An Invitation to Contribute to the Development of a Best Practices Manual Based on Experience Gained from the Project

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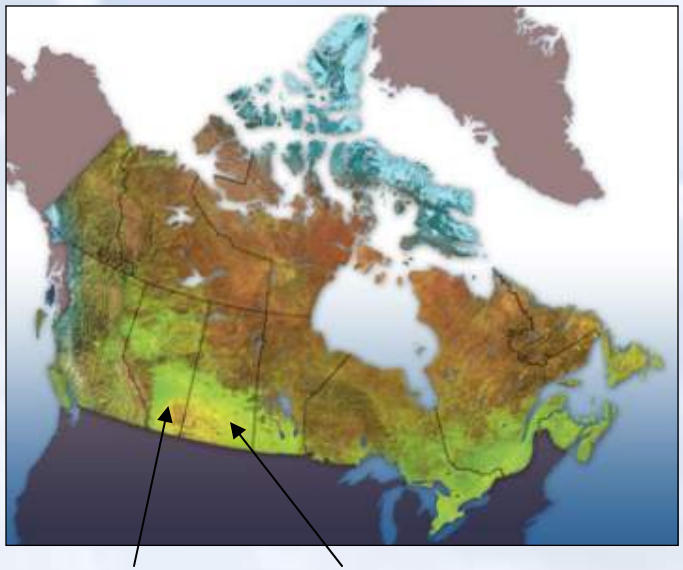
IEA GHG
WEYBURN-MIDALE
CO_2 MONITORING
AND STORAGE PROJECT

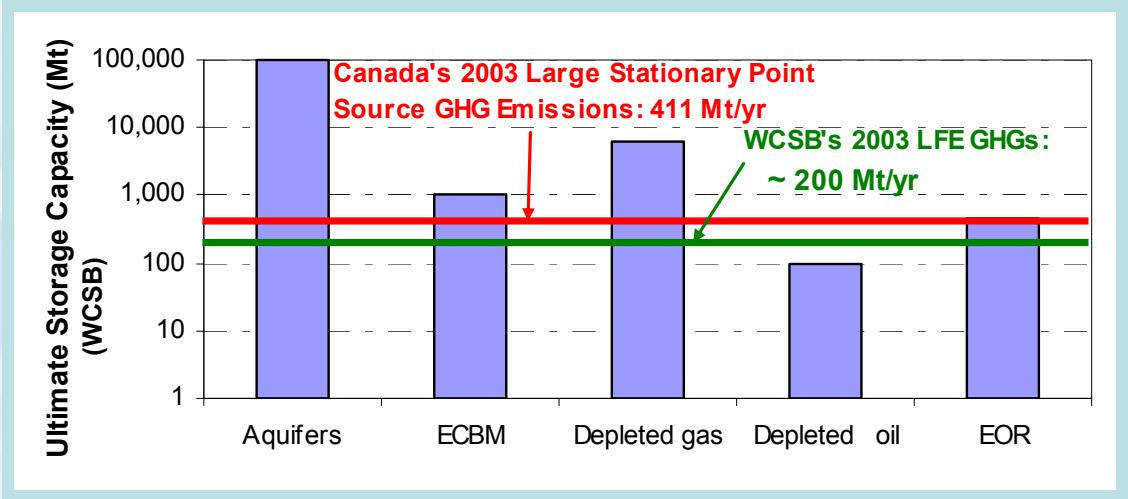
Why geologically store CO_2?

- A pragmatic and viable option for reducing GHG emissions
- A technology allowing the world to move towards an energy economy with zero net emissions from fossil energy use
- Particularly feasible where significant geological storage capacity is in close proximity to large volume emitters with relatively high purity CO_2 or capture costs are low
  - e.g. Western Canadian Sedimentary Basin (WCSB)

What tools do we need to make this happen on a large scale?



Alberta & Saskatchewan contain a large part of the Western Canadian Sedimentary Basin



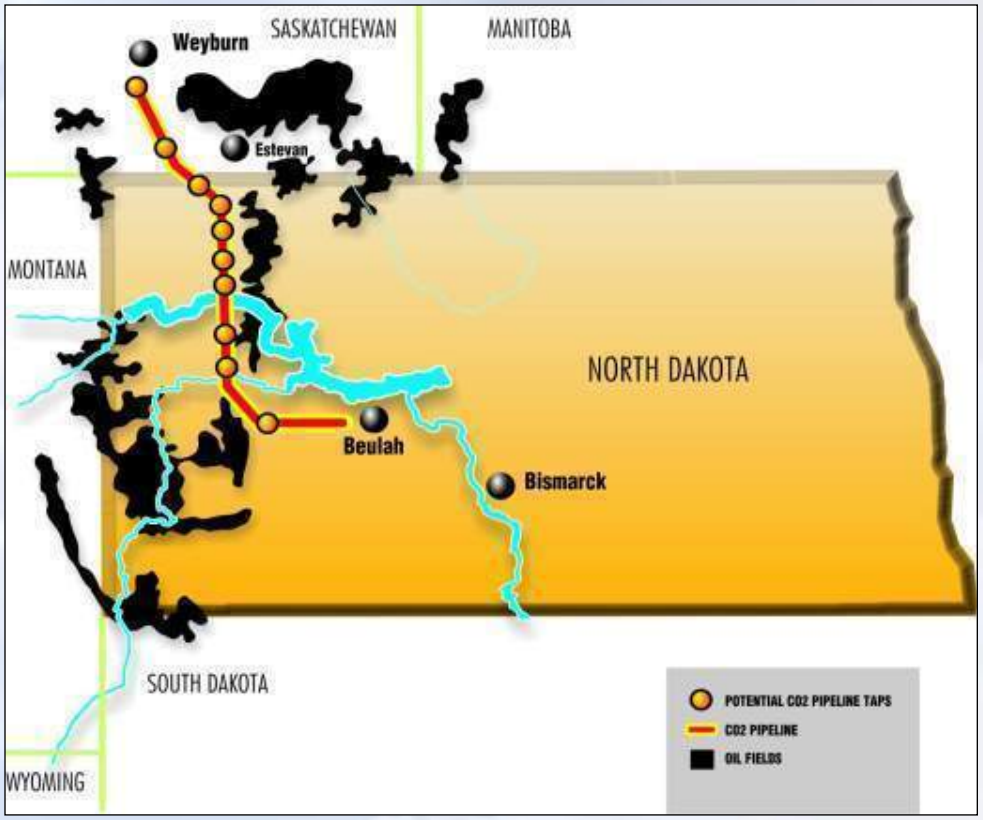
Stefan Bachu, Alberta Geological Survey, 2004-2006

Environment Canada, 2006

The Source of CO_2

Dakota Gasification Company

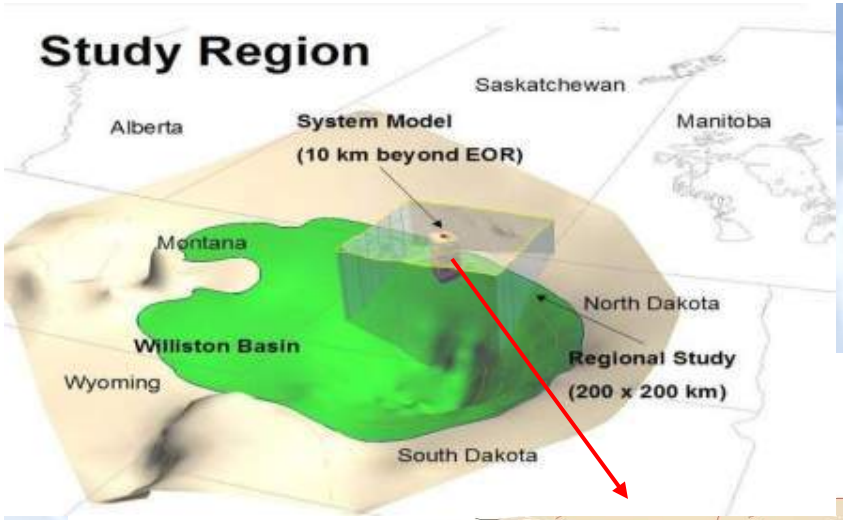
- 155 mmscfd of EOR-quality CO_2 by-product of coal (lignite) gasification (over 8,000 tonnes/day)
- currently ~ 80% is contracted to companies operating CO_2-EOR operations in SE Saskatchewan, Canada

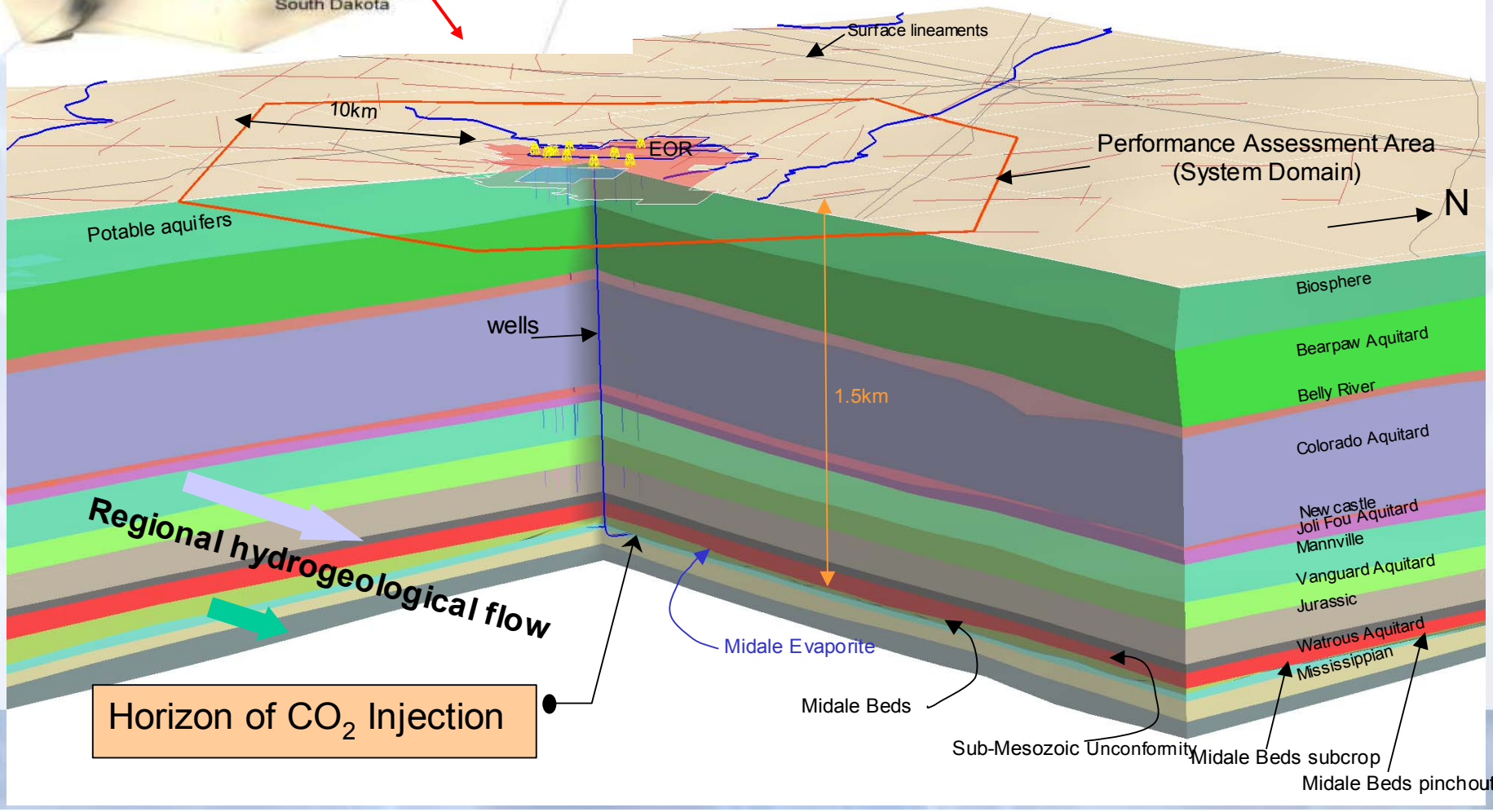


Issue:

What public policies and processes must be established for crediting purposes when GHGs from a non-Kyoto signatory country are sequestered in a Kyoto signatory country?

Where is the CO_2 stored?





Some Technical Details

- Baseline monitoring survey (geophysical, geochemical, surface) in July 2000 (pre-injection)
- CO_2 injection began in September 2000 in 19 of 75 planned patterns
- R&D program focused on the first 19 patterns (Phase 1a)
- Regular monitoring surveys completed (quarterly, annually)

Facility where main CO_2 pipeline enters Weyburn field from Beulah, ND

Summary of Phase 1 Results

- **Geological "container" at Weyburn is effective:**
  - Primary carbonate and secondary shale seals are highly competent
  - Sluggish hydrogeological flow in Midale beds
  - Hydraulic separation between adjacent aquifers
  - No fluid flow connecting all aquifers (including flow along fractures, discontinuities)

- **Migration of CO_2 outside the EOR area at 5000 years post-injection:**
  - 26.8% (7 million tonnes) moves outside the EOR area but remains within geological region or "area of study":
    - **18.2% migrates to geosphere below reservoir via water phase but is confined within EOR perimeter**
    - **8.6% migrates laterally within reservoir but outside 75 EOR patterns (moving updip or northeast)**
    - **0.02% goes above reservoir but confined within EOR perimeter**
    - **0.14% leaks via aging, abandoned wells**
    - **0.0% enters potable aquifers near the surface**

- **Worth remembering:**
  - Water saturated with dissolved CO_2 is more dense (heavier) than unsaturated water and tends to sink, discouraging leakage to potable aquifers and the surface

Why pursue a Final Phase project?

"Encourage the widespread use of technologies required for the design, implementation, monitoring and verification of a significant number of CO_2 geological storage projects in Canada and the USA"

- Build a Best Practices Manual (BPM) as a practical, technical guide for design and implementation for CO_2 storage associated with EOR
- Influence the development of clear, workable regulations for CO_2 storage, building upon existing, effective regulatory framework
- Influence the development of an effective public consultation process
- Influence the development of effective public policy to seed the development of a large, economic CO_2 supply and infrastructure, and a mechanism for monetizing credits for CO_2 storage

IEA GHG Weyburn-Midale CO_2 Monitoring and Storage Project

Best Practices Manual – Final Phase

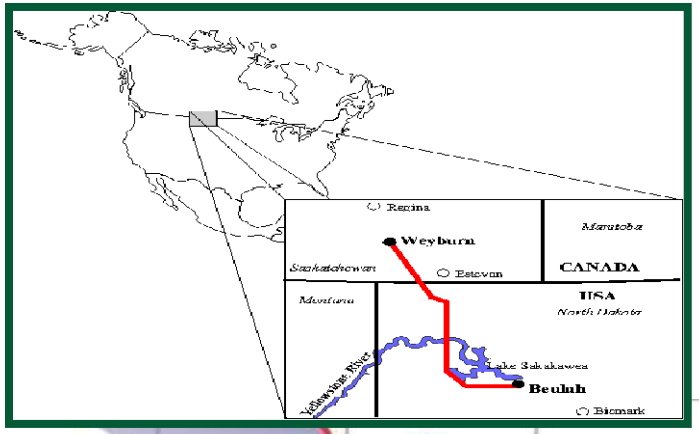
Protocols for:

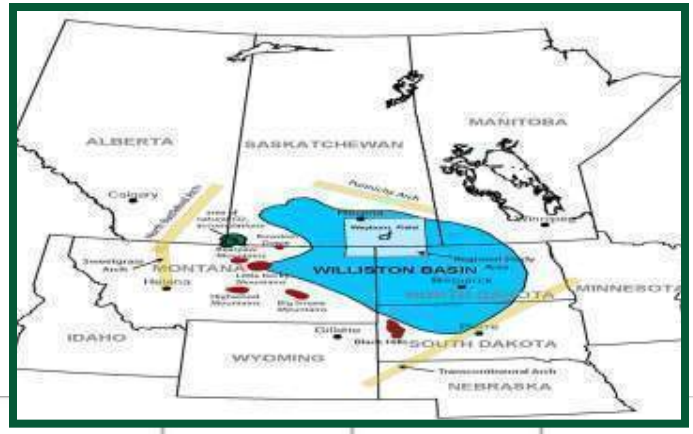
- *Storage site selection*
- *Monitoring and verification of stored CO_2*
- *Well-bore integrity monitoring and remediation*
- *Long-term risk assessment and risk management*
- *Maximizing economic CO_2 storage capacity*

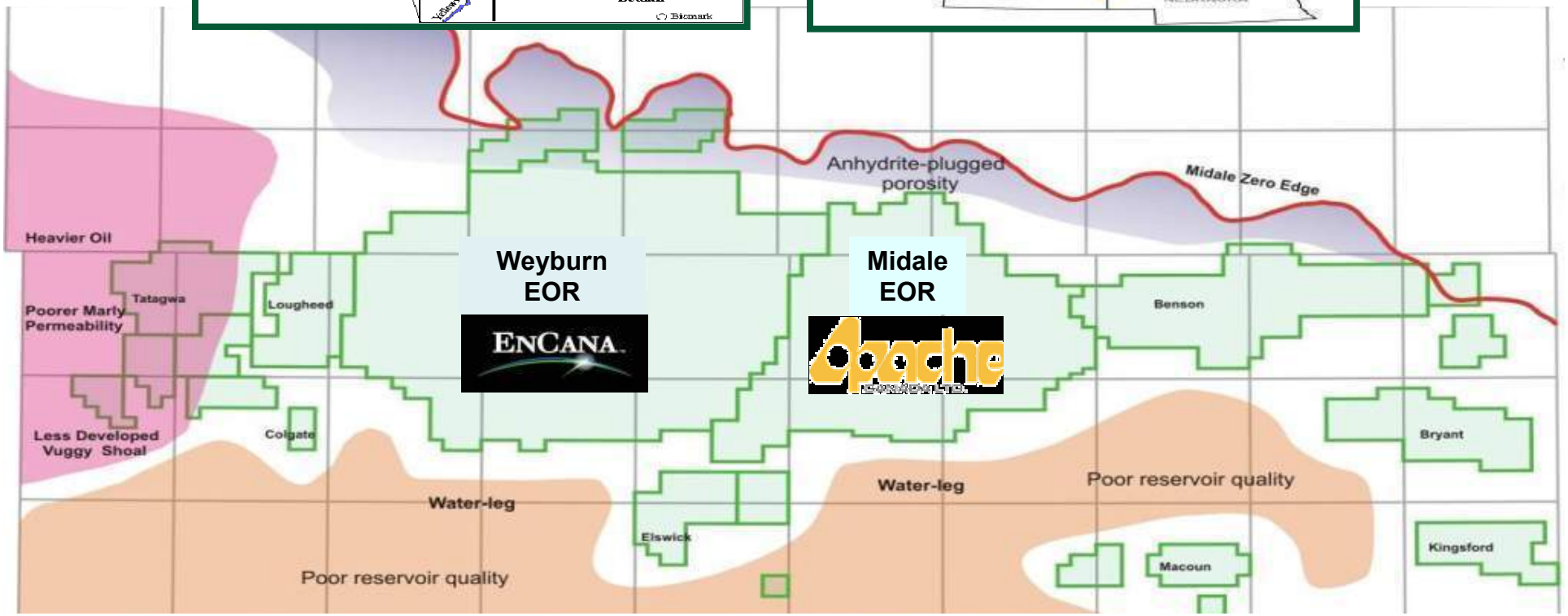
Overarching Principles: Address gaps in IPCC CCS Report and facilitate good public policy development to ensure widespread deployment of long-term CCS

ptrc
Petroleum Technology Research Centre

Apache Canada includes its Midale CO_2-EOR operation in the Project







Public Communications and Outreach (Policy) – Final Phase

- With stakeholders, develop a Communication Plan based on the Weyburn experience and other major international CO_2 geological storage projects:
  - *Identify and focus on issues (and metrics) of key interest to policy makers, regulators, investors and (national and local) public*
  - *Appropriately communicate the Best Practices Manual and other relevant technical information to these essentially non-technical audiences*
  - *Launch the public communication process early*
- Based on issues/feedback from these stakeholders, revisit and accordingly revise the Best Practices Manual

Regulatory Policy Research – Final Phase

- Use existing national and provincial regulations as a basis for developing a generic "Straw Dog" regulatory application suitable for use in many different jurisdictions, addressing long-term storage issues and gas-credit accounting

- Work with regulatory bodies to develop fit-for-purpose, science-based, multi-jurisdictional regulations and outline an effective two-way public communication process

- Based on the foregoing, and feedback from stakeholders, revisit and accordingly revise the Best Practices Manual to make it universally applicable

You are invited to…

… provide advice on the development of the Best Practices Manual, public communication activities, and key advice for public policymakers and regulators

… a workshop on:

Wednesday, May 10 at 5:05 pm
Plaza C

We have not yet had input from a large USA and international group of experts and stakeholders.

Your technical and public policy expertise will be invaluable sources of guidance.

… So please join us!