
Oil Sands Supply Outlook

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Topics

- Introduction
- Oil Sands Industry Overview
- Industry Supply Costs
- Natural Gas Use in the Oil Sands Industry
- Industry Outlook

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CERI Study No. 108

- **Oil Sands Supply Outlook**
 - *Potential Supply and Costs of Crude Bitumen and Synthetic Crude Oil in Canada, 2003-2017*
 - Released March 3, 2004
- **Study Contents**
 - Industry Supply Costs
 - Industry Issues
 - Bitumen and Synthetic Crude Oil Supply Projections

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Conclusions

- **Alberta's oil sands industry has a very robust future given a reasonable outlook for crude oil prices**
 - The industry needs crude oil prices of US\$25/b (2003 real, WTI at Cushing) to recover costs and earn an adequate return on investment
 - The industry faces many challenges that must be overcome for sustained growth
 - Many projects will proceed, others will not

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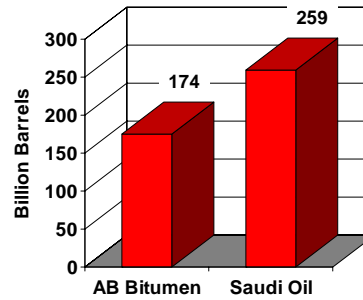


Resources and Reserves



Courtesy of the Petroleum Communication Foundation (PCF)

Remaining Reserves



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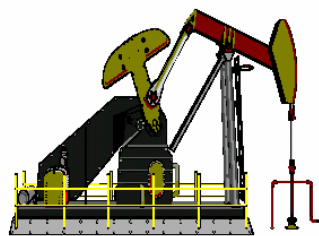
Source: Alberta Energy and Utilities Board; Oil & Gas Journal

Resources and Reserves



Mineable Resources/Reserves

- < 75m depth to top of oil sands formation
- Athabasca only
- 7% of OBIP; 20% of initial established reserves; 70% of cumulative production



In Situ Resources/Reserves

- > 75m depth to top of oil sands formation
- Athabasca, CL and PR
- 93% of OBIP; 80% of initial established reserves; 30% of cumulative production

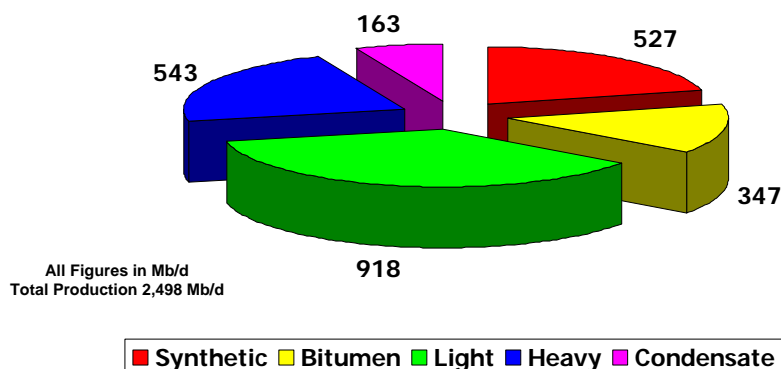
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Source: Energy and Utilities Board (Year-end 2002)

Overview - Production

Alberta's Oil Sands provided 35% of Canada's "crude oil" production in 2003



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Source: National Energy Board (Preliminary Data)



Supply Cost

- **Supply Cost is the constant dollar price needed to recover all capital expenditures, operating costs, royalties and taxes and earn a specified return on investment**
- **For this study supply costs are calculated:**
 - In constant 2003 dollars
 - using a 10%/a discount rate (real) - equivalent to a discount rate of 12%/a (nominal) based on an inflation rate of 2%/a

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Source: CERI Study No. 108



Bitumen Supply Costs

	Plant Gate (C\$/b)	WTI @ Cushing (US\$/b)
Cold Lake Primary (CHOPS)	14.51	21.57
Cold Lake CSS	17.77	25.12
Athabasca SAGD	15.64	25.10
Athabasca Mining & Extraction	15.48	24.97

CHOPS: Cold Heavy Oil Production with Sand

CSS: Cyclic Steam Stimulation

SAGD: Steam Assisted Gravity Drainage

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Source: CERI Study No. 108

SCO Supply Costs

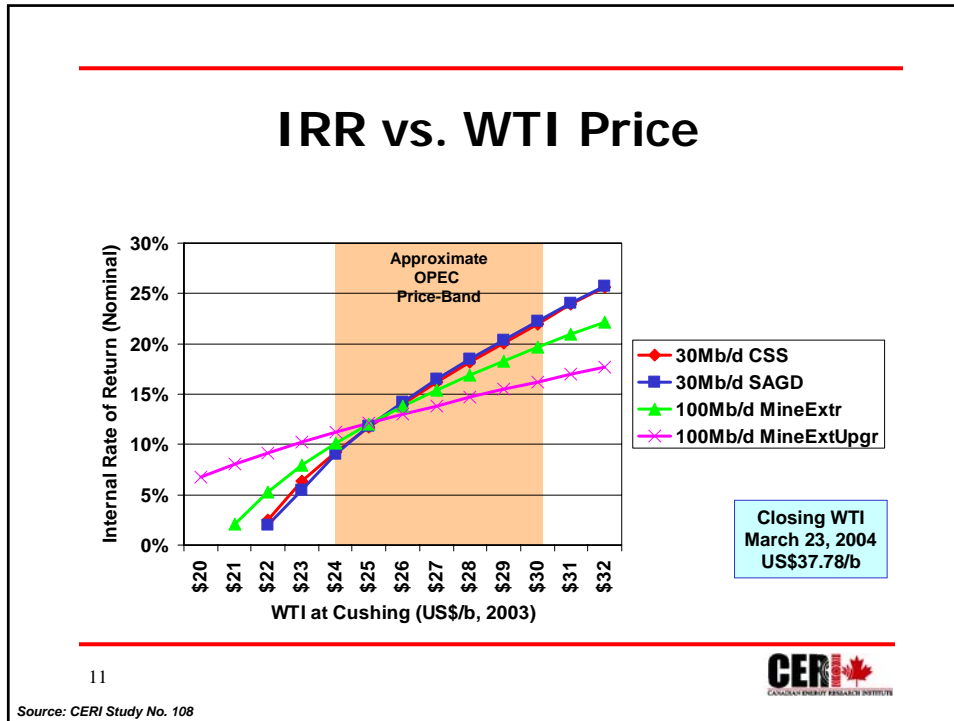
	Plant Gate (C\$/b)	WTI @ Cushing (US\$/b)
Mining, Extraction & Upgrading	30.50	24.90
Standalone Upgrading	12.71	N/A

SCO: Synthetic Crude Oil

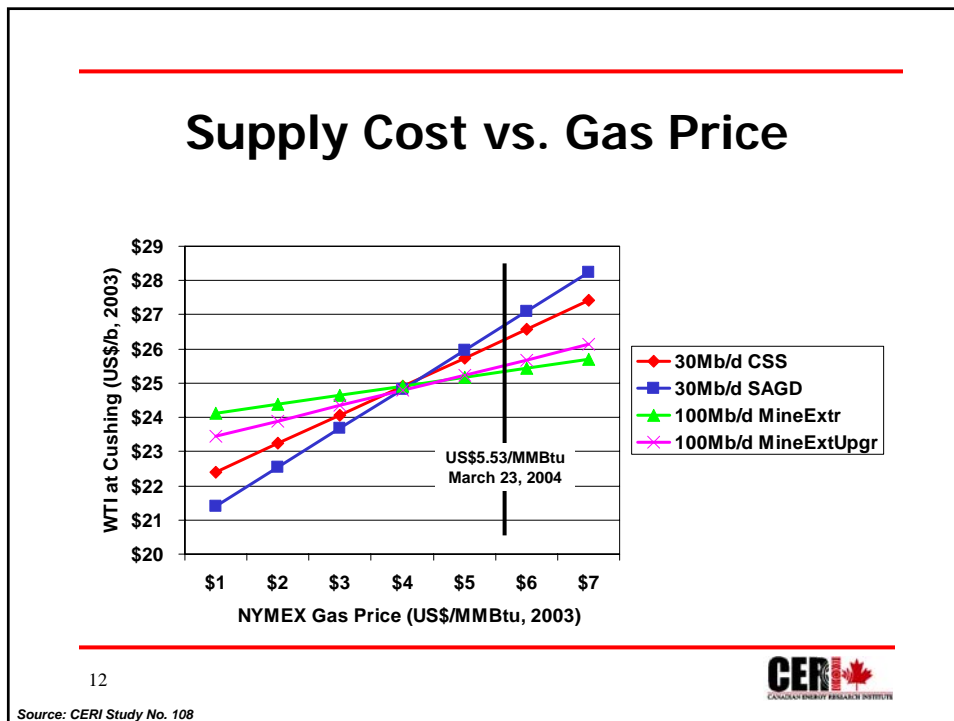
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Source: CERI Study No. 108



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Bitumen and SCO Supply Projections

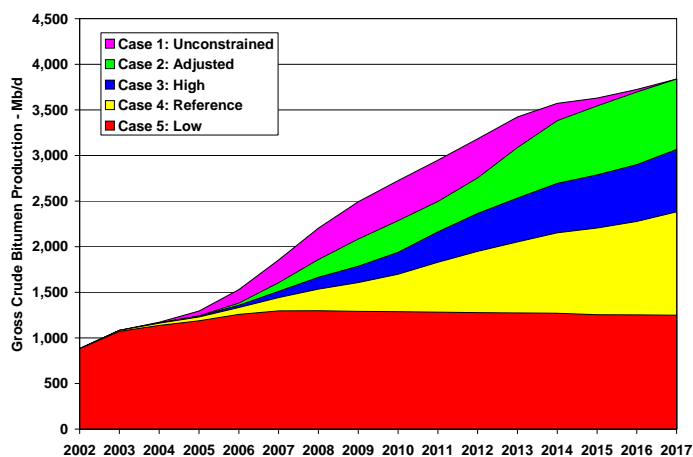
- Case 1 Unconstrained
- Case 2 Adjusted Unconstrained
- Case 3 High (US\$32/b)
- Case 4 Reference (US\$25/b)
- Case 5 Low (US\$18/b)

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Source: CERI Study No. 108

All Supply Projections



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Source: CERI Study No. 108

Supply Outlook in 2017 (million barrels per day)

	SCO	Bitumen	Total
Unconstrained	2.0	1.5	3.5
High (US\$32/b)	1.6	1.2	2.8
Reference (US\$25/b)	1.3	0.9	2.2
Low (US\$18/b)	0.8	0.3	1.1

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Source: CERI Study No. 108

Capital Spending (C\$ billions per year)

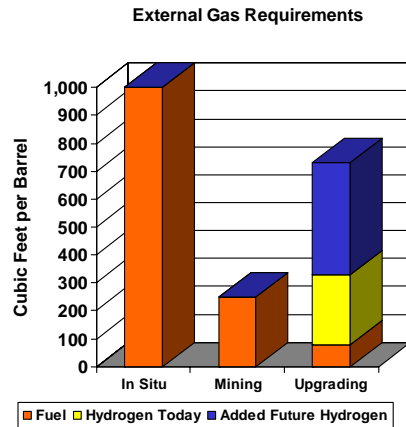
	Total
Unconstrained	6.2
High (US\$32/b)	4.4
Reference (US\$25/b)	3.1
Low (US\$18/b)	1.0

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Source: CERI Study No. 108

Oil Sands Gas Requirements



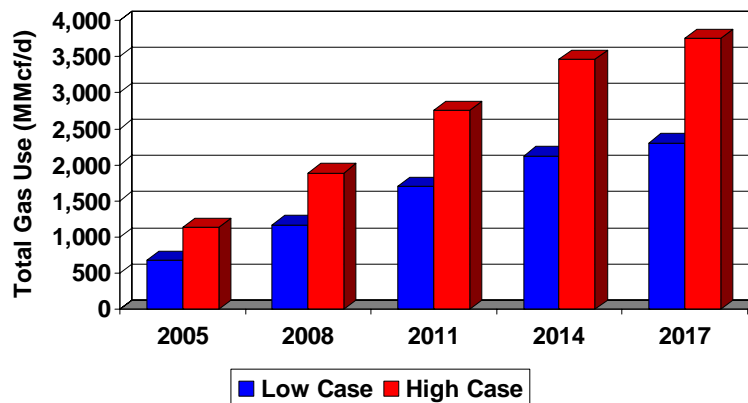
- Thermal in situ projects are very large energy consumers – Gas use depends on recovery performance
- Gas use for upgrading is higher for production of higher quality synthetic crude oil

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Source: Oil Sands Technology Roadmap



Oil Sands Gas Use – Unconstrained Projection



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Source: CERI Study No. 108



Implications

- Oil sands industry will compete for natural gas supply with other North American gas consumers
- Resultant strong natural gas prices will provide incentives for:
 - Further efficiency improvements
 - New recovery technologies
 - Fuel substitution

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1-Day Seminars

- Comprehensive overview of CERI's Oil Sands Outlook
- Demonstration of CERI's "Supply Cost" and "Projection" models
- Locations and Timing
 - Calgary April 1
 - Fort McMurray April 21
 - Edmonton April 22

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Backup Charts

Supply Cost Assumptions CERI Natural Gas Outlook

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Key Supply Cost Assumptions

Economic Assumptions

Base Year	2003
Discount Rate	10%/a (Real)
Inflation Rate	2%/a
Exchange Rate	0.75 US\$/C\$

Energy Costs

NYMEX Natural Gas	US\$4.25/MMBtu
NYMEX - AECO Basis	US\$0.50/MMBtu
Plant Gate Natural Gas	C\$4.74/GJ
Plant Gate Electricity	C\$40/MWh

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Key Supply Cost Assumptions

Oil Price Differentials

MSW at Edmonton - Dilbit at Hardisty	US\$7.00/b
MSW - SCO at Edmonton	US\$1.00/b
Condensate Premium over MSW at Edmonton	5%

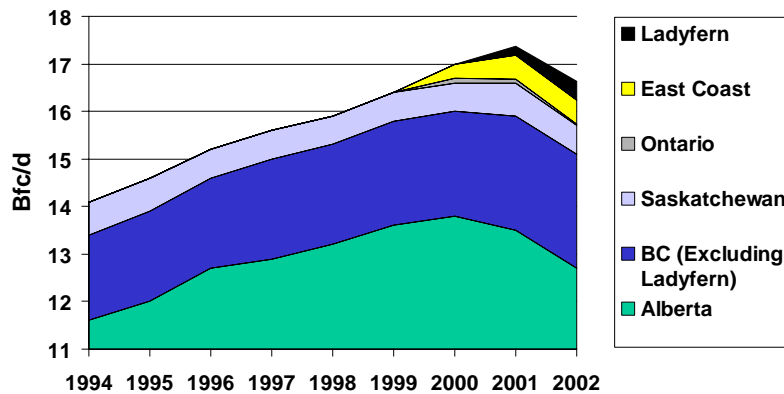
Oil Transportation Costs

MSW from Edmonton to Chicago	US\$1.61/b
WTI from Cushing to Chicago	US\$0.82/b

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Historical Canadian Natural Gas Production



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Source: CERI Study No. 107



