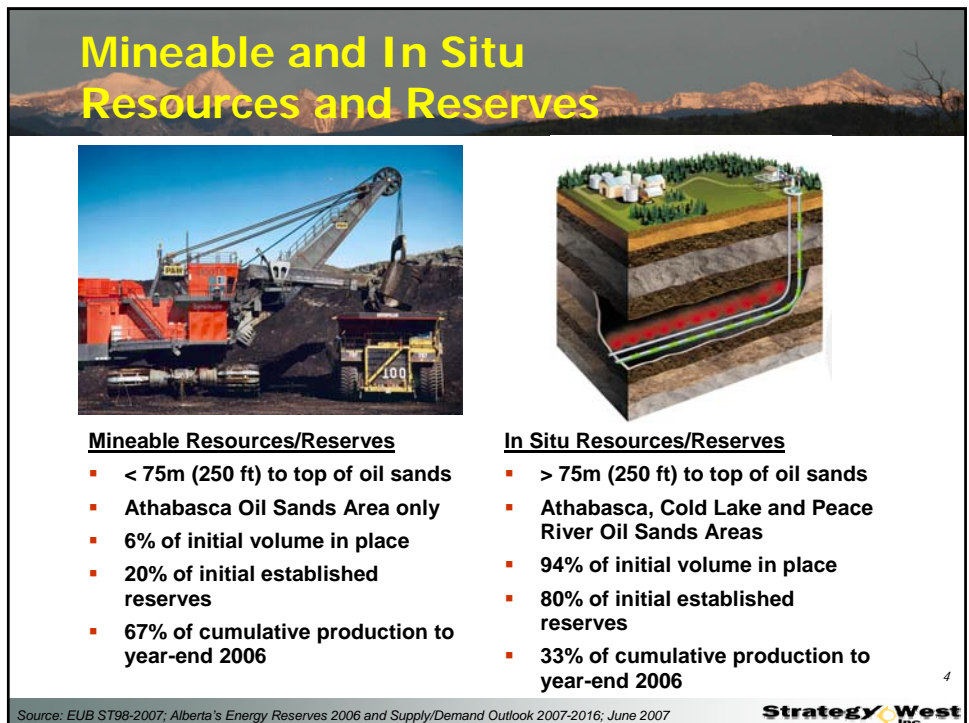
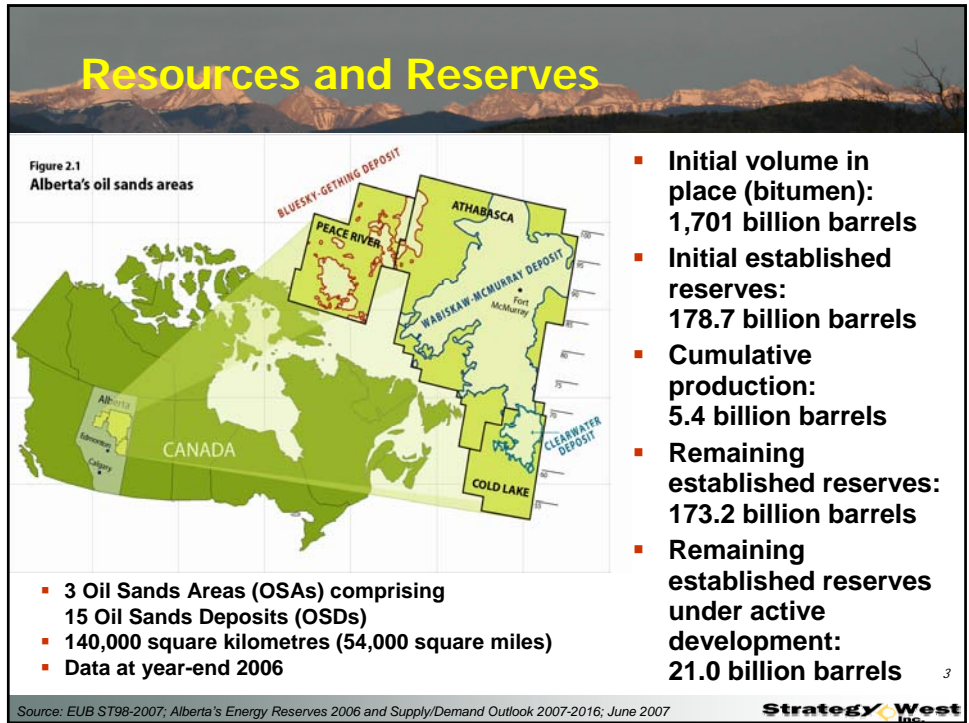


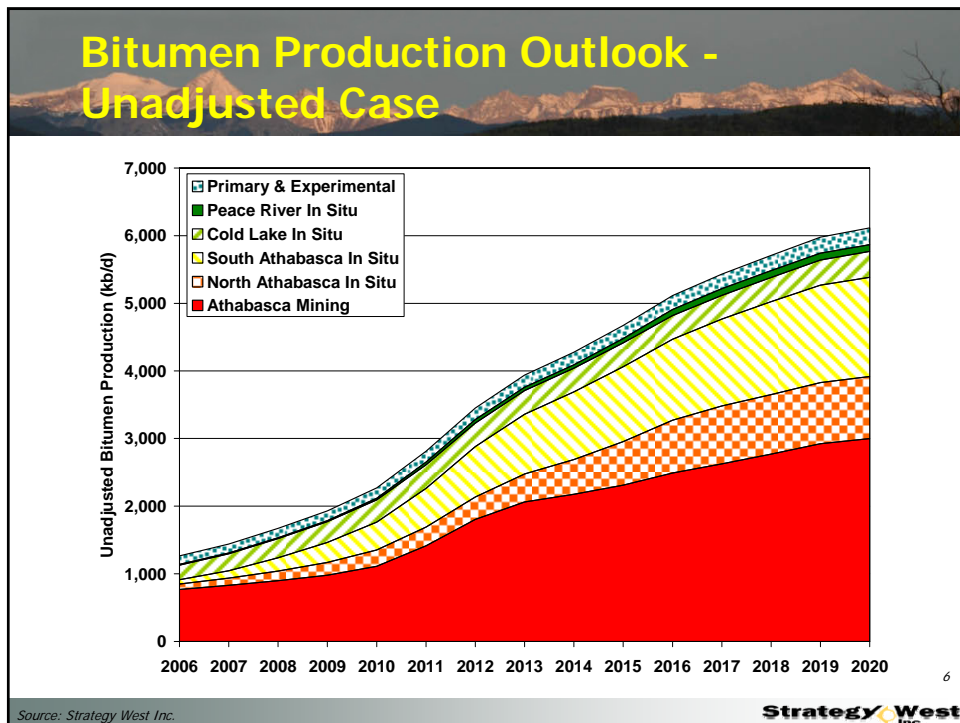
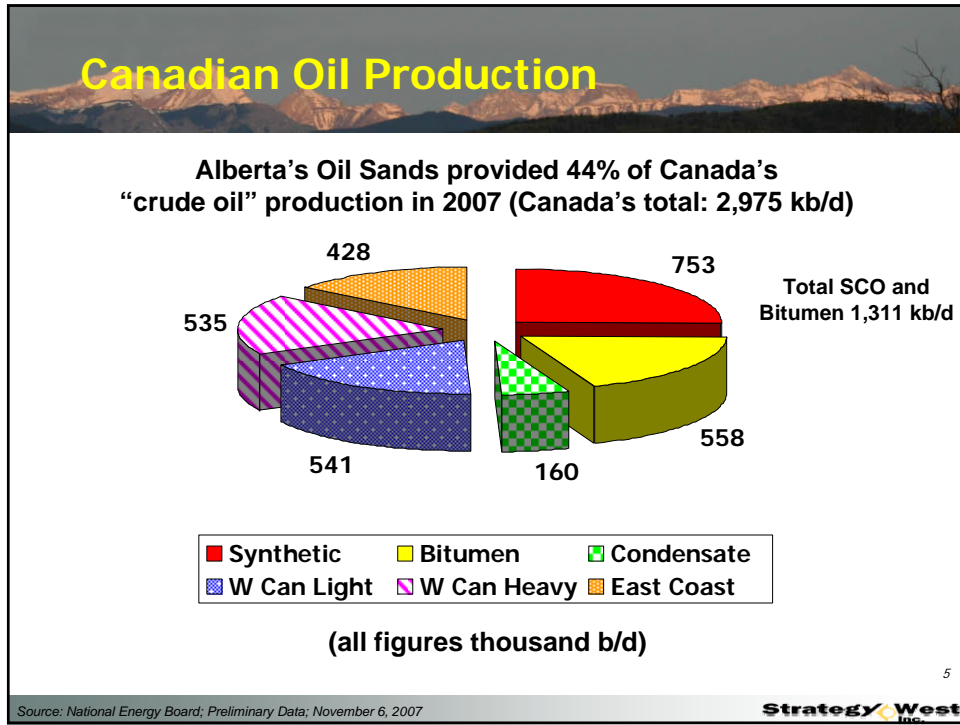
Presentation Outline

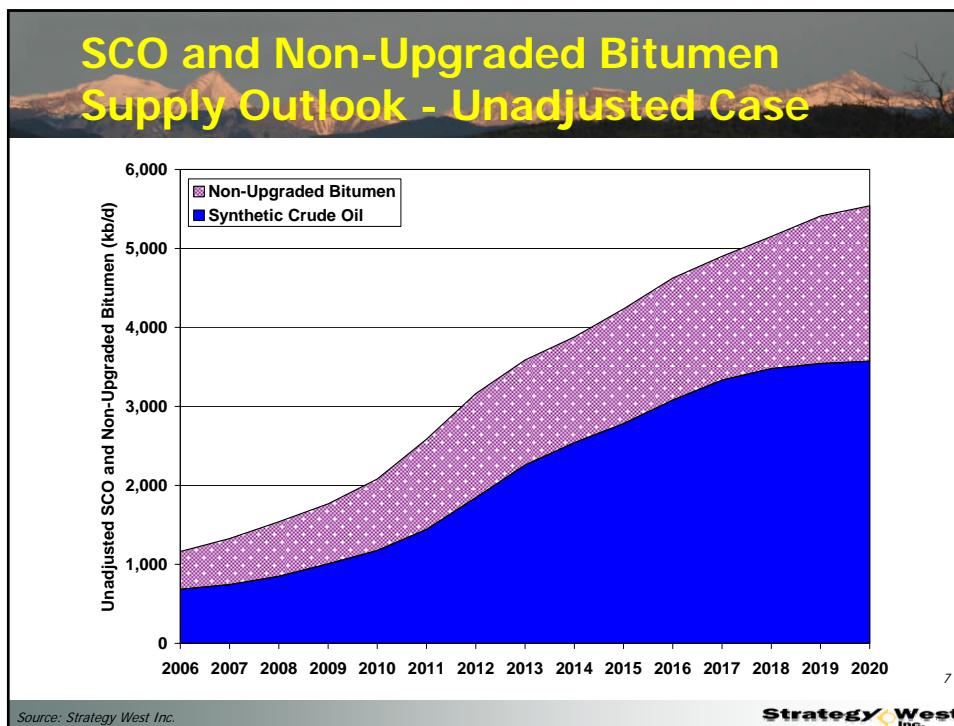
- Oil Sands Industry Overview
- Unadjusted Oil Sands Production Outlook
- Oil Sands Industry Challenges and Sustainability
- Oil Sands Energy and Hydrogen Requirements
 - Current Sources
 - Industry Options to Reduce Purchased Gas Requirements
- Conclusions

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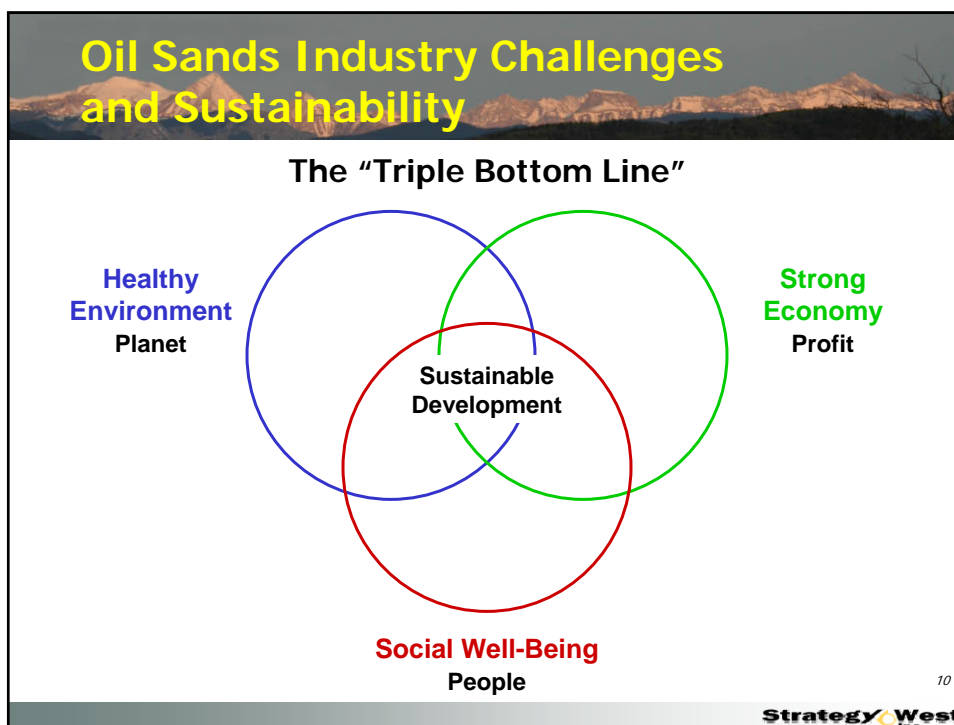
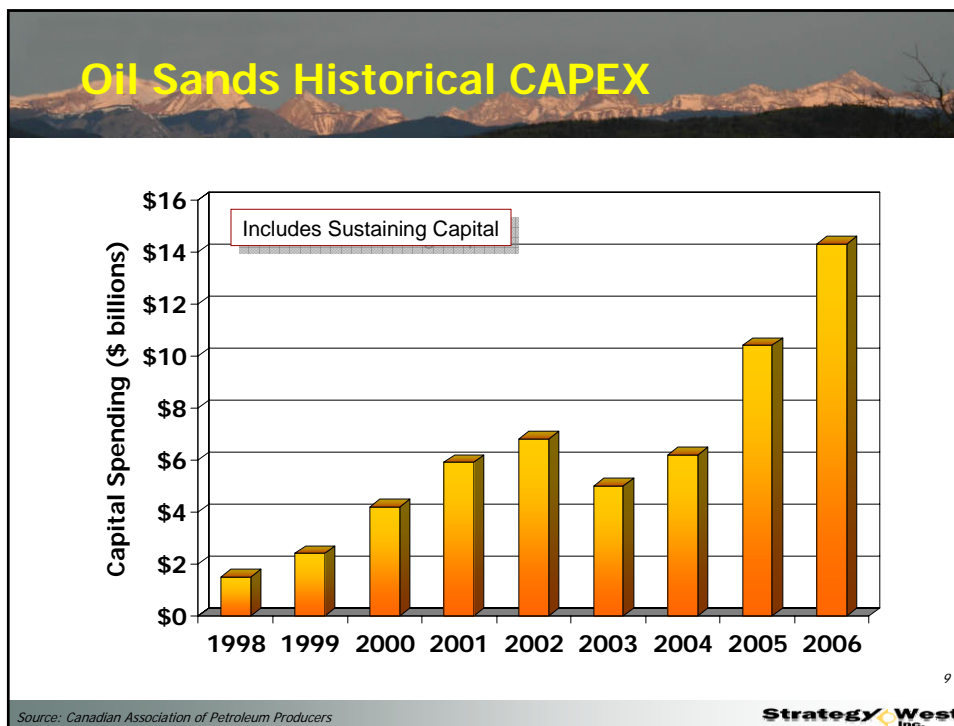


CAPEX – Unadjusted Case

	Production Increase 2008-2020 (million b/d)	Initial CAPEX (2007 C\$ per b/d)	Average Annual Initial CAPEX 2008-2020 (2007 C\$ billions)
Mining & Extraction	2.2	\$40,000 (Bitumen)	\$6.7
In Situ	2.5	\$10,000-\$35,000 (Bitumen)	\$5.7
Incremental Production	4.7		\$12.4
Upgrading	2.8	\$50,000 (SCO)	\$10.9
Total CAPEX			\$23.3

Note: does not include sustaining capital

Source: Strategy West Inc. 8



Oil Sands Energy and Hydrogen Requirements

<p>Energy</p> <ul style="list-style-type: none"> ▪ In situ steam and process heat ▪ Mining/extraction process heat ▪ Upgrading process heat ▪ Electricity 	<p>Hydrogen</p> <ul style="list-style-type: none"> ▪ Hydro-conversion processes (upgrading)
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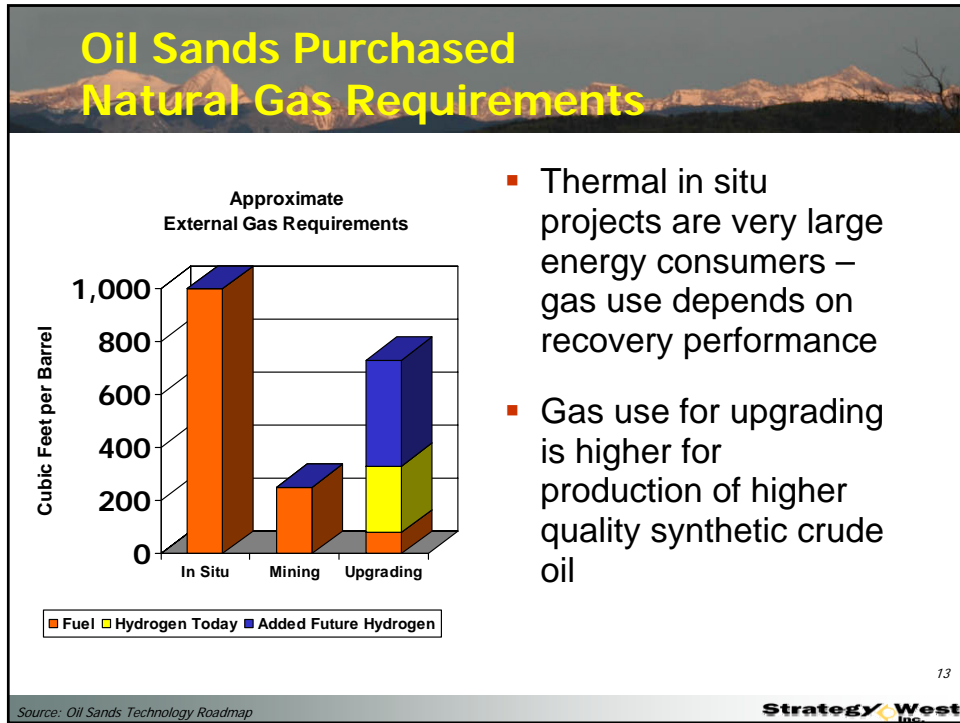
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Current Sources of Thermal Energy, Hydrogen and Electricity

<p>Thermal Energy</p> <ul style="list-style-type: none"> ▪ Purchased natural gas ▪ Produced gases (in situ projects) ▪ Process gases (upgraders) ▪ Liquid hydrocarbon fuels ▪ Crude bitumen ▪ Coke and other bitumen residues (upgraders) 	<p>Hydrogen</p> <ul style="list-style-type: none"> ▪ Steam Methane Reforming (natural gas) <p>Electricity</p> <ul style="list-style-type: none"> ▪ On-site generation ▪ Purchased electricity
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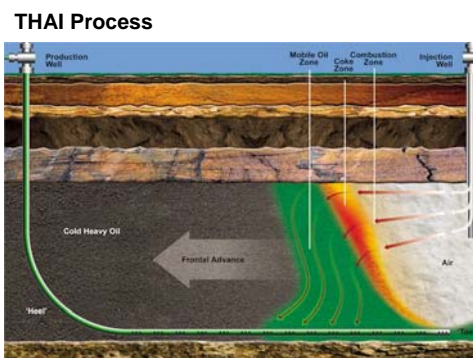
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- ## Industry Options to Reduce Purchased Gas Requirements
- Conservation/Energy Efficiency Improvements
 - New (Less Energy Intensive) Bitumen Recovery Technologies
 - In Situ
 - Mining and Extraction
 - Alternative Sources of Thermal Energy, Electricity and Hydrogen
 - Gasification of Bitumen Residues
 - Combustion of Bitumen/Bitumen Residues
 - Nuclear
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New In Situ Bitumen Recovery Technologies

- In Situ Combustion
 - Toe-to-Heel-Air-Injection (THAI)
- Solvent Injection
 - VAPEX
 - Thermal Solvent
- Hybrid (Steam-Solvent) and Co-injection Processes
- Polymer Flooding
- Electric Heating



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Image Source: Petrobank Energy and Resources

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New Mining/Extraction Bitumen Recovery Technologies

- Mining
 - Mine-face Ore Preparation
- Extraction
 - Low-Energy Extraction
 - High-temperature Froth Treatment
 - Asphaltenes Recovery and Use
 - Bitmin Process
- Mine-face Extraction

Suncor's Mobile Crusher



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Image Source: Suncor Energy Inc.

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Oil Sands Gasification Projects

Project	Gasification Status
OPTI/Nexen Long Lake Phases 1-4	Construction (Phase 1)
North West Upgrading Phases 1-3	Approved
Northern Lights Phases 1 & 2	Application
Shell Scotford Upgrader 2 Phases 1-4	Application
Suncor Voyageur Phase 2	Being Evaluated
Fort Hills Sturgeon Phases 2 & 3	Being Evaluated
CNRL Horizon Phases 4 & 5	Being Evaluated
CNRL Primrose Phases 1 & 2	Being Evaluated
NAOSC Upgrader Phase 2	Being Evaluated

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Source: Project Applications and Company Announcements Strategy West Inc.

- ## Combustion of Bitumen/ Bitumen Residues
- **Coke Burning**
 - Suncor power plant
 - Syncrude Fluid Cokers
 - **Multiphase Superfine Atomized Residue (MSAR)**
 - **Asphaltenes**
 - Mining project cogeneration facilities

 - **Issues**
 - SO₂ and particulate emissions require flue-gas scrubbing
 - CO₂ emissions exceed those from combustion of natural gas
 - **Opportunities**
 - O₂ firing
 - CO₂ capture
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The Nuclear Option

Potential Benefits

- Reduced Greenhouse Gas Emissions
- Competitive Thermal Energy and Electricity Cost
- Long-Term Price Stability

Issues

- Public Concerns
 - Safety
 - Terrorist threats
 - Nuclear waste disposal
- Capital Cost
- Reactor Size/Technology
- Reliability/Refurbishment
- Timing
 - Alberta nuclear by 2017?
 - All technologies must be certified by the CNSC

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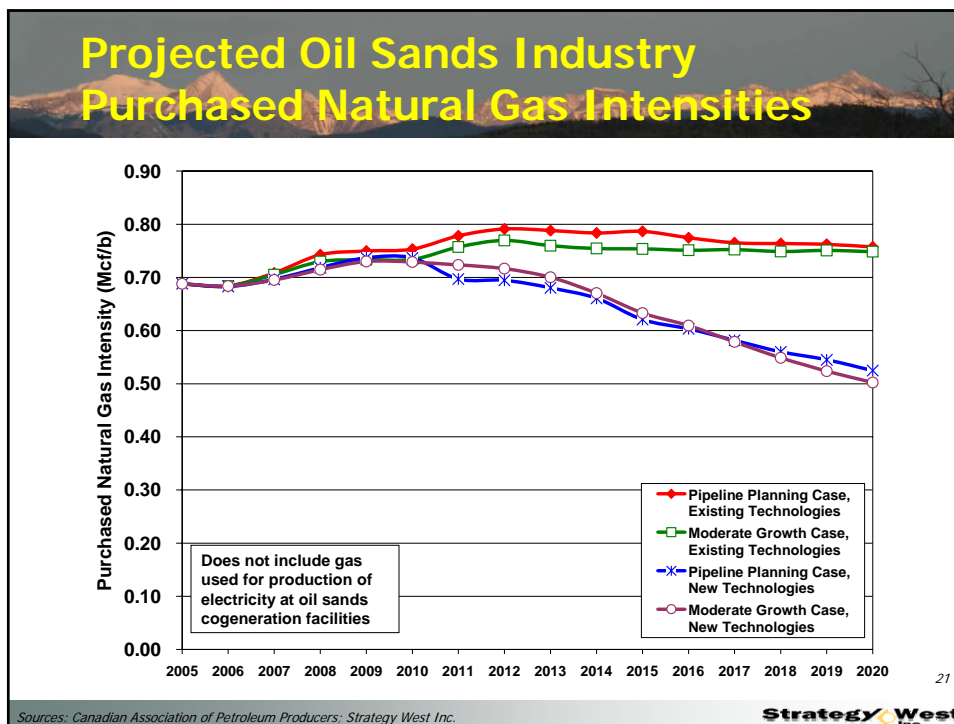
Strategy West/CAPP Study: Gas Use by the Canadian Oil Sands Industry

- Examination of the oil sands industry's present and future energy needs and energy sources over the 2006 to 2020 period to identify:
 - Industry gross thermal energy requirements consistent with CAPP's Canadian Crude Oil Production and Supply Forecast
 - Use of associated natural gas at bitumen production facilities
 - Use of process gases at upgrading facilities
 - Natural gas purchases after accounting for use of associated natural gas and process gases
- Strategy West's assessment was released in the report *Gas Use by the Canadian Oil Sands Industry* dated December 2007

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Sources: Canadian Association of Petroleum Producers; Strategy West Inc.

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Wrap-up and Conclusions

- Canada's oil sands deposits are among the world's largest hydrocarbon accumulations.
- The industry is well developed and making a substantial contribution to global oil supply.
- The oil sands industry is aggressively taking action to reduce its consumption of purchased natural gas.
- While the many challenges facing the industry will cause some project delays and cancellations, these challenges are being addressed and the industry will continue to grow.



Thank You

Questions?

Please visit
www.strategywest.com for oil
sands project lists and other
detailed oil sands industry
information

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