

As of September 30, 2016, the Carbon Capture and Sequestration Technologies program at MIT has closed. The website is being kept online as a reference but will not be updated.

http://sequestration.mit.edu/tools/projects/boundary_dam.html

Boundary Dam Fact Sheet: Carbon Dioxide Capture and Storage Project

Company/Alliance: SaskPower

Location: Unit #3, Boundary Dam Power Station, Estevan, Saskatchewan, Canada

Feedstock: Coal

Size: Original 139 MW gross upgraded to 160 MW gross; Net after CO₂ capture retrofit (1Mt/yr) is 110 MW net

Capture Technology: Post-combustion amine

CO₂ Fate: EOR in Weyburn field (90% of CO₂). Transportation is via 66 km pipeline built by Cenovus. Any CO₂ not used for EOR is to be used at the [Aquistore](#) project 2 km away

Start Date: Started in October 2014. Fully operational end 2016

Motivation/Economics:

The total cost of the project is currently \$1.5 billion. The original cost was \$1.3 billion. Of that original cost estimate: \$800 million was for the CCS process, with the remaining \$500 million for retrofit costs. SaskPower feels they can cut capital costs 20-30% on the next unit.

The Boundary Dam project received \$240 million from the federal government. The provincial government also supported the project. Besides electricity, revenue will be generated from the sale of CO₂, sulphuric acid, and fly ash.

Due to decreased capture rate and failure to deliver promised CO₂ to Cenovus Energy, Saskpower had to pay C\$12million in 2014 in penalties. More penalties are expected for 2015. Saskpower is confident that revenue from captured CO₂ will be greater than the penalties.

Comments:

- *April 2016:* SaskPower announced that Boundary Dam was operational every hour of the month of March, exceeding their reliability target of 85 per cent. March marked the second time in three months that the plant has been operating throughout the month. 83,497 tonnes of carbon dioxide were captured in March. A total of 757,000 tonnes of CO₂ have been captured at Boundary Dam since the operational start-up in the fall of 2014.

- *January 2016:* Boundary Dam's CCS project successfully operated two successive months with 99% online in January. This brings total capture to 625,000 tons of CO₂ since capture started in 2014.

- *October 2015:* SaskPower announced that it has encountered a number of problems with the capture portion of its Boundary Dam Project. While the exact problems have not been published, it did announce on September 14, 2015, that a new 90'000 kg cylinder would "improve the reliability of the storage for the amine solution being used to capture the CO₂." The issue has resulted in the capture portion to only work 40% of the past year. This has resulted in only 0.4Mt/yr capture of CO₂ since the project started. However when it was working the capture rate was at the anticipate 90%. The decreased volume of captured CO₂ has created additional problems with the Cenovus Energy who signed a 10-year agreement to purchase the CO₂ for their EOR project. SaskPower now has to pay penalties for the CO₂ shortfall.

Saskpower said that the project is on track to be fully operational by the end of 2016.

- *October 2014:* Boundary Dam starts.

- *January 2013:* Alberici will remove the old Unit 3 boiler and install a new Hitachi 160 MW turbine.

- *December 2012:* SaskPower announced that Cenovus Energy of Calgary will purchase the full volume of 1Mt/yr of CO₂ captured at Boundary Dam for EOR projects operated by Cenovus operated near Weyburn.

- *July 2011:* SaskPower signed a \$30 million contract with Stantec for engineering consultancy during the design and construction of the system.

- *January 2011:* Babcock and Wilcox were contracted to rebuild the boiler in Unit 3.

- *December 2010:* SaskPower announced that it was proceeding with the \$354 million rebuild of 150 MW Unit 3 at Boundary Dam, the province's largest coal-fired generating station.

- *March 2010:* SNC Lavalin and Cansolv Technologies Limited were selected to oversee the engineering, procurement and construction activities for the Boundary Dam project. Cansolv, a wholly-owned subsidiary of Shell Global Solutions, will supply the carbon capture process design for the project. Cansolv has developed an innovative system of capturing sulphur dioxide at coal-fired power plants, which has been adopted by three facilities in China. Cenovus will also set up injection wells and build a 40 mile-long pipeline connecting the Weyburn EOR project with Boundary Dam.

The retrofit is located at Boundary Dam's Unit 3. The project will capture 90% or 1Mt/yr. This project has been re-sized from an earlier plant to build a 300 MW clean coal facility near Estevan which had been shelved by the previous provincial government because of its escalating cost (\$1.5 billion to \$3.8 billion). This smaller scale project has occurred after the federal government gave the province \$240 million.

There are no other energy sources nearby so power generation from coal is the only option. There are a few nearby lignite mines, which reduces the cost of transportation to the plant.

A \$5.2 million, pre-commercial-scale chemical absorption technology demonstration pilot plant has already been operating at Boundary Dam as part of the International Test Centre for CO₂ Capture. Part-funding of \$1.2 million came from the Canada/Saskatchewan Western Economic Partnership Agreement.

[Cenovus Energy](#) built the 66-km pipeline to transport the CO₂ to nearby oil fields in the southern part of the province, where it will be used for enhanced oil recovery. The unused CO₂ will be stored by the independent [Aquistore](#) research project, 3.4 km deep Deadwood Formation, a brine and sandstone water formation which is below the Williston Basin, a sedimentary basin comprised of porous and non-porous rocks. Aquistore is a research project managed by the Petroleum Technology Research Centre (PTRC).

Project Link: [Boundary Dam Integrated Carbon Capture and Storage Demonstration Project](#)

Technical Papers:

GHGT-12 Plenary Talk on Boundary Dam, Mike Monea, President, CCS Initiatives, SaskPower, (Nov 2014) <[Link to PDF](#)>
Stéphanne, K, *Start-up of World's First Commercial Post-combustion Coal Fired CCS Project: Contribution of Shell Cansolv to SaskPower Boundary Dam ICCS Project*, Energy Procedia, Vol 63, pp 6106-6110, (2014) <[Link to PDF](#)>

Other Sources and Press Releases:

Canadian carbon capture and storage projects will soon sequester up to 6.4 million tonnes of CO₂ per year (September 2016)

Boundary Dam project reaches a milestone (August 2016)
SaskPower renegotiated contract to avoid \$91.8M penalty (June 2016)
Carbon capture project repaired at least six times a day on average since May 2013 (June 2016)
Environment ministers reflect on Boundary Dam CCS tour (June 2016)
Aquistore research information being relayed to Mexico (May 2016)
SaskPower CEO says CCS project back on track, renewables main focus to 2030 (April 2016)
Strong Results in March for Boundary Dam (April 2016)
BD3 operated as advertised in January (February 2016)
SaskPower Pushes Reset on Boundary Dam Carbon Capture and Storage Plant (December 2015)
SaskPower Admits to Problems at First "Full-Scale" Carbon Capture Project at Boundary Dam Plant (October 2015)
Boundary Dam one year later (October 2015)
BHP Billiton partners with SaskPower (September 2015)
Harper Government Marks Opening of New SaskPower Carbon Capture Test Facility (June 2015)
SaskPower's Mike Monea on carbon capture and storage (May 2015)
CO₂ Solutions Accelerates Pursuit of Commercial Opportunities by Bringing Forward Demonstration Project (May 2015)
Premier Brad Wall touts Sask. carbon sequestration project (April 2015)
The race to catch carbon: New life for coal energy (March 2015)
Boundary Dam project is reaping benefits (Feb 2015)
BD3 performing beyond expectations, says SaskPower (Feb 2015)
A Look Inside the First Commercial Coal Plant with Carbon Capture and Storage (Jan 2015)
First commercial-scale CCS plant comes online (Sept 2014)
Big piece of Estevan clean coal project moves into place at Boundary (January 2013)
SaskPower clean coal project about to enter next construction phase with tie-in to Boundary Dam Unit 3 (Jan 2013)
Alberici to install turbine for SaskPower carbon capture pilot project (Jan 2013)
Saskatchewan committed to proceeding with carbon-capture project (April 2012)
Carbon capture project moving right along (March 2012)
CO₂ stripper rolls into Boundary Dam (Dec 2011)
SNC-Lavalin will design Boundary Dam capture project (May 2011)
Hitachi announce collaboration to provide steam turbine CCS project (Feb 2010)
Fluor awarded the front-end engineering design (July 2009)
Clean coal power plant to be build at Boundary Dam (Feb 2008)
SaskPower seeks energy industry partnership (May 2008)