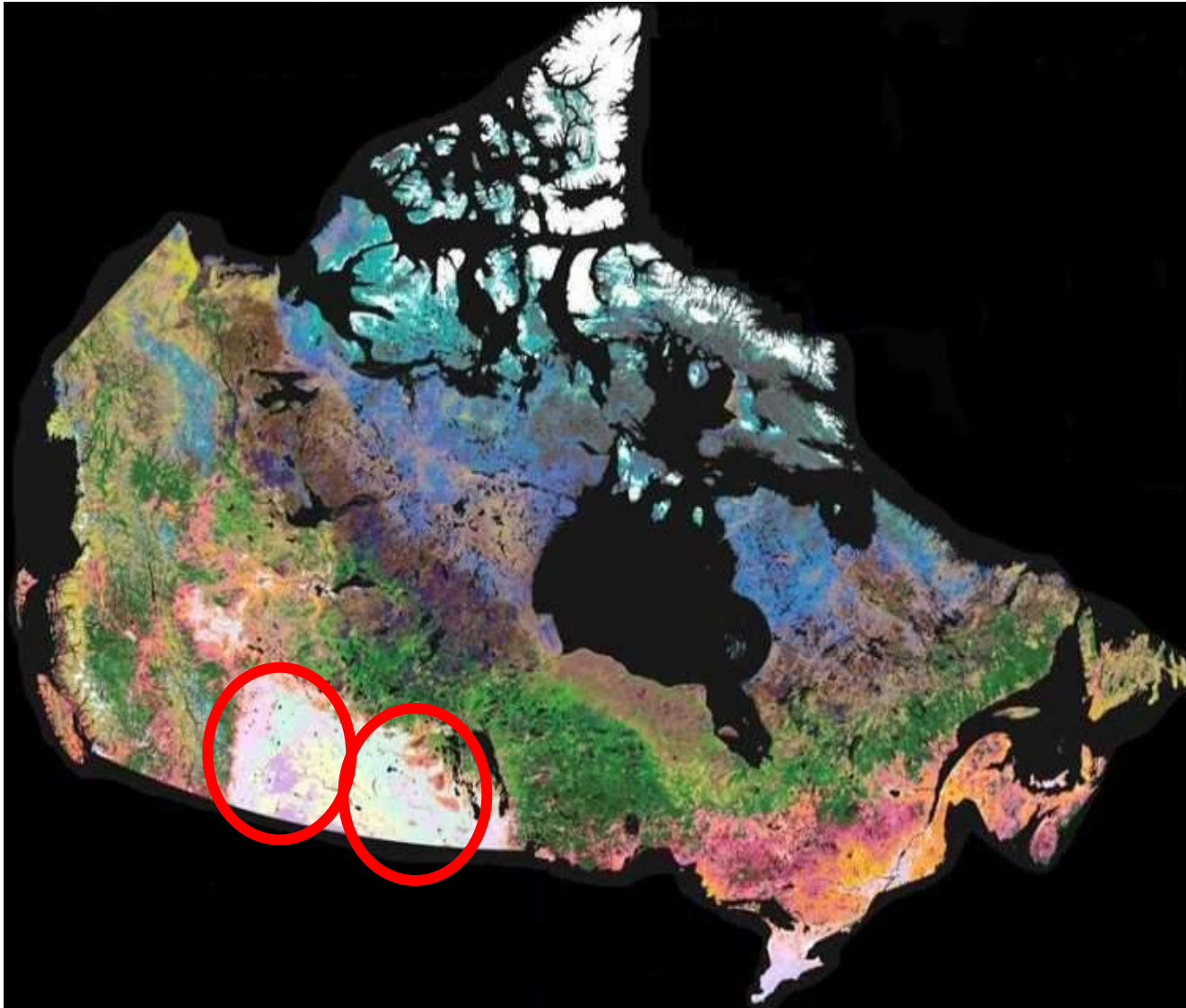


CCUS Project Developments and Policy Drivers in Canada

Neil Wildgust
Chief Project Officer,
Petroleum Technology Research Centre

Presented at Carbon Storage R&D Project Review Meeting, August 21-23, 2012
Pittsburgh, PA

Main Areas of Current CCS Development in Canada



Current Government Funding of CCS Projects: Alberta and Saskatchewan

Project	Federal	Provincial
Quest Project	120 MM	745MM
Swan Hills	----	285 MM
Enhance (ACTL)	63 MM	495MM
Boundary Dam	240MM	
Aquistore	14 MM*	5 MM
Weyburn-Midale	+15 MM**	3.5 MM

* 5 million from Sustainable Development Technology Canada (stand-alone federally funded agency) and 9 million ECOeti

**Includes NRCan and USDOE (Canada and USA)

Boundary Dam Near Estevan Saskatchewan



PTRC's CO₂ Capture and Storage Activities



IEA GHG
WEYBURN-MIDALE
CO₂ MONITORING
AND STORAGE PROJECT



Aquistore Project

Project Objectives:

- Demonstrate CO₂ storage in deep saline formation is a safe, workable solution to reduce greenhouse gas (GHG) emissions
- Develop best methods & technologies to monitor GHG
- Involve research institutions, policy makers, industry, and public



Project Overview

- **CO₂ storage research monitoring project**
- **Designed to inject 2000 tonnes CO₂/day**
- **\$22.3M in sponsorship secured to date**
- **Buffer protection and long-term storage option for SaskPower's Boundary Dam Carbon Capture Project**



Phase 1: Demonstration & Evaluation

- site selection, permits, agreements, community engagement
- risk assessment, seismic surveys, monitoring programs
- evaluation/injection well
- observation/monitoring well
- test injection trucked in CO₂



Project Location

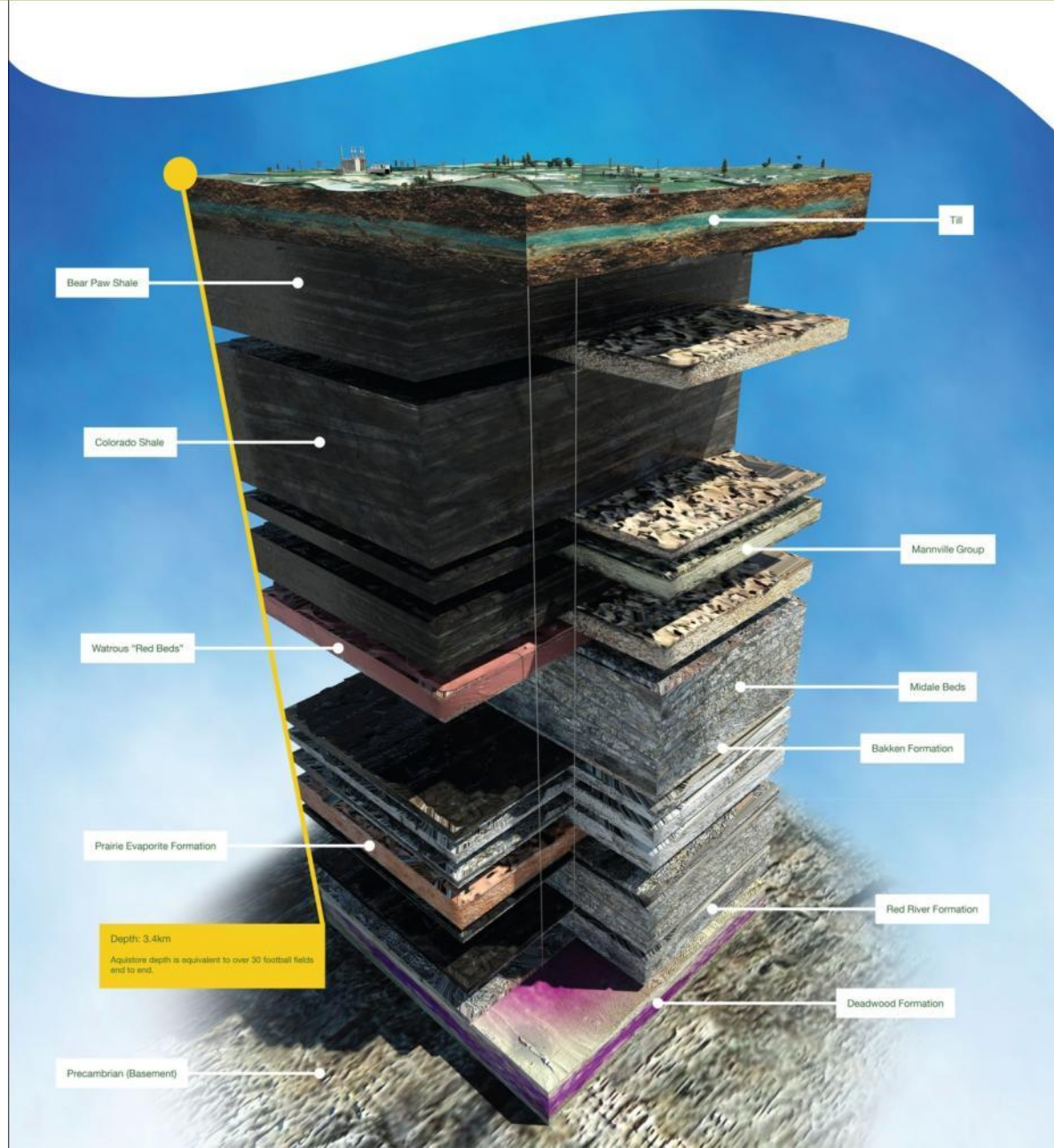


Ground level view towards Boundary Dam Power Station



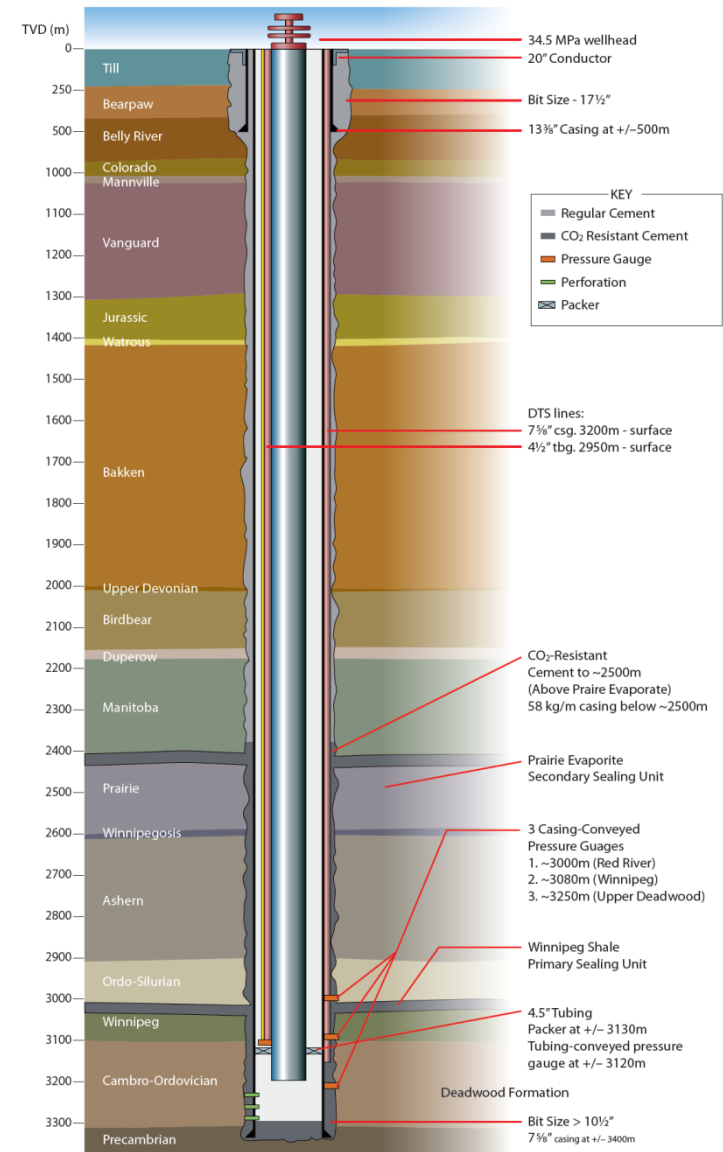
Well location remains largely free of water during the 1:500 year flood in Saskatchewan 2011

Subsurface Model



Injection Well Design

- Well depth 3300m to reach Deadwood in Estevan area
- Surface 13-3/8" casing to ~500m
- Production 7-5/8" casing to ~3300m
- 7-5/8" production casing for operability with 4.5" tubing
- Achieves evaluation and potential injection objectives
- Coring, DST, Logging program



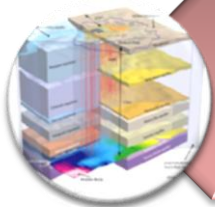
IEAGHG Weyburn-Midale CO₂ Monitoring & Storage Project (WMP) 2000 to 2012



Commercial EOR operations in Weyburn and Midale oilfields utilise anthropogenic CO₂



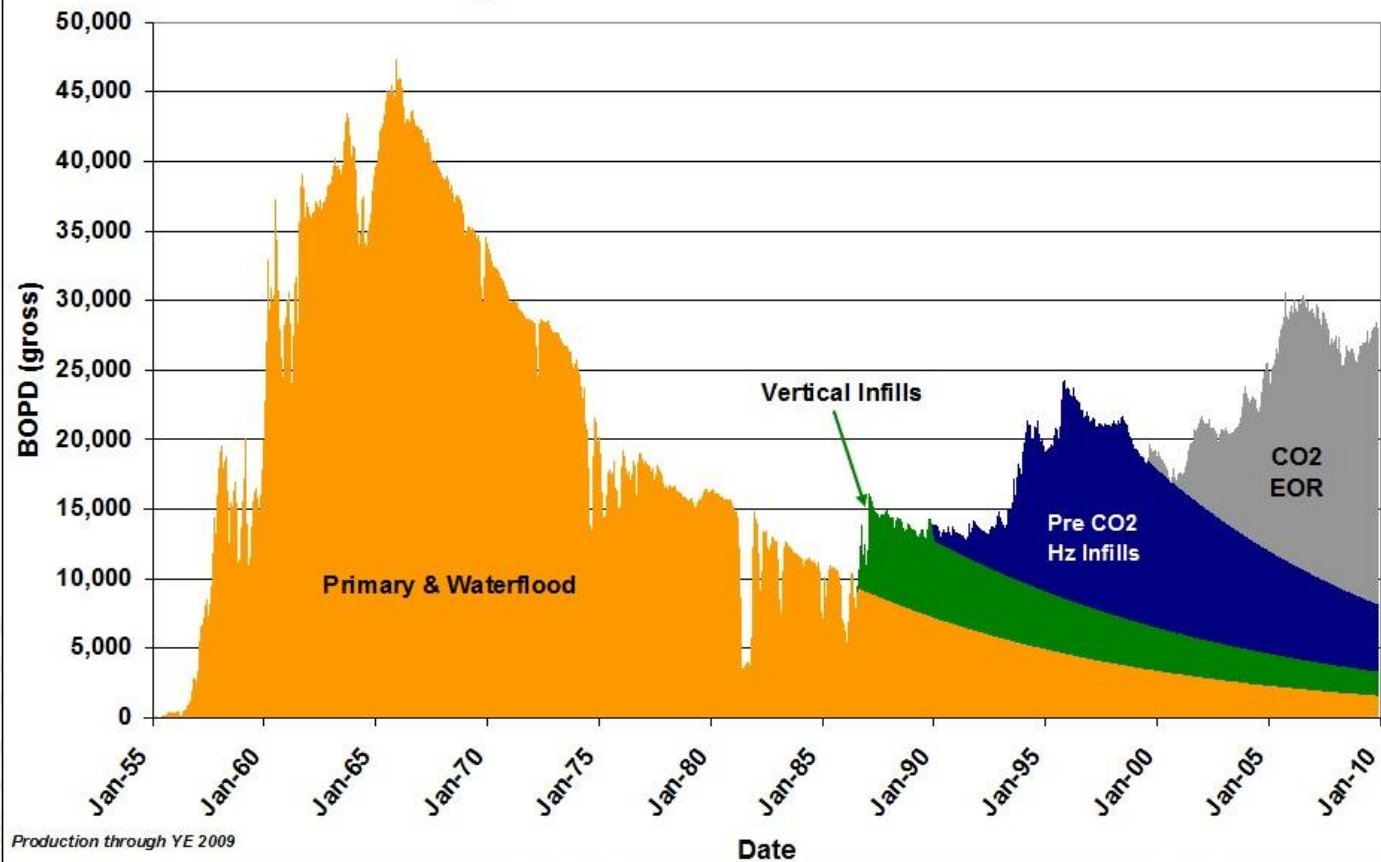
Over 20Mt of CO₂ injected and stored since 2000



WMP has used these sites to study technical aspects of CO₂ geological storage



Weyburn Unit Oil Production

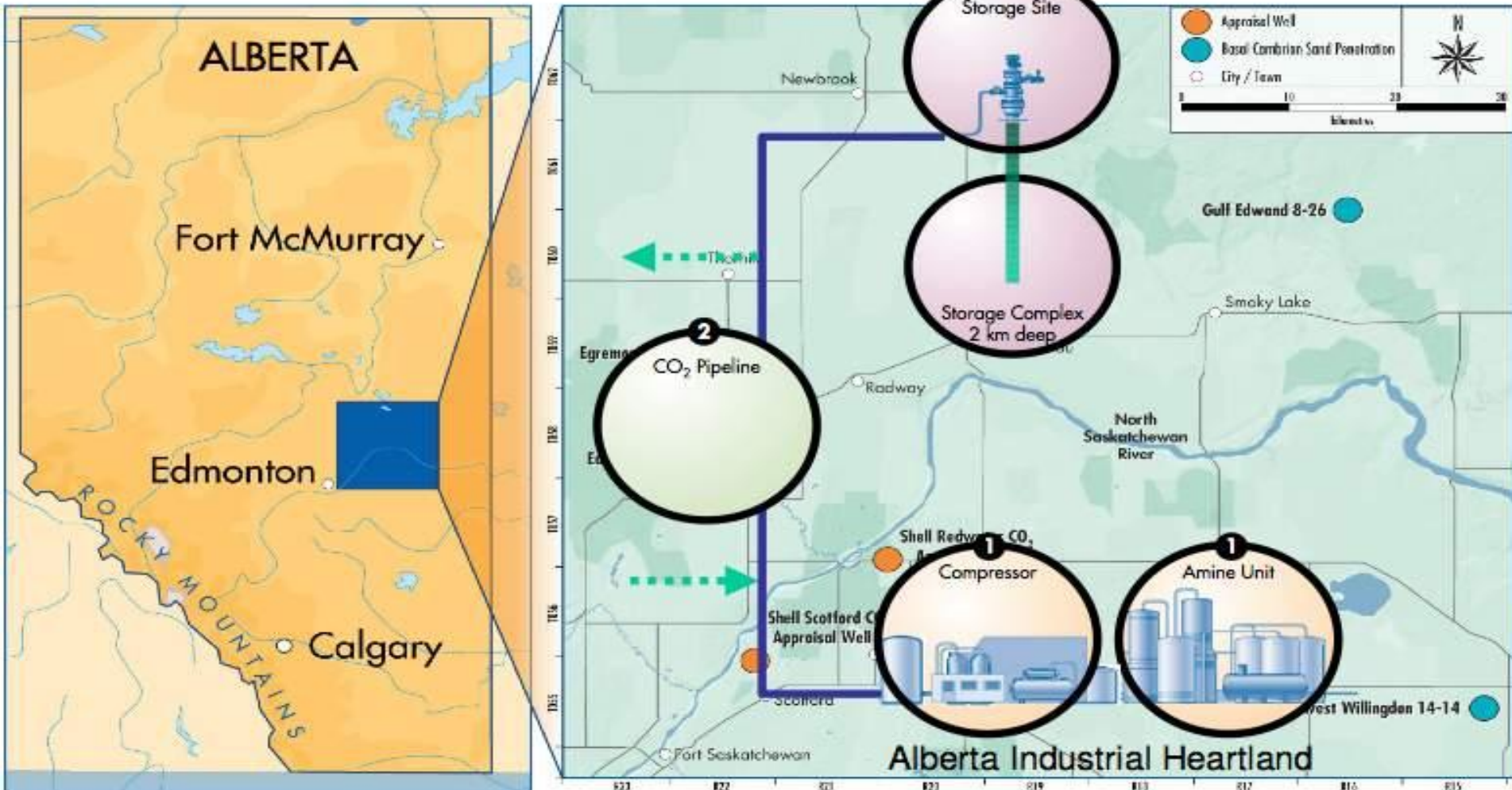


Production through YE 2009

Quest Project



Quest Location Map



Quest CCS Project - Overview



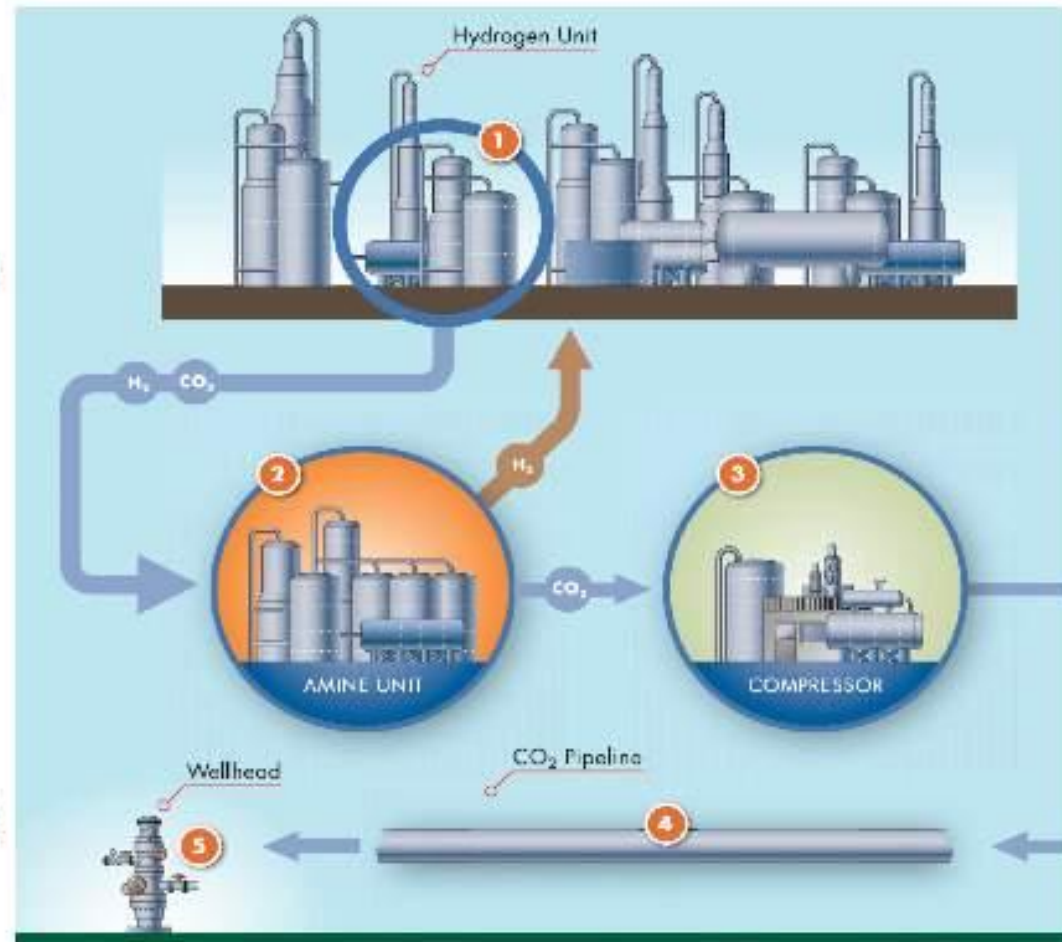
Quest CCS Project - Joint Venture among Shell (60%); Chevron (20%); and Marathon (20%)

Quest is a fully integrated CCS Project: capture, transport, inject, store & monitor CO₂

Capacity to capture over one million tonnes of CO₂ per year or 35% of Scotford Upgrader direct emissions

Equivalent of taking 175,000 vehicles off the road

CO₂ will be transported by pipeline and stored approximately 2 kms underground



ACTL: Alberta Carbon Trunk Line



ACTL

ACTL is the Enabler to Large Scale CCS



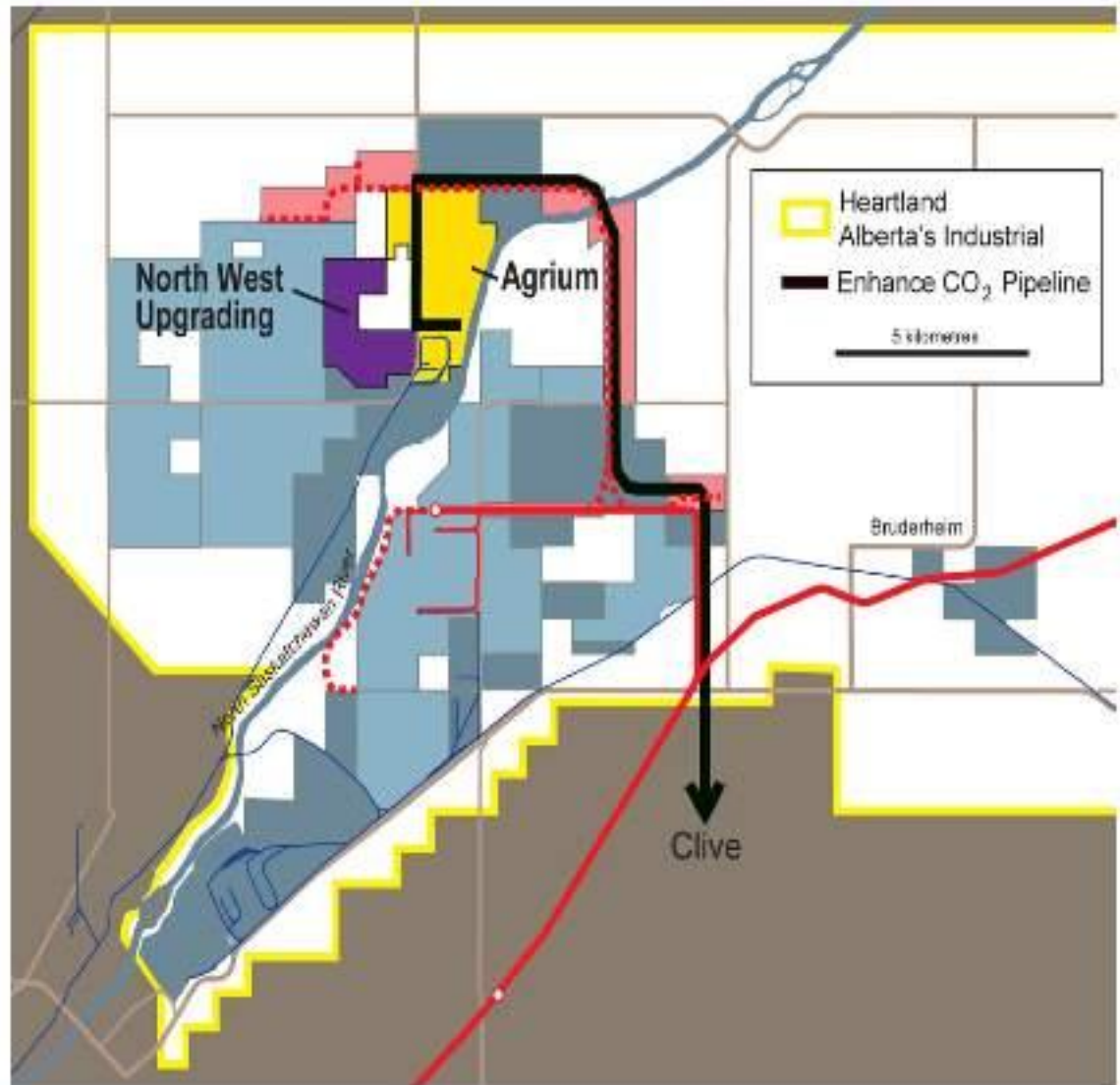
- **ACTL is there for all emitters**
- **Will be extended throughout Alberta**
- **Starts in Alberta's Industrial Heartland east of Edmonton**
- **Initial CO₂ supply comes from**
 - **Upgrading**
 - **Petrochemicals**



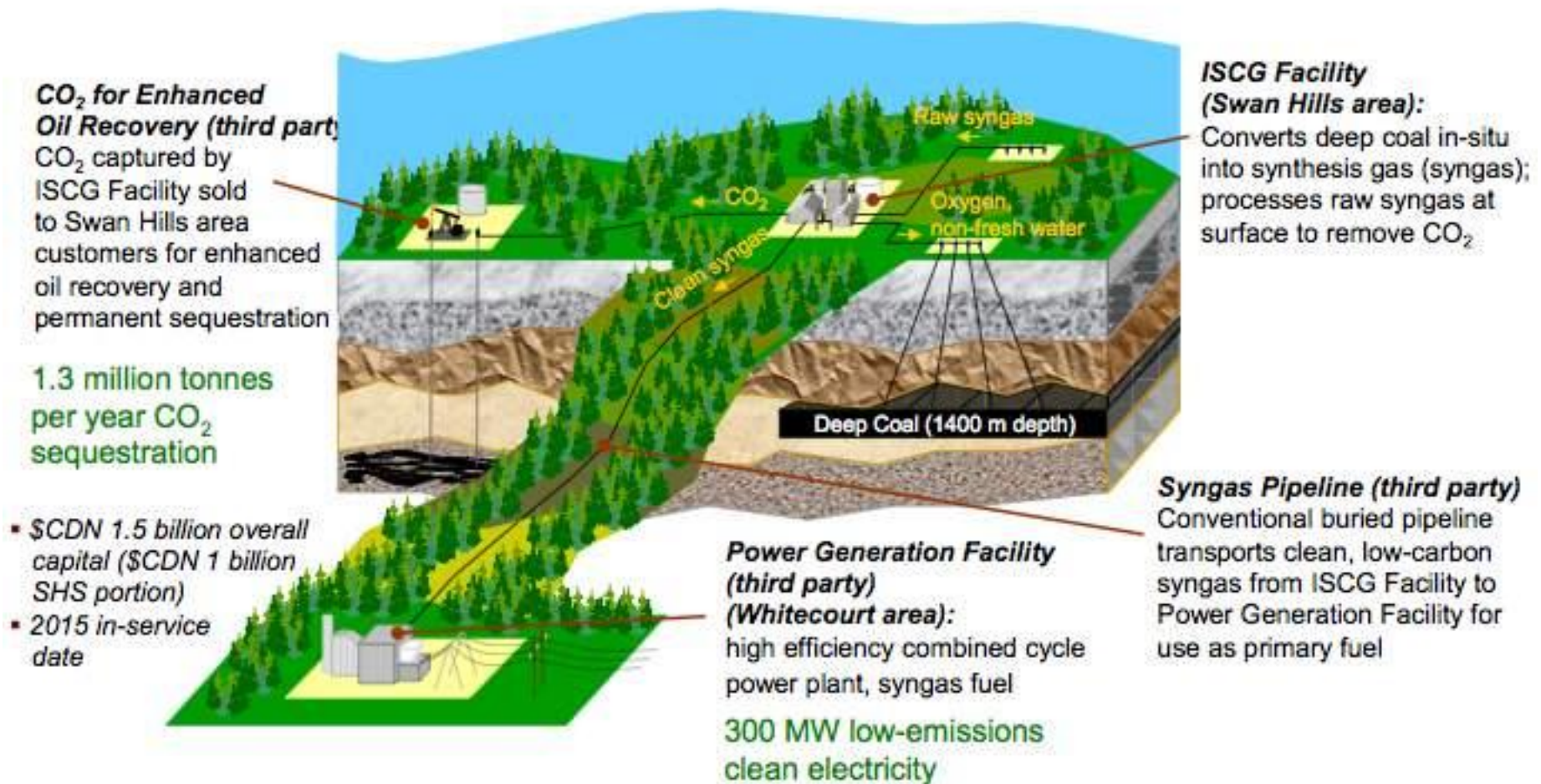
ACTL

Enhance's Current CO₂ Suppliers

- **Agrium**
 - The only EOR suitable CO₂ source available today
- **North West Upgrading's gasifier**
 - Next available pure source
- **Combined volume 5,000 Tonnes per day**
 - Sufficient to start construction



Swan Hills Clean Gas For Clean Power – Project Overview





ptrc

Petroleum Technology
Research Centre

Thank You
