

The background of the entire page is a photograph of an industrial facility, likely a power plant or refinery, with a strong blue color cast. The image shows various levels of walkways with metal railings, large pipes, and complex machinery. The lighting is dramatic, with highlights on the metal surfaces and deep shadows in the recessed areas.

PUBLIC ENGAGEMENT **AND PUBLIC OPINION**

ABOUT THE
CLEAN-COAL
BD3 ICCS
PROJECT



Social research needs to be an important priority going forward as we consider more complicated decisions regarding energy.

FROM START TO FINISH of the retrofit project, SaskPower was very proactive in its efforts to publicize the upgrade at BD3 to convert it to clean coal power generation. More than 100 presentations about BD3 were made locally at Chambers of Commerce and Rotary clubs, as well as at various venues and to a wide variety of audiences around the Province. The aim was to educate and build understanding amongst the public utility's "shareholders". Since the construction at BD3 was completed in the Fall 2014, SaskPower has continued to be proactive about engaging its stakeholders with many public announcements about the awards BD3 has earned, by hosting a 2014 CCS Symposium and the 2015 IEAGHG PCCC3 Conference, and by ensuring ongoing media and public awareness of new initiatives to support the future of clean power generation.

The local consensus surrounding the BD3 ICCS project, including storage of CO₂ at Weyburn and the site hosting the Aquistore Project, has been positive. Retrofitting BD3 was certainly seen as preferable to the closures of BD1 and BD2 in 2013 and 2014, with associated negative impacts on jobs and the longevity of the Estevan Coal Mine (operated by Westmoreland Coal Company). In fact, the CO₂ by-product sales were seen positively because they would boost the local oil industry in the Estevan and Weyburn region. Since Pan Canadian's first injection at Weyburn in 2000, the local public had become very comfortable with the notion of CO₂ injection underground.

The construction period also had positive spin-offs for local businesses and for homeowners who were willing to temporarily run bed and breakfast accommodations for construction workers brought



to the site. Province-wide, the benefits of increased royalty revenue from oil production were regarded in a positive light.

More distant stakeholders were more likely to have negative and outspoken opinions regarding the environmental impact of use of coal for power generation and the project delays and cost overruns experienced by SaskPower that played heavily in the press. Unfair comparisons have been drawn to natural gas and “green” power options such as wind power, without regard to availability, grid impacts, operability and life cycle costs of these options. The continued decay in the price of natural gas since the BD3 retrofit investment decision was made in 2009–2010 has served to erode the economics of the project. It is not uncommon for public entities to face this challenge, which is akin to having a “crystal ball” to predict future energy pricing!

The recurring negativity about the project from some quarters, particularly Saskatchewan and Canada-based ENGOs, has made it clear to SaskPower that social research needs to be an important priority going forward as we, as a society, consider more complicated decisions regarding energy production and power generation choices. Some initial questions about social barriers to CCS that we might contemplate include the following:

What is the perception of cost?

- | Capital cost
- | Social cost
- | Lifecycle cost
- | Operating cost

What is the perception of health risk?

What is the perception of environmental risk?

What is the preference for alternative energy solutions?

Additionally, continually updated and robust socio-economic assessments relevant to specific projects and a portfolio of project investments would help support public engagement on the important issue of future energy options.

Every coal-related power project in the future will face the same kinds of issues experienced by SaskPower’s BD3 ICCS clean coal retrofit, so, too, will any other “mega” energy project. It is critical that we, as a society, collectively understand how people think and then develop opinions on important public issues.

From this understanding we will learn how to most effectively engage the public so they internalize, assess, acknowledge and approve how and why public investment and regulatory approval decisions are made regarding energy projects.

ABBREVIATIONS

This is not a comprehensive list.

BD3 – Boundary Power Plant Station Unit 3

CCS – Carbon Capture, Transportation and Storage

CCPC – Canadian Clean Power Coalition

CCTF – SaskPower’s Carbon Capture Test Facility (at Shand Power Station)

CEPA – The Canadian Environmental Protection Act

CIC – Crown Investments Corporation of the Government of Saskatchewan (owner of all Crown corporations such as SaskPower)

CO_{2e} – The climate forcing factor associated with a greenhouse gas expressed as “carbon dioxide equivalents”. For example, the climate forcing factor of methane (CH₄) is 21 times the factor for CO₂. Hence, one methane molecule is equivalent to 21 carbon dioxide molecules in terms of greenhouse impact on the climate.

C\$ – Canadian Dollars

EC – European Commission

ECRF – SaskPower’s Emissions Control Research Facility (at Poplar River Power Station)

EOR – Enhanced Oil Recovery

EU – European Union

GHG – Greenhouse Gas

GWh – Giga-Watt-Hour, the energy unit of total power generation

ICCS – Integrated Carbon Capture and Storage, which is the name of the combined BD3 power plant retrofit project and the geological storage of its captured CO₂.

IEAGHG – IEA Greenhouse Gas R&D Programme

MW – Mega-Watt, the energy unit used for power-generating capacity

PCC – Post-Combustion Capture

PM_{2.5} – Fine Particulate Matter found in the air that is less than or equal to 2.5 mm (micrometres) in diameter and normally only observed by electron microscope. This material is often associated with energy combustion and the fine particulate matter is believed to cause serious health issues upon entering lungs of air-breathing animals.

PM₁₀ – Coarse Particulate Matter found in the air that is less than or equal to 10 (mm) micrometres in diameter. It can be seen with the human eye in the air as soot, dust, dirt and liquid droplets. This material is often associated with energy combustion.

PTRC – Petroleum Technology Research Centre, a non-profit R&D corporation located in Regina, Saskatchewan

R&D – Research and Development

QA/QC – Quality Assurance and Quality Control

SE – Southeast

SaskPower – Saskatchewan Power Corporation

REFERENCES

¹ 2014 SaskPower Annual Report

² SaskPower's fiscal year runs from January 1 to December 31.

³ From 2010–2014, SaskPower invested C\$4.7 billion in capital assets (upgrades, new construction)

⁴ Canada Gazette, Vol. 146, No. 19 – September 12, 2012 (Government of Canada)

⁵ Provided by SaskPower

⁶ <http://www.ir.gov.sk.ca/coal>

⁷ The Encyclopedia of Saskatchewan. The Oil and Gas Industry. http://esask.uregina.ca/entry/oil_and_gas_industry.html

⁸ Melzer, Stephen, 2012. Report for the National Enhanced Oil Recovery Initiative, Center for Climate and Energy Solutions Carbon Dioxide Enhanced Oil Recovery (CO₂ EOR): Factors Involved in Adding Carbon Capture, Utilization and Storage (CCUS) to Enhanced Oil Recovery

⁹ From Leasing Mineral Rights: "Unitization of a producing field: The purpose of unitization is to produce oil or gas more efficiently and effectively by bringing together an area involving a large number of sections. Unitization is used where the industry feels that a large portion of the oil and gas can be produced with fewer wells. Upon unitization, an owner within the boundaries of the unitized field is entitled to participate in production, even though no well is located on his land. The provisions of a lease may therefore permit "pooling," in which case you receive a portion of the royalty, based on the number of acres you put in the pool. The lease may permit "unitization," which converts your royalty into a "tract factor," based on a complex formula. Even though unitization in the vast majority of cases provides a better total income for the mineral owner, an owner should not grant the right to unitize automatically; nor should he leave it up to the company's discretion. Because participation in a unit is not based on the number of acres you have in the unit but is determined by the company, based on geological factors, you should very carefully assess your position. For example, while you may hold five per cent of the area in a unit, you may be allocated only two per cent of the production."

¹⁰ <http://www.economy.gov.sk.ca/PR-IC11>

¹¹ Pan Canadian was a subsidiary company of Canadian Pacific Railway until it merged with Alberta Energy Company in 2002 to form EnCana Corporation, an independent oil and gas corporation. In December 2009, Cenovus Corporation split from EnCana to operate as an independent integrated oil company, including all of the oil assets from the original firm. EnCana continues to operate the natural gas assets of the original firm and is a leading independent Canadian natural gas producer.

¹² Numac Energy Inc. was incorporated in Alberta in 1971 and was an independent oil producing company until it was purchased by Anderson Exploration Inc. in early 2010. Anderson was subsequently purchased by Devon Energy (USA) to form Devon Canada Corporation in late 2010. Numac, in partnership with Nexen Inc., operated a CO₂-EOR pilot at its Elswick Midale oil leases in 2001 using trucked CO₂ from the Air Liquide plant in Medicine Hat, Alberta. It ultimately decided not to proceed with full-scale operation of CO₂-EOR due to various technical issues it encountered during the pilot as well as poor economics due, in part, to the lack of a pipelined source of CO₂. The Elswick oil field is one of many potential CO₂-EOR targets in SE Saskatchewan.

¹³ [http://www.economy.gov.sk.ca/adx/asp/adxGetMedia.aspx?DocID=10290,10289,3384,5460,2936,Documents&MediaID=26122&Filename=SPRI+CO₂+Pilot+Injection+Test.pdf](http://www.economy.gov.sk.ca/adx/asp/adxGetMedia.aspx?DocID=10290,10289,3384,5460,2936,Documents&MediaID=26122&Filename=SPRI+CO2+Pilot+Injection+Test.pdf)

¹⁴ http://www.ucsusa.org/global_warming/science_and_impacts/impacts/early-warning-signs-of-global-1.html#.Va6YMnnbKTM

¹⁵ http://unfccc.int/kyoto_protocol/items/2830.php ; The agreement came into force in 2005 upon ratification by 55 signatory parties belonging to the UNFCCC. Those signatories include Canada but notably exclude the USA as of mid-2015.

¹⁶ Clift, R. and J. Seville (Editors), 1993. Proceedings of the Second International Symposium on Gas Cleaning at High Temperatures. University of Surrey, UK. Springer Science and Business Media. P. 129.

¹⁷ https://en.wikipedia.org/wiki/Integrated_gasification_combined_cycle

¹⁸ <http://www.nrcan.gc.ca/energy/coal/carbon-capture-storage/4307>

¹⁹ <http://www.nrcan.gc.ca/energy/coal/carbon-capture-storage/4333>

²⁰ <http://cornerstonemag.net/exploring-the-status-of-oxy-fuel-technology-globally-and-in-china/>

²¹ Tanner, C. S., Baxley, P. T., Crump, J. G., & Miller, W. C. (1992, January 1). Production Performance of the Wasson Denver Unit CO₂ Flood. Society of Petroleum Engineers. doi:10.2118/24156-MS

²² Beliveau, D. A. (1987, November 1). Midale CO₂ Flood Pilot. Petroleum Society of Canada. doi:10.2118/87-06-05

²³ The Midale and Weyburn oil fields are operated in the same geological formation, along with several surrounding oil leases/ operations. Each of the two oil fields is owned by approximately 30 owners but each field was "unitized" in the 1960s to support water flooding infrastructure investment. Each unitized oil field is operated by one major oil company on behalf of the owners. Pan Canadian was an owner of part of the Midale oil field and consequently had access to the CO₂-EOR pilot program undertaken by Shell Canada.

²⁴ [http://www.dakotagas.com/CO₂_Capture_and_Storage/Pipeline_Information/index.html](http://www.dakotagas.com/CO2_Capture_and_Storage/Pipeline_Information/index.html)

²⁵ Apache Canada began a commercial CO₂-EOR flood at Midale in 2006 using approx. 1800 tonnes per day of CO₂ supplied by DGC. At that time Apache Canada contributed data and sponsorship to the renamed IEAGHG Weyburn-Midale CO₂ Monitoring and Storage Project.

²⁶ Hitchon, Brian (Editor), 2012. Best Practices for Validating CO₂ Geological Storage: Observations and Guidance from the IEAGHG Weyburn Midale CO₂ Monitoring and Storage Project. Chapter 1. Updated data from Cenovus and PTRC as of 2014.

²⁷ Approximately one-third of the CO₂ injected in a given oil production cycle is "lost" to the reservoir. The uncertainty prior to the IEAGHG Weyburn CO₂ Monitoring Project beginning its work was, "Where does the CO₂ go?"

²⁸ <http://ptrc.ca/projects/veyburn-midale>

²⁹ <http://www.canadiancleanpowercoalition.com/>

³⁰ <http://www.SaskPower.com/our-power-future/our-electricity/our-electrical-system/cory-cogeneration-station/>

³¹ <http://www.canadiancleanpowercoalition.com/index.php/ccpc-materials/ccpc-reports-phase/phase-i/>

³² Wilson, M. and M. Monea (Editors), 2004. IEAGHG Weyburn CO₂ Monitoring and Storage Project Summary Report 2000–2004. From the Proceedings of the 7th International Conference on Greenhouse Gas Control Technologies, September 5–9, 2004, Vancouver, Canada. Petroleum Technology Research Centre, Regina.

³³ <http://hub.globalccsinstitute.com/sites/default/files/publications/151303/co2-stored-underground-ieaghg-veyburn-midale-co2-monitoring-storage-project.pdf>

³⁴ http://www.environment.gov.sk.ca/adx/asp/adxGetMedia.aspx?DocID=1273,1272,929,928,926,240,94,88,Documents&MediaID=619&Filename=2007-052_project_description.pdf

³⁵ By this time, CO₂ sequestration in deep saline aquifers associated with "acid gas reinjection" at natural gas producing operations was an accepted practice, e.g. StatOil's Sleipner field. See Tore A. Torp and John Gale, Proceedings of the 6th Conference on Greenhouse Gas Control Technologies, 2003, Volume 1, p. 311–316.

³⁶ <http://www.pm.gc.ca/eng/news/2008/03/25/pm-and-saskatchewan-premier-announce-major-carbon-capture-and-storage-project>

³⁷ <http://www.publications.gov.sk.ca/details.cfm?p=56895>

³⁸ <http://www.SaskPower.com/our-power-future/our-electricity/our-electrical-system/boundary-dam-power-station/>

³⁹ <http://www.shell.com/global/products-services/solutions-for-businesses/globalsolutions/shell-cansolv/shell-cansolv-solutions/co2-capture.html>

⁴⁰ <http://www.shell.com/global/products-services/solutions-for-businesses/globalsolutions/shell-cansolv/shell-cansolv-solutions/so2-co2.html>

⁴¹ Johnstone, Bruce, 2012. From Regina Leader-Post and Saskatoon StarPhoenix newspapers. "SaskPower, Cenovus sign CO₂ supply deal". December 20, 2012.

⁴² There are many sources of ENGO criticism of the BD3 ICCS Project. One example from the Sierra Club of Canada is embedded in the newspaper article noted in reference 51.

⁴³ Zinchuk, B., 2015. Pipeline News. "Report critical of Boundary Dam suggests the answer is wind". April 1, 2015.

⁴⁴ <http://large.stanford.edu/courses/2010/ph240/vasudev1/>

⁴⁵ See for example: Lefebvre, R., Elena Simonova, and Liang Wang. July 2012. Issue in Focus. Certified General Accountants (Canada). "Labour Shortages in Skilled Trades – The Best Guestimate?" http://ppm.cga-canada.org/en-ca/Documents/ca_rep_2012-07_labour-shortage.pdf

⁴⁶ https://en.wikipedia.org/wiki/R._W._Beck,_Inc. Due to various acquisitions since 2009, R.W. Beck is now part of Leidos Engineering LLC, www.leidos.com/engineering

⁴⁷ <http://www.babcock.com/products/Pages/Subcritical-Radiant-Boilers.aspx>

⁴⁸ <http://www.snclavalin.com/en/>

⁴⁹ <http://www.mhps.com/en/products/generator/>

⁵⁰ <http://www.stantec.com/>

⁵¹ <http://www.cenovus.com/operations/oil/docs/rafferty-landowner.pdf>

⁵² Johnstone, B., 2014. Regina Leader-Post. "CCS best bet to stop climate change." October 4, 2014.

⁵³ Wu, Ying and John J. Carroll (editors), Acid Gas Injection and Related Technologies, Advances in Natural Gas Engineering, 2011. John Wiley & Sons. P. 170.

⁵⁴ <http://www.tcmda.com/en/>

⁵⁵ <http://www.oilsandsken.com/huge-challenge-facing-oil-and-gas-companies/>

⁵⁶ <http://www.ferc.gov/industries/gas/indus-act/lng.asp>

⁵⁷ <http://www.nrcan.gc.ca/energy/coal/carbon-capture-storage/4333>

⁵⁸ <http://SaskPowerccs.com/2015-symposium/symposium/>

⁵⁹ <http://www.co2-research.ca/index.php/about-us/>

⁶⁰ <https://ukccsrc.ac.uk/>

⁶¹ Hitchon, Brian (Editor), 2012. Best Practices for Validating CO₂ Geological Storage: Observations and Guidance from the IEAGHG Weyburn Midale CO₂ Monitoring and Storage Project.

⁶² Private communication with the PTRC.