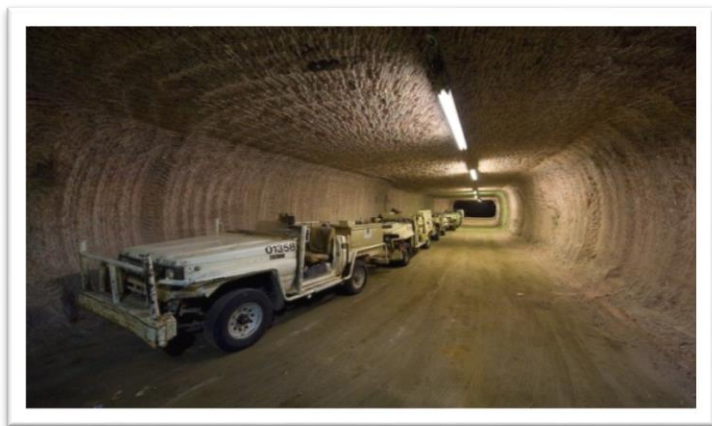


SASKPOWER CCS

BOUNDARY DAM CCS PROJECT

SECARB PRESENTATION

SASKATCHEWAN'S ENVIRONMENT



Growing both economically and demographically.

WHAT IS SASKPOWER?



Why Did We Get Involved In

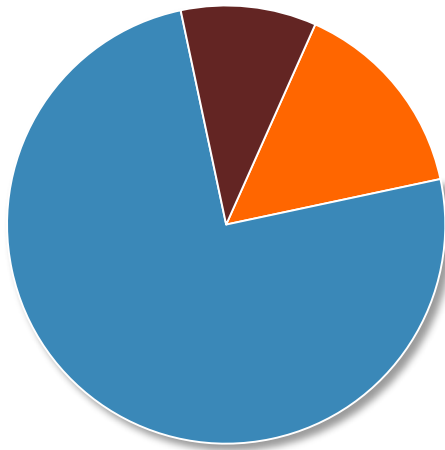
CCS?

REGULATIONS

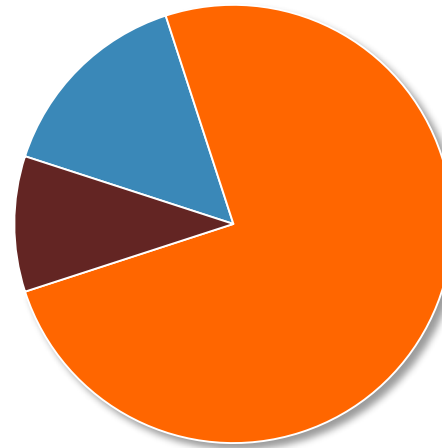


COMPARING COSTS

Baseload Natural Gas
Cost of Electricity

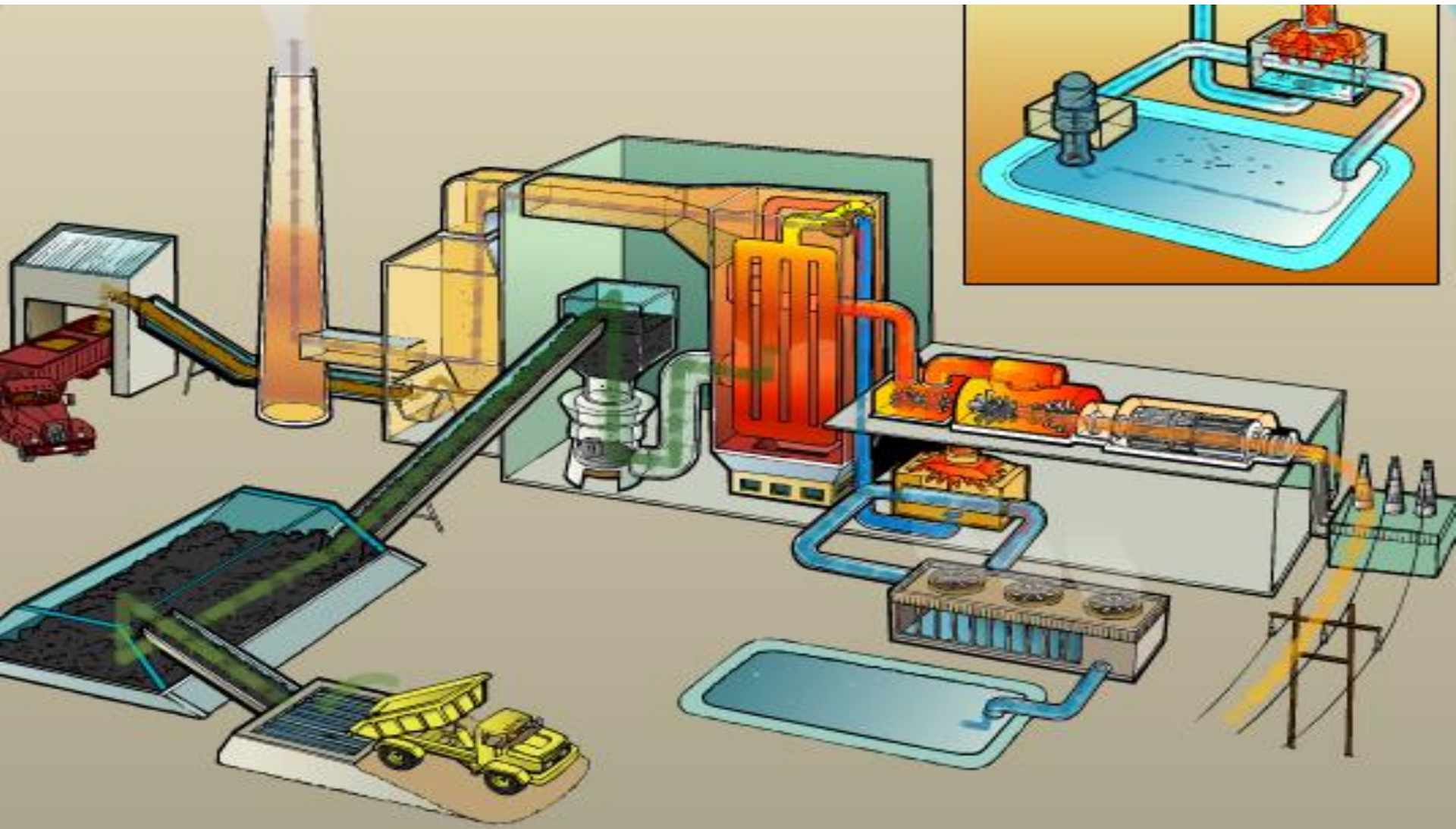


BD3 Carbon Capture
Cost of Electricity



Figures from 2009 - 2010

TYPICAL PULVERIZED COAL POWER PLANT



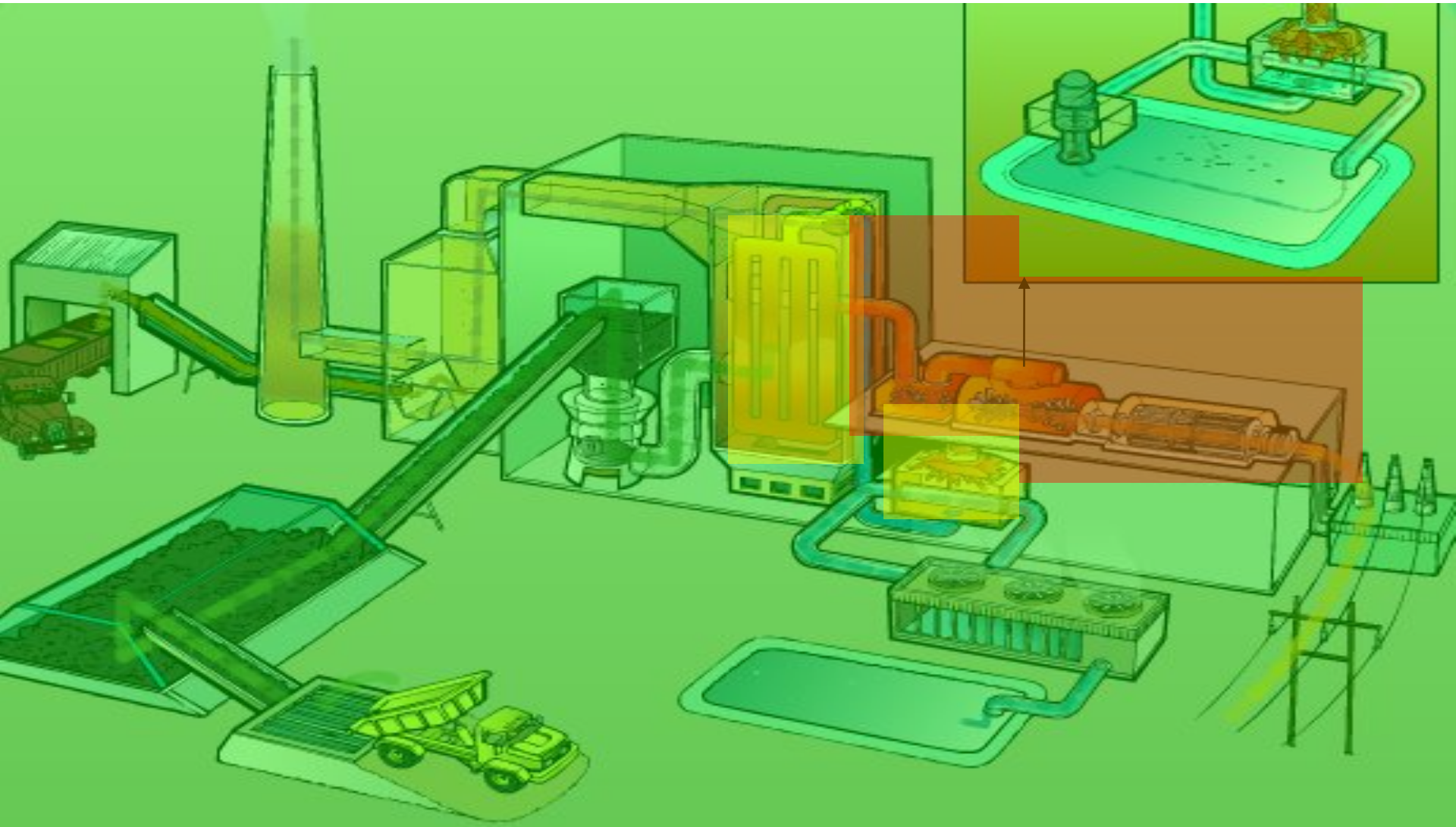
BOUNDARY DAM POWER STATION - 2010



Unit 3

SaskPower
Boundary Dam

BOUNDARY DAM 3 - CONDITION



BD3 PROJECT DEVELOPMENT

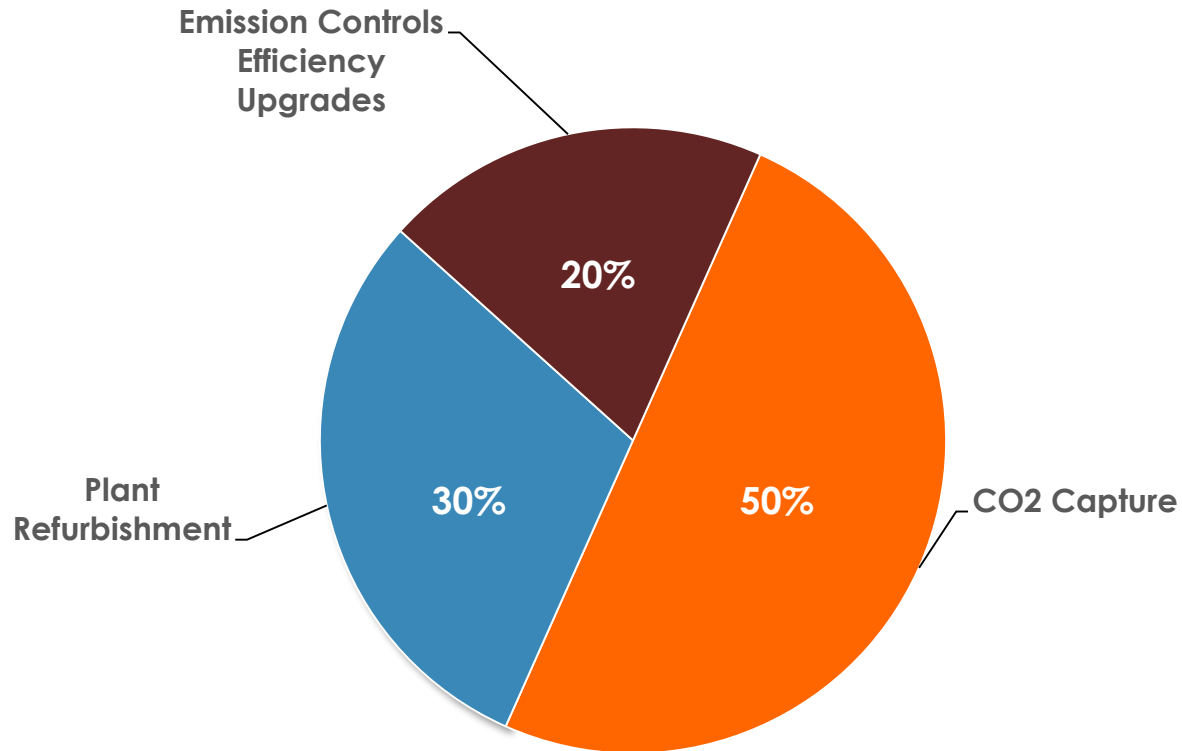
Five Key Deliverables:

- 1) Life Extension** - Refurbish Unit 3 to allow an additional 30 years of reliable, safe operation
- 2) Performance Upgrades** - Upgrade Unit 3 criteria emissions control (Sox, NOx, Hg) as well improve efficiency
- 3) CO₂ Capture Technology** – incorporate technology that best meets our overall Corporate objectives – both near and long term
- 4) Cost Effective COE** – all of the above to be accomplished with a COE at or below that of the next lowest supply option – likely Nat. Gas CC. Likely require a CO2 sale for EOR to achieve.
- 5) In-Service 2014**

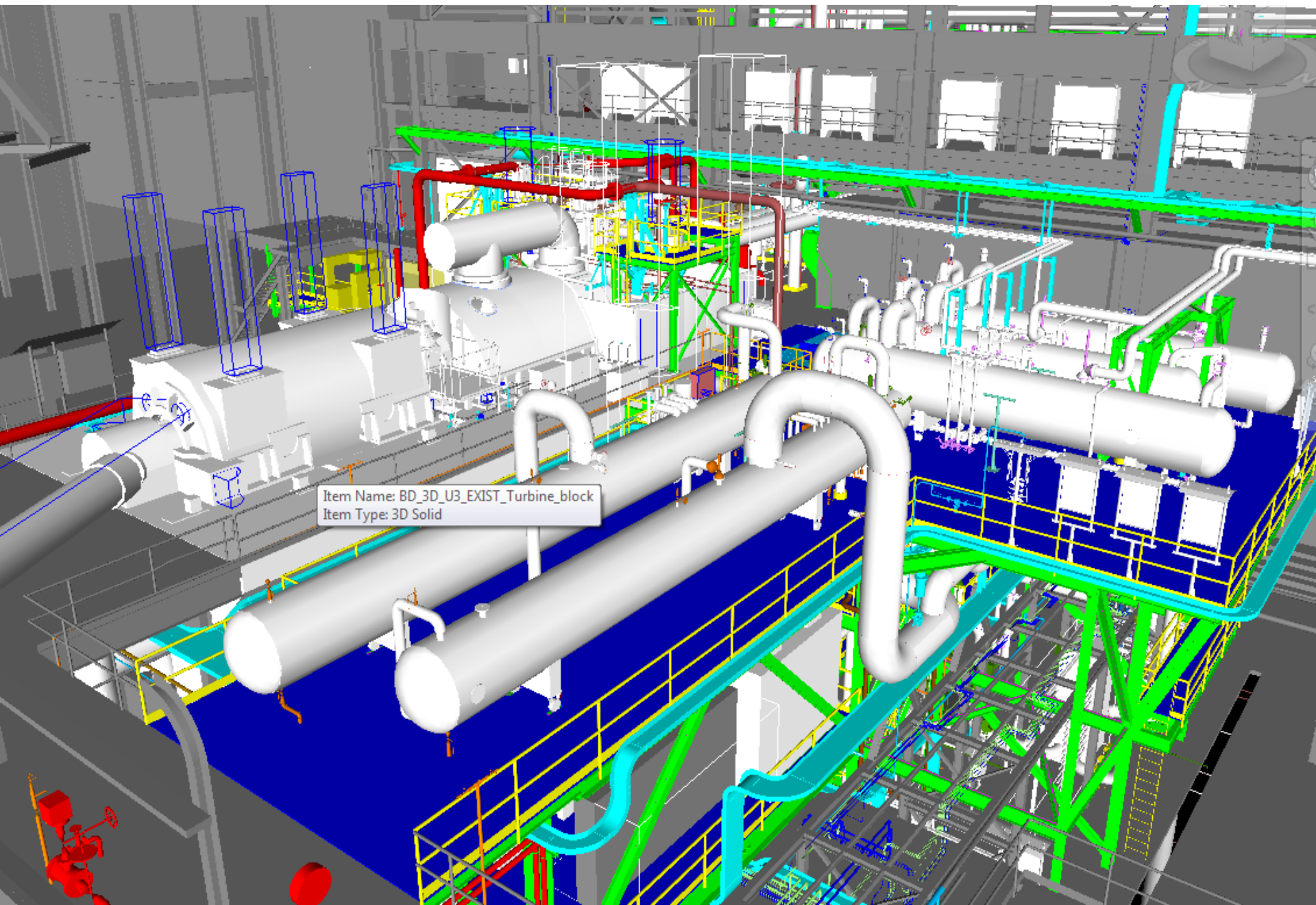
BD3 PROJECT PERFORMANCE

	ORIGINAL	REBUILT NON-CAPTURE	REBUILT CAPTURE
Commissioning Date	1969	Jun-14	Oct-14
ELECTRICAL OUTPUT (MW)			
Gross Output	150	161.1	147.4
Station Service	11	12.1	11.9
Capture Station Service			11.4
Compression			13.9
Net Electrical Output	139	149	110.2
EMMISSIONS (t/GWh)			
CO2	1094	1010	134
SO2	11.05	10.24	0
Nox	2.037	0.885	1.182
Water	482	446	293
BYPRODUCTS (tpd)			
CO2			3240
H2SO4			56

BD3 PROJECT COST BREAKDOWN



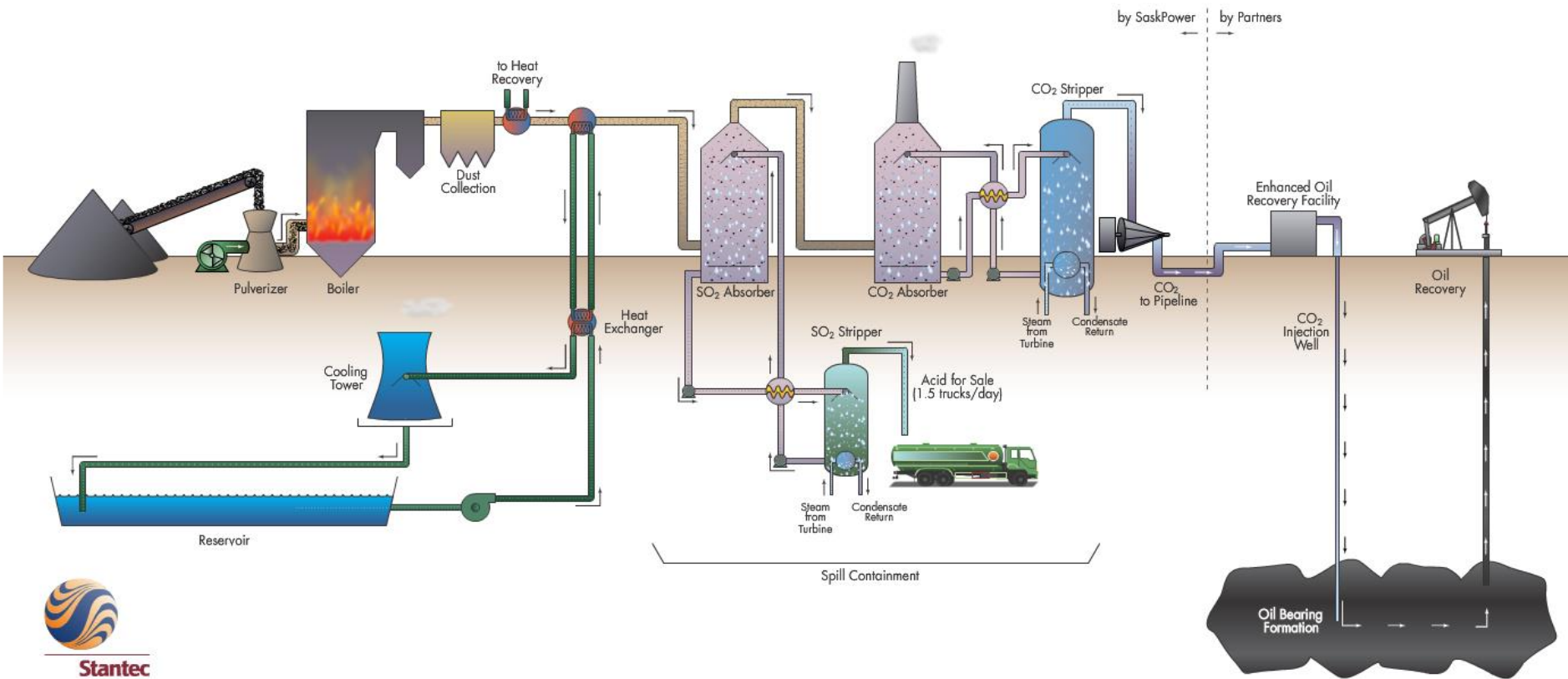
BD3 - TURBINE HALL



CARBON CAPTURE PROCESS



Carbon Capture Process





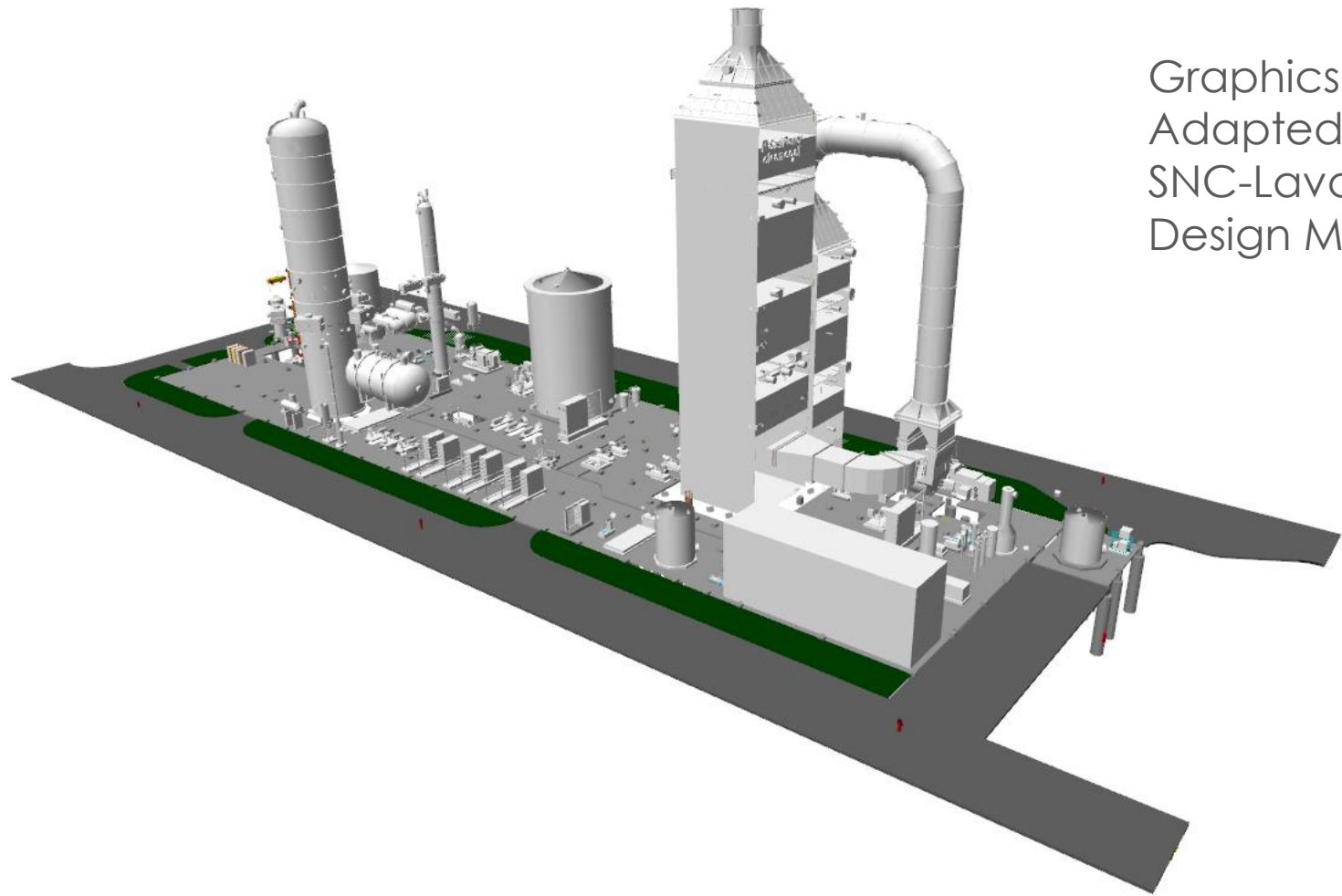
An aerial photograph of the Boundary Dam Carbon Capture and Storage (CCS) project. The central feature is a large, light-colored industrial building with "SaskPower Boundary Dam" written on its side. Several tall, red-and-white striped smokestacks are visible behind the building. To the left of the main building is a large electrical substation with numerous power lines and transformers. In the foreground, there are several large parking lots filled with cars and trucks, along with various smaller industrial buildings and storage areas. The facility is situated on a grassy plain next to a large body of water, with a winding river or lake in the background. The text "BOUNDARY DAM" and "CCS PROJECT" is overlaid in large, white, bold letters at the bottom of the image.

BOUNDARY DAM CCS PROJECT

FLUE GAS COOLER MODULE



SO₂ AND CARBON CAPTURE PLANT



Graphics
Adapted from
SNC-Lavalin
Design Model

Major Vessels (Q3 2011 to Q2 2012)

CO2 COMPRESSOR



CO2 COMPRESSOR



An aerial photograph of the Boundary Dam power plant and its associated Carbon Capture and Storage (CCS) project. The main power plant building is a large, light-colored structure with several tall, red-and-white striped smokestacks. To the left of the main building is a large electrical substation with numerous power lines and transformers. In the foreground, there are several large parking lots filled with cars and trucks, along with various support buildings and construction equipment. The entire facility is situated on a grassy area next to a large body of water, with a winding river or lake in the background. The text "BOUNDARY DAM CCS PROJECT" is overlaid in large, white, bold letters across the bottom half of the image.

BOUNDARY DAM CCS PROJECT

BD3 CURRENT STATUS

- **Power Plant**

- In service June 2014
- Performance testing completed Fall 2014
 - Turbine 1% better than guarantee efficiency
 - Boiler above guarantee, awaiting report
- Successful “dual mode” operation
- Successful isolation from capture plant disruptions

- **Capture Plant**

- First CO₂ Sale Oct 2014
- Maximum capacity reached 2780 tpd.
 - No apparent barriers to reaching full load
- Total CO₂ captured to date 178,000 t.
- Equipment issues largely addressed
- Process / Chemistry optimization in progress



WHERE WE ARE GOING

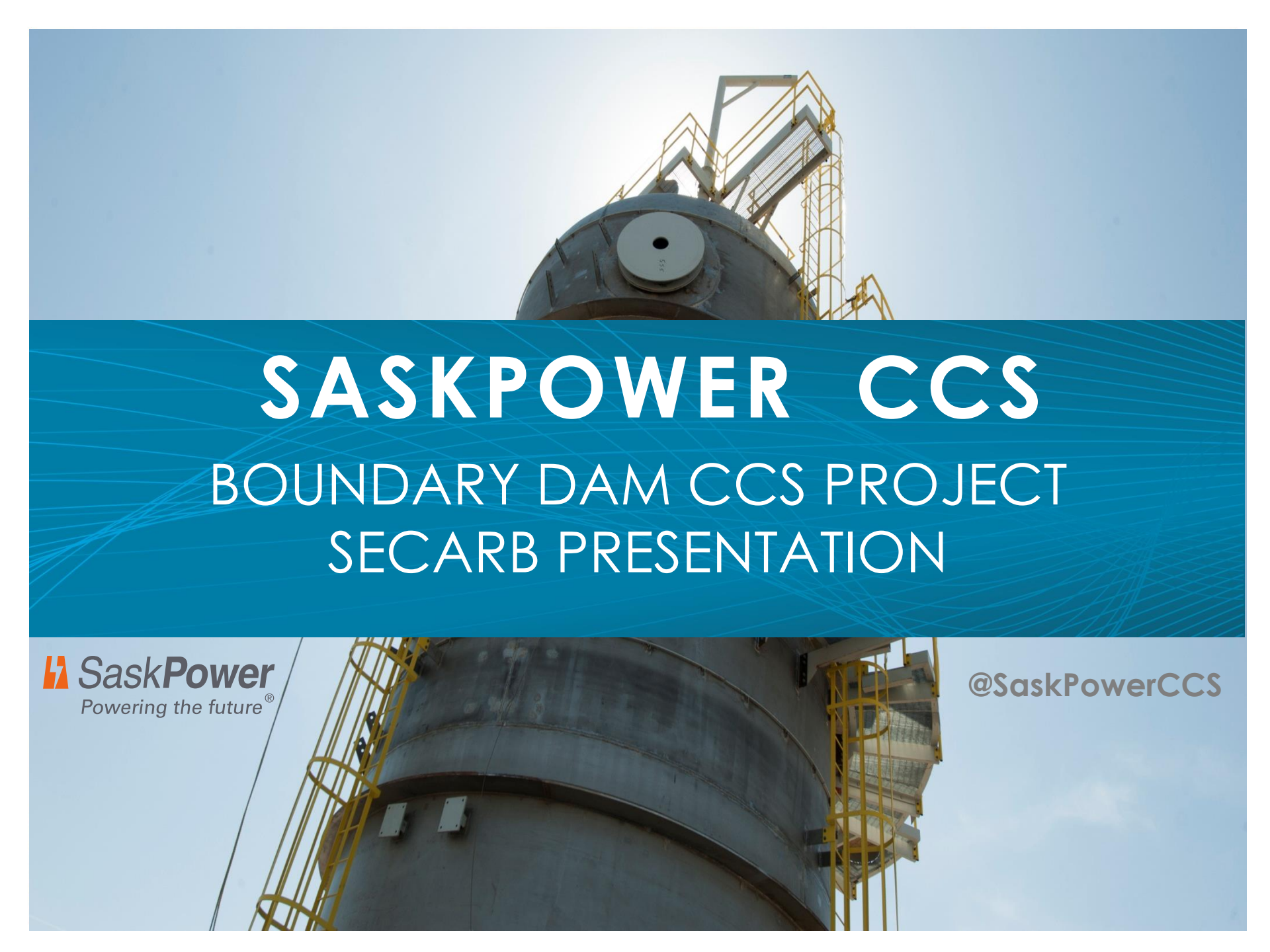


CONSORTIUM

The background is a solid blue color with a pattern of thin, white, curved lines that sweep across the frame, creating a sense of motion and depth.

TAKE THE TOUR

www.SaskPowerCCS.com/tour



SASKPOWER CCS

BOUNDARY DAM CCS PROJECT

SECARB PRESENTATION