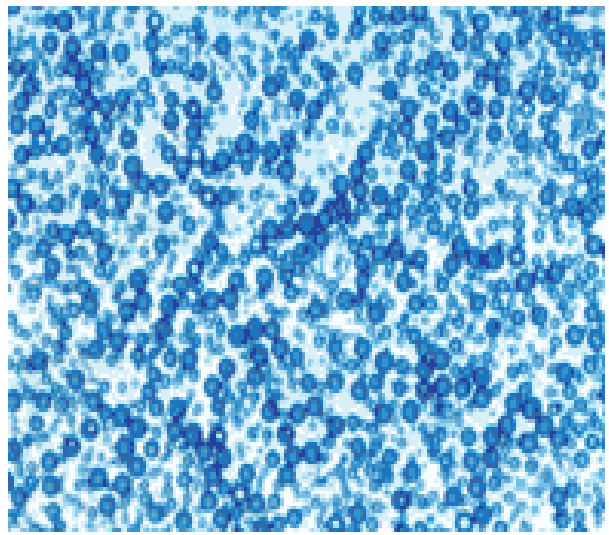
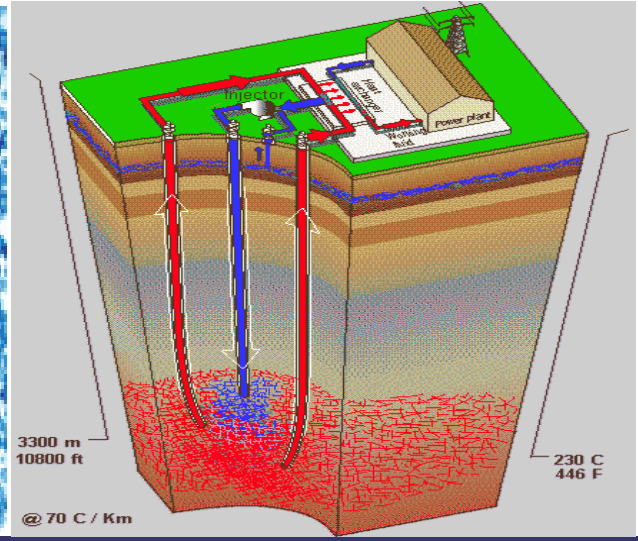




The Canadian Oil Sands in a Carbon Constrained World

Ninth Cross-Border Forum on Energy Issues

Washington March 6, 2008

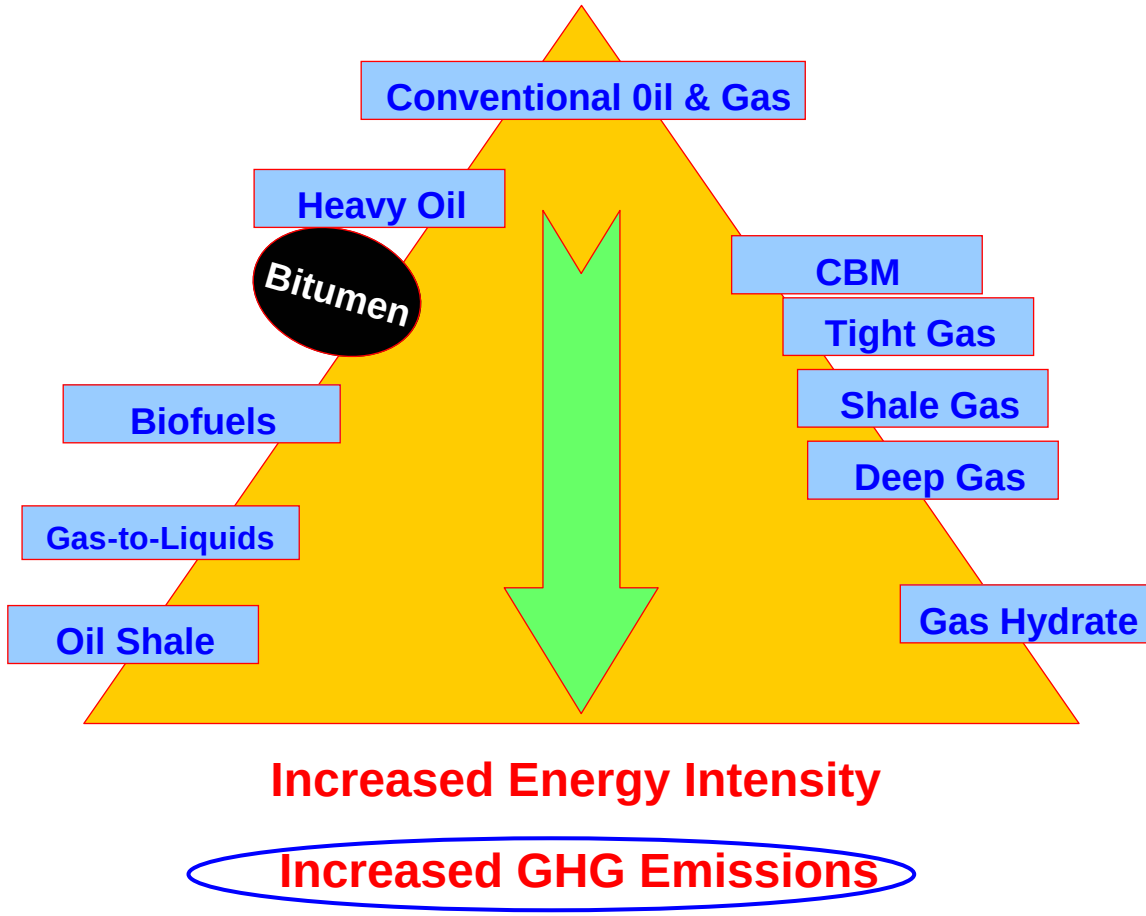
Eddy Isaacs, Executive Director

Alberta Energy Research Institute (AERI)

www.AERI.AB.CA

The Unconventional Reality

- Energy demand accelerating
- "Easy stuff" is a struggle
- Global barrel getting heavier
- CO_2 challenge is greater



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Size of the Oil Sand Resource

Alberta's oil reserves contribute to 16% of total global reserves, 2nd Only to Saudi Arabia

Reserves (2004 - EUB)
(Billion Barrels)

	Oil Sands
In Place	1,629
Reserves	175

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The Carbonate Triangle

Grosmont formation area = 75,000 km^2

Massive resource with no proven recovery technology

- Highly viscous oil and complex geology
- Several developmental projects underway

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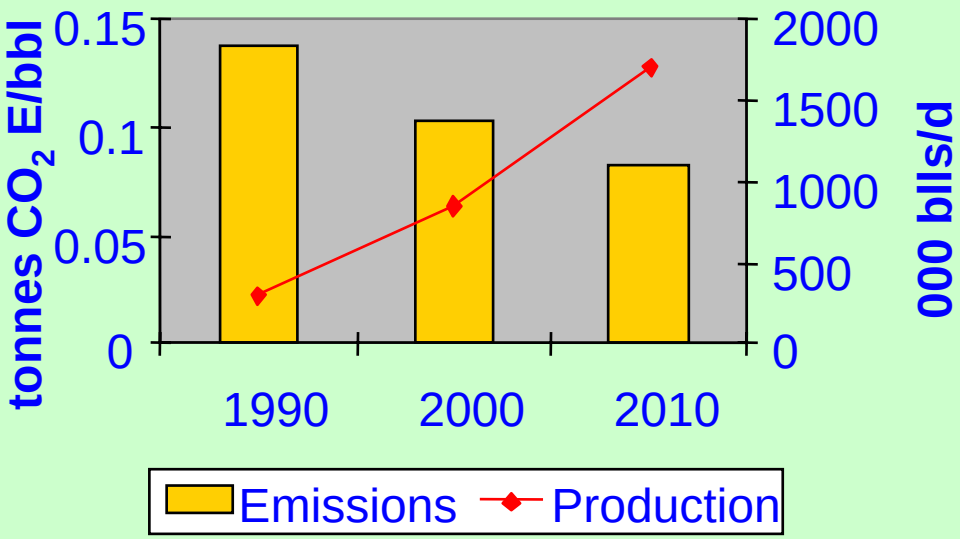
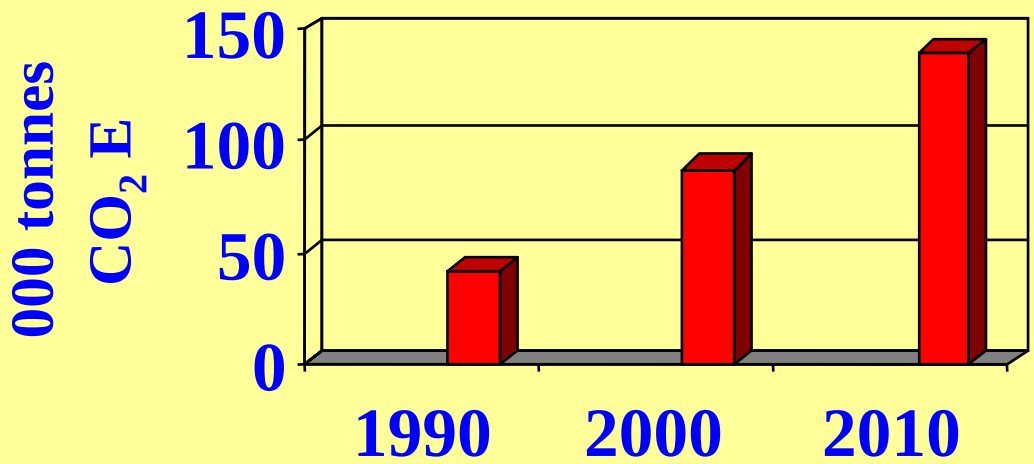
Oil Sands: GHG Challenges



Oil sands energy efficiency gains

Total emissions increase



Options for Reducing CO_2 Emissions (also natural Gas & water Use)

Process Development Technologies

- Enhancements to thermal processes
  - Steam-solvent hybrids
- Solvent processes
  - Heated solvent
- Combustion
- Electrical Heating

Options for Reducing CO_2 Emissions
(also natural Gas & water Use)

"Game Changers"

- **Nuclear**
  - **Steam**
  - **Steam, hydrogen, power**
- **Geothermal**
  - **Steam**
  - **Power**
- **Gasification**
  - **Steam, hydrogen, power**
  - **CO_2 capture and storage**

Carbon Capture and Storage Initiatives

- CO_2 capture from large emitters
  - Power plants: post combustion and pre-combustion
  - Oil sands operations: combine with gasification
  - Upgrading and refining: integration
- CO_2 transportation
  - CO_2 pipeline backbone: industry consortium
- CO_2 utilization and storage
  - CO_2- EOR: current commercial projects
  - Acid Gas Injection: current commercial projects
  - CO_2 Enhanced Coalbed Methane: feasibility and pilot studies
  - CO_2 for enhanced gas recovery: pilot studies
  - Deep saline aquifer storage: feasibility studies
- Key government-industry implementation initiatives
  - Large-scale demonstrations
  - CCS Development Council

Examples of AERI Sponsored Demonstration Projects – Creating Solutions to GHG Challenges

1. Gasification Technologies Leading to Carbon Capture and Storage Opportunities
2. Waste to Clean Power & Fuels
3. Clean Coal IGCC Plant
4. Long Lake Project CO_2 Capture Study
5. Petcoke/Coal to Natural Gas with CO_2 Capture
6. Next Generation Gasification Technology with CO_2 Capture
7. In Situ Combustion - Oil sands Production
8. Electrical Heating - Oil Sands Production
9. Underground Coal Gasification (UCG)

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The Prospective Future

- The oil sands will be an integral part of a North American Energy Strategy
  - Seamless collaboration on cleaner technology to reduce commercial risks
- The oil sands industry will move from competing for supply with other North American gas consumers to alternative options
- Options for CO_2 mitigation and natural gas displacement
  - New combination of recovery technologies and “game-changers” over the next 20 years
- Gasification of coke/asphaltenes/coal with carbon capture and storage will be the ‘ready-to-go’ option → integrates across energy systems creating value:
  - Source of heat, hydrogen and power
  - Petrochemicals and clean fuels
- GHG mitigation routine part of doing business