

SASKPOWER CCS

BOUNDARY DAM CCS PROJECT

MAKING BUSINESS SENSE



JOIN THE SASKPOWER CONSORTIUM TODAY

SaskPower leaders, engineers and consultants have years of experience in researching, constructing and integrating CCS technology with a coal-fired power station. SaskPower has made the case for the continued use of coal as an affordable fuel source for power generation. Let us help you build your CCS project. Come learn from our experience and the 20-30% cost savings we have identified.



OVERALL PROJECT COSTS*

Overall Project Total.....	\$1,467 Million
Canadian Federal Government Paid Amount.....	\$239.6 Million
Net Cost to SaskPower.....	\$1,227 Million

CCS FACILITY CONSTRUCTION COSTS:
\$905 Million

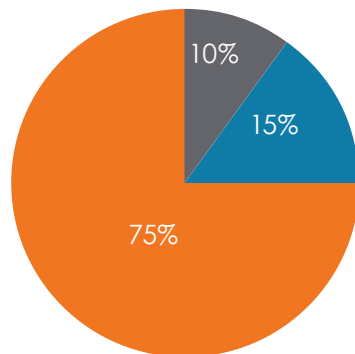
POWER PLANT REFURBISHMENT COSTS:
\$562 Million

*SaskPower's total investment for the CCS project is \$1.23 billion. The federal government contributed a further \$240 million towards the project, for a total of \$1.467 billion. As with any major infrastructure project, we are still finalising outstanding financial arrangements with some vendors. This process will take some time and will affect the project's final cost.

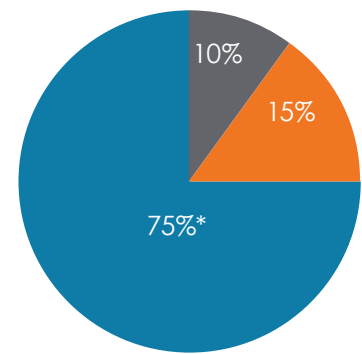
WHY CCS - A COMPARISON WITH NATURAL GAS

When SaskPower began evaluating CCS as a possibility, coal with CCS was compared against the next-best alternative: natural gas. Assumptions were made on initial investment, current borrowing rates, internal rate of return as well as coal and natural gas prices to determine if CCS was economically competitive with other options. As a result, SaskPower found that the costs of building and operating a gas facility and retrofitting a coal unit with CCS were essentially the same. The true benefit came from Saskatchewan's abundance of coal and that fuel source's affordable, stable price. Alternatively, natural gas prices can fluctuate dramatically, making the ultimate return on such a plant uncertain.

- CAPITAL INVESTMENT
- FUEL EXPENSE
- O & M



**BD3 CARBON CAPTURE
COST OF ELECTRICITY**



**BASELOAD NATURAL GAS
COST OF ELECTRICITY**

*Market price of gas can fluctuate unpredictably.

BYPRODUCTS

The business case that SaskPower put forward contemplated the ability to secure various offtakers for byproducts of the carbon capture plant and Unit #3 of the power station. SaskPower has secured contracts for three byproducts: flyash, sulphuric acid and CO₂.

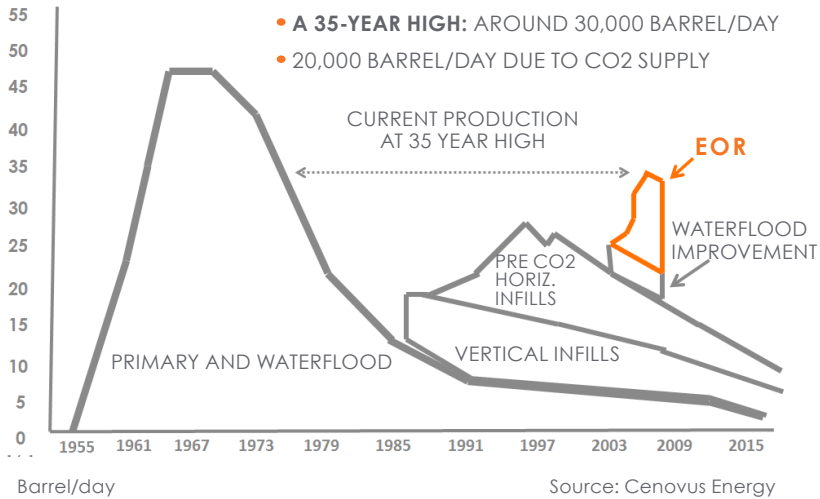
The flyash is utilized by the concrete industry. SaskPower sells essentially all of its flyash produced by all the units at the Boundary Dam Power Station.

All 10,800 tonnes of sulphur dioxide produced at Boundary Dam Unit #3 will be captured and transformed into 96-per-cent pure, saleable sulphuric acid to be sold primarily for industrial purposes. The production of sulphuric acid will also allow SaskPower to meet its own needs for this product.

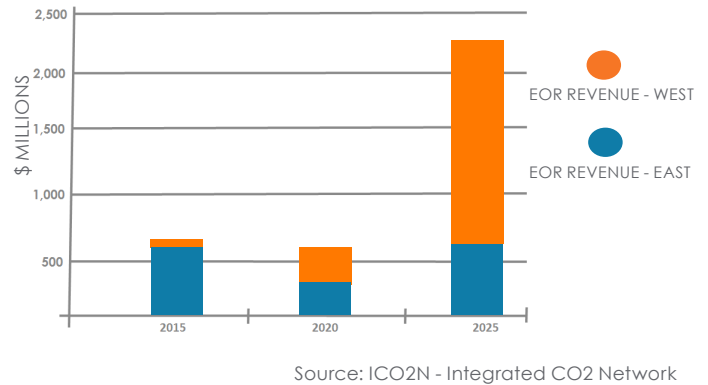
These byproducts are relatively small contributors to the business case. They are however an important factor of environmentally sustainable coal power.

SaskPower has secured a 10-year contract for its primary byproduct: carbon dioxide. It will be used for enhanced oil recovery (EOR) in nearby oilfields. EOR production has been undertaken in Saskatchewan since the early 2000s and has been conducted in Texas since 1975. Enhanced oil recovery has a significant impact on oil production, labour, community economic spin offs and provincial royalties. The graphic to follow illustrates the output levels of primary and secondary production in Saskatchewan oilfields and the impact of CO₂ injection for enhanced oil recovery. The application of enhanced oil recovery with CO₂ injection has not only prolonged the life of oilfields in Saskatchewan, but also secured economic benefits for many years to come.

WEYBURN-MIDALE EOR PROJECT: HOW CCS IS HELPING OIL PRODUCTIVITY



POTENTIAL EOR REVENUES IN SASKATCHEWAN



BOUNDARY DAM CCS PROJECT (UNIT#3)

EMISSION	PRE-CCS	POST-CCS	REDUCTION
CO2	1,139,711	112,741	90%
SOX	7,123	0	100%
NOX	2,410	1,050	56%

DATA DISPLAYED IN TONNES/YR

EMISSIONS REDUCTION

Through various initiatives, SaskPower is reducing and offsetting carbon dioxide, sulphur dioxide, mercury and nitrogen oxide emissions in its operations. The Boundary Dam Integrated Carbon Capture and Storage Project (Unit #3) and the retirement of Units #1 and #2 at Boundary Dam will reduce CO2 emissions by almost two million tonnes. The project will also contribute to a reduction of 17,000 tonnes of sulphur dioxide from SaskPower's three coal plants that will not be released into the atmosphere in 2014. Over the past several years, SaskPower has also reduced mercury emissions. In 2013, it reduced and offset 250 kg of mercury emissions. Notably, the retirement of Units #1 and #2 at the Boundary Dam Power Station will result in an additional reduction of 40 kg of mercury emissions and reduce annual nitrogen oxide emissions by another 2,000 tonnes per year.

The SaskPower Boundary Dam Integrated Carbon Capture and Storage Project (Unit #3) will capture one million tonnes of CO2 annually. This is the equivalent of taking 250,000 cars off the road every year.

ESTIMATED ECONOMIC IMPACT

EOR (ONE OIL INDUSTRY EXAMPLE):

- \$850 million capital investment over 10 to 15 years
- 20 to 30 year project life
- 47 million barrels incremental oil recovery
- \$481 million (est.) in crown royalties and production
- \$241 million in corporate income taxes
- \$65.7 million in resource surcharge
- 4,850 person-years of direct employment



SaskPowerCCS.com



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