# Opportunity and Challenge for Alberta in Carbon Capture and Storage

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## Alberta Investment in CCS



News release

**Building Tomorrow** 

July 8, 2008

Alberta surges ahead with climate change action plan

\$2 billion invested in carbon capture and storage; \$2 billion in public transit





### Size of the Prize



The oil in Canada's bitumen deposits is more than double the world's remaining reserves of conventional crude oil, which should soon make Canada the world's marginal supplier of oil.

## What is Carbon Capture & Storage?





Capture

- Separate CO<sub>2</sub> from other gas streams at industrial plants
- Compression
- Expensive & energy intensive
- Pipeline
- Storage
  - Deep saline formations
  - Depleted oil and gas reservoirs
  - Enhanced oil recovery

### **Canada's GHG Regulatory Framework**

"all coal-fired electricity plants and oil sands upgraders and in-situ plants that come into operation in 2012 or after will be required to meet a stringent target based on the use of carbon capture and storage by 2018"

Source: Gov't of Canada



## Alberta's Climate Change Plan

ALBERTA'S REDUCTION COMMITMENTS





#### **One of Many Strategies**



Note: CCS represents the carbon capture and storage wedge. CCS/EE represents the carbon capture and storage (CCS) and energy efficiency (EE) overlap. The fuel switching wedge represents the contribution of switching from coal to oil products to natural gas to electricity; this portion also includes the contribution of renewables (wind, hydroelectricity, etc.) and nuclear power. The output wedge represents the GHG reductions due to lower physical output.



#### **Alberta's Industrial Emissions**



#### How much is a "Megatonne" of $CO_2$ ?

- >216,000 cars driven for one year
- ▶ 114 million US gallons
- 2.3 million barrels of oil
- One year of electricity for 128,000 average US homes
- 556,000 tonnes of waste going to landfill
- >483 Empire State buildings in volume
- ~100 days production from <u>one</u> typical Oil Sands upgrader!



## **Capture Technologies**





SMART THINKING. Powerful solutions.

Modified from CETC, NRCan, 2005

### **CO2** Pipelines

#### CO<sub>2</sub> Pipeline Network in the U.S.





## Alberta Opportunity



Sources:

- Oil Sands: Fort MacMurray
- Petrochem : Fort Saskatchewan, Joffre
- Coal Power: Wabamun Lake
- Pipelines
  - point & shoot vs backbone
- Storage
  - > Capacity
  - Containment
  - > Injectivity



#### **Acid-Gas Injection Sites in Western Canada**





## **Carbon Capture Economics**

CO<sub>2</sub> Supply Potential 2012 to 2015 cost includes capture and transport





#### **Final Comments**

Clean Coal energy penalty ~ 30%

Technology and experience will improve costs

Alberta's \$15/tonne carbon tax is a starting point but will not spur CCS

\$2 billion subsidy will result in initial projects but will not spur widespread deployment





## **Questions?**

