EERC Technology… Putting Research into Practice

## The Plains $CO_2$ Reduction (PCOR) Partnership

# Fort Nelson Carbon Capture and Storage (CCS) Project

**Third CSLF Ministerial Meeting**
**Technical Working Group**
**London, England**

**Edward N. Steadman and John A. Harju**
**October 11, 2009**


PCOR Partnership 2003–Present
NETL
EERC
University of North Dakota
ABENGOA BIOENERGY
AIR PRODUCTS
Alberta Energy
AERI
Alberta Energy Research Institute
ALLETE
Ameren
ACCCE
AMERICAN COALITION FOR CLEAN COAL ELECTRICITY
AMERICAN LIGNITE ENERGY
Apache
BAKER HUGHES
BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative
BECHTEL
Biorecro
Blue Source
BNI COAL
BRITISH COLUMBIA
The Best Place on Earth
Ministry of Energy, Mines and Petroleum Resources
Carbozyme Inc.
CCX
Chicago Climate Exchange
CMG
Dakota Gasification Company
Ducks Unlimited Canada
CANADA'S CONSERVATION COMPANY
DUCKS UNLIMITED
Eagle Operating Inc.
EICCD
ENBRIDGE
Encore
Acquisition Company
ERCB
Energy Resources Conservation Board
AGS
Alberta Geological Survey
Environment Canada
EXCELSIOR ENERGY
Fischer Oil and Gas, Inc.
GREAT NORTHERN
GREAT RIVER ENERGY
HESS
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DNR
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LIGNITE Energy COUNCIL
Manitoba
Manitoba Hydro
MARATHON
MEG Energy Corp
Melzer Consulting
Minnesota Pollution Control Agency
minnesota power
Minnkota Power
COOPERATIVE, INC.
MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI RIVER ENERGY SERVICES
MONTANA-DAKOTA UTILITIES CO.
Montana Department of Environmental Quality
MUREX PETROLEUM CORPORATION
NATIONAL COMMISSION ON ENERGY POLICY
Natural Resources Canada
Nebraska Public Power District
Always there when you need us
Nexant
NORTHAMERICAN COAL CORPORATION
North Dakota DEPARTMENT OF COMMERCE
North Dakota Department of Health
NORTH DAKOTA GEOLOGICAL SURVEY 1895
NORTH DAKOTA OIL AND GAS DIVISION
Industrial Commission of North Dakota Lignite Research, Development and Marketing Program
Industrial Commission of North Dakota Oil and Gas Research Council
NORTH DAKOTA NATURAL RESOURCES TRUST
NORTH DAKOTA PETROLEUM COUNCIL
NDSU
NORTH DAKOTA STATE UNIVERSITY
OTTER TAIL POWER COMPANY
xand
Risk Management Solutions
ptrc
Petroleum Technology Research Centre
PHTC
Prairie Public
Pratt & Whitney
A United Technologies Company
RAMGEN POWER SYSTEMS
RPS Energy
Saskatchewan Industry and Resources
SaskPower
Schlumberger
Shell Canada Limited
Spectra Energy
STRATEGIC WEST ENERGY LTD.
SUNCOR ENERGY
TAQA
TESORO
TGS
UNIVERSITY OF ALBERTA
UNIVERSITY OF REGINA
USGS
science for a changing world
Weatherford
ADVANCED GEOTECHNOLOGY
WESTERN GOVERNORS' ASSOCIATION
WESTMORELAND COAL COMPANY
Xcel Energy

8/09

# Field Validation Tests

Recognized
March 2007
Paris

# Fort Nelson CCS in a Deep Saline Formation

Drill rig and camp site near Fort Nelson, British Columbia, Canada

Spectra Energy SM


**Because of development of the Horn River Basin, Fort Nelson represents a growing $CO_2$ point source in western Canada.**

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# Natural Gas-Processing Facilities

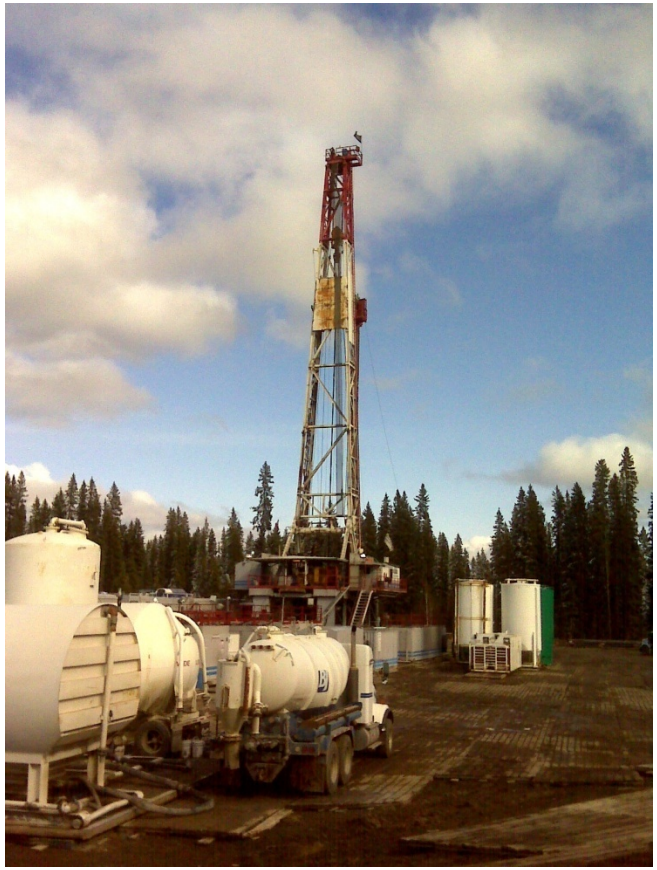
- Process raw gas found in nature to produce sales-quality natural gas for use in residential, commercial, and industrial applications.
- Processing generally involves:
  - Removal of impurities in the raw gas (e.g., formation $CO_2$ and $H_2S$).
  - Extraction of petroleum liquids (e.g., butane and propane) for other energy usage.
- Can be significant sources of anthropogenic $CO_2$ emissions.
- Over 1600 facilities worldwide (1300 in the United States and Canada).
- Many facilities are good candidates for carbon capture and storage (CCS) and geological $CO_2$ sequestration.

# Fort Nelson Gas-Processing Facility

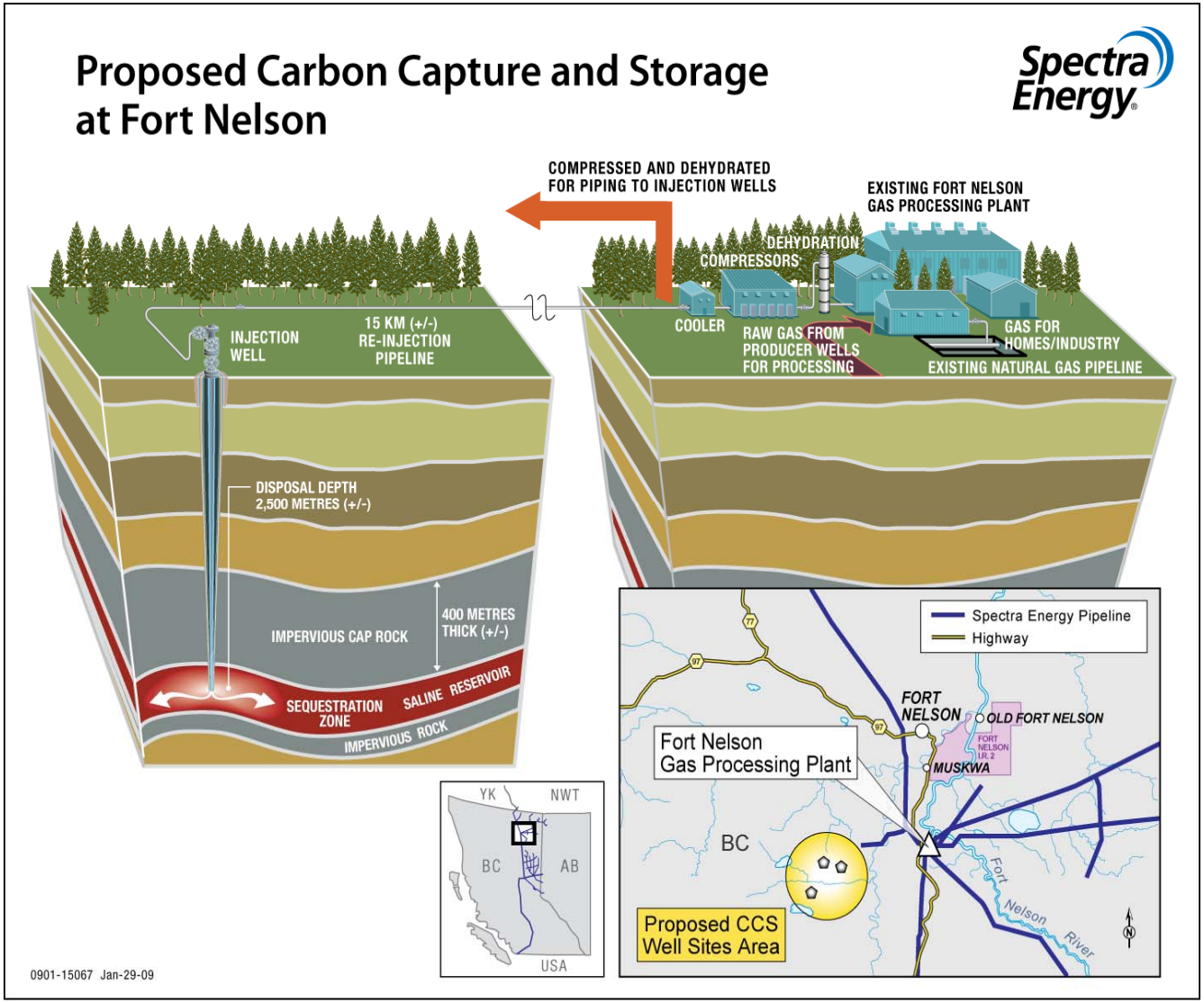
- Owned and operated by Spectra Energy; largest processing facility in the region and largest of its type in North America.
- Perhaps the largest sequestration project of sour $CO_2$ in a deep saline formation.
- International effort led by Spectra Energy includes industry, government, universities and technologists as collaborators.

# Phase III Fort Nelson Goals

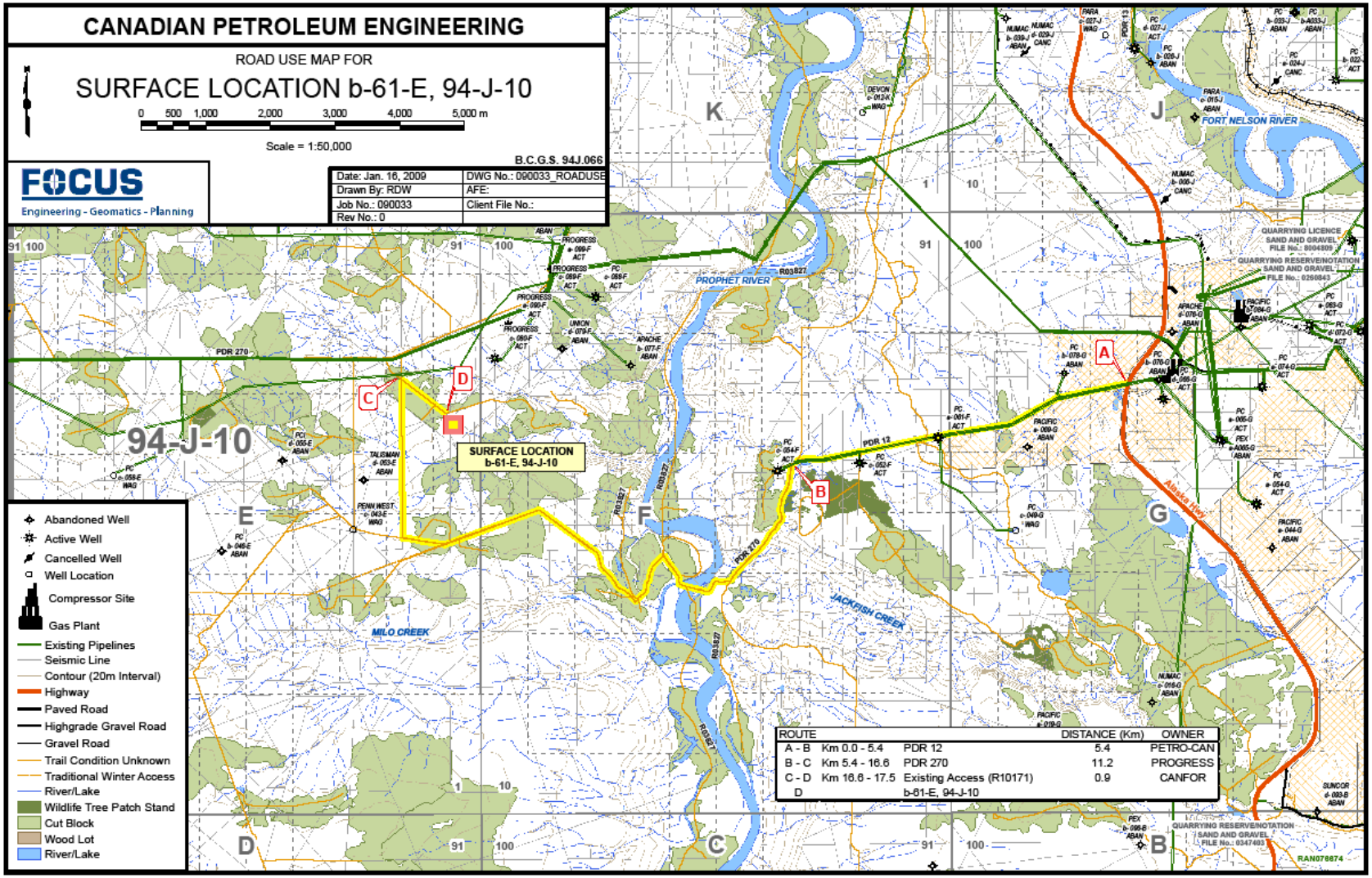
- Verify and validate the technical and economic feasibility of using brine-saturated carbonate formations for large-scale $CO_2$ injection.
- Demonstrate that robust monitoring, verification, and accounting (MVA) of a brine-saturated $CO_2$ sequestration project can be conducted cost-effectively.



# Phase III Canadian Project Overview



# Phase III Fort Nelson – Current Status



# Phase III Fort Nelson – Current Status (cont.)

- Exploration/injection well was drilled spring 2009.
- PCOR Partnership is providing an integrated risk management, modeling, and MVA program.
- The efficient and streamlined nature of the key elements may well lead to one of the most rapid deployments of a commercial-scale saline formation CCS project available in North America.

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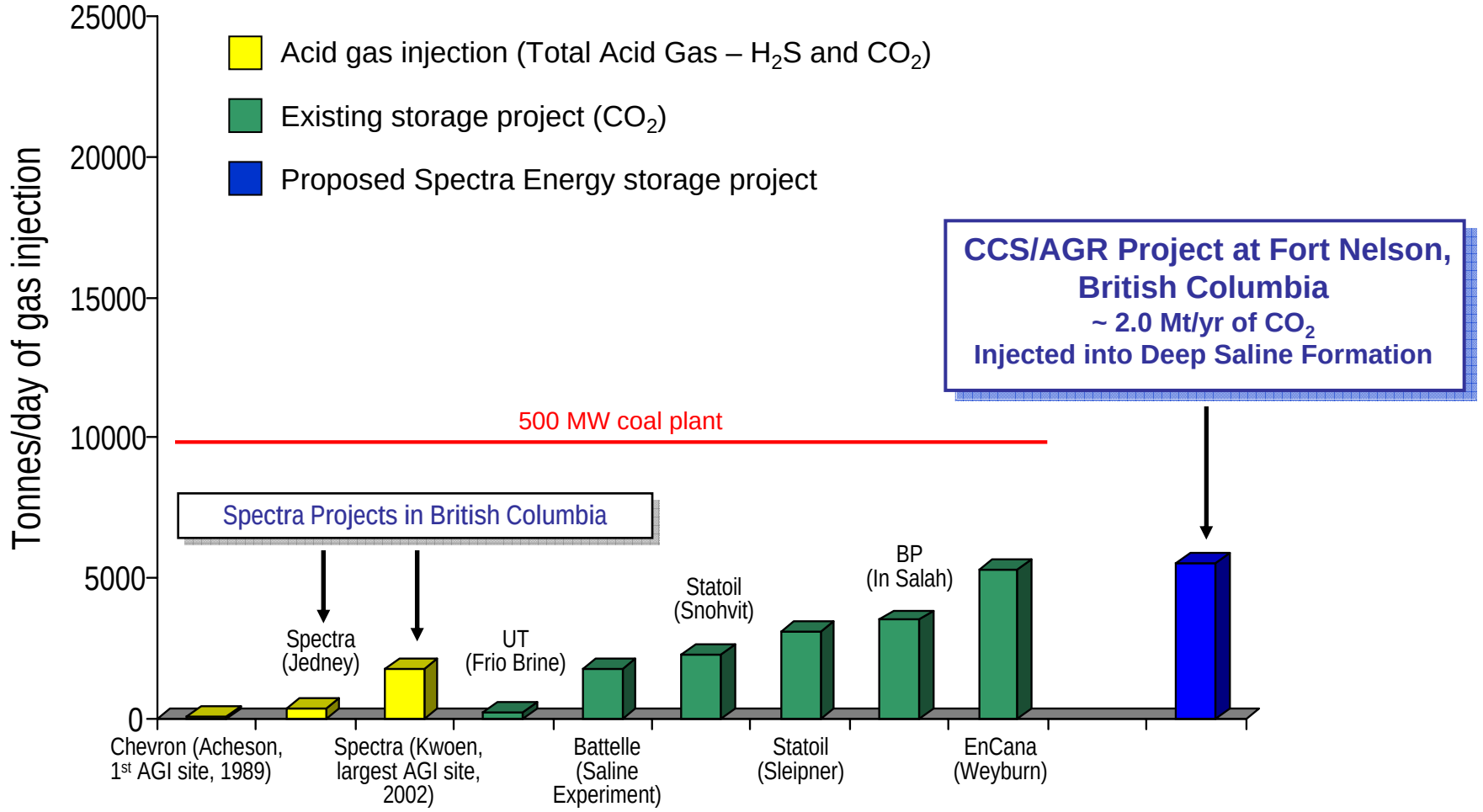
# Phase III Fort Nelson – Current Status (cont.)

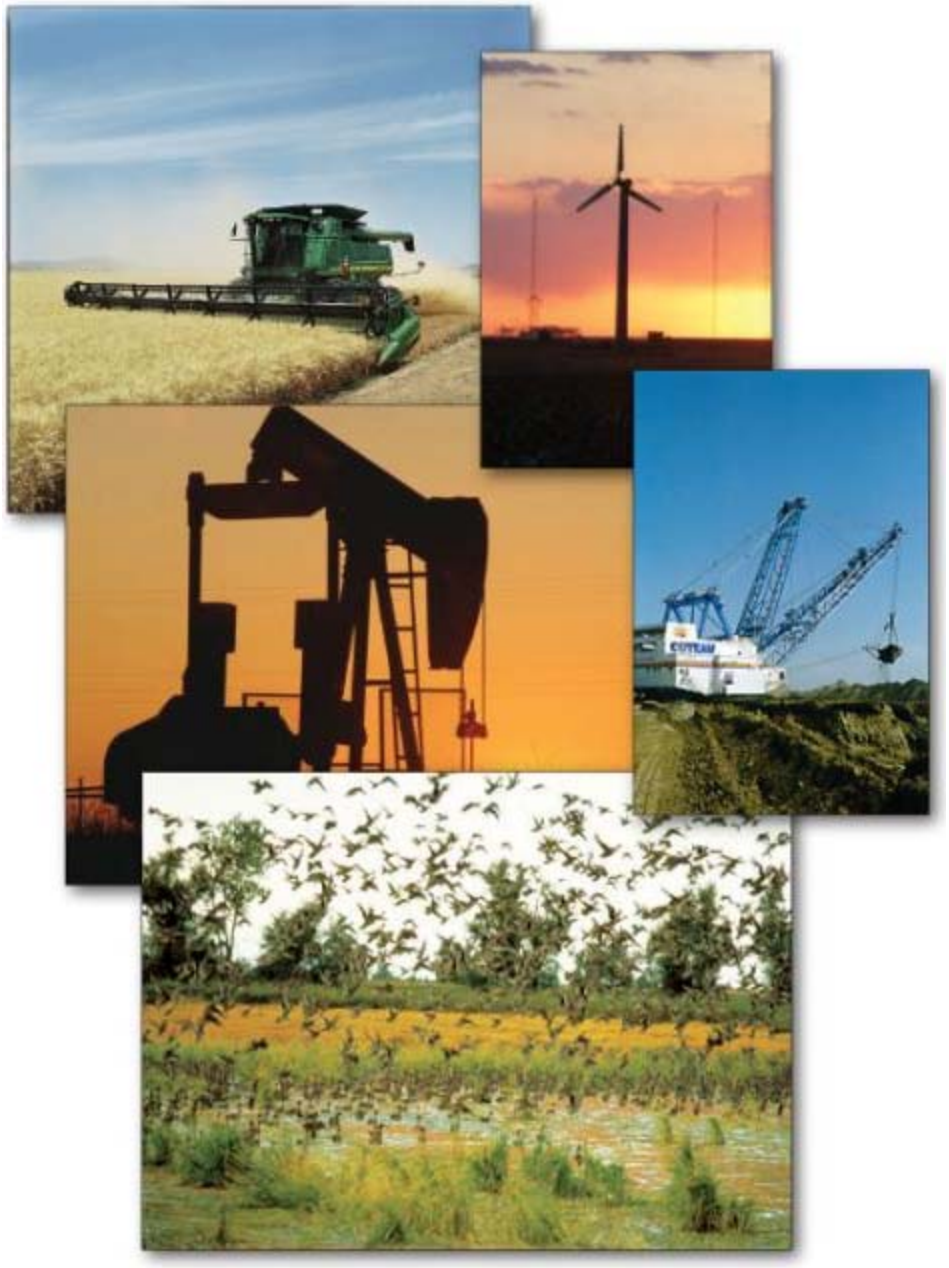
# Phase III Fort Nelson – Current Status (cont.)

# Comparison of Worldwide $CO_2$ Injection

## Potential for Canadian Leadership in Large-Scale CCS




Adapted from Figure 5.22 of IPCC Special Report on Carbon Dioxide Capture and Storage, 2005.



PCO2R Partnership

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