



# Carbon Capture and Storage: the view from Canada

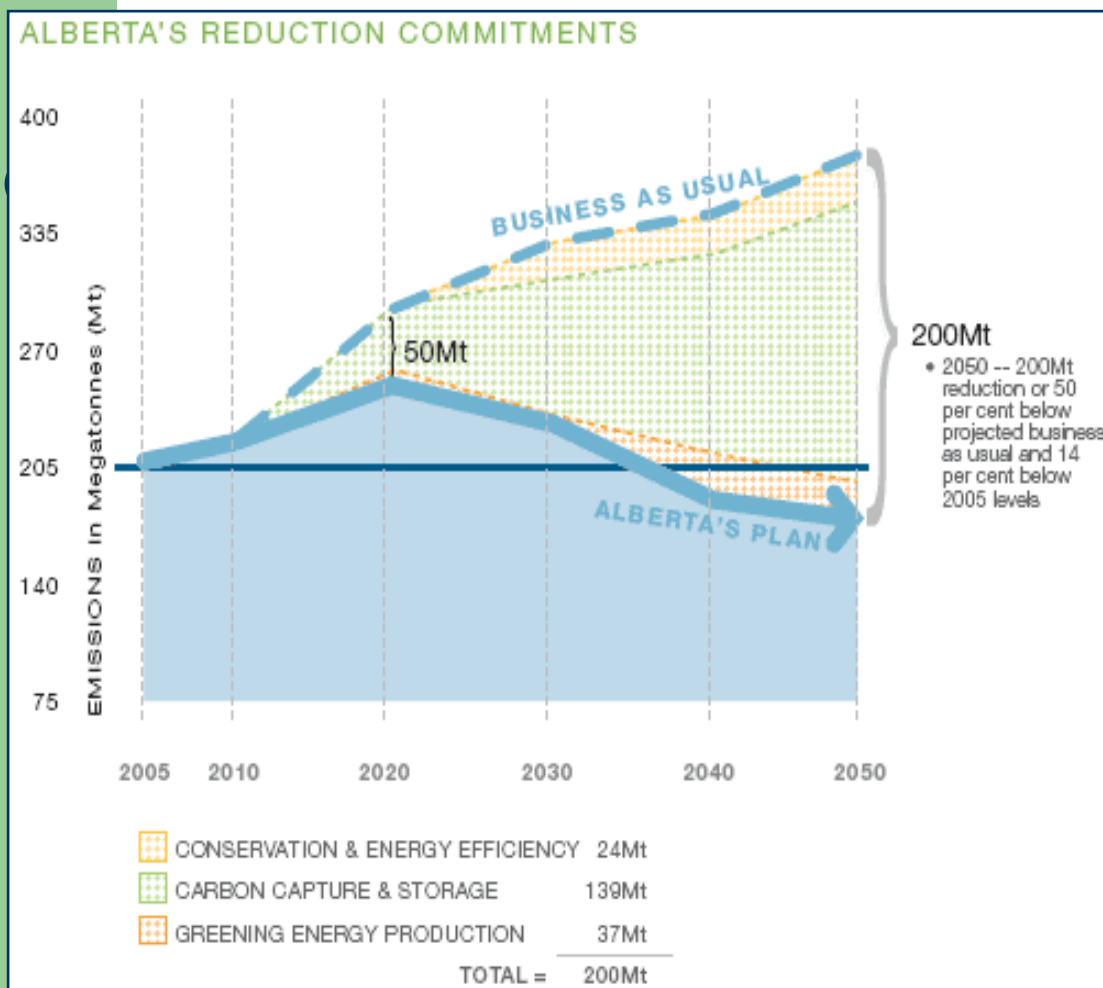
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All Energy '08



# Federal activity

- Turning the Corner: Taking Action to Fight Climate Change
  - Cut emissions by 20% by 2020 (against 2006)
  - Mandatory reductions starting in 2010
  - Incentive for CCS ready until 2018 (electricity and tar sand)
  - Intensity targets until 2018, absolute targets thereafter
  - CCS is a key component of achieving the targets
  - Technology fund available, increasing cost and decreasing amount of target can be achieved with technology fund applications.
  - Tar sands – project specific, electricity - corporate

# Alberta Government Plan



- Alberta produces about 40% of

Canada's GHG emissions

- Its plan to reduce emissions heavily reliant on CCS
- CCS to account for 70% of planned reductions, or 139 Mtpa

## Other government plans

- British Columbia looking at trading, following West Coast US model, CCS is a component
- Saskatchewan targeting to stabilise growth by 2010 and reduce emissions by 32% from 2004 levels by 2020, CCS will be a key part
- Ontario still looking at nuclear
- Other provinces developing plans, in particular Nova Scotia looking at CCS
- Need country wide consistency

# Integrated CO<sub>2</sub> Network (ICO<sub>2</sub>N)

- ICO<sub>2</sub>N consists of 18 leading companies from a variety of industries – power, oil & gas, fertilizer, chemicals, metals



- ICO<sub>2</sub>N represents:
  - More than 100 Mtpa of industrial emissions (14% of Canada's total emissions)
  - Over 60% of Alberta's power generation
  - ~ 95% of oil sands petroleum production
- Mandate is to work with provincial and federal governments to develop the CCS solution
- ICO<sub>2</sub>N has conducted several engineering, economic and other analyses: [www.ICO2N.com](http://www.ICO2N.com)

# Alberta Saline Aquifer Project (ASAP)

- Canadian pipeline co. Enbridge Inc. leading a group of over 20 energy industry participants in the Alberta Saline Aquifer Project (ASAP).
- ASAP is a broad-based, industry-supported initiative that participants will roll out in phases:
  - Phase 1 = identification of suitable locations for the long term sequestration (storage) of carbon dioxide in deep saline aquifers. It is expected to be completed by the end of 2008.
  - Phase 2 = a pilot project during which sequestration sites will be designed to receive injected carbon dioxide.
  - Later phases will involve expanding the project to a large-scale, long-term commercial sequestration operation.

# Shell Canada's Quest Project

- Shell is considering a Project to capture more than one

million tonnes of CO<sub>2</sub> per year from its Scotford Upgrader, located near Edmonton, Alberta, Canada.



**CO<sub>2</sub> Capture  
Scotford Upgrader**



**Pipeline**



**Sequestration  
near Scotford**



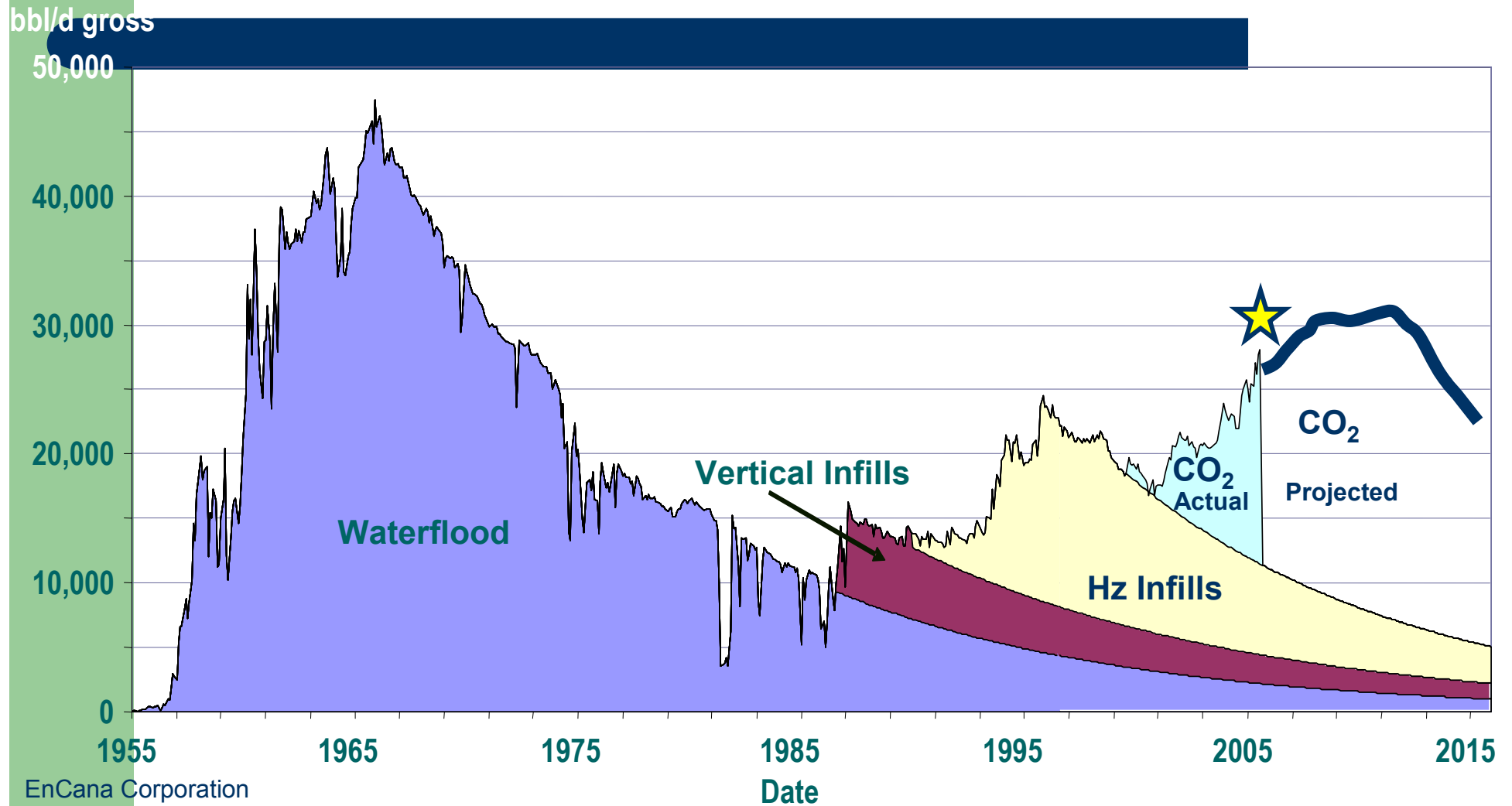
## Other Alberta based initiatives

- Wabamun Saline Aquifer Project
  - Evaluating a 1 Gt storage option
- Heartland Area Redwater Project
  - Alberta Research Council led project to look at full cycle CCS in Redwater area, near Edmonton

# Other initiatives

- Spectra Energy – NE British Columbia
  - Large acid gas injection project with H<sub>2</sub>S as well as CO<sub>2</sub> being injected into a saline aquifer
  - PCO<sub>2</sub>R monitoring
- Weyburn (now Weyburn Midale) final phase underway
- CCRL, PTRC proposed capture from reformers and injection in Regina area
- University of Regina, Montana full cycle CCS with post combustion capture at 1000 tonnes per day
  - Based on UofR, HTC Pureenergy modular technology for CO<sub>2</sub> capture at 1000 to 1500 tonnes per day
- SaskPower – 3000 t/d capture by post-combustion by 2013
- Canadian Academy of Engineers – need for multiple large scale projects aimed at 5 Mt/yr in the next 6-7 years

# EnCana's Weyburn Unit Production



# CCS Pureenergy 1000



# International Center for Performance Assessment of Geologic Storage of CO<sub>2</sub> (IPAC)

- Vision: a new Centre of Excellence based in

Western Canada (University of Regina) to improve understanding of CCS and enable its large-scale deployment

- Internationally networked to other centres to exploit synergies in research and expertise around the globe
- A public-private partnership
  - Financial support from industry and governments is being finalized
- Builds on extensive industry and academic experience in Western Canada



QUESTIONS?