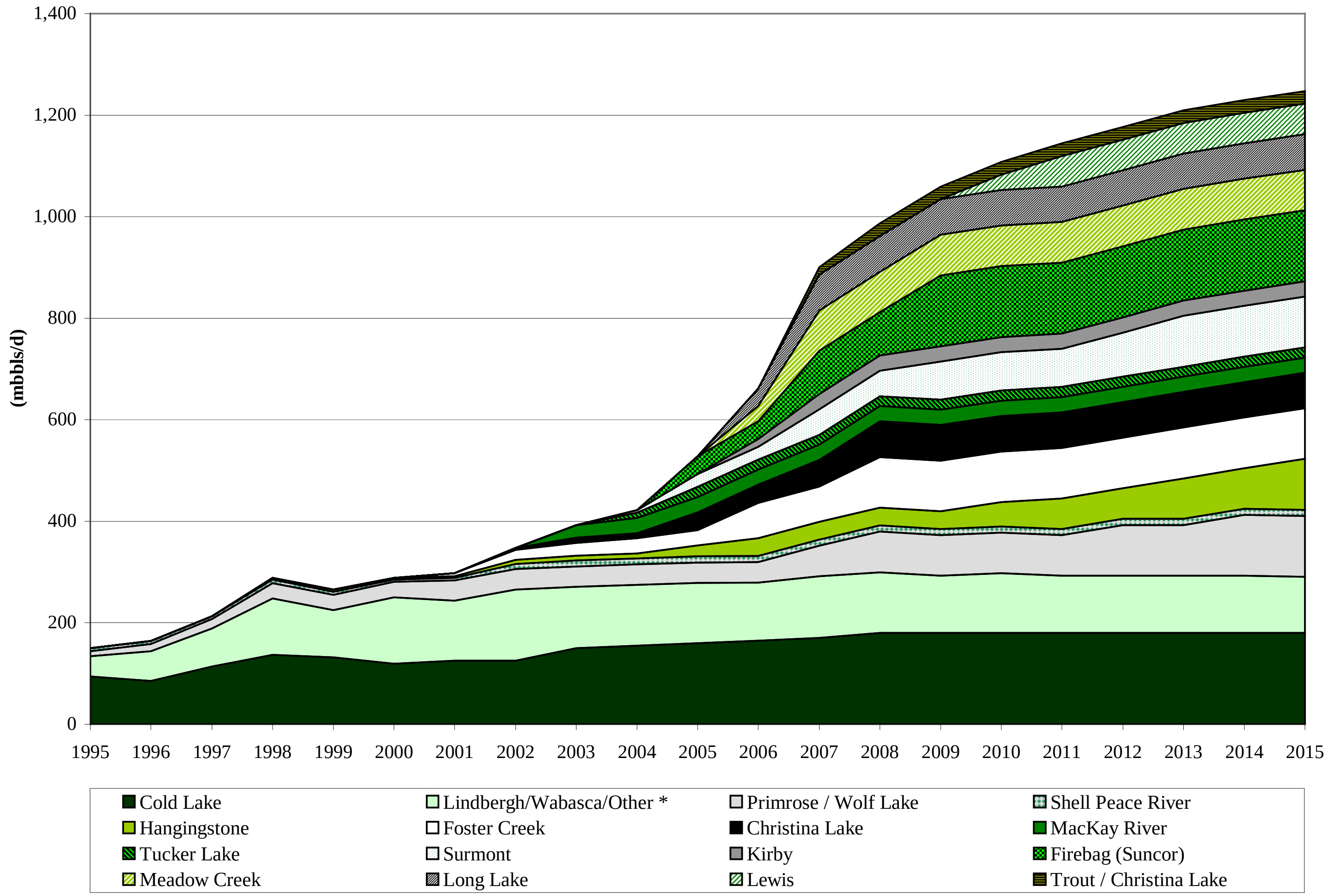
Source: Company reports and TD Securities estimates. Assumes all economic projects with major sponsors reach targeted production levels according to currently disclosed timing

Mining Production Forecast



Source: Company reports and TD Securities estimates. Assumes all economic projects with major sponsors reach targeted production levels according to currently disclosed timing

In Situ Production Forecast



Source: Company reports and TD Securities estimates. Assumes all economic projects with major sponsors reach targeted production levels according to currently disclosed timing
* Various small projects (multiple owners) in Lindbergh, Wabasca and Cold Lake Regions - includes some primary bitumen production

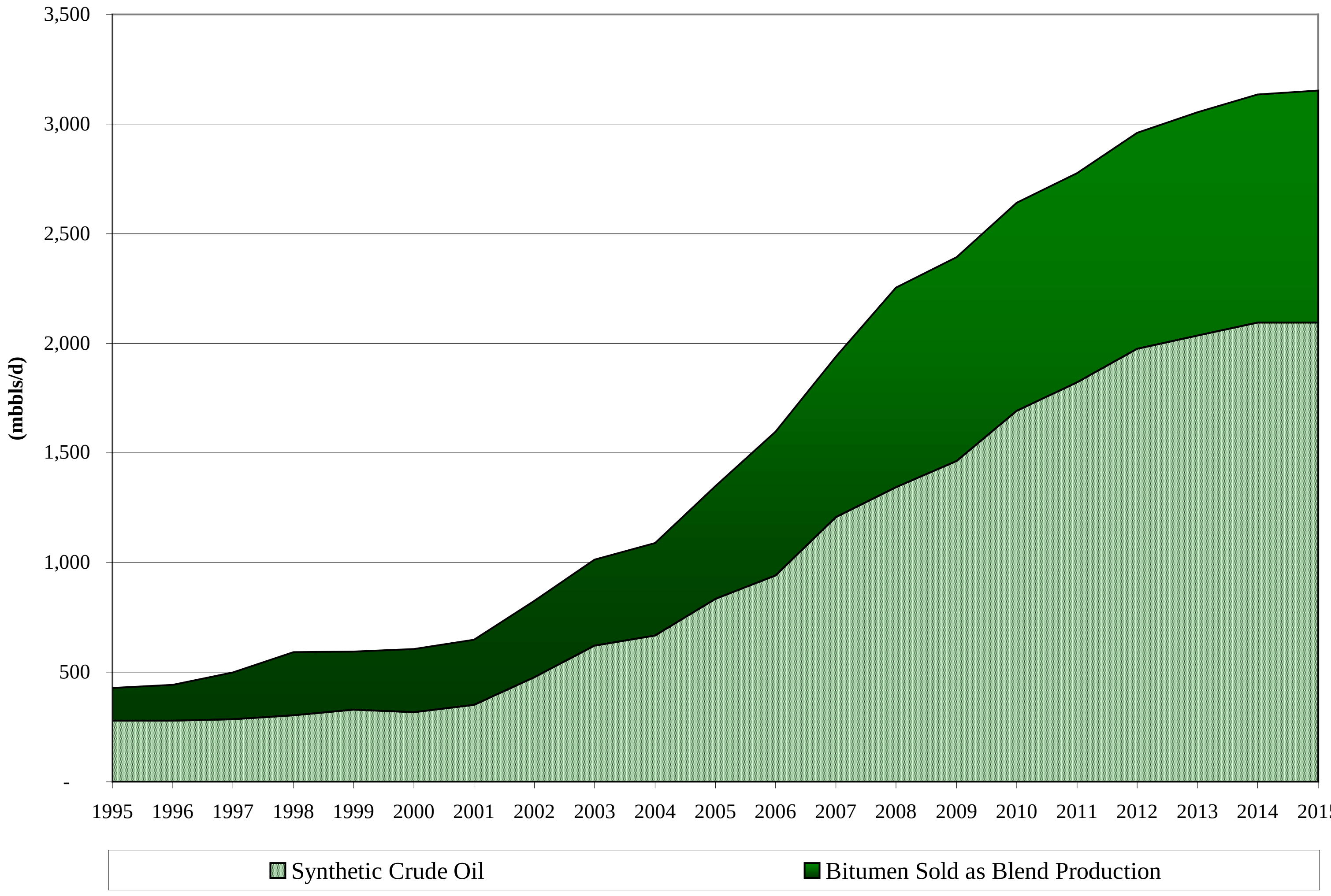
SCO / Bitumen Sold As Blend Production Forecasts

'000's bbl/d	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Synthetic Crude Oil																					
Syncrude	202	201	206	210	224	204	226	253	258	287	370	370	370	400	440	440	440	440	500	560	560
Suncor	76	78	79	94	106	114	125	225	225	225	285	310	385	435	515	550	550	550	550	550	550
Muskeg River (Albian)	-	-	-	-	-	-	-	-	138	155	180	203	225	225	225	350	450	525	525	525	525
Meadow Creek	-	-	-	-	-	-	-	-	-	-	-	30	80	80	80	80	80	80	80	80	80
Long Lake	-	-	-	-	-	-	-	-	-	-	-	29	58	58	58	58	58	58	58	58	58
Horizon	-	-	-	-	-	-	-	-	-	-	-	-	60	115	115	155	155	232	232	232	232
MacKay River	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	30	30	30	30	30
Lewis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	60	60	60	60	60
Synthetic Crude Oil	278	279	286	303	329	317	351	478	621	667	835	941	1,208	1,343	1,463	1,692	1,822	1,975	2,035	2,095	2,095
Bitumen Sold as Blend																					
Cold Lake	94	85	114	137	132	119	125	125	150	155	160	165	170	180	180	180	180	180	180	180	180
Lindbergh/Wabasca/Other *	40	59	74	111	93	131	119	141	146	150	149	145	122	120	113	118	113	113	113	113	111
Primrose / Wolf Lake	10	14	19	30	30	31	40	40	40	40	40	40	60	80	80	80	80	100	100	120	120
Shell Peace River	6	6	6	7	6	4	5	10	12	12	12	12	12	12	12	12	12	12	12	12	12
Hangingstone	-	-	-	3	4	3	4	8	10	10	22	35	35	35	35	48	60	60	80	80	100
Foster Creek	-	-	-	-	-	-	5	20	25	30	30	70	70	100	100	100	100	100	100	100	100
Christina Lake	-	-	-	-	-	-	-	4	10	10	35	35	52	70	70	70	70	70	70	70	70
Tucker Lake	-	-	-	-	-	-	-	-	-	10	20	20	20	20	20	20	20	20	20	20	20
Surmont	-	-	-	-	-	-	-	-	-	5	25	25	50	50	75	75	75	87	100	100	100
Fort Hills	-	-	-	-	-	-	-	-	-	-	20	95	95	190	190	190	190	190	190	190	190
Kirby	-	-	-	-	-	-	-	-	-	-	-	15	30	30	30	30	30	30	30	30	30
Trout / Christina Lake	-	-	-	-	-	-	-	-	-	-	-	-	15	25	25	25	25	25	25	25	25
Bitumen Sold as Blend Production	150	164	213	288	265	288	297	348	393	422	513	657	731	912	930	948	955	987	1,020	1,040	1,058
Total SCO / Bitumen Sold as Blend	428	443	499	591	594	605	648	825	1,013	1,089	1,348	1,598	1,938	2,254	2,392	2,640	2,777	2,961	3,054	3,134	3,152

Source: Company reports and TD Securities estimates. Assumes all economic projects with major sponsors reach targeted production levels according to currently disclosed timing

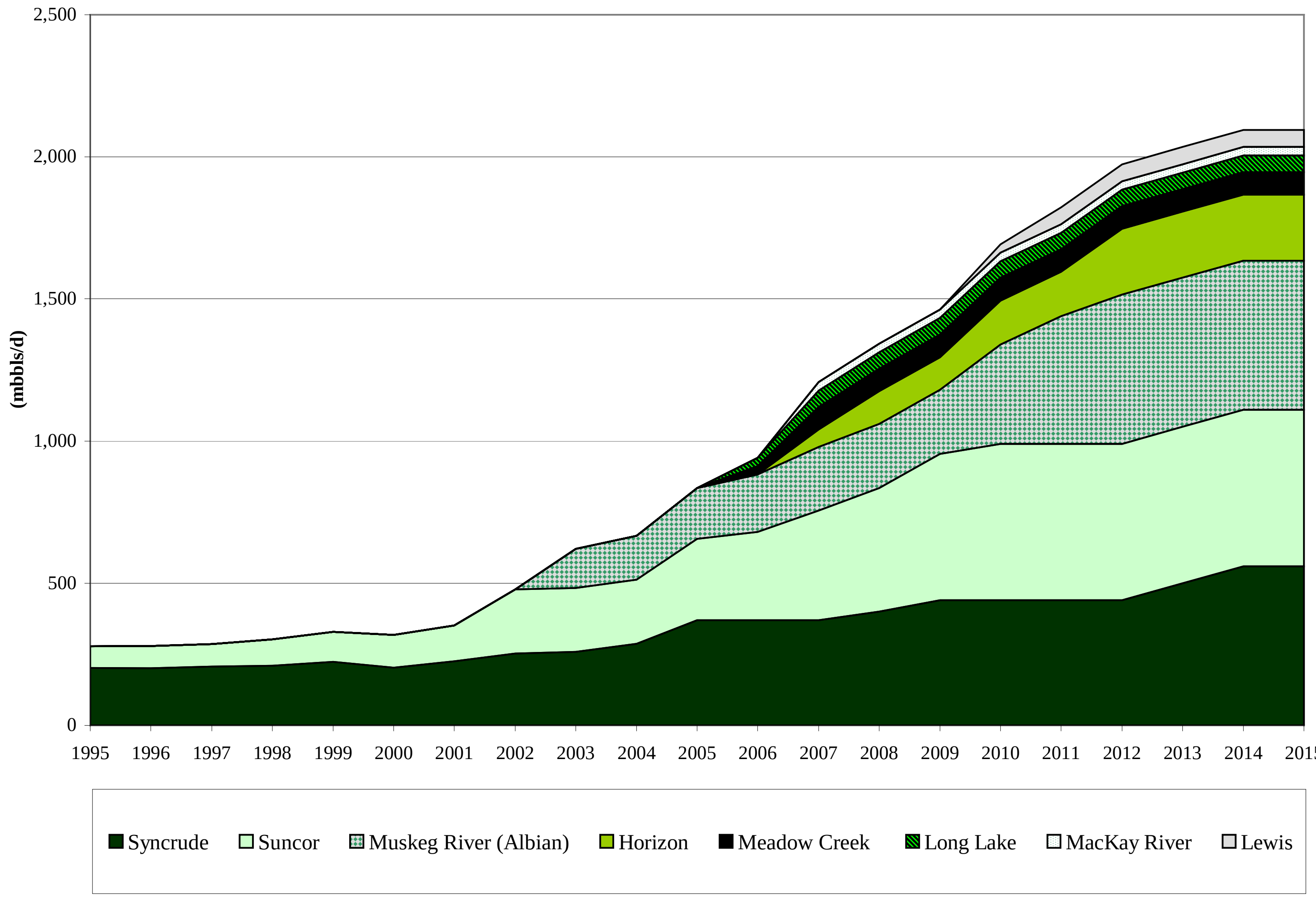
* Various small projects (multiple owners) in Lindbergh, Wabasca and Cold Lake Regions - includes some primary bitumen production. Includes Mackay River production until 2007, at which point it will be upgraded at Edmonton

Finished Product Production Forecast



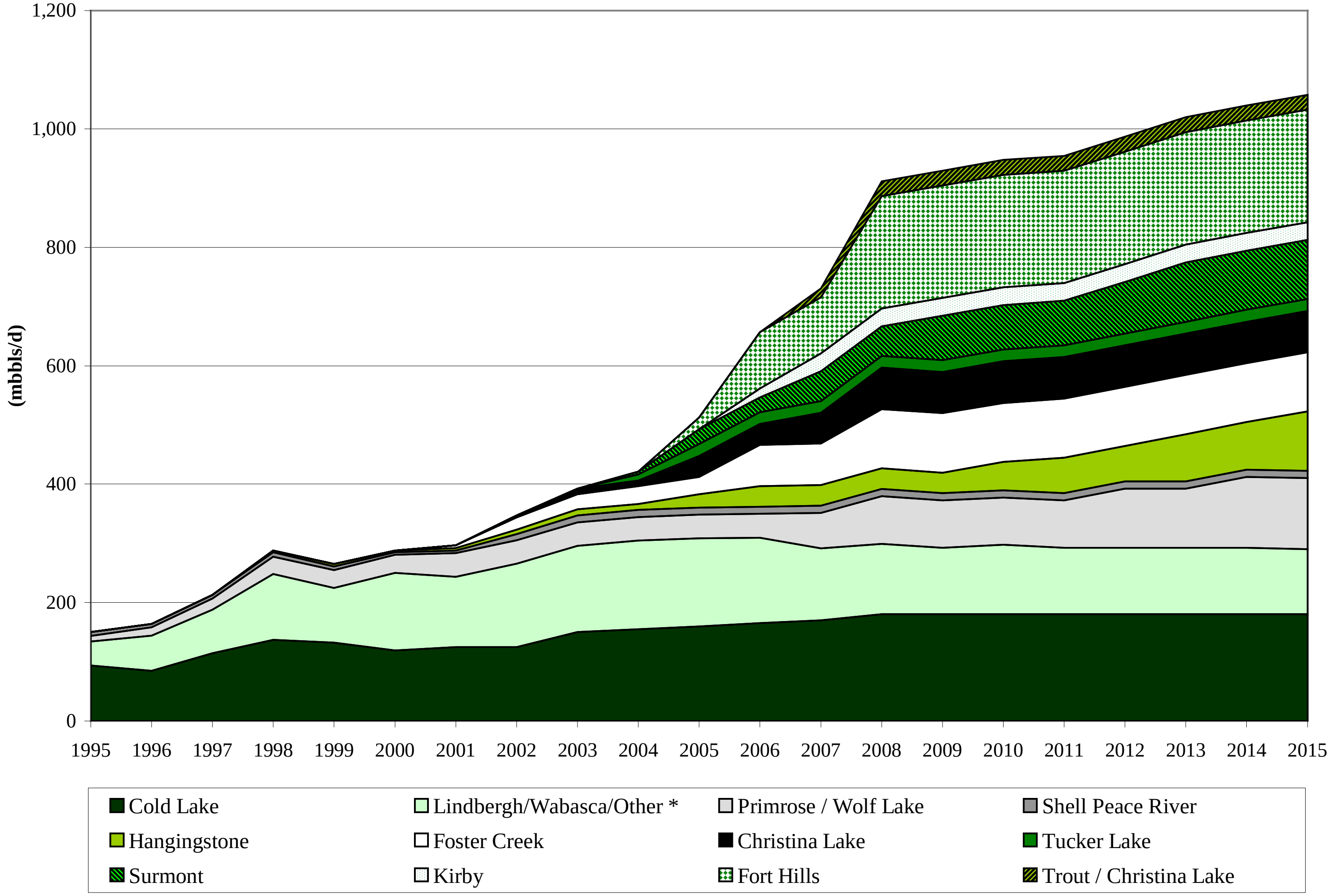
Source: Company reports and TD Securities estimates. Assumes all economic projects with major sponsors reach targeted production levels according to currently disclosed timing

Synthetic Crude Oil Production Forecast



Source: Company reports and TD Securities estimates. Assumes all economic projects with major sponsors reach targeted production levels according to currently disclosed timing

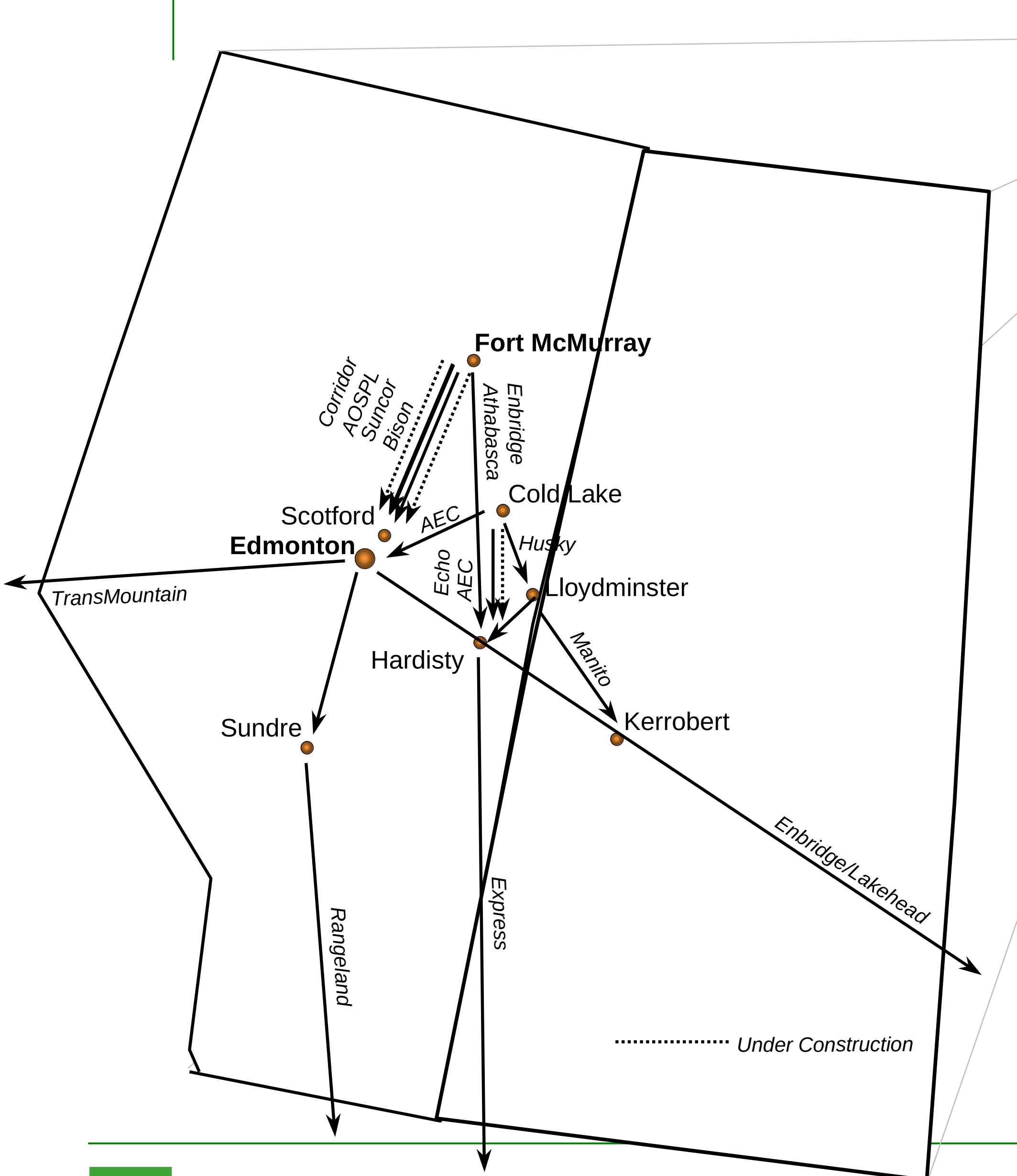
Bitumen Sold as Blend Production Forecast

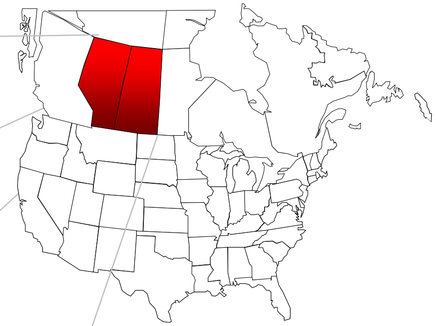


Source: Company reports and TD Securities estimates. Assumes all economic projects with major sponsors reach targeted production levels according to currently disclosed timing
* Various small projects (multiple owners) in Lindbergh, Wabasca and Cold Lake Regions - includes some primary bitumen production

Transportation

Transportation Overview

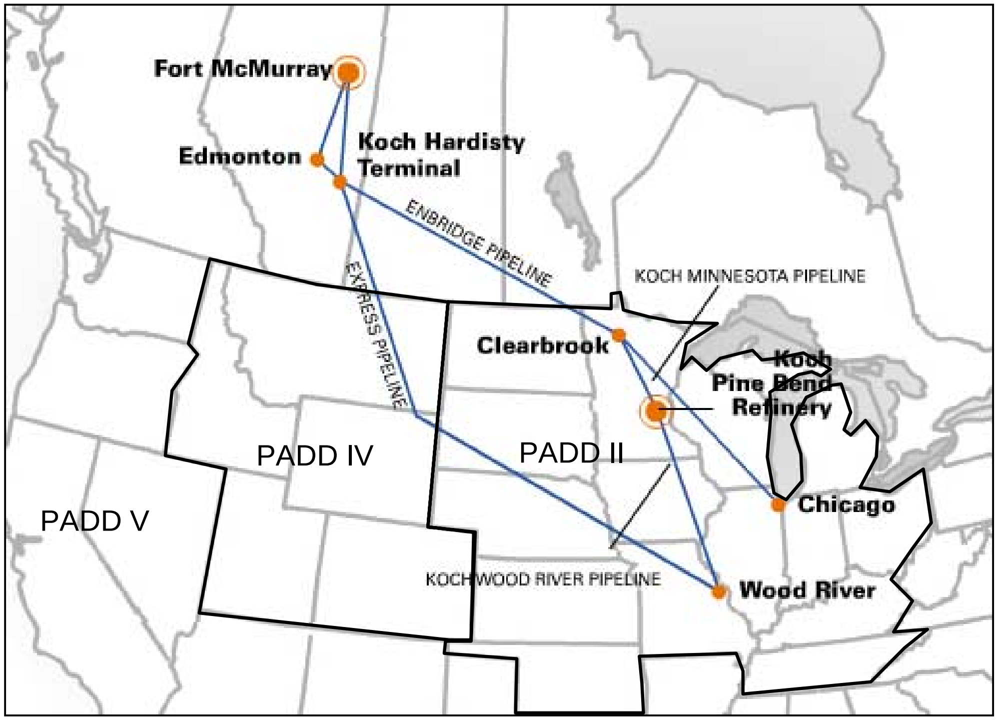




- Bitumen blend and SCO are transported from the various field facilities to major hubs in Alberta (Edmonton and Hardisty) by one of several pipelines
- The majority of the non-upgraded bitumen produced to date has been from the Cold Lake region and is transported on the AEC system
- Syncrude delivers its sweet synthetic crude to Edmonton on the AOSPL system owned by Pembina Pipelines L.P.
- Suncor's SCO goes to Hardisty on Enbridge's line and into Edmonton on its own private line
- Enbridge recently announced plans to build a pipeline from the Athabasca region to the Vancouver area to reach refining markets in Washington and California or Asia via tanker

Transportation Overview

- Bitumen blend and SCO are transported on the major pipelines out of Western Canada, and can easily access the primary markets in Eastern Canada, PADD II and PADD IV
  - most heavy crude and bitumen moves on the Enbridge/Lakehead pipeline system to the U.S Midwest, Ontario and Pennsylvania
  - increasing volumes are moving on the Express/Platte pipeline system owned by Alberta Energy Company (EnCana)
- Secondary markets in PADD V and offshore are accessed by ship
- As the production of bitumen and SCO increases, expansions of one or more of these systems will be needed



Transportation - Key Issues

- Currently, excess capacity exists to transport bitumen blend and SCO to markets
  - this capacity will be fully utilized as more new projects come onstream
  - projects that utilize unique technology or have unique product specs will require new or dedicated pipelines eg:
    - Albian (Shell et al) utilizes a unique solvent as part of their extraction process, and this solvent also acts as diluent to allow the bitumen to be shipped to the upgrader near Edmonton, where the diluent/solvent is stripped off and returned to the mine site
  - other projects that want to ship their products to a regional upgrader or major pipeline terminal without diluent will require a heated/insulated pipeline
    - B.C. Gas is proposing to build such a line called Bison from Fort McMurray to Edmonton in the 2005-'06 time frame

- Given the growth in Western Canadian production, additional expansions of transmission lines will be likely required over the next 10+ years
  - a phased series of expansions on Enbridge is already underway and will add 350,000 bbl/d of heavy crude oil (including bitumen blend) capacity to the system
    - phase I, which was completed in Q2 1999, cost $825 million and added 170,000 bbl/d of capacity
    - phase II will cost $120 million, will add 40,000 bbl/d starting in Q2 2002
    - phase III is estimated to cost $450 million and will add 140,000 bbl/d starting in late 2003

Bitumen and Synthetic Crude Oil Markets

Bitumen Blend Pricing

- As a product, bitumen blend competes with conventional oil
  - the price of bitumen blend is based on various posted prices, the most common of which are the “LLB” at Hardisty, Alberta posting and the “LLK” at Kerrobert, Saskatchewan
  - the benchmark heavy oil posting is Bow River crude at Hardisty, Alberta
  - LLB/LLK is posted by a number of companies including Koch, BP and Petro-Canada
- The light-heavy differential is used to reference these postings to WTI, and is a commonly referred to measure of bitumen blend/heavy oil pricing
- Since bitumen is blended with diluent prior to being sold, there is no direct bitumen posting, it must be calculated, by assuming that blend is simply a weighted average of diluent and bitumen
- Assuming long term prices for WTI of US$20.00, a light-heavy differential of US$6.50, diluent of US$21.00, and a ratio of 30% diluent per barrel of blend gives the following netback:

WTI	[US$]		20.00	
less light-heavy differential	[US$]	-	6.50	
Bitumen Blend	[US$]		13.50	
less condensate cost	[US$]	-	6.30	($21.00 x 30%)
Bitumen value per barrel of blend	[US$]		7.20	
Bitumen value per barrel of bitumen	[US$]		10.29	($7.20 / 70%)

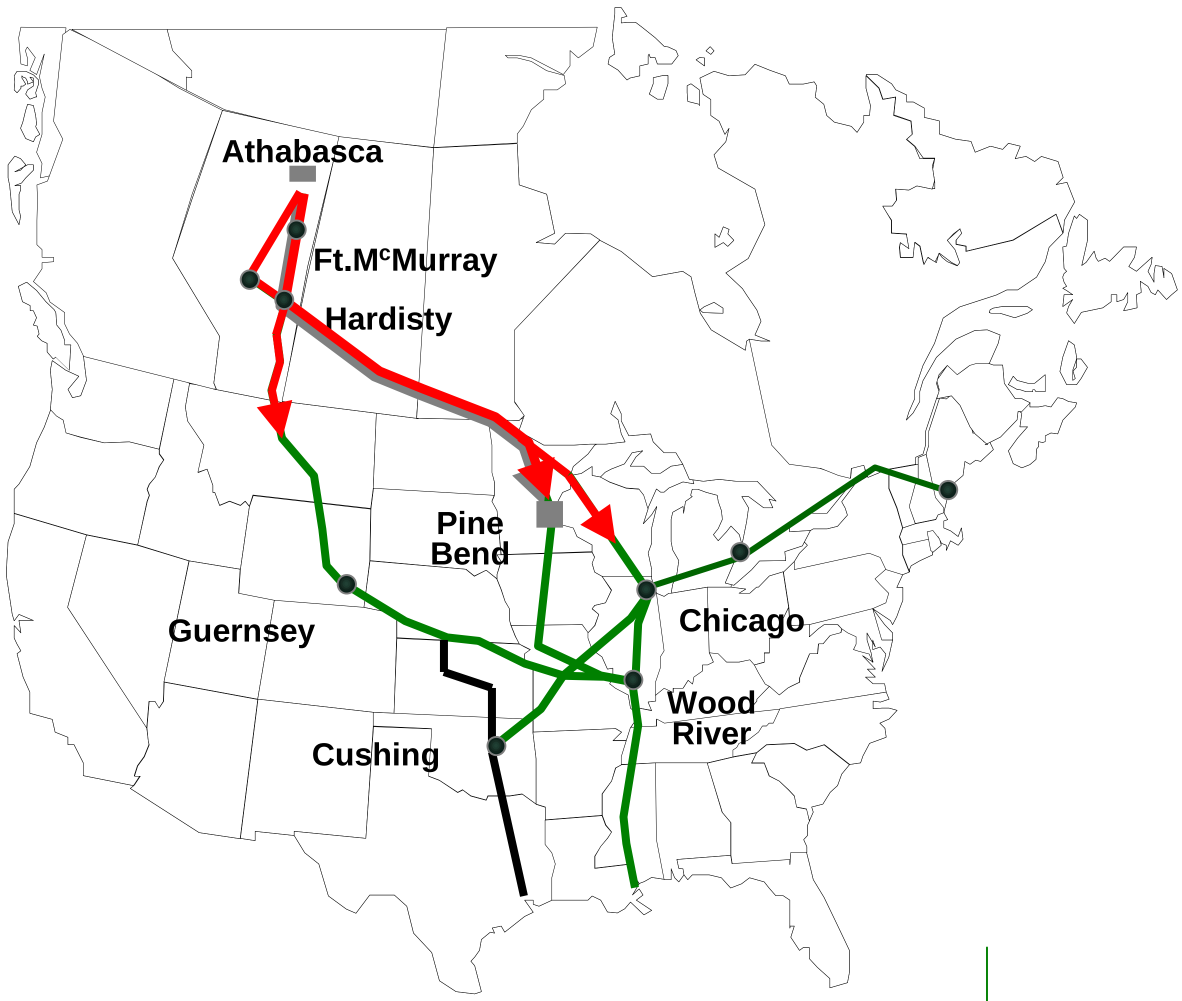
Markets for Bitumen Blend

Major Customers for Canadian Heavy Oil & Bitumen Blend

Canada
- Husky Lloydminster [1]
- IOL Sarnia
- Coop Regina
- Shell Scotford [2]
- Petro-Canada Edmonton [3]

Montana
- Conoco Billings
- Exxon Billings

US MidWest
- Koch Pine Bend
- ExxonMobil Joliette
- BP Whiting
- BP Toledo
- PDV Lemont
- Shell Wood River



1) Upgrader only
2) Integrated with Shell's mining project - no third party volumes after 2003
3) Refinery being converted to take 100% bitumen by 2007 - integrated with Petro-Canada's SAGD projects - no third party volumes after 2006

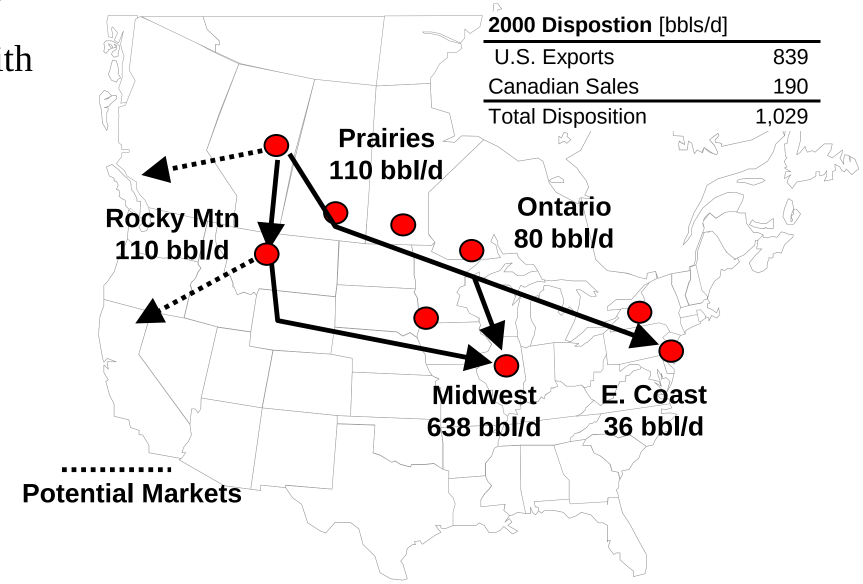
Markets for Bitumen Blend

- Bitumen blend is purchased by refineries that have associated upgrading facilities - coking or hydrocracking
- The majority of Canadian blend is sold into PADD II, with additional volume sold in Alberta, Eastern Canada and PADD IV
- Over 50% of Canadian bitumen blend is purchased by 6 refineries:

– Koch, Pine Bend MO	15%
– BP, Whiting IN	11%
– BP, Toledo OH	8%
– Husky, Lloydminster AB	8%
– ExxonMobil, Joliet IL	7%
– PDV, Lemont IL	5%
	53%

Disposition of Bitumen & Heavy Crude OIl

2000 Dispostion [bbls/d]	
U.S. Exports	839
Canadian Sales	190
Total Disposition	1,029



Source: Alberta Energy; National Energy Board

- The estimated capacity for bitumen blend and heavy oil is estimated to be over 1 million barrels per day in Canada, PADD II and PADD IV
  - CITGO's refinery is shut down for repairs until Q2'02
  - capacity "creep" of 1-2% per year is typical of most refineries
  - no new upgrading capacity has been announced in the U.S.
- Competing products to bitumen blend are Mexican (Maya) heavy oil and to a lesser extent, Venezuelan heavy
  - most Venezuelan crude is upgraded or is tied to Venezuelan-owned refineries

Markets for Synthetic Crude Oil

- As a product, SCO competes with conventional light crude oils, both domestic and offshore
  - synthetic crude oils have historically traded at a small differential (both positive & negative) to conventional light oils
- Synthetic crude oil can be processed by most refineries, thus it is sold to a much broader mix of refineries than bitumen blend
  - amount any refinery can process while optimizing profitability is limited however
- Synthetic is a substitute for light crude oil, but has some key differences
  - most synthetics are "bottomless", meaning there is no heavy residual remaining after refining - this is an advantage over crude oils for many refineries
  - however, existing synthetic crude oils cannot produce the required quality of certain products, e.g. diesel fuel, jet fuel and asphalt, therefore the refiner must blend the synthetic with other crude
  - existing synthetics also has a higher proportion of low quality vacuum gas oil ("VGO") which is more difficult and expensive for refineries to process
- With the expected significant increase in synthetic crude oil over the next 10 years, SCO is expected to sell at a larger discount to conventional light oils than it has historically
  - existing producers and new projects are expected to produce higher/different quality SCO in the future to address some of the aforementioned issues

Economics of Oil Sands

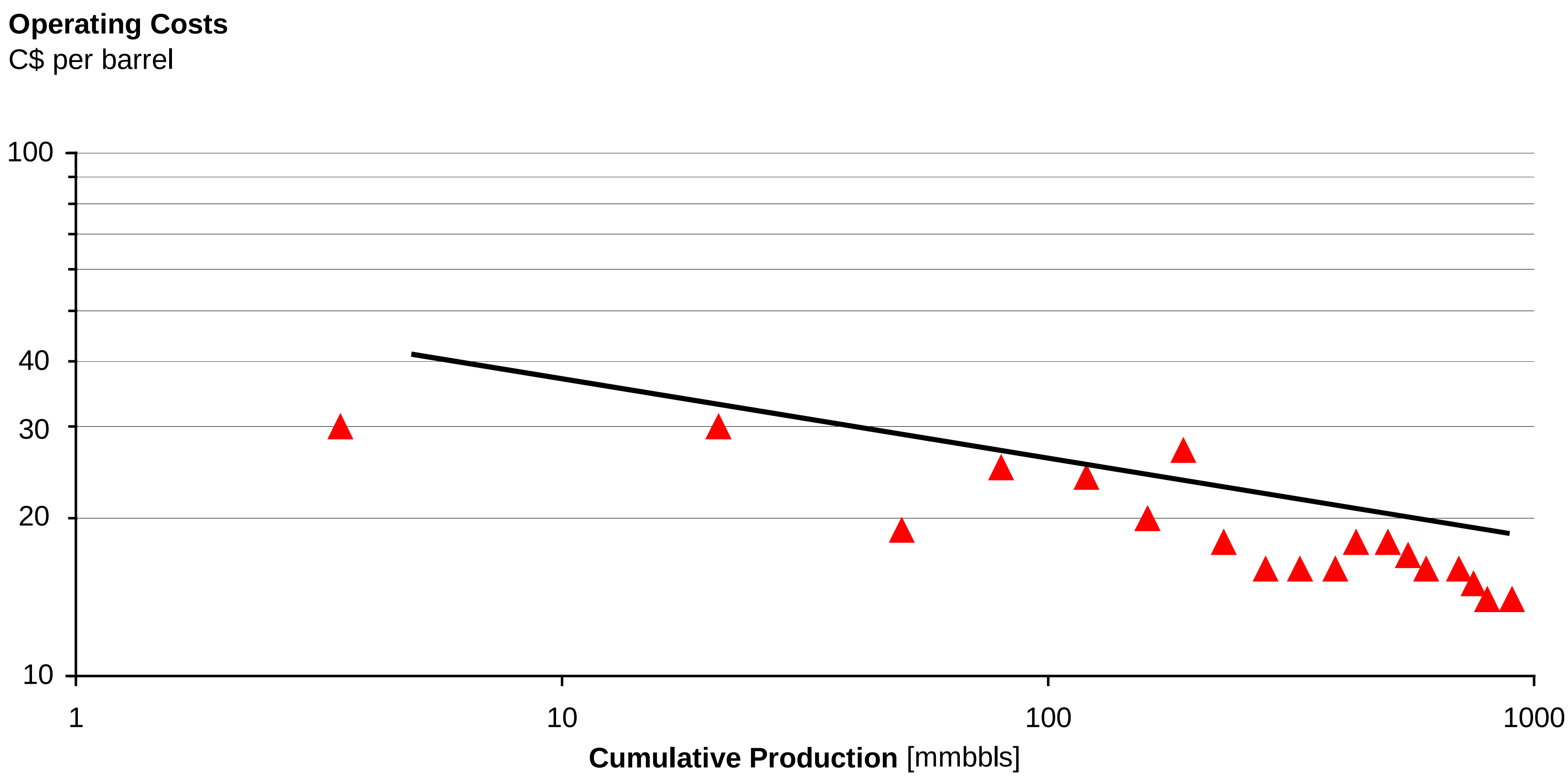
Oil Sands Economics - Key Drivers

- Long life assets
  - projects normally have 30+ years of reserves
  - non-declining production
- Expected growth from expansions
  - virtually all projects have been expanded and contemplate further expansions
- Attractive economics
  - after-tax IRRs on base projects >12%
- Attractive Royalty and Tax Regime
  - Alberta's royalty regime is structured to encourage development, and consists of a nominal 1% royalty before project payout and 25% thereafter, plus an allowance for return on capital
  - royalties are paid based on the price of bitumen, not SCO
  - corporate taxes are likewise not payable until all capital is recovered and similarly encourage expansions

Oil Sands Economics - Key Drivers

- Mining
  - the key cost drivers are initial capital, sustaining capital (primarily replacement of mining equipment and facility maintenance), labour and maintenance
- In Situ
  - the primary cost driver is the price of natural gas, which is burned as fuel to produce steam. Minimizing the SOR is critical to economic success
  - capital cost and required scale is significantly lower than mining
  - advances are being made to reduce the energy requirement
    - ie. VAPEX process which involves the injection of solvent into the reservoir
- Upgrading
  - as with mining, there is a large up front capital requirement
  - depending on the choice of upgrading technology:
    - there is a large cost of natural gas as both a fuel and a feedstock for the production of hydrogen used in upgrading (hydrocracking)
    - while coking avoids the use of hydrogen, there is a cost associated with lower product yield and the production of a waste product

Syncrude Experience Curve



Technological improvements have decreased operating costs substantially at the Syncrude joint ventures mining projects

Capex per Flowing Barrel

Project	Capex [5] Mining/SAGD [$mm]	Capex [5] Upgrading [$mm]	Capex [5] Integrated [$mm]	Production Mining/SAGD [bbl/d bitumen]	Production Upgrading [bbl/d SCO]	Capex / Production Mining/SAGD [$/bbl/d Bitumen]	Capex / Production Upgrading [$/bbl/d SCO]	Capex / Production Integrated [$/bbl/d SCO]
Mining								
Syncrude								
Stage 1 [1]	na	na	$470.0	25,556	23,000	na	na	$20,435
Stage 2 [1]	na	na	$1,000.0	41,111	37,000	na	na	$27,027
Stage 3 [1]	na	na	$3,543.0 [4]	122,222	110,000	na	na	$32,209
Total [3]	$1,900.0	$3,113.0	$5,013.0	188,889	170,000	$10,059	$18,312	$29,488
Millenium [3]	$1,200.0	$2,200.0	$3,400.0	122,222	110,000	$9,818	$20,000	$30,909
Muskeg River [2]	$2,200.0	$2,800.0	$5,000.0	155,000	190,000	$14,194	$14,737	$26,316
Fort Hills								
Stage 1 [2]	$2,000.0	na	na	95,000	na	$21,053	na	na
Stage 2 [2]	$1,300.0	na	na	95,000	na	$13,684	na	na
Total	$3,300.0	na	na	190,000	na	$17,368		
Horizon [2]	$3,600.0	$4,400.0	$8,000.0	270,000	230,000	$13,333	$19,130	$34,783
					Average Mining	**$13,690**		
SAGD								
Foster Creek [1]	$340.0	na	na	30,000	na	$11,333	na	na
Petro-Canada								
Mackay River [1]	$300.0	na	na	30,000	na	$10,000	na	na
Meadow Creek [1]	$600.0	na	na	60,000	na	$10,000	na	na
	$900.0	$1,750.0	$2,650.0	90,000	85,000	$10,000	$20,588	$31,176
Firebag [2]	$1,500.0	$2,700.0	$4,200.0	155,556	140,000	$9,643	$19,286	$30,000
Christina Lake [1]	$90.0	na	na	10,000	na	$9,000	na	na
	$500.0	na	na	70,000	na	$7,143	na	na
Hangingstone [1]	$600.0	na	na	60,000	na	$10,000	na	na
Long Lake Phase 1 [1]	$700.0	$1,450.0	$2,150.0	70,000	58,989	$10,000	$24,581	$36,447
					Average SAGD	**$9,640**		
					Overall Average	**$11,376**	**$19,341**	**$31,324**

(1) Per Company Reports
(2) Per TD Securities' Estimates
(3) Integrated capex figures per Company Reports, breakdown per TD Securities' estimates
(4) Syncrude Stage 3 capex excludes portion of $650mm environmental charges that benefit the entire project
(5) Excludes costs of co-gens, and, if applicable, dedicated pipelines

Continued Development - Major Issues

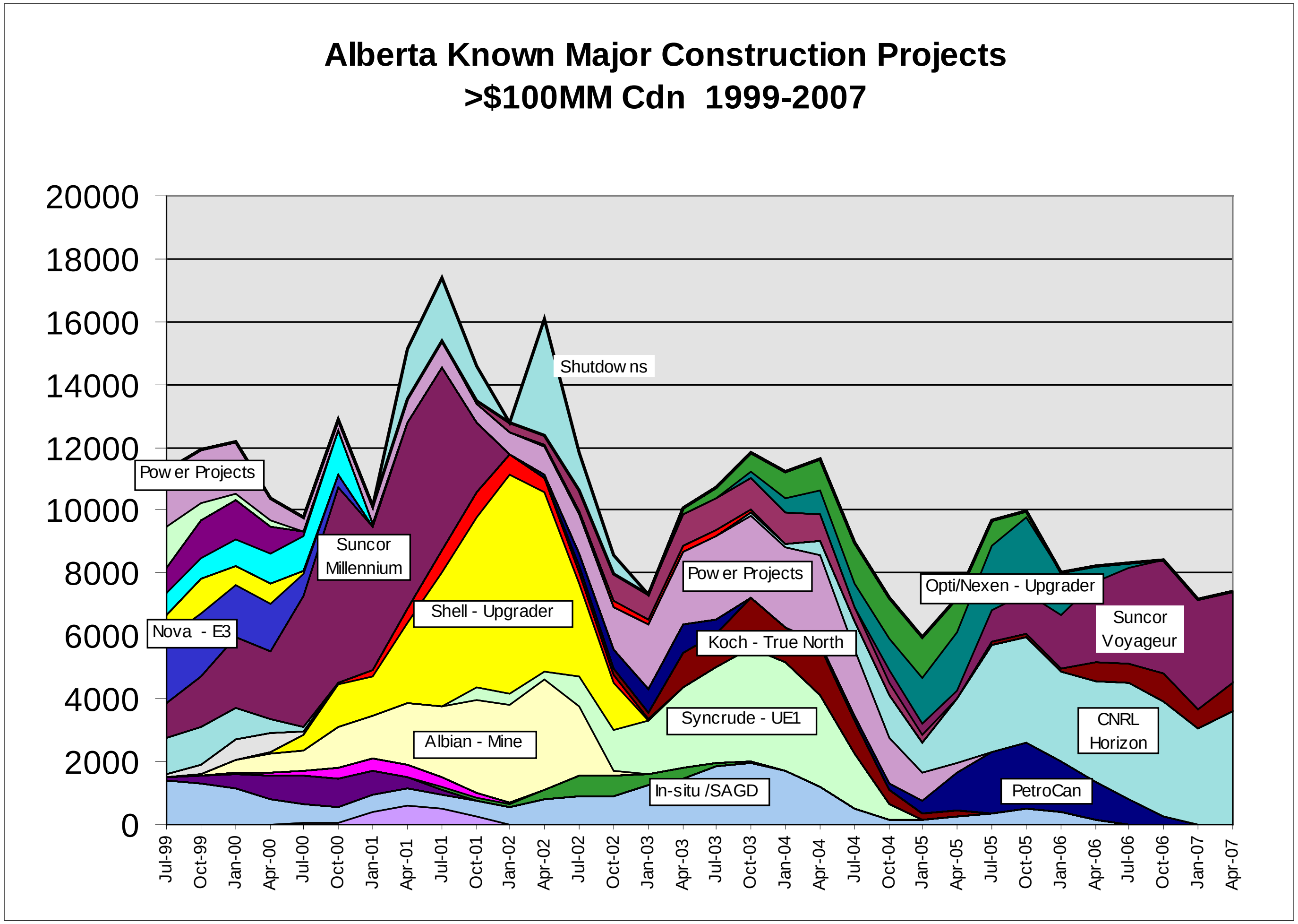
Oil Sands - Major Issues

- Upgrading capacity is currently close to supply and will be exceeded if growth continues as planned without additional capacity additions
  - many of the announced projects have indicated that upgrading may be part of the project e.g. Petro-Canada, CNRL, OPTI/Nexen
  - some of the non-integrated projects may not go ahead in the near to medium term, given the current economics of standalone in situ projects
  - the economics of upgrading are good, given the forecasted environment of wide light-heavy differentials
- The economics of non-integrated projects will be more volatile, as they have more exposure to various commodities
  - an in situ project without an upgrader will be subject to prices of natural gas, diluent, crude oil and the light/heavy differential
- Diluent ($C5^+$) supply may become a constraint to bitumen blend transportation, but there are many mitigating factors:
  - alternative diluents, such as synthetic crude oil, light oil, refinery streams (naptha)
  - partial upgrading (significantly reduces diluent requirements)
  - local/regional upgrading (allows for diluent to be eliminated or recycled back to producing fields)
  - insulated pipelines
- The economic stresses due to fluctuating natural gas costs can be offset by several factors:
  - co-generation plants (excess electricity sold into the market)
  - alternative fuels, e.g. bitumen or coke
  - improved recovery techniques, e.g. solvent addition

Oil Sands - Major Issues

- While the resource seems almost limitless, most of the best leases have been secured, thus creating a barrier to entry to new players
  - companies have shown the ability to “farm-in” on or acquire a percentage of held leases e.g. Western Oil Sands & Chevron, UTS Energy, Koch, OPTI and Nexen
- Environmental issues, specifically cumulative impacts on watershed and airshed, may become increasingly difficult and costly to deal with
  - Alberta has been very oil friendly and very development friendly and no project has been rejected outright
  - more likely an issue of time, cost and patience than go/no-go
  - Kyoto?
- Tight labor and construction market
  - Fort McMurray currently enjoying an very active economy
  - recent projects (Suncor’s Millenium and Shell’s Muskeg River) have undergone major cost overuns (65% and 40% respectively) due largely to shortages of labor supply and productivity issues
  - coordinated timing of major mining and upgrader / refiner projects will be important to avoid similar situations (in situ projects much less labor intensive)

Oil Sands - Major Issues



Source: Flour Inc.

The Alberta labor environment for major construction projects is not currently forecasted to be as severely constrained as it was in the summer of 2001

TD Securities' Oil Sands Financings

TD Securities is the recognized leader in advising, and raising capital for, heavy oil & oil sands projects & companies...		**$90,000,000** OPTI Canada Inc. Private Placement of Equity **May 2002** Sole Agent	**US$450,000,000** Western Oil Sands 8 3/8 % Senior Secured Notes **April 2002** Lead Underwriter & Joint Book-Runner	**$100,000,000** Western Oil Sands Senior Secured Credit Facility **April 2002** Sole Underwriter & Administrative Agent	**$250,000,000** Shell Canada Limited Extendible Floating Rate Note Facility **February 2002** Lead Underwriter & Sole Bookrunner
US$500,000,000 Suncor Energy Unsecured Notes **January 2002** Co-Manager	**$225,000,000** Pembina Acquisition of the Alberta Oil Sands Pipeline **November 2001** Exclusive Financial Advisor	**$16,000,000** UTS Issue of Common Shares **October 2001** Lead Underwriter	**$45,000,0000** Western Oil Sands Equity Rights Offering **October 2001** Financial Advisor	**$30,000,000** Western Oil Sands Rights Offering Standby Commitment Subordinated Bridge Facility **June 2001** Sole Underwriter	**$90,000,000** Passage Energy On the Sale of Passage to a Confidential Bidder **April 2001** Exclusive Financial Advisor
$90,000,000 Western Oil Sands Rights Offering Standby Commitment **March 2001** Sole Underwriter	**$90,000,000** Western Oil Sands Subordinated Bridge Facility **March 2001** Sole Underwriter	**US$150,000,000** Baytex Issue of Senior Subordinated Notes **February 2001** Lead Manager & Sole Bookrunner	**$161,000,000** ATCO Power Scotford Cogeneration Facility Project Loan **January 2001** Lead Arranger & Administrative Agent	**$14,000,000** UTS Private Placement of Equity & Participation Rights **October 2000** Exclusive Financial Advisor & Sole Agent	**$700,000,000** BC Gas Project Financing for Corridor Pipeline **September 2000** Lead Arranger & Administrative Agent
$100,000,000 Western Oil Sands Subordinated Bridge Loan **July 2000** Lead Underwriter	**$290,000,000** Albian Sands, Shell, Chevron, Western Oil Sands Lease Financing of Hydrogen Manufacturing Unit **June 2000** Syndication Agent	**$123,000,000** Western Oil Sands Private Placement of Equity **December 1999** Exclusive Agent	**$280,000,000** Western Oil Sands Committed & Contingent Equity **December 1999** Exclusive Agent	**$535,000,000** Western Oil Sands Senior Secured Credit Facilities **December 1999** Lead Underwriter, Administrative Agent & Sole Bookrunner	**$74,000,000** Western Oil Sands Acquisition of 20% interest in the $5B Athabasca Oil Sands Project from Shell Canada **December 1998** Exclusive Financial Advisor
$96,000,000 Canadian Oil Sands Trust Unit Issue **February 1998** Underwriter	**$150,000,000** Alberta Sale of 5% interest in the Syncrude Joint Venture to Murphy Oil **1993** Advisor to the Province of Alberta	**Heavy Oil & Bitumen Producers** EnCana, Nexen, Petro-Canada, CNRL, Imperial Oil Esso, Conoco, Husky Energy, Shell, Suncor Lender	**Syncrude JV Owners** Petro-Canada, Imperial Oil Esso, Nexen, Conoco, EnCana Lender	TD Securities	