



SASKPOWER CCS CCUS TEM



SaskPower
Powering the future[®]

@SaskPowerCCS



SASKATCHEWAN'S ENVIRONMENT



Growing both economically and demographically.

WHO IS SASKPOWER?



SASKPOWER'S ENERGY MIX

- 490,000 customers
- 151,000KM of transmission line
- 3,513 MW generating capacity



DIVERSIFIED POWER GENERATION.



COAL
50%



GAS
25%



HYDRO
20%

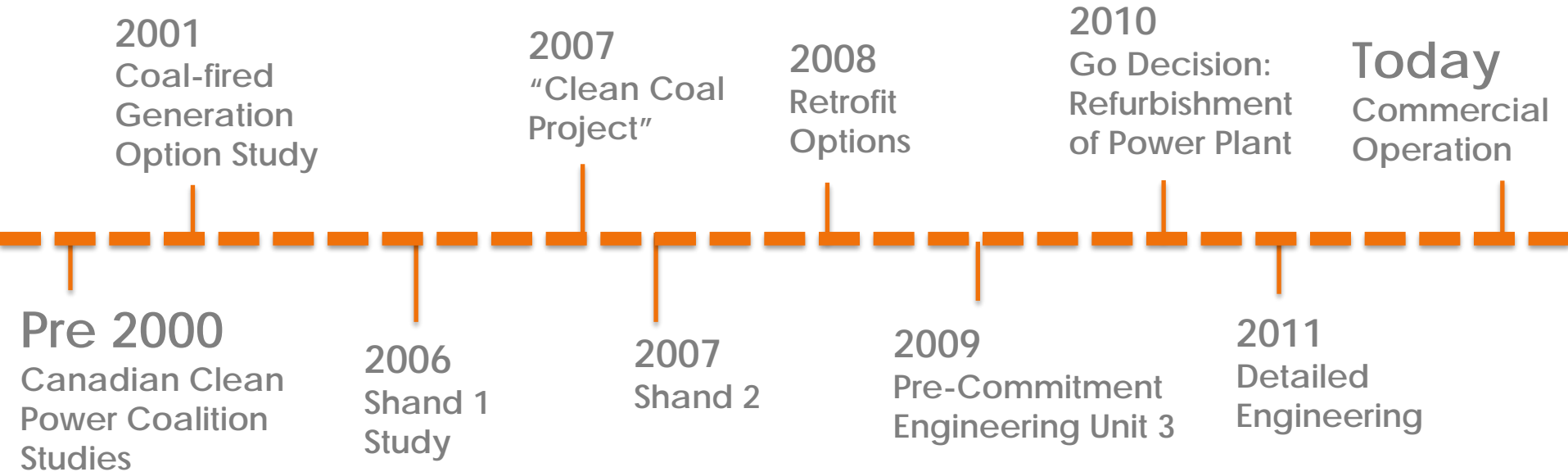


WIND
3%



OTHER
2%

CCS TIMELINE.



Why Did We Get Involved In



CCCS?

REGULATIONS.





COMPARING REGULATIONS.

MODIFIED / REFURBISHED COAL UNITS

Kg CO2 / MWh net (less than 2,000 MMBtu/h)	
	
420*	861.8

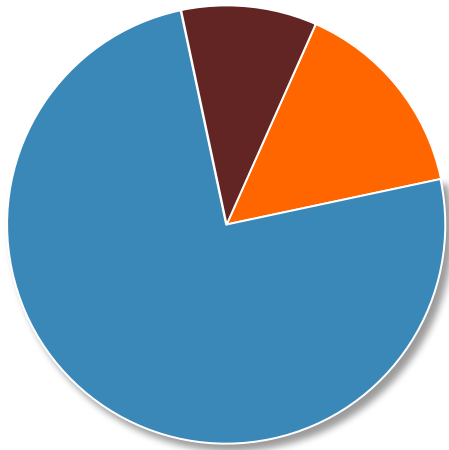
NEW COAL / NATURAL GAS UNITS

Kg CO2 / MWh net	
	
420*	644.5

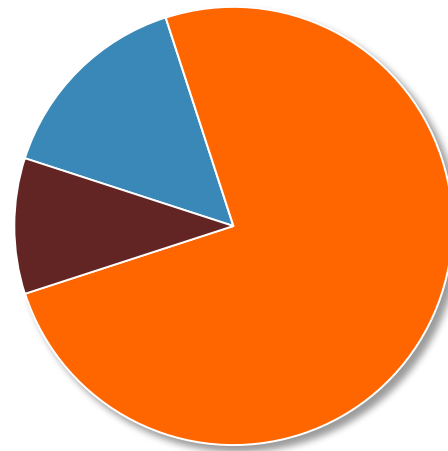
*Conversion based on SaskPower's BD3 unit at 124.6 MW net (after station services, SO2 capture, CO2 capture but before CO2 compression).

COMPARING COSTS.

Baseload Natural Gas
Cost of Electricity



BD3 Carbon Capture
Cost of Electricity



- Capital Investment
- Fuel Expense
- O & M

Figures from 2009 - 2010

TWO PROJECTS





BOUNDARY DAM
CCS PROJECT



CCS FACILITY.

CO₂ AND SO₂ ABSORBERS



CO₂ STRIPPER





SO₂ STRIPPER



ACID PLANT



CO2
CO2

CO₂ PIPELINE.

BOUNDARY DAM UNIT 3

Emission Change	Pre-CCS	Post-CCS	Reduction
CO ₂	1094	120	90%
SO ₂	11	0	100%
NO	1.5	1.1	27%
PM10	.2	.02	90%
PM2.5	.1	.03	70%

THE EQUIVALENT TO:



TAKING ALL THE CARS OFF THE
ROAD IN REGINA, SK (POP. 220K)

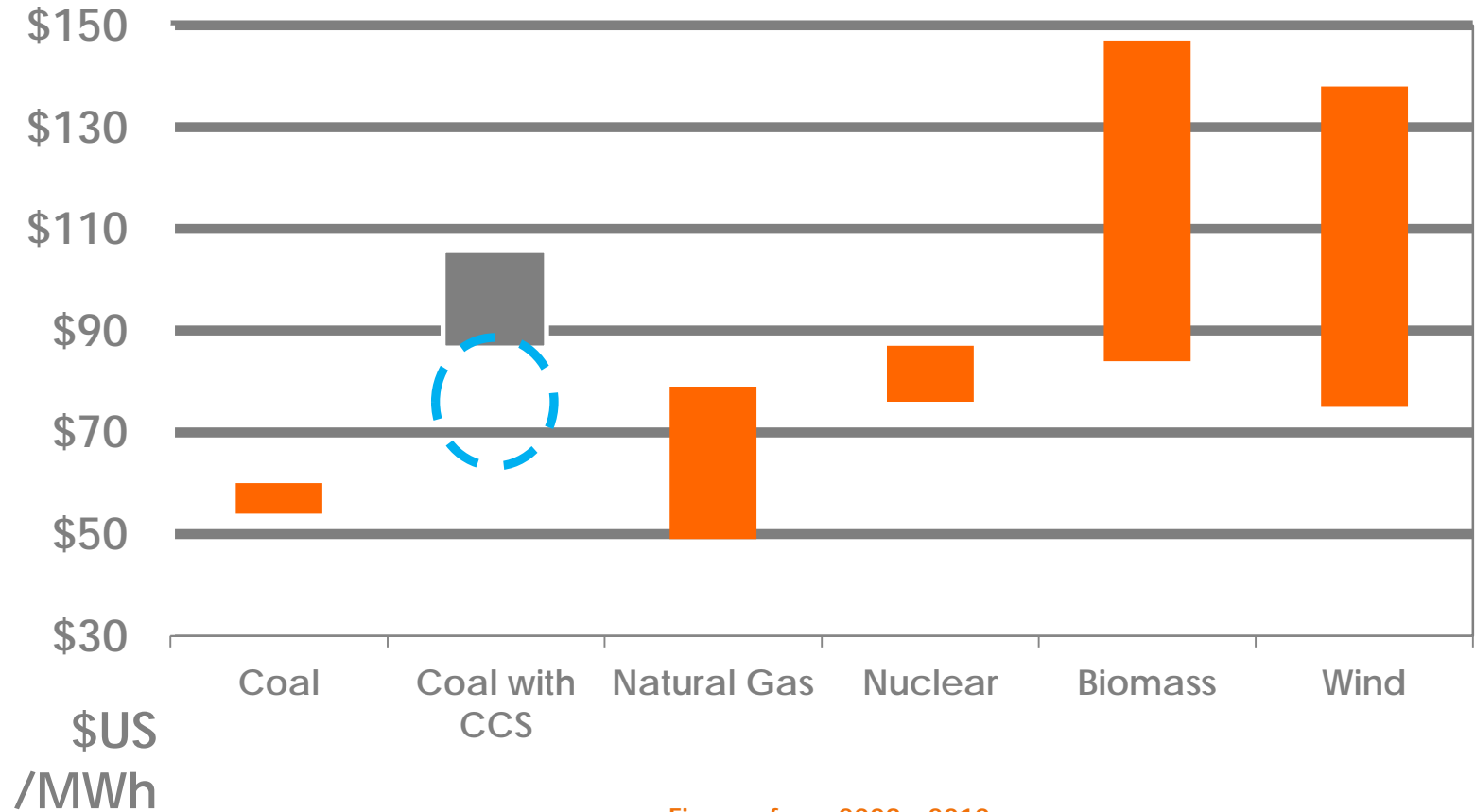


+ CAPTURING ALL CO2 FROM
HEATING/COOLING OF EVERY HOME



+ KEEPING THE LIGHTS ON IN
HALF OF THE CITY.

GENERATION COSTS.

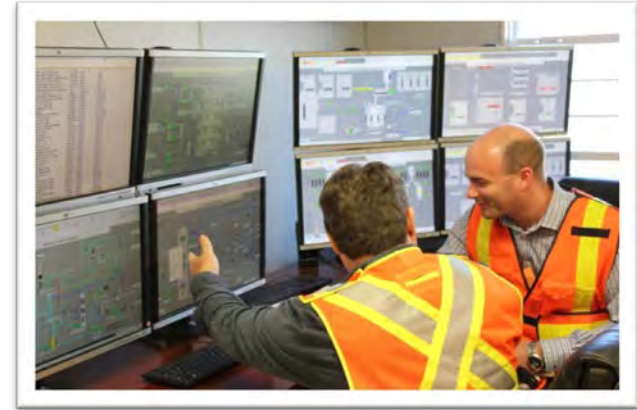


Figures from 2009 - 2010

THE NEW REALITY.



Complex Commissioning



Unprecedented Simulator
Training




Detailed SOP



Vendor Contract Negotiations

THE STATS.

- 1,700 – Number of construction workers on site at peak
 - Percentage of engineers who have done this before - 0%
 - 4.7M - Combined man hours thus far
 - +10 - Amount of countries who contributed materials, components, technology
 - 150+ - Number of contracts in place
- 

FULL SPECTRUM

CCUS

SECURING OFF-TAKERS.



- Sale of CO₂ to oil company for EOR.

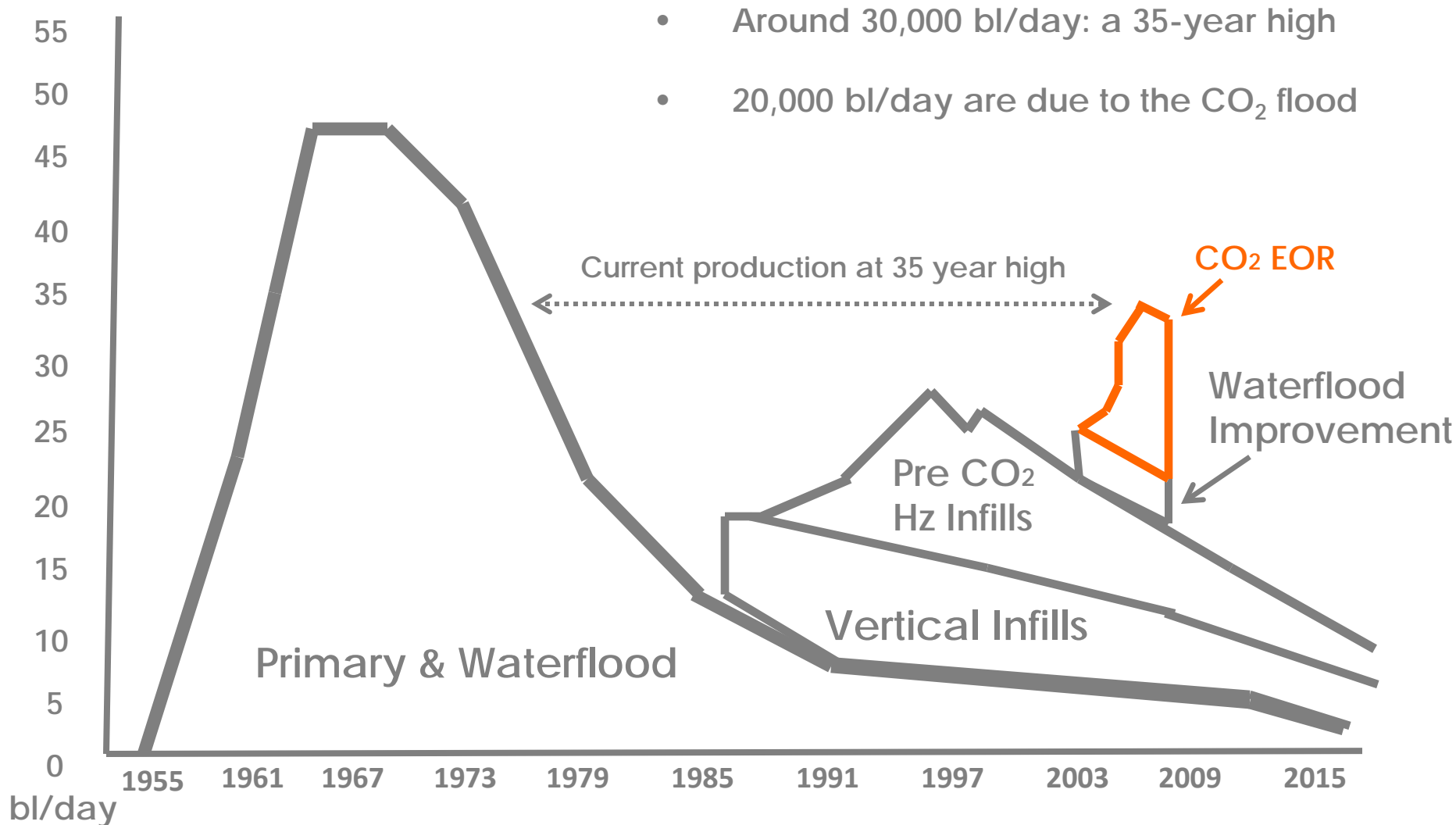


- Sale of sulphuric acid, used primarily for industrial purposes including fertilizer.



- Sale of flyash for concrete production 100%.

ENHANCED OIL RECOVERY.



STORAGE.

Pure CO₂ storage with SaskPower's Carbon Storage and Research Centre's host project, Aquistore.

Independent monitoring project that identifies feasibility of injecting CO₂ into a deep saline reservoir in an effort to reduce GHG emissions.

Aquistore will receive approximately 350,000 tonnes of CO₂ over its life. Storage is regulated by the Ministry of Environment.

Will be measured, monitored, verified and audited.

Saskatchewan has experience with storage due to the Weyburn Midale project. Approximately 20 million tonnes of CO₂ stored and monitored.



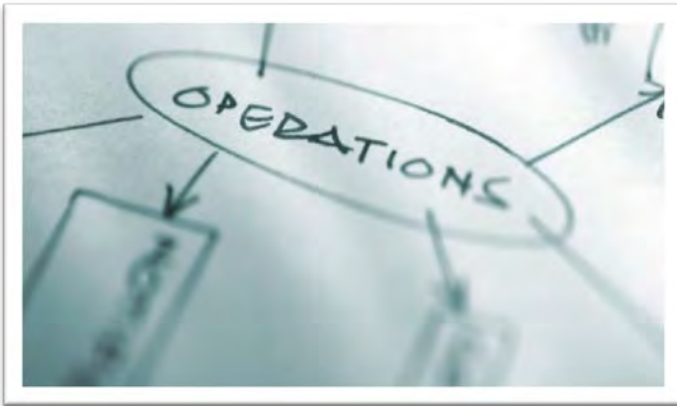
MAKING THE NEW REALITY.



Complex Commissioning



Unprecedented Simulator
Training



Detailed SOP



Vendor Contract Negotiations



CCTF

WHERE ARE WE GOING?



Amine Chemistry Lab



University Collaboration



Symposium



Boundary Dam 4+5



WHERE WE ARE GOING

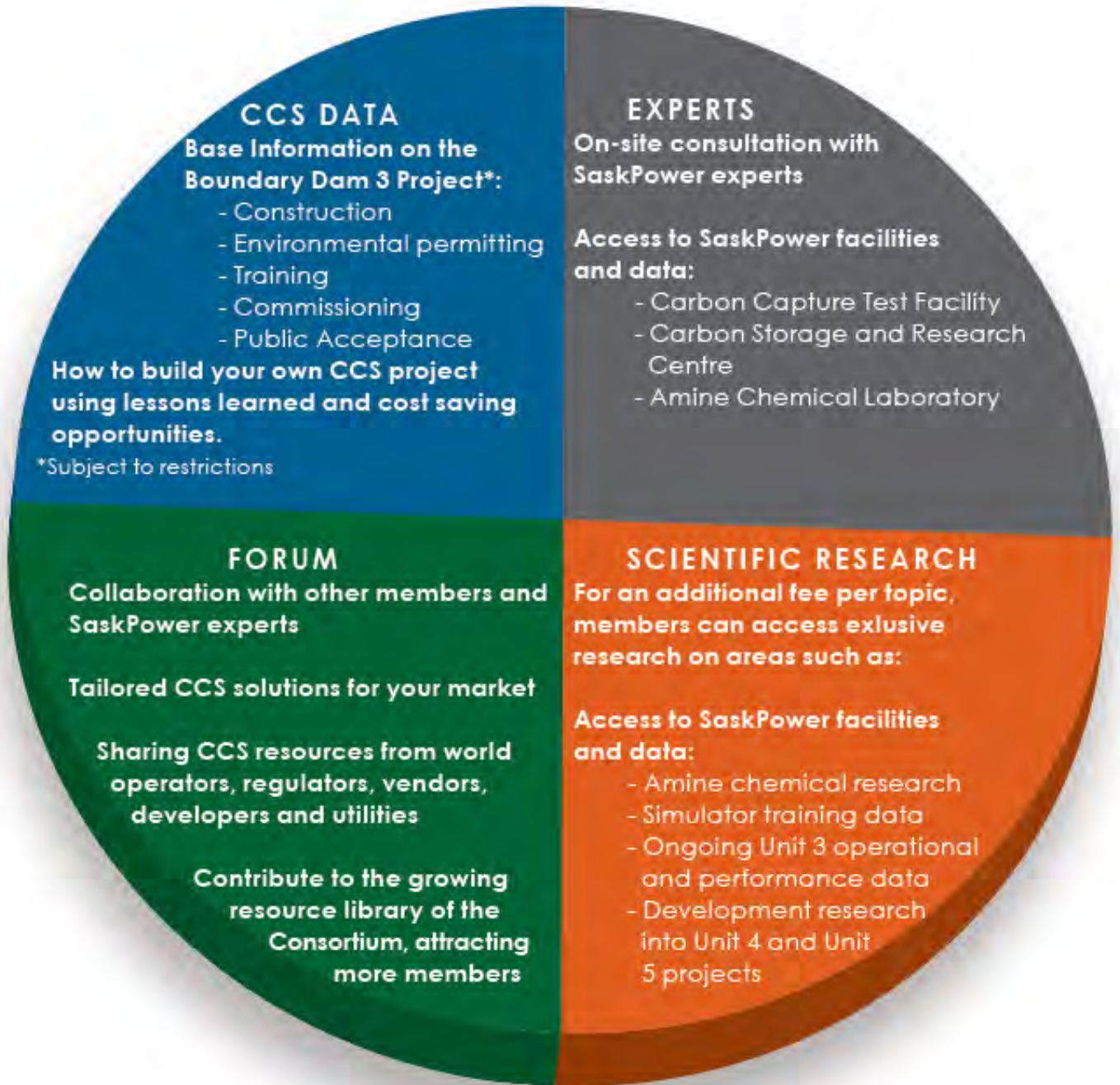


TOURS



CONSORTIUM

CONSORTIUM





WHY IT MATTERS



**PUBLIC ACCEPTANCE:
BEING PROACTIVE**

TAKE THE TOUR.

www.SaskPowerCCS.com/tour



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