

April 16th – 19th, 2013

The Alberta Carbon Trunk Line


*Carbon
Sequestration
Leadership
Forum (CSLF);*

Application
Presentation



ACTL

Government
of Alberta

 Natural Resources Canada Ressources naturelles Canada

Canada

The Alberta Carbon Trunk Line (ACTL)



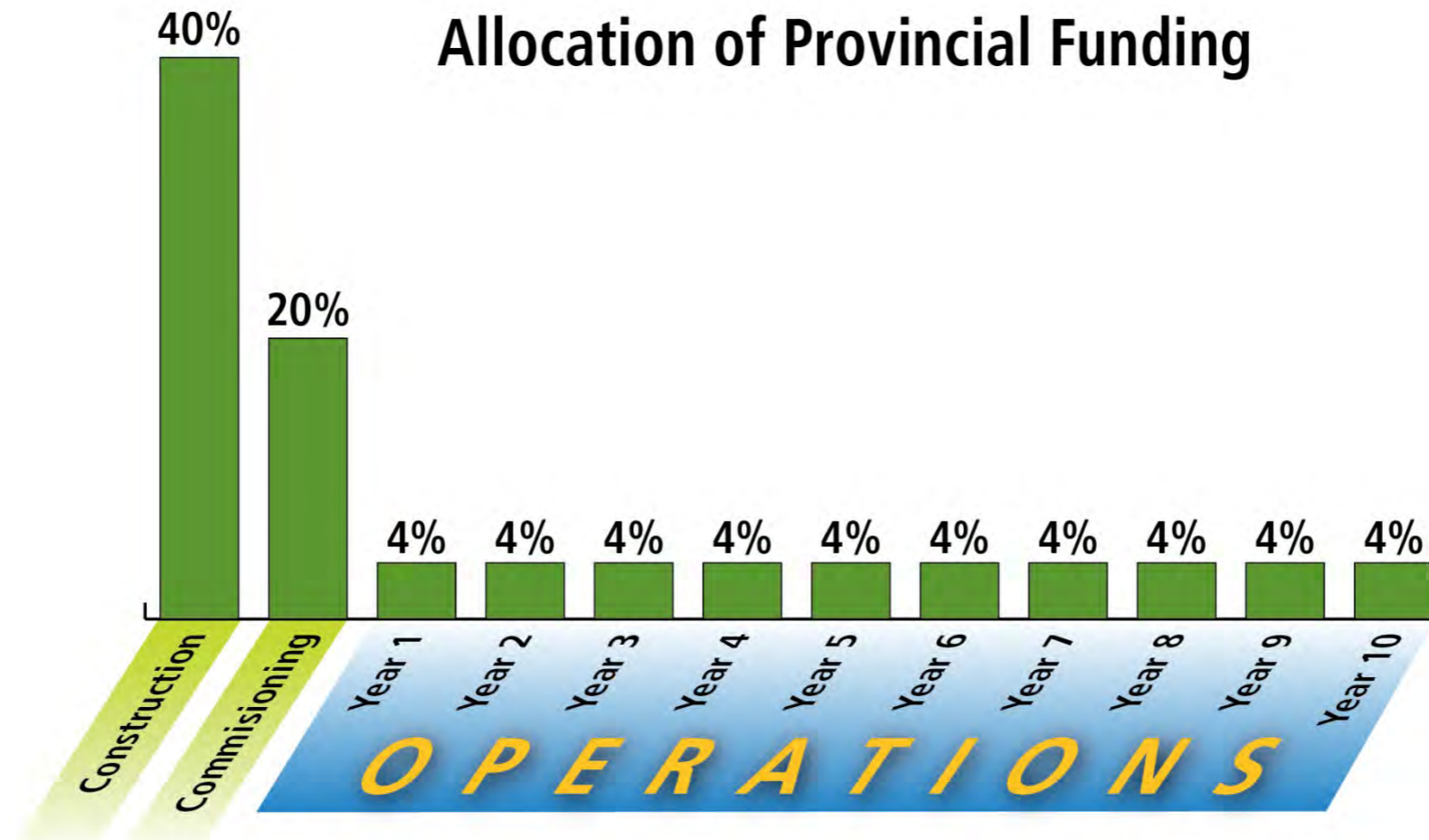
- One of two Carbon Capture and Storage (CCS) projects supported by the Alberta and Canadian governments
 - Designed pipeline capacity 14.6 Mt/year of CO₂; licensed for 5.5 Mt CO₂/year
 - Able to unlock 1 Billion barrels of light oil (initially 30 Mt in Clive oil field)
- Storage of 2 Gt CO₂



The Alberta Carbon Trunk Line (ACTL)

This is a completely integrated CO₂ Capture, Transport, Utilization and Storage (CCUS) project that takes CO₂ from industrial CO₂ sources and brings it to old oil fields for enhanced oil recovery and CO₂ storage (“cradle to grave”)

Furthermore, unlike the Sleipner, Gorgon, In Salah and Quest projects, ACTL involves the participation and commercial transactions between several companies rather than being constructed and operated under a “single roof”



Provincial Funding: CAD\$495 million

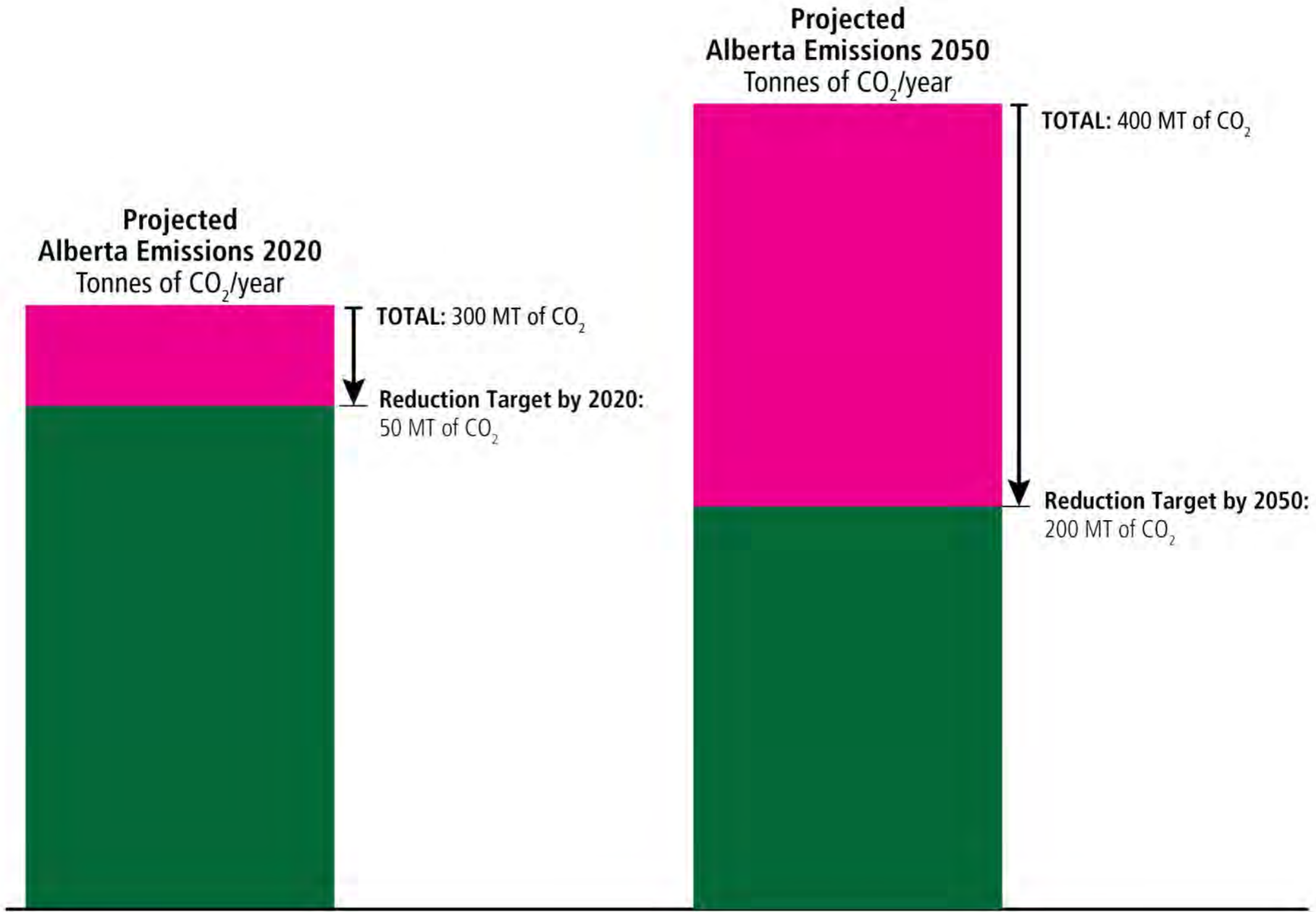
Government of Alberta

Federal Funding: CAD\$63.2 million

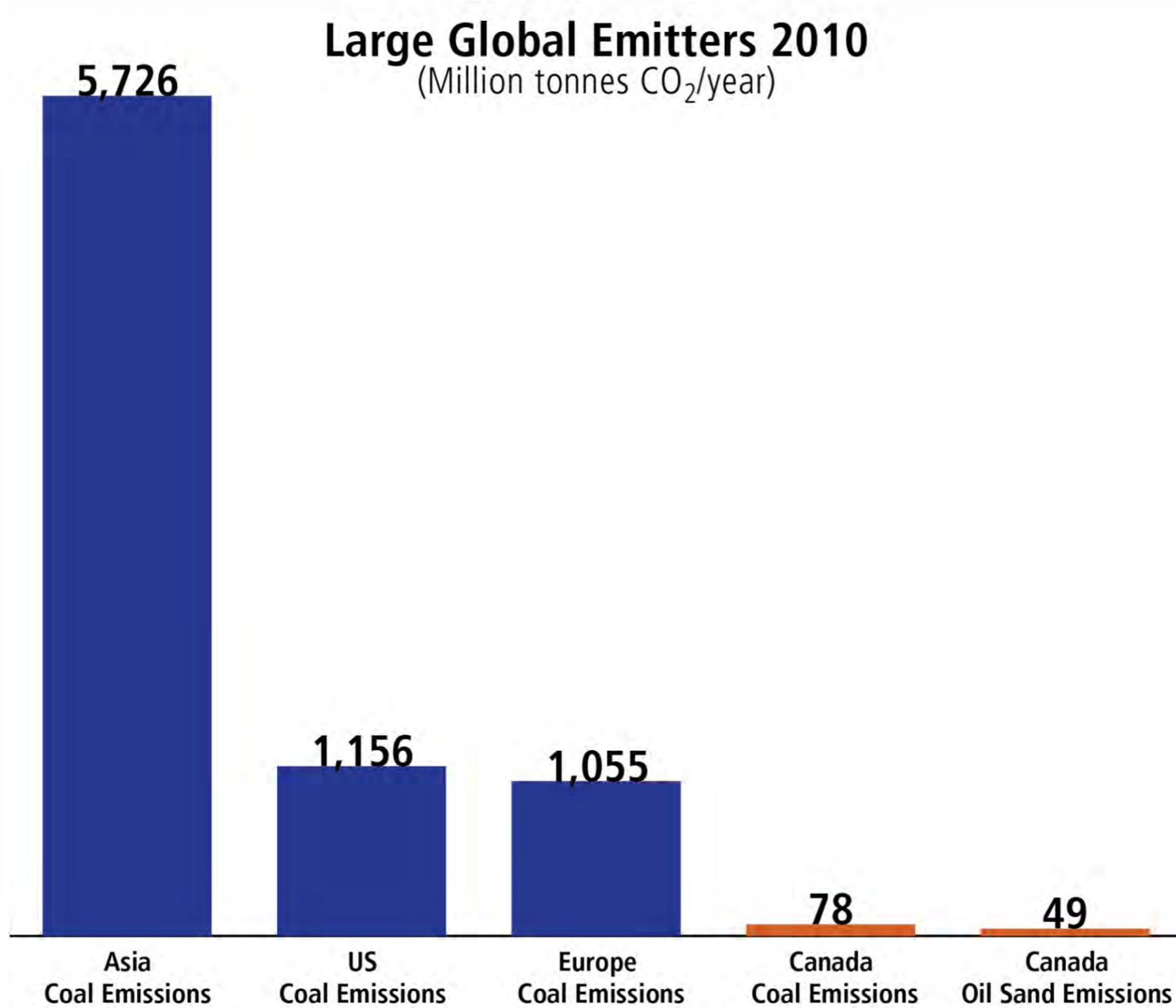
Natural Resources Canada / Ressources naturelles Canada
Canada



Alberta Emissions Reduction Targets



Let's Not Forget ...

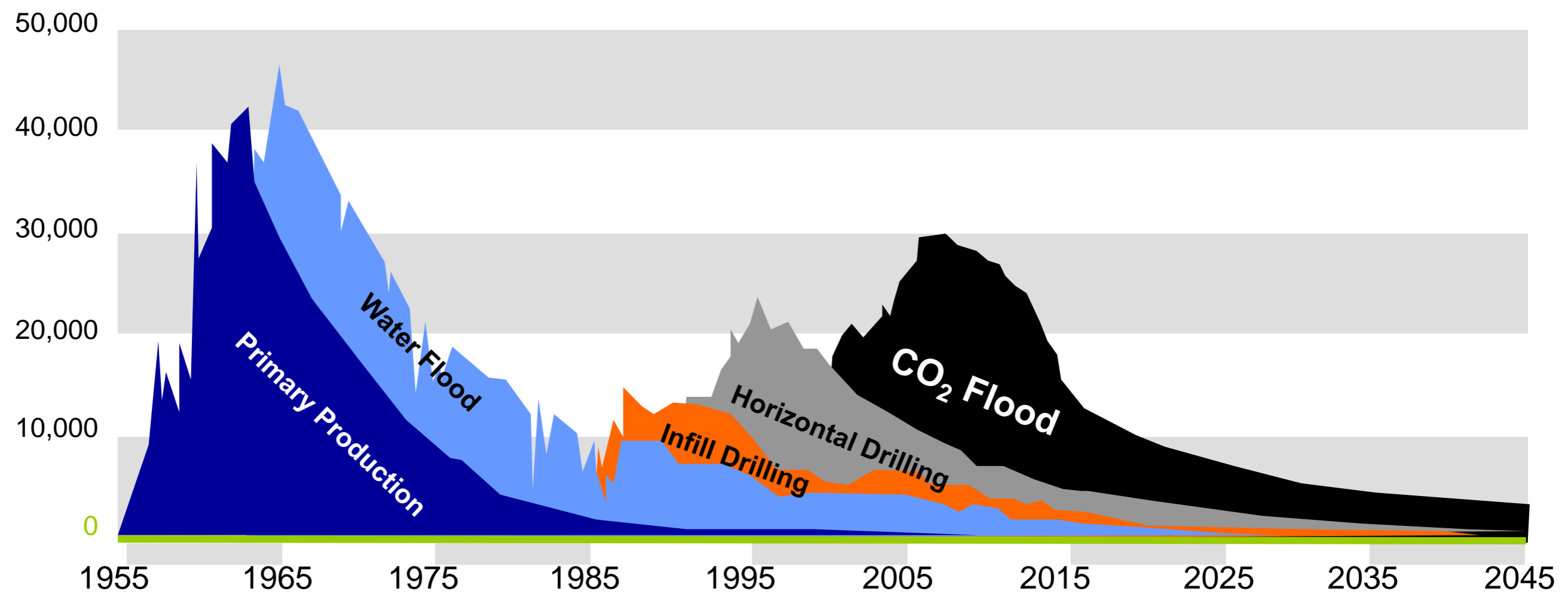




Weyburn: CO₂ Sequestration in Oil Reservoirs

Incremental recovery 155 million barrels
Sequestration 45 million tonnes CO₂

Weyburn Production
bb/d



CO₂ for the project comes from coal gasification in North Dakota



ACTL

Weyburn: A Template for CCS in Alberta



North Dakota to Weyburn: 300km total
Initial injection rate: 5,000T/d
Source : Gasification facility

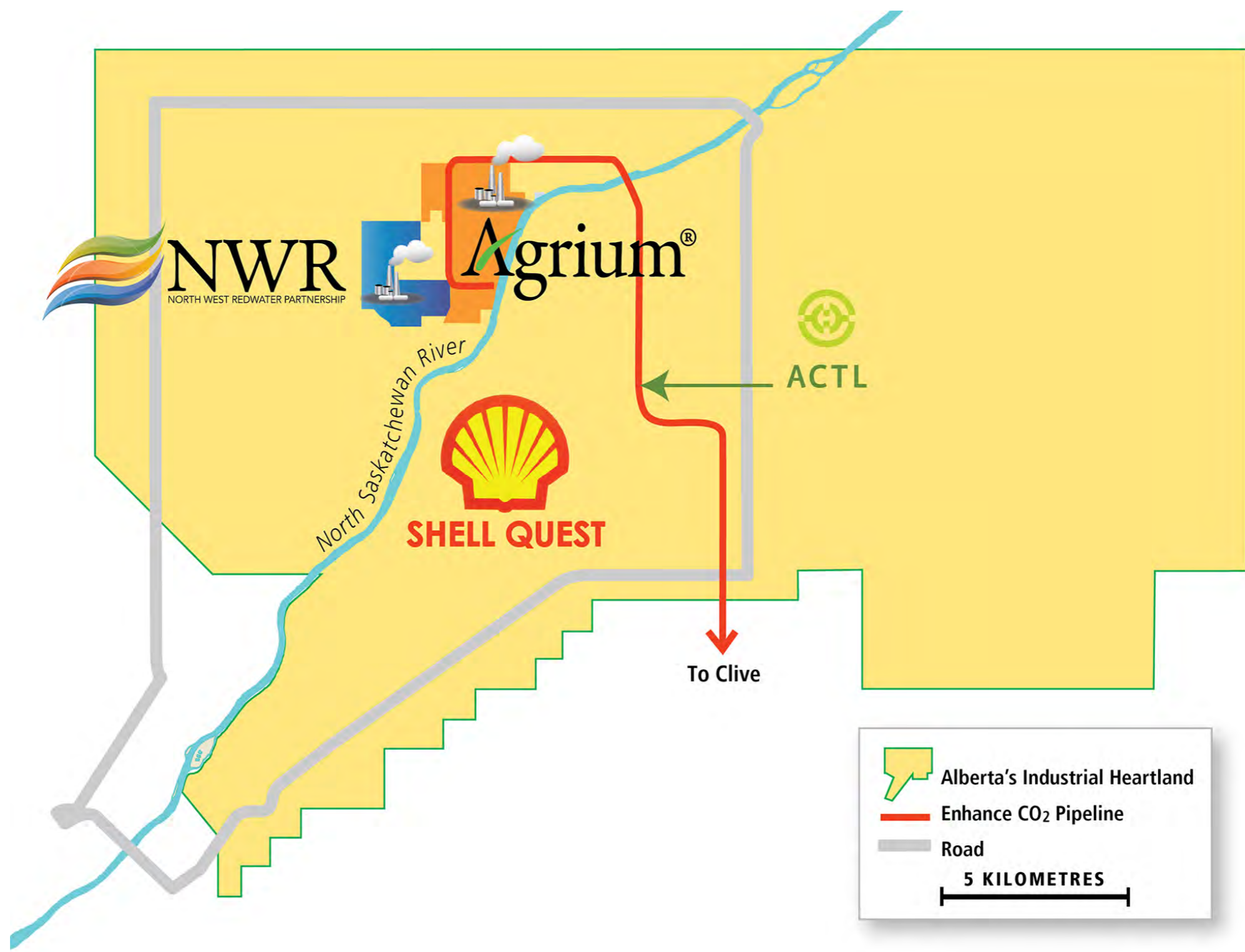
Weyburn is currently the largest CCS project in the world

Repeat in Alberta



Redwater to Clive: 240km
Initial injection: 5,000T/d
Source : Steam Methane Reforming and Bitumen Gasification

Location of Initial CO₂ Sources



Agrium is a major retail supplier of agricultural products and a leading global producer and marketer of agricultural nutrients and industrial products

- \$15 Billion Agricultural products company
- The largest global agricultural retailer, with approximately 1,250 facilities
- The Agrium Redwater Facility is the largest fertilizer complex in Canada and North America
 - Produces approximately 680,000 tonnes of ammonium phosphate (MAP) and close to 1.4 million tonnes of nitrogen based nutrients
 - Process CO₂ is currently vented to atmosphere

 Agrium

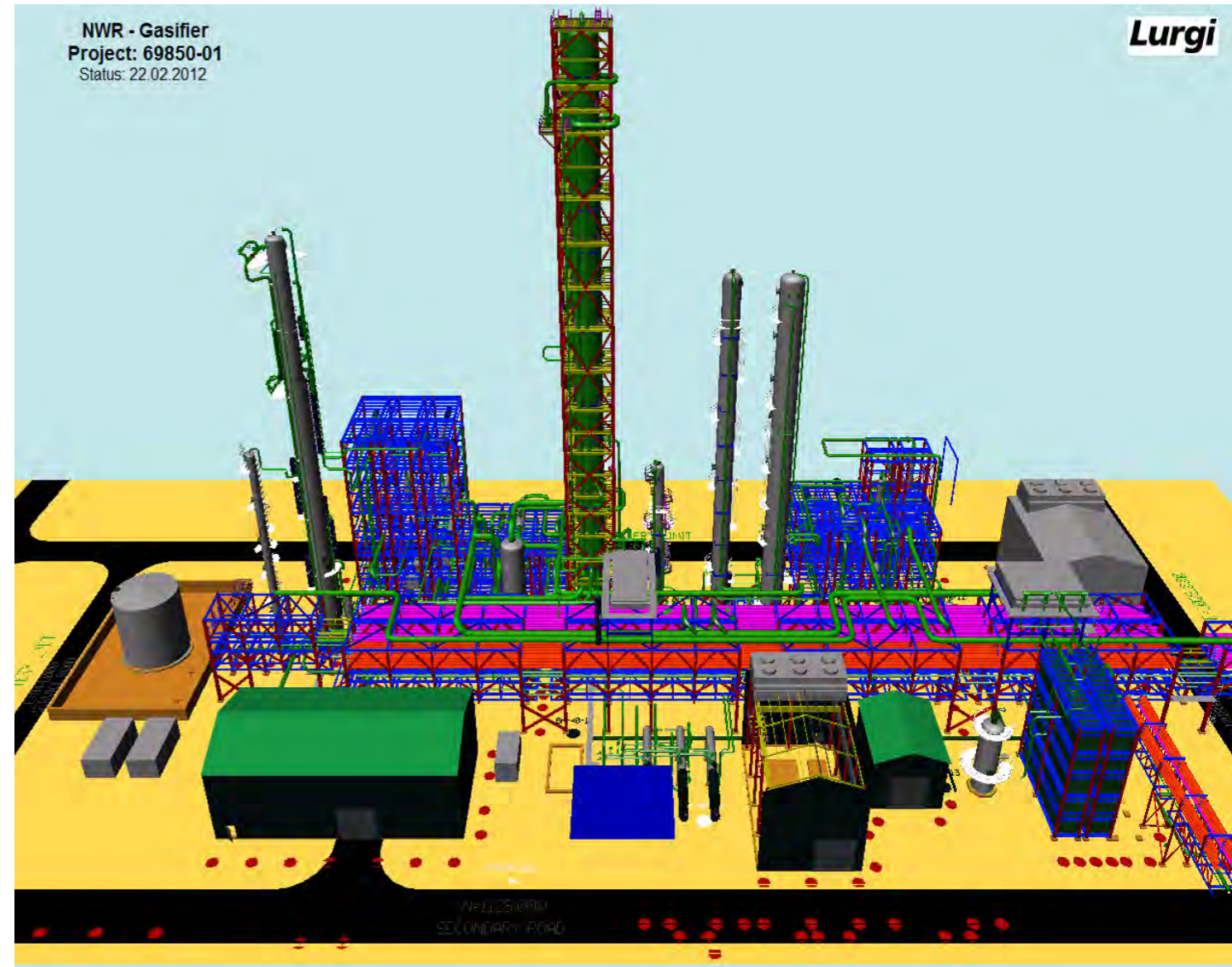
Agrium CO₂ Recovery Facility (CRF)

- 800 tonnes a day of **wet, low pressure, high purity CO₂**
- CRF located on perimeter of Agrium site
- Detailed engineering complete
- All of the major mechanical equipment has been procured
- Modular package design to minimize onsite construction
- On-site tie-in to Agrium plant completed



World's first upgrader and refinery with an integrated carbon management solution

- Processing 50,000 barrels per day of bitumen in 1st of 3 phases
- Producing refined products such as ultra low sulphur diesel with lowest carbon footprint in the world
- Using Lurgi gasifier technology to produce hydrogen and pure (99%+) dry CO₂ from bitumen bottoms (with no coke by-product)



NWRPSR CO₂ Supply

- Dry, low pressure, low temperature
- High purity, no contaminants
- Process more straight forward than Agrium design
- Only requires compression and cooling, no dehydration, refrigeration or pumping required
- CO₂ compression system designed for 4,200 T/day



Enhance maintains a comprehensive stakeholder engagement policy

- The pipeline is 240 km long and has a total 1,348 stakeholders along its route
- The project has 100% landowner approval
 - Eight open houses
 - Extensive stakeholder meetings
 - Information brochures
 - Newsletters
- Right of Way finalized, involving ~400 landowners





ACTL Pipeline

Pipeline is Far Advanced

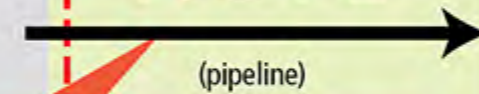
- Received regulatory approval and permit to construct
- Pipeline valves and actuators were manufactured and are in a secure storage facility (*photos on slides 16 – 17*)
- Finalized pipe specification
- Purchased 12” pipe for river crossing
- Survey and construction plans finalized South of Highway 15 (220 km out of 240 km)
- Acquired 100% of the right of way (ROW) South of Highway 15 without requiring any surface rights or regulatory hearing
- The ROW through the Alberta Industrial Heartland area has been finalized and we will be acquiring the remainder of that portion of the right of way in 2013
- Clearing of ROW began February 19th, 2013 (*photos on slide 18*)

Enhance ACTL Project

**AGRIUM and NWR
CO₂ RECOVERY FACILITIES**



ACTL



MAIN LINE BLOCK VALVES



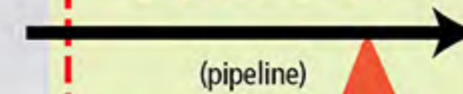
ACTL Pipeline – Valves (Continued)

Enhance ACTL Project

**AGRIUM and NWR
CO₂ RECOVERY FACILITIES**



ACTL



TIE-IN VALVES



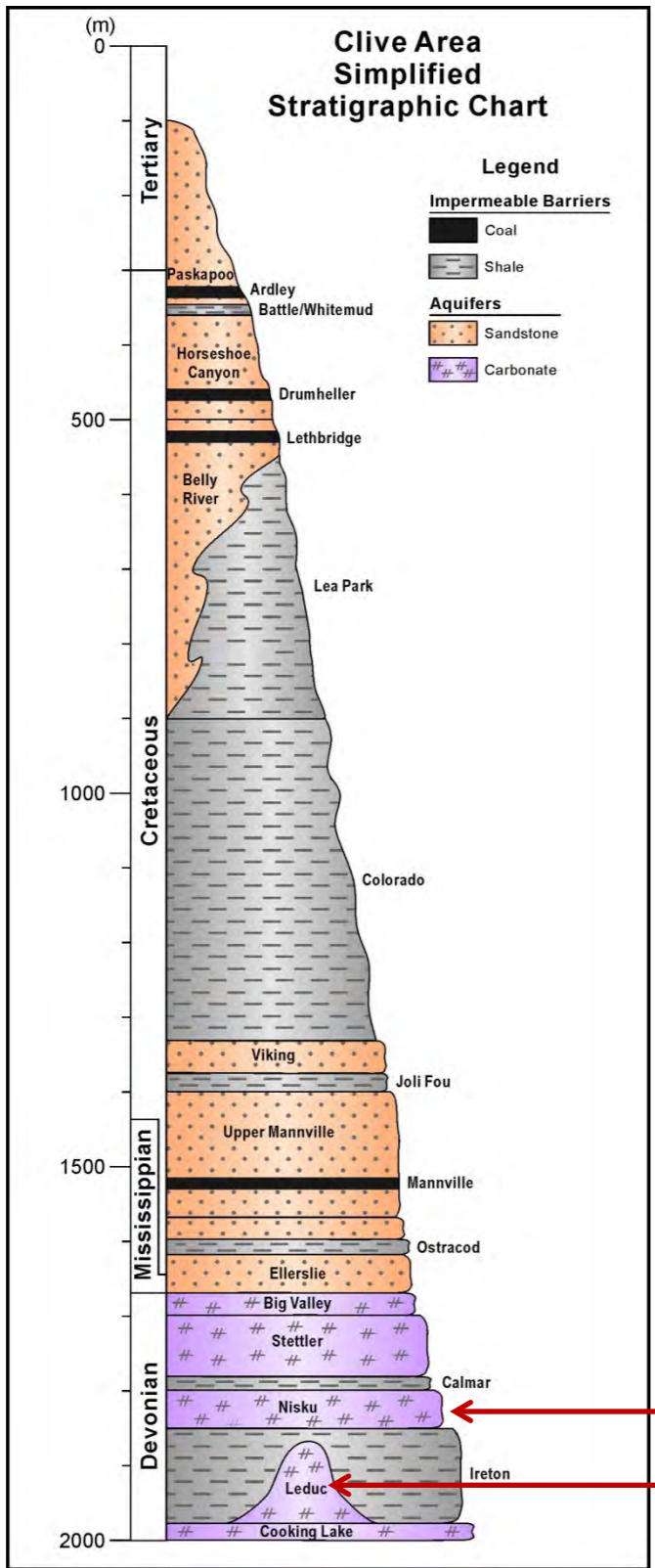
VENT VALVES



Right of Way Clearing Began February 19th, 2013



First EOR Site – Clive Oil Reservoirs



Clive Reservoirs (Leduc and Nisku)
 Depth: approximately 1,800 meters
 Current Pressure: 1,813 psig

Project Timeline Calendar Quarters





ACTL – Enabler towards Large Scale CCS

Potential Industrial CO₂ Sources

Potential CCS Sites


ACTL Phase One


Potential ACTL Growth





ACTL

The Alberta Carbon Trunk Line

Enhance Energy Inc.
www.enhanceenergy.com