Natural Gas Use in Alberta's Oil Sands Industry

CERI North American Natural Gas Conference

March 1, 2004

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Outline

- Oil Sands Industry Overview
- Bitumen and Synthetic Crude Oil Supply Projections
- Oil Sands Industry Natural Gas Demand and Available Supply
- Implications
- Conclusions

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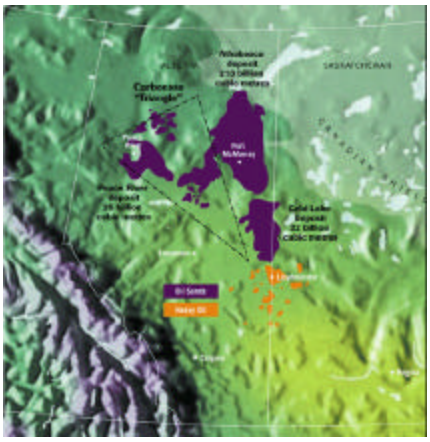
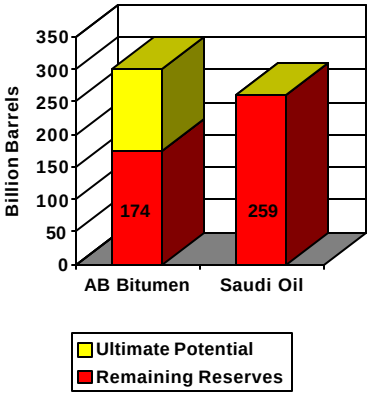
Huge Resource Base





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

Substantial Production

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

	Mb/d	%
Conventional Light	918	36.8
Condensate	163	6.5
Conventional Heavy	543	21.7
Unprocessed Crude Bitumen	347	13.9
Synthetic Crude Oil	527	21.1
Total	2,498	100.0

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Source: National Energy Board (Preliminary Data)

New Production Capacity

- **Mining/Extraction**
  - **Syncrude – Stage 3**
  - **CNRL – Horizon**
  - **AOSP – Jackpine**
  - **True North – Fort Hills**
- **In Situ**
  - **Suncor – Firebag**
  - **ConocoPhillips – Surmont**
  - **Nexen/OPTI – Long Lake**
  - **CNRL - Primrose Wolf Lake Expansion**

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Note: Projects that are either under construction or approved. Many others are at various stages in the regulatory process.

CERI Oil Sands Supply Outlook

- **CERI Study No. 108 being released March 3, 2004**
- **Bitumen and SCO Supply Projections**
  - **2004 - 2017**
  - **5 Cases**
- **Supply Costs**
  - **In situ technologies**
  - **Mining and extraction**
  - **Upgrading**
- **Issues - including energy requirements, sources and costs**
- **Breakfast presentation, Calgary Petroleum Club, March 10, 2004**

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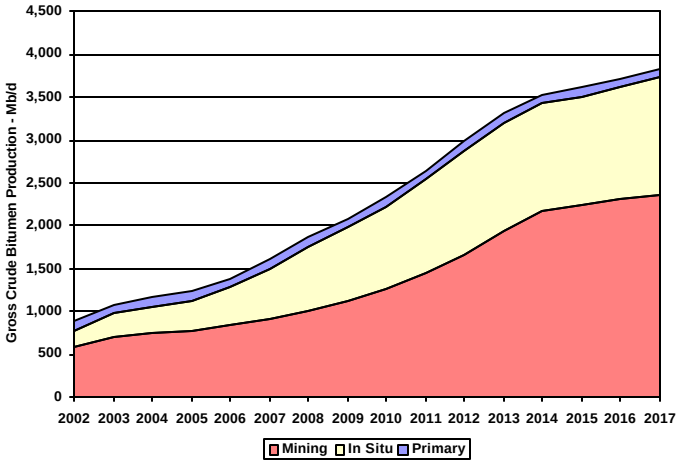
Unconstrained Supply Projection



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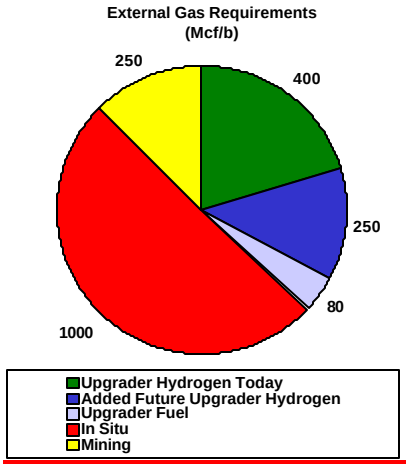
Source: CERI Study No. 108

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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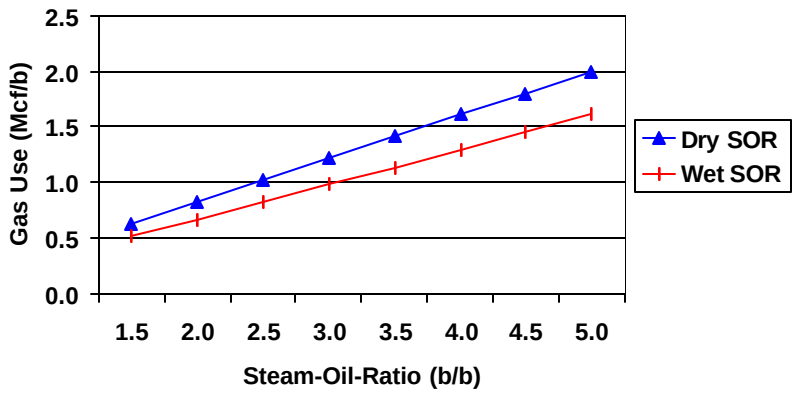
Source: Oil Sands Technology Roadmap

Thermal In Situ Gas Use



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Source: CERI Study No. 108

Gas Use Assumptions (Mcf/b)

	Low Case	High Case
Thermal In Situ	0.90	1.20
Mining	0.20	0.30
Upgrading	0.30	0.70

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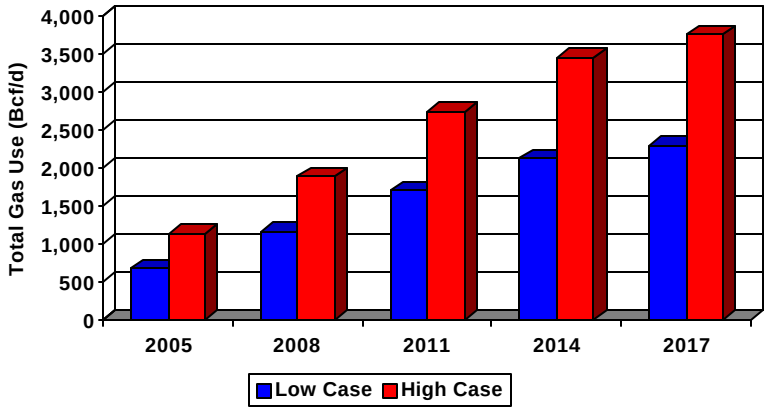
Source: CERI Study No. 108

Oil Sands Gas Use – Unconstrained Projection



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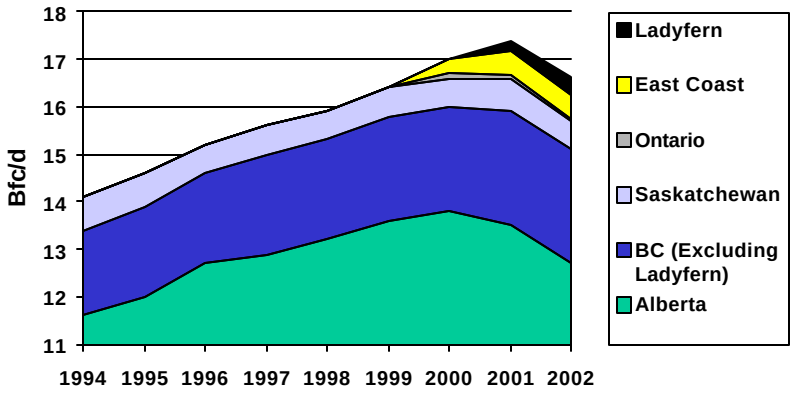
Source: CERI Study No. 108

Historical Canadian Natural Gas Production



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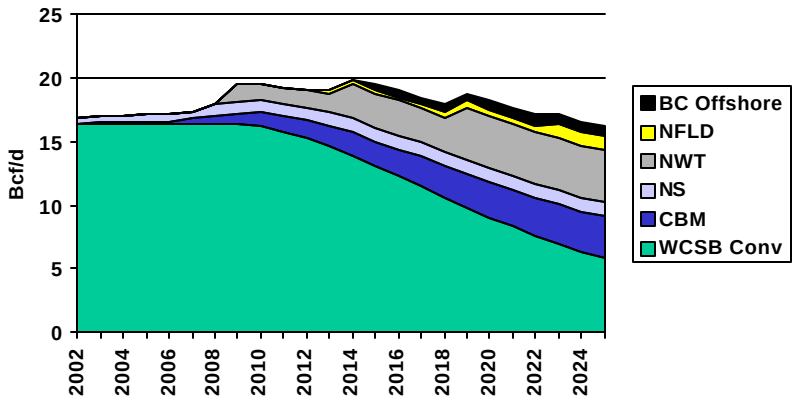
Source: CERI Study No. 107

Projected Canadian Natural Gas Production



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Source: CERI Study No. 107

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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In Situ Recovery Technologies

- **Proven Thermal Recovery Techniques**
  - **Cyclic Steam Stimulation**
  - **Steam Assisted Gravity Drainage**
- **Technology Improvements**
  - **Low Pressure SAGD**
- **New Solvent-Based Recovery Processes**
  - **Solvent Injection - VAPEX**
  - **Hybrid Thermal Solvent Processes - SAGP, ES-SAGD, TSS-SAGD**
- **New In Situ Combustion Processes - THAI**

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Energy and Hydrogen Supply Options

- **Energy**
  - **Natural Gas**
  - **Coke and other Bitumen Residues**
  - **Coal**
  - **Nuclear**
- **Hydrogen**
  - **Natural Gas**
  - **Gasification of Coke, Bitumen Residues or Coal**
  - **Electrolysis of Water (Nuclear)**

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Conclusions

- **The Oil Sands Industry is very energy intensive provided by consumption of large quantities of natural gas**
- **Oil Sands Industry growth will contribute to strong growth in natural gas demand and upward pressure on natural gas prices**
- **High natural gas prices will drive industry efforts to improve efficiencies, develop new technologies and investigate/develop alternative fuels and sources of hydrogen**

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