

### **Beyond Boundary Dam – What's Next?**

**USEA Consensus Webinar, October 19, 2021** 

Presented by: Beth (Hardy) Valiaho, VP Strategy and Stakeholder Relations

## ABOUT THE INTERNATIONAL CCS KNOWLEDGE CENTRE

#### Mission:

To accelerate the understanding and use of carbon capture and storage as a means of managing GHG emissions

- Staff are available to provide experiencebased considerations for CCS projects.
- Guidance for planning, design, construction and operation.
- Active engagement with financiers, decision makers, and business case partners.



### **CCS Operational Lessons for the World**

#### **Boundary Dam 3 CCS Facility**



LEARNING STARTS HERE

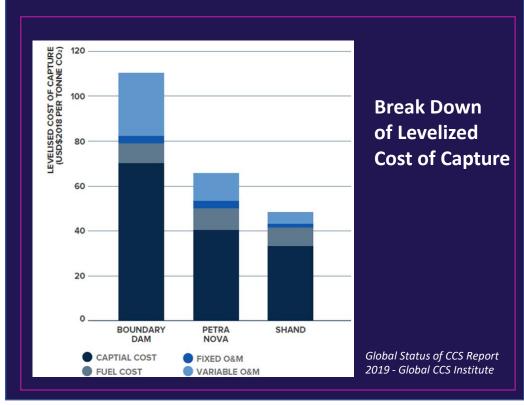
WORLD'S 1<sup>ST</sup> LARGE-SCALE POST-COMBUSTION CCS FACILITY

IN OPERATION SINCE 2014 with over 4 million tonnes captured & stored

#### **Shand Feasibility Study**

Key findings of the feasibility study evaluates the economics of CCS on a 300MW coal-fired power plant in Saskatchewan.

- Projected capture capacity of 2Mt/yr
- Capital cost to be 67% less per tonne of CO<sub>2</sub> captured



#### **CURRENT STATE OF CCS SECTOR IN CANADA**

**Investment Timeline for Large-scale CCS Projects in Canada** 

\$120M Government of Canada Investments

\$240M

Alberta Alberta's CCS Fund - Government of rovides funding to

ACTL (\$371.25M to Enhance Energy and up to grant funding for \$123.75M to North Boundary Dam CCS West Redwater plant facility Partnership)

\$495M+

-Government of

Alberta efinery proceed:

> \$32.2M -Government of Canada (\$14M) -Government of Saskatchewan (\$5M) -Industry (\$13.2M)

WEYBURN-MIDALE CO<sub>2</sub>-EOR CCUS OPERATIONS

**BOUNDARY DAM CCS FACILITY** 

SHELL QUEST CCS FACILITY

ALBERTA CARBON TRUNK LINE (ACTL)

Energy and Shell

Up to \$305M Canadian Pension Plan Investment

CO₂ pipeline built by ACTL partner Wolf Midstream

1999

2000 2001-2007 2008

Canada

2009

2010

2011

Canada

4CTI

\$1.24M

- SaskPower

Government of

Saskatchewan)

Refurbishment and

retrofit of power

plant (\$232M)

Construction of

(\$886M)

Boundary Dam CCS

(owned by

anada provides

grant funding to

2012 2013 2014

2015 2016-2017 2018 2019 To Date

Major Milestones

surveys underway

**Boundary Dam CCS** acility captures

CO<sub>2</sub> is sent to Weyburn-Midale ilfields and used

CO<sub>2</sub> is sent to Aquistore for sequestration

> Boundary Dam CCS facility surpasses 3.6Mt CO₂ captured

CO<sub>2</sub> is captured at Nutrien's Redwater Fertilizer facility CO2 is captured at Sturgeon Refinery CO<sub>2</sub> is injected at Enhance Energy's Clive oilfield

- \* Additional funds and research came from: Cenovus Energy, PTRC, US Department of Energy, Government of Saskatchewan Ministry of Industry and Resources, EnCana, BP, ChevronTexaco, Dakota Gasification Company, ENAA (Japan), Nexen SaskPower, TransAlta, Total (France)
- † Funding was accessible based on milestone achievements complete, 40% during construction, 20% with the achievement of commercial operations which was achieved in Spring 2020 and the remaining 40% as CO<sub>2</sub> is injected. https://www.alberta.ca/assets/documents/carbon-capture-storage-projects-funding-agreement-actl.pdf

# LEHIGH HANSON EDMONTON POST-COMBUSTION CO, CAPTURE FEASIBILITY STUDY



As the world moves towards decarbonizing more industrial sectors, CCS will play a vital role in reducing the carbon footprints of various industries that do not have renewable alternatives.

To produce cement, two streams of emissions occur – energy emissions, and industrial process emissions

- Energy emissions can be reduced by efficiency.
- Industrial process emissions must be captured to significantly lower emissions. They represent 4% of global emissions.

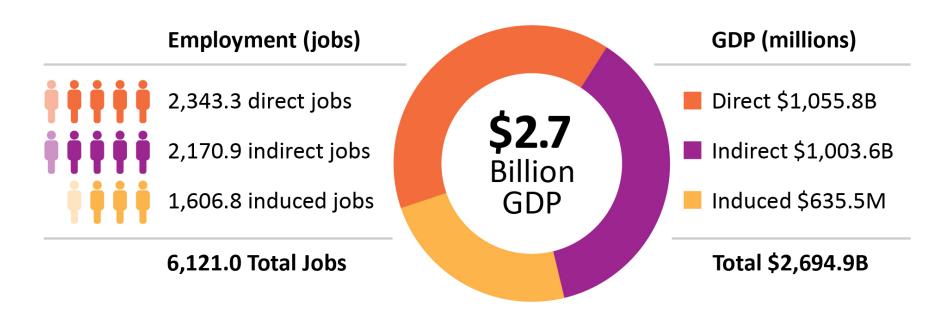
Lehigh Cement and the Knowledge Centre announced a joint feasibility study of a commercial-scale CCS project (study results this fall!). ANTICIPATING OPERATION MID-2020s



Lehigh Hanson Edmonton Post-Combustion CO<sub>2</sub> Capture Pre-Feasibility Study <a href="https://ccsknowledge.com">https://ccsknowledge.com</a>

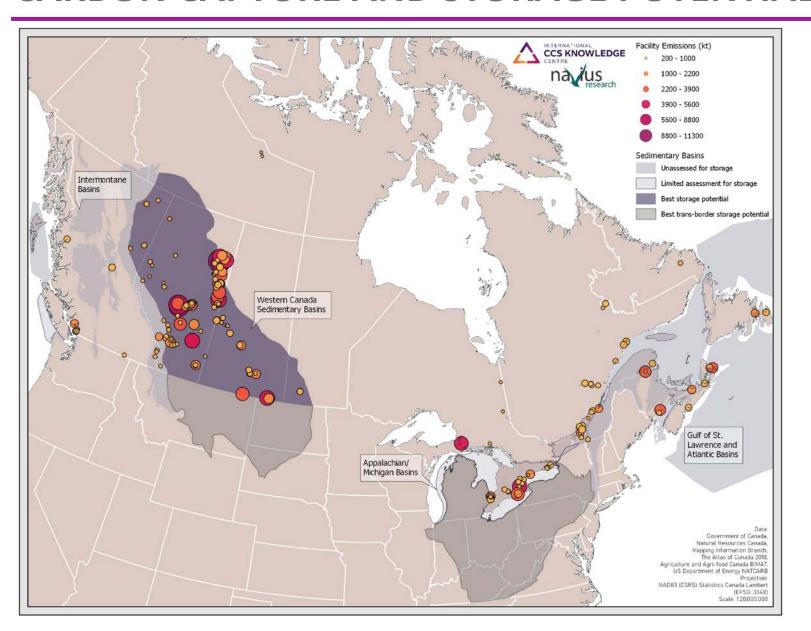
#### **ECONOMIC IMPACT**

# Impacts to GDP & Employment of Increased Large-Scale CCS Investment in Canada (for 3 projects over 4 years)



This graph shows the economic impacts, specific to GDP and employment based on the construction and development of three large-scale CCS projects over three years. This would translate to an annual GDP of \$673.3M for each of the four years.

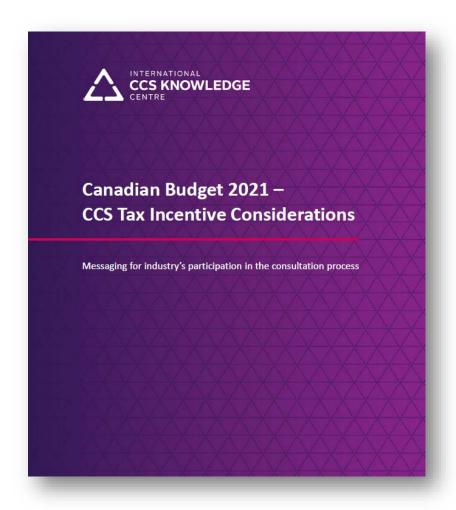
### **CARBON CAPTURE AND STORAGE POTENTIAL**



Map indicates large heavy industry emitters across Canada, as well as storage 'sink' potential.

Source: The International CCS Knowledge Centre

# CCS INCENTIVE TAX CREDIT UNDER DEVELOPMENT IN CANDA





WHO GETS THE CREDIT?



**EMISSIONS REDUCTIONS & TIMELINES** 



INVESTMENT TAX CREDIT (ITC) DESIGN



VALUE OF THE TAX CREDIT

- FRONT-END ENGINEERING DESIGN (FEED)
- STORAGE PERMENANCE
- ENHANCED OIL RECOVERY (EOR)

#### **CERTAINTY AND RISK**



45Q tax credit & competitiveness



Uncertain carbon price vs certainty of ITC / capital financing



Changing business models – EOR as revenue vs. credit stacking



Alberta Pore Space Tenure Management ("Public Good" Sequestration Hubs)



EOR uncertainty vs EOR real reductions



Technology Readiness Levels and near-term projects

#### **FUTURE OF THE KNOWLEDGE CENTRE**

Based on our lessons learned and hands-on expertise, the Knowledge Centre can aid in the acceleration of CCS globally to mitigate GHG emissions.

Projects can relate to strategic advice, CCS engineering and studies, as well as the associated policy, financing, and business cases required to implement CCS.

These offer partners and clients risk management/mitigation strategies required to satisfy decision makers and financiers.

The Knowledge Centre has a competitive advantage because of its experience and is well positioned to add real value, bringing the most value when it is fully engaged as a cohesive unit for strategy, stakeholder engagement and project development advisory services.

Share knowledge & keep satisfied aid in development monitor keep (minimum informed & effort) educate

Readiness

Willingness





For more information please visit our website at:

ccsknowledge.com

### Thank You



Contact us by email: info@ccsknowledge.com



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