

# Canada's oil sands – the *in situ* perspective

January 27, 2010

Presentation to Canadian Heavy Oil Association (CHOA)

Chris Bloomer  
IOSA Member  
Petrobank



- *In situ* Oil Sands Alliance
- Independent and innovative Alberta-based *in situ* oil sands companies:
  - Athabasca Oil Sands Corp.
  - Connacher Oil & Gas Ltd.
  - Laricina Energy Ltd.
  - MEG Energy Corp.
  - Osum Oil Sands Corp.
  - Petrobank Energy and Resources Ltd.

- Emerging *in situ* oil sands developers

## **OUR GOAL:**

**To unlock a safe, secure supply of  
energy using innovative methods  
we can all be proud of**

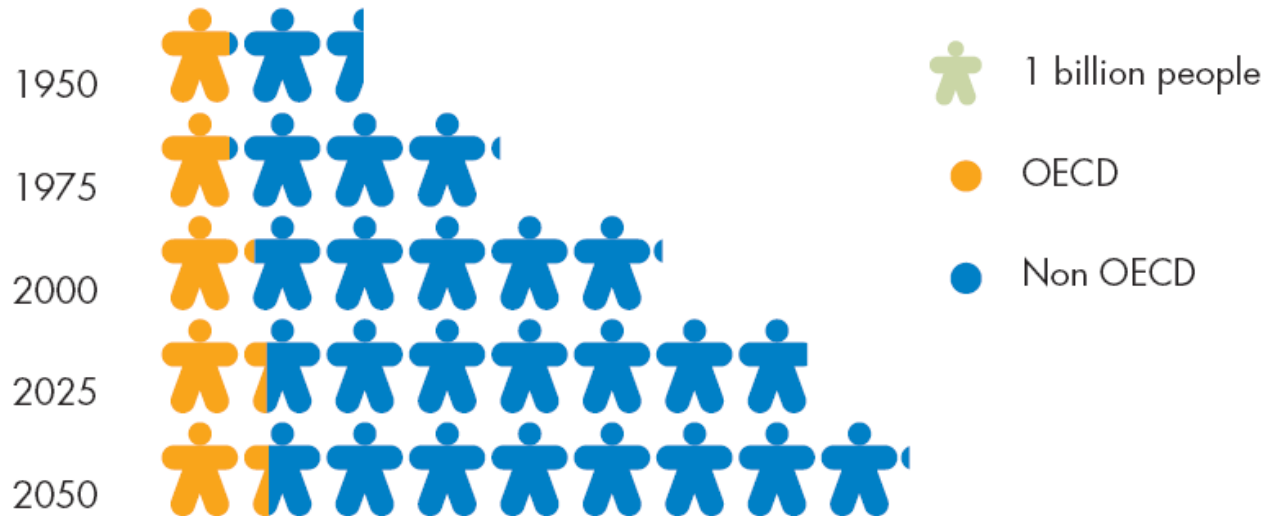
“The world can no longer avoid three hard truths about energy supply and demand.”

Shell Energy Scenarios to 2050

- Step-change in energy use
- Supply will struggle to keep pace
- Environmental stresses are increasing

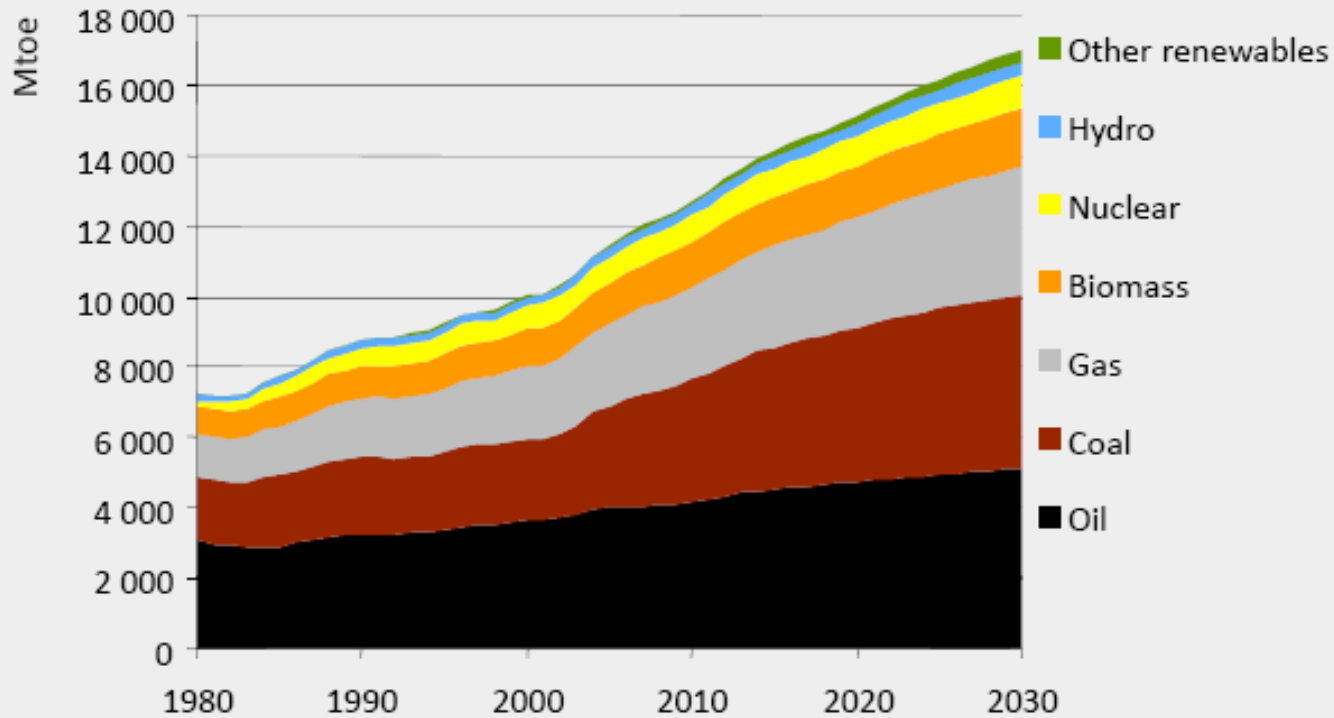
- Population is a key driver for energy demand

## World population<sup>1</sup>



Source: Shell Energy Scenarios to 2050

“World energy demand expands by 45% between now and 2030...”



Source: OECD/IEA World Energy Outlook 2008

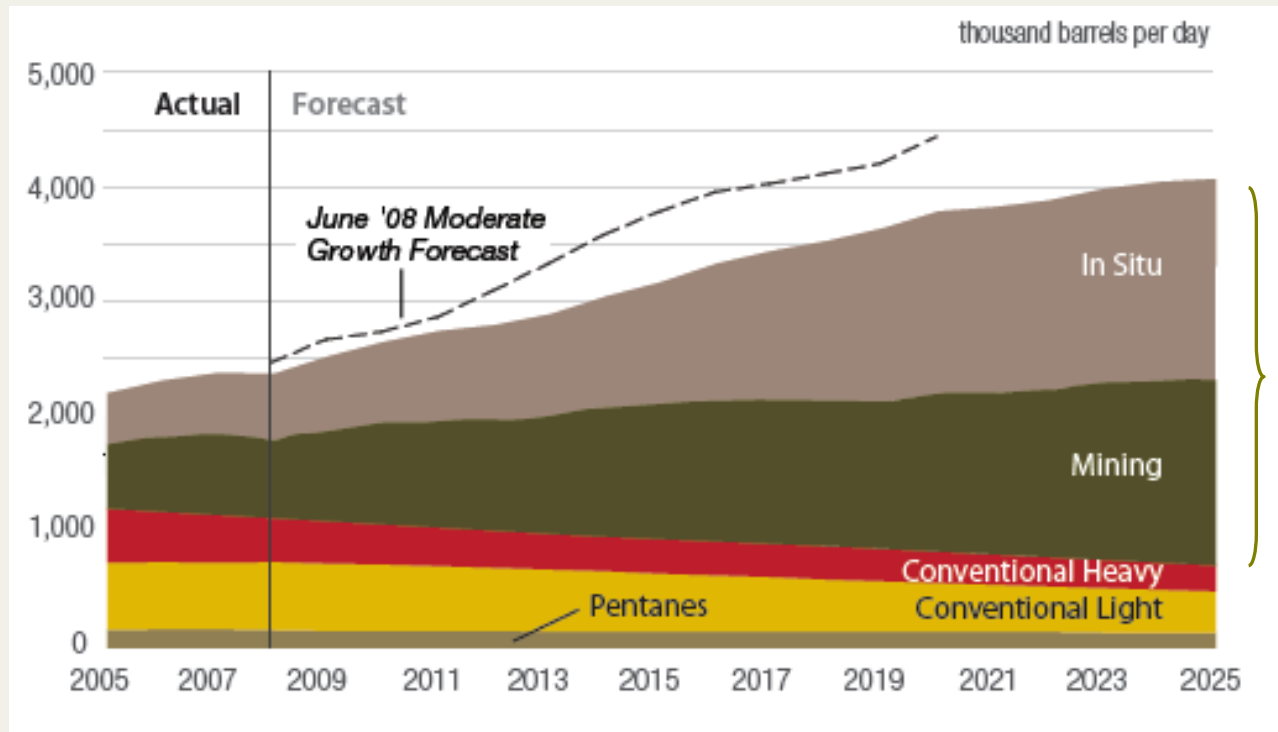
- Even with renewables & energy efficiency measures, oil production between 85 and 105 million barrels per day will be required



Source: International Energy Agency World Energy Outlook 2008

# Growing Dependence on the Oil Sands

## Western Canada Oil Sands & Conventional Production

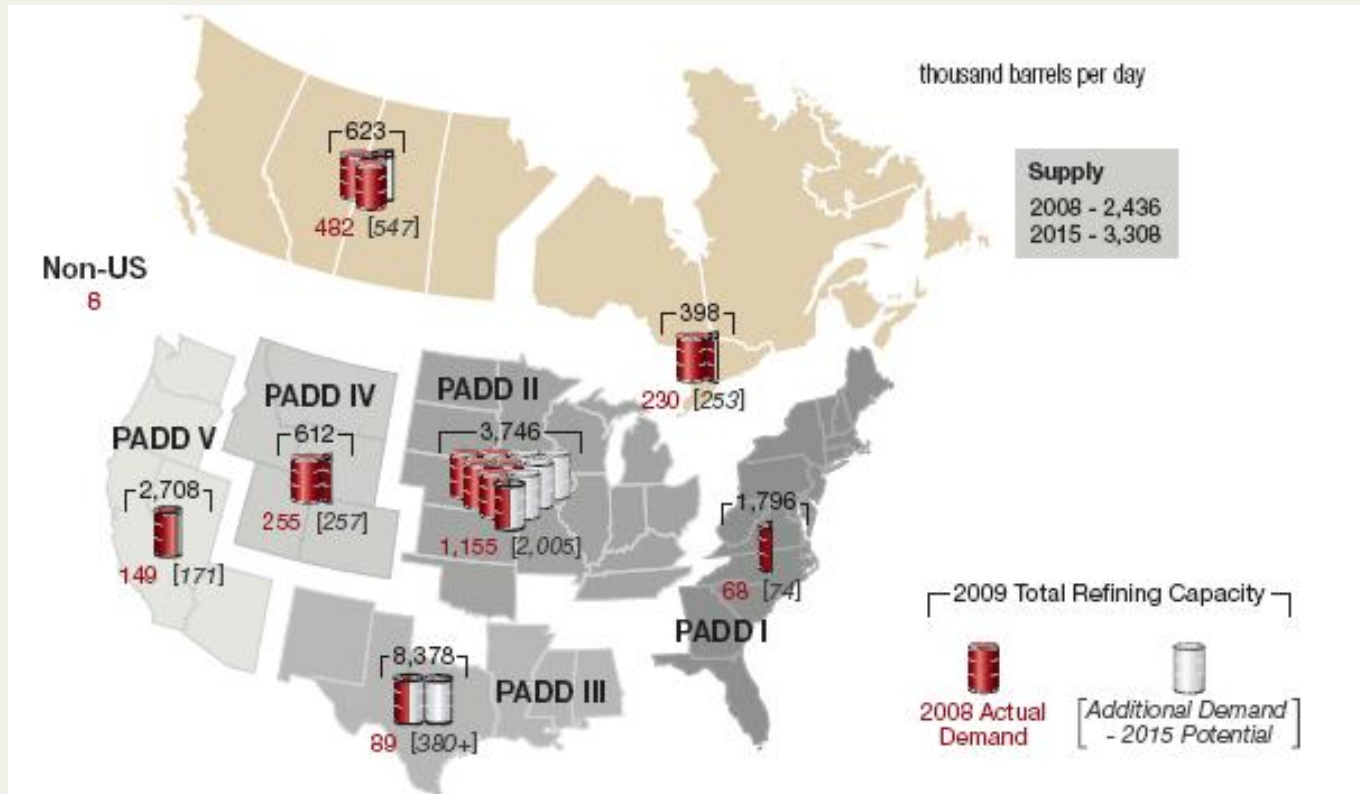


Oil sands are the future of Canada's energy sector

Source: Canadian Association of Petroleum Producers, Figure 2.3, *Crude Oil Forecast, Markets & Pipeline Expansions*, June 2009

# Growing Dependence on the Oil Sands

## Market Demand for Western Canadian Crude Oil – Actual 2008 vs 2015 Potential



US Gulf Coast refineries (PADD III) are counting on Canadian oil sands production to replace declining supplies from Mexico and Venezuela

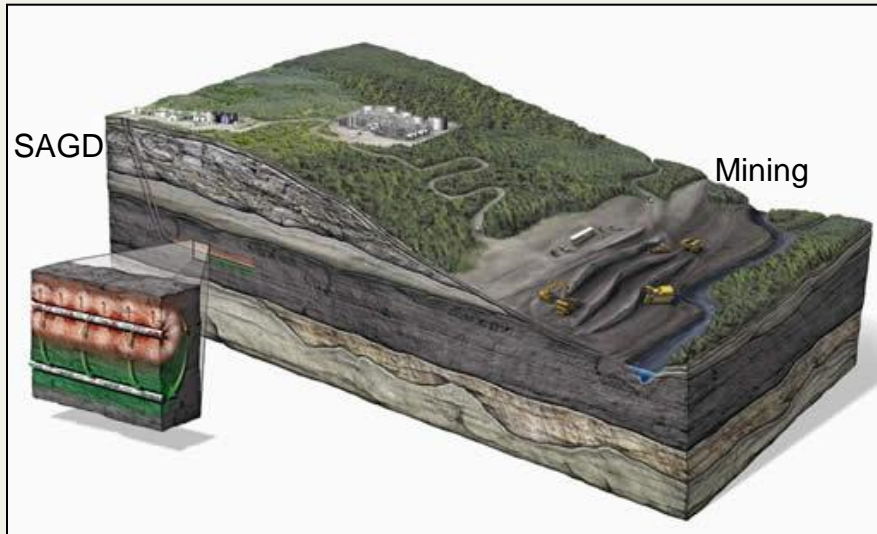
Source: Canadian Association of Petroleum Producers, Figure 3.1, *Crude Oil Forecast, Markets & Pipeline Expansions*, June 2009

- Alberta's oil sands possess 1.7 trillion bbls of bitumen; it is a key global hydrocarbon resource
- 174 billion bbls are currently considered recoverable, with 80% from *in situ* production
  - Development in recovery technology, primarily *in situ*, could increase this to 315 billion bbls (Source: EUB ST98-2007)
- Innovation with *in situ* recovery balances the needs of energy supply with responsible development
  - Surface impacts less than 1/1000<sup>th</sup> the impact to land from forestry
  - Deeper, non-potable water use with >90% recycle
  - Life cycle emissions ~15% greater than conventional crudes

# Alberta *In Situ* Bitumen Technology

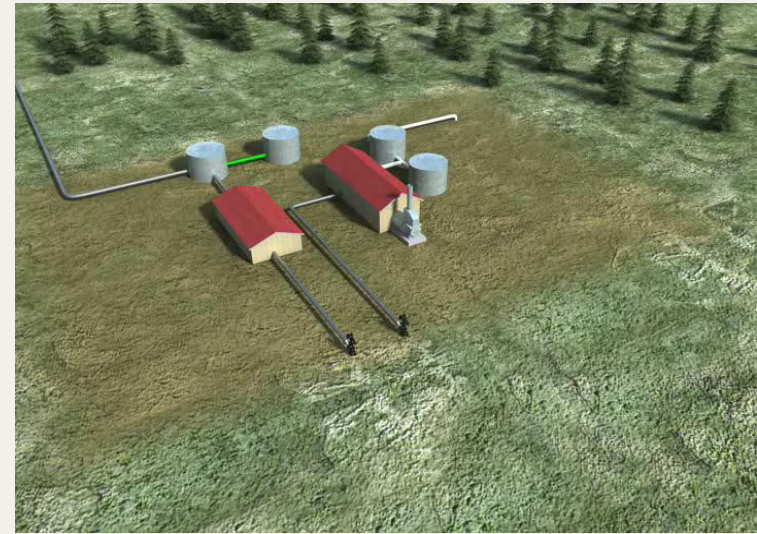
- Most common *in situ* process is Steam-Assisted Gravity Drainage (SAGD)
  - technology home grown in Alberta
  - uses horizontal wells; minimal surface disturbance
- 13,224 *in situ* wells drilled since 1992
- 9,514 of these wells are currently producing
- 552,000 barrels produced via *in situ* in 2008
- 306.5 million cumulative barrels produced since inception via *in situ* production (as of Dec. 31, 2008)

## What is SAGD?



Source: Enerplus Resources

## The SAGD Process



Source: Laricina Energy

# Alberta *In Situ* Bitumen Technology

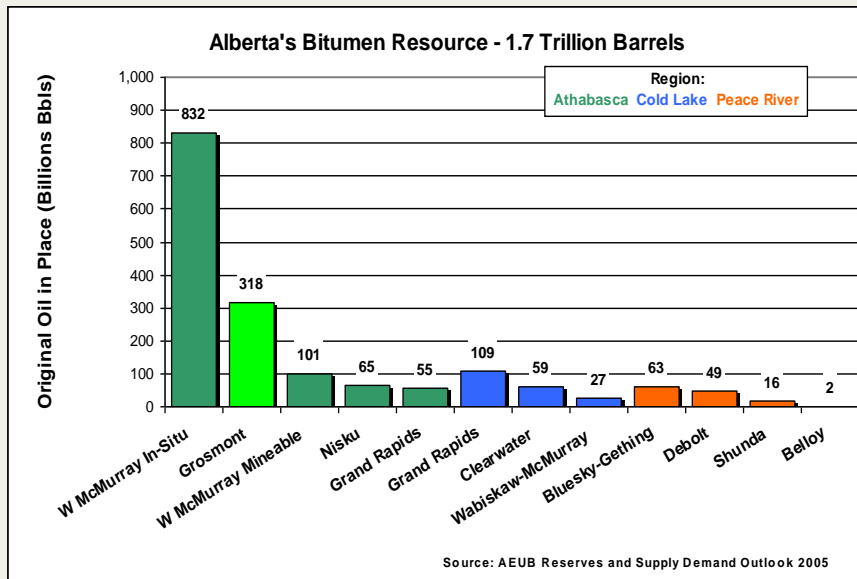


A SAGD oil sands facility designed to produce 10,000 barrels of bitumen per day for ~ 25 years

Source: Connacher Oil and Gas Ltd. – Photo of Pod 1 oil sands project at Great Divide

# In Situ Potential is Widespread

- Alberta's total oil sands resource covers about 140,000 km<sup>2</sup>
  - Only 2% of this area is suitable for mining
- *In situ* is more representative of the oil sands and like the conventional business
- *In situ* development is distributing economic activity outside of Fort McMurray
  - Peace River, Wabasca, Cold Lake, Bonnyville



## Location of oil sands deposits



Source: Canadian Association of Petroleum Producers, Figure 2.2, *Crude Oil Forecast, Markets & Pipeline Expansions*, June 2009

- A SAGD well pair produces 500-2,000 bopd from 1-hectare (2.5 acre)
- Land areas required to produce the same amount of energy as 500 bopd:
  - California-style thermal recovery: **20** hectares (50 acres)
  - Wind turbines: **50** x 1.5 MW turbines, plus power lines
  - Iowa corn to ethanol: **750** hectares (1900 acres)
- 5 million bopd of *in situ* recovery:
  - would require a total of about 10,000 ha in use, equivalent to 100 km<sup>2</sup> (10x10 km)
  - less than 0.1% of the area would be under active development at any one time

- Local residents are consulted
- Shared land use (e.g. roads/ROW's) with conventional oil & gas, forestry, power transmission
- Extensive flora & fauna studies are mandatory
- Timely reclamation is mandatory
  - A typical clearing-to-reclamation cycle is ~20 years
- No soil contamination is permitted
  - *In situ* facilities constructed to very high standards
- *In situ* siting is flexible

- Water for new *in situ* projects is sourced from deep, brackish (non-potable) aquifers
  - River/surface water is not used
- Produced water is 80-95% recycled

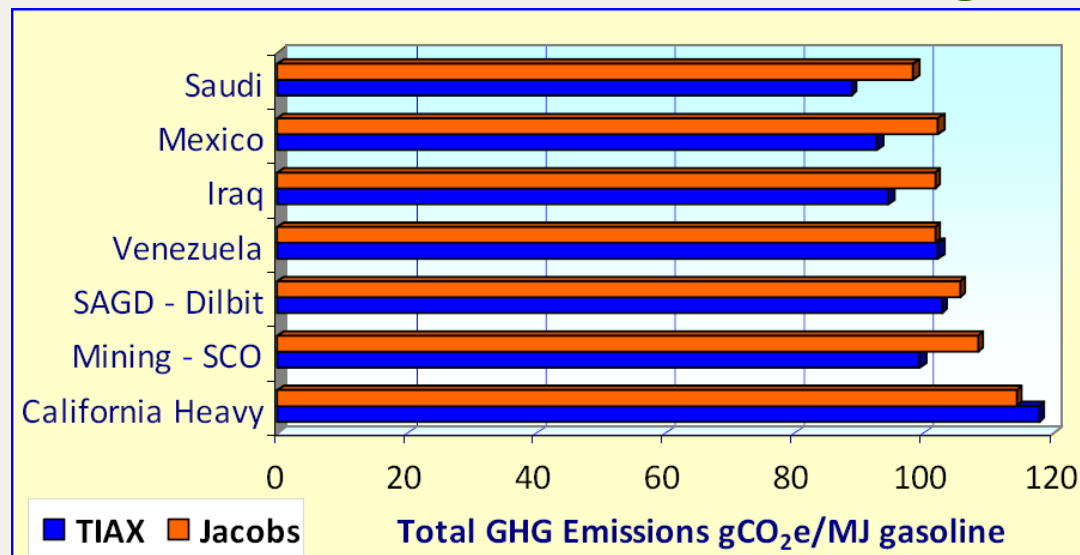
## Volume of water used to produce things

Product	Average virtual water content (m <sup>3</sup> /ton)
Beef	15,500
Rice	2,291
Wheat	1,334
Corn	909
SAGD Bitumen	0.6

Source :

<http://www.waterfootprint.org/Reports/ResearchData/Appendix%20XV.xls>

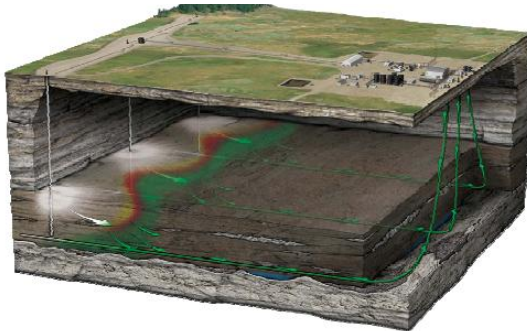
- Oil sands emissions are only 5-15% higher relative to the average crude oil processed in the United States, on a “well-to-wheels” basis.
  - California Heavy has higher emissions than oil sands, based on two independent studies <sup>(1)</sup>
- Most emissions, 70-80%, are released during end use



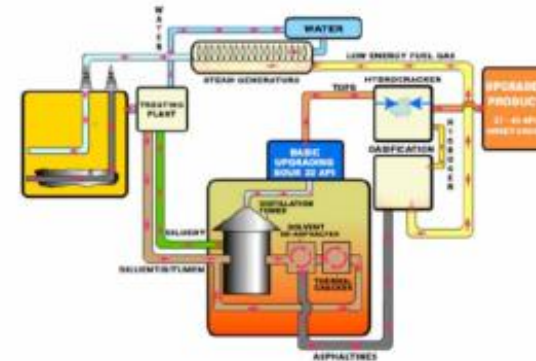
(1) Source: TIAX and Jacobs Consultancy. Source: AERI – Life Cycle Analysis of North American and Imported Crude Oils, July 23, 2009  
<http://eipa.alberta.ca/home/lifecycle.aspx>

- More efficient use of energy reduces CO<sub>2</sub> generation proportionately:
  - Innovations in reservoir recovery will reduce energy requirements (lower Steam/Oil ratios):
    - Solvent additives to SAGD
    - Cold solvent processes
    - Variants of above
  - Facility synergies between projects
  - Cogeneration

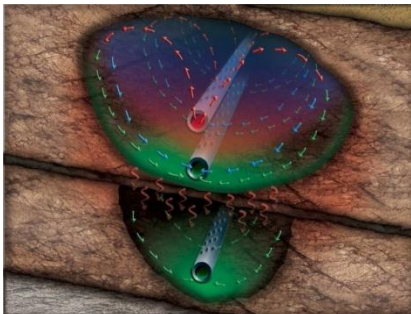
**THAI™ (Toe-to-Heel Air Injection)**  
-Petrobank Whitesands Project



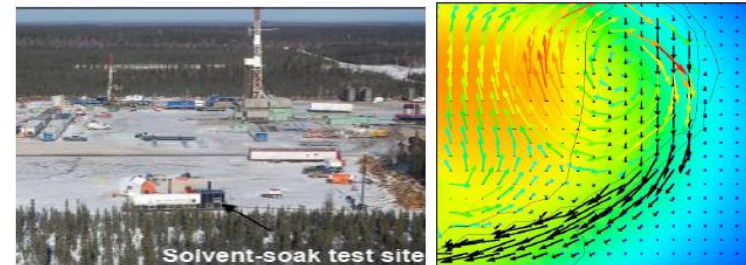
**Asphaltene Gasification – Nexen/OPTI Long Lake**



**PHARM – Heat Harvesting SAGD - Laricina**



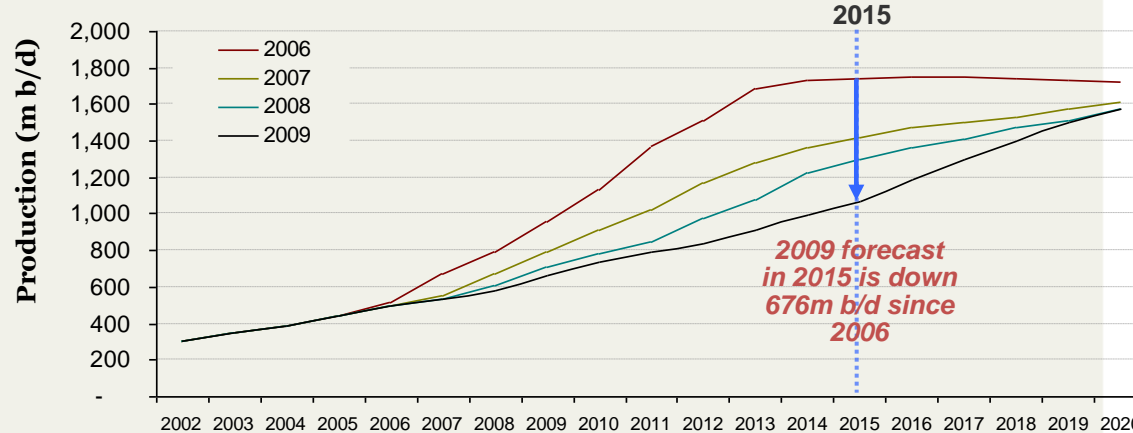
**Cold Solvent and Solvent Assisted SAGD - Laricina**



## Forecast *in situ* growth is falling

- Since 2006, CAPP's forecast of *in situ* production for 2015 has fallen by 670,000 b/d
- Why the shortfall?
  - Regulatory delays
  - Cost pressures
  - Operational and reservoir challenges
  - Capital market turmoil
  - Environmental pressures (CO<sub>2</sub>) and public perception (“dirty oil”)
- Major fiscal implications on many levels

Oil sands production, *in situ* only  
(CAPP forecasts for 2006, '07, '08 & '09)



- Future production growth
- Increased provincial revenues
- Increased employment opportunities
- Reinvesting in local communities
- Have spent over \$2.5 billion on capital expenditures

**\$7 billion injection into North American economy over next 5 years**

- 20 billion barrels of bitumen resources
- 1 million barrels of bitumen per day for more than 30 years
- Moderate pace of development an ideal incubator for new technologies
- New technologies lead to advancements for the industry in efficiency, cost and performance, as well as environmental improvements

- Balancing Energy, the Economy and the Environment
- Time to talk about solutions

## Learn more about us:

# IOSA.ca

The screenshot shows the IOSA.ca website homepage. At the top left is the IOSA logo with the tagline "IN SITU OIL SANDS ALLIANCE". To the right are navigation links: "ABOUT US", "THE ISSUES", "OUR PROCESS", and "MEDIA". A search bar and "Sitemap" link are in the top right corner. The main content area features a large blue-tinted image of an industrial facility at night. Below the image is the headline: "The world demands responsible, affordable energy. But where will it come from?". The text below the headline discusses the industry's commitment to responsible development and innovation. A sidebar on the left contains the text: "Oil sands companies will never change." and a newsletter subscription box. At the bottom, there are four small text boxes providing news updates.

**IOSA**  
IN SITU OIL SANDS ALLIANCE

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ABOUT US THE ISSUES OUR PROCESS MEDIA

**Oil sands companies will never change.**

**The world demands responsible, affordable energy. But where will it come from?**

Without skeptics, we'd never move forward. They keep us on our toes, always wanting to know how, when, why. It's because of the questions we get that we're able to create positive change in our industry.

Yet, as *in situ* innovators whose business has been widely misunderstood, we recognize it is time to start participating in conversations about our industry. We want a sustainable, peaceful and prosperous future for North America.

We want to focus on specific solutions we are developing to address geopolitical, economic, ecological, infrastructure and social realities. This approach will help our members provide over 13 billion barrels of secure, reliable oil to North Americans in the most responsible way possible. So far, we have spent an estimated \$2.5 billion to do so, and anticipate injecting an additional \$7 billion into the North American economy in the next 5 years.

Subscribe to our newsletter  
Get regular updates and stay informed about IOSA's activities.

On February 19th, the day of US President Obama's first visit to Canada, a story about IOSA appeared in the Globe and Mail. [Click here to read it.](#)

The Government of Alberta has recently released a new energy strategy to achieve clean energy production, wise energy use and sustained economic prosperity.

Find out how our members are integrating business and ecology with innovative technologies.

Canadasoilands.ca is a website devoted to debate and discussion about responsible development of our bitumen resources. [Click here to participate in the discussion.](#)

This presentation contains forward-looking information. Actual results could differ materially due to market conditions, changes in law or government policy, changes in operating conditions and costs, changes in project schedules, operating performance, demand for oil and gas, commercial negotiations or other technical and economic factors.