The world’s first coal-fired post-combustion CCS facility.

SaskPower

Carbon Sequestration Leadership Forum

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WHO IS SASKPOWER?

THE SASKATCHEWAN CHALLENGE IS TO MEET THE GROWING DEMAND FOR ENERGY, PROVIDE IT AT AN AFFORDABLE COST, AND REDUCE EMISSIONS.

电力能源多样化
DIVERSIFIED POWER GENERATION.

Coal
50%

Gas
25%

Hydro
20%

Wind
3%

Other
2%

BOUNDARY DAM INTEGRATED CCS PROJECT

Regulations

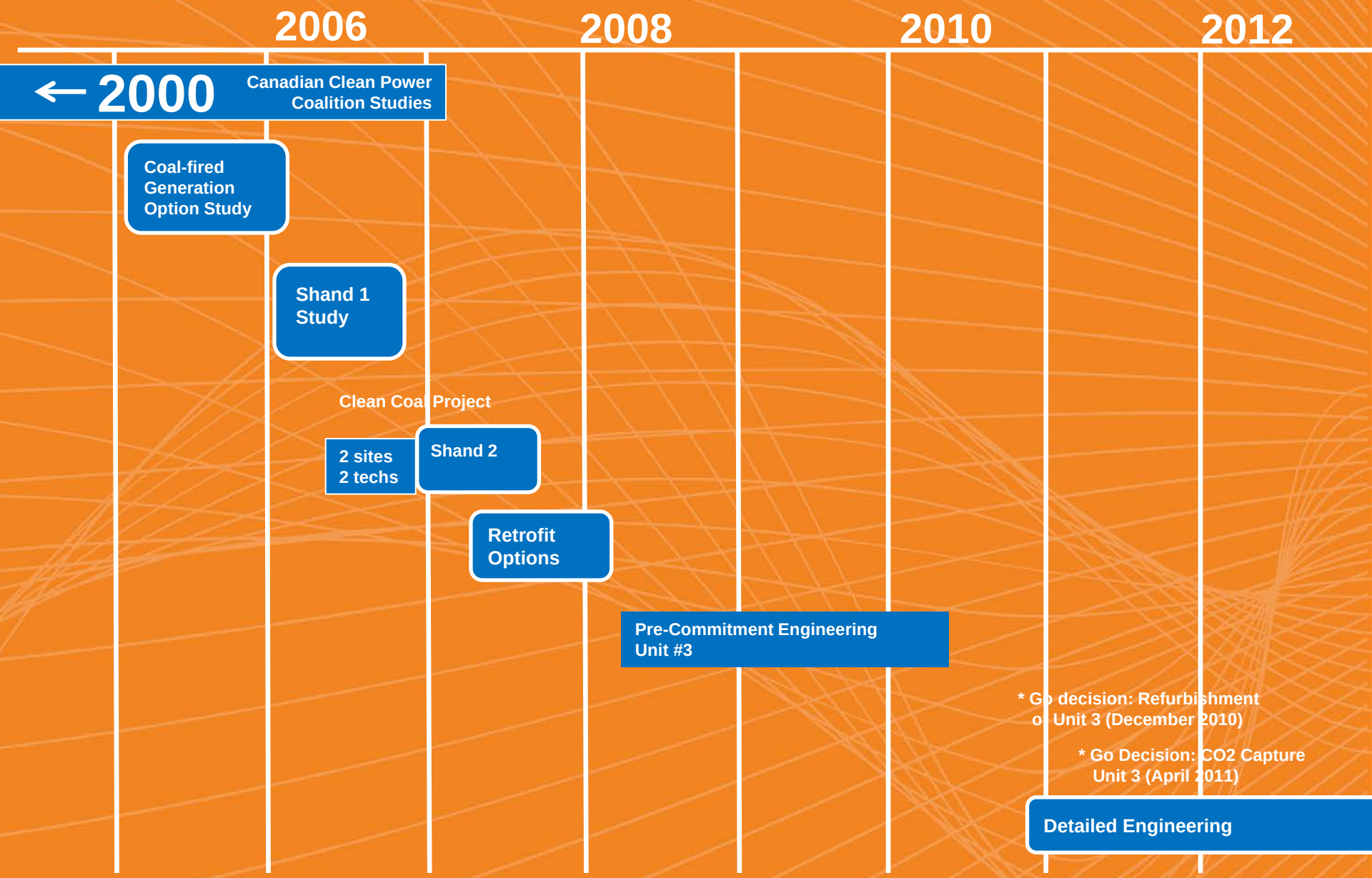
Boundary Dam Unit 3

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%
Hg		Under Corporate Cap	

CO2 Equivalent to 250,000 Vehicles Off the Road Every Year.

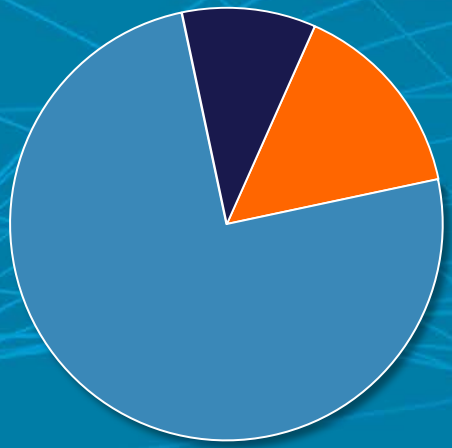
OUR BUSINESS CASE

Analysis and Cost Estimates

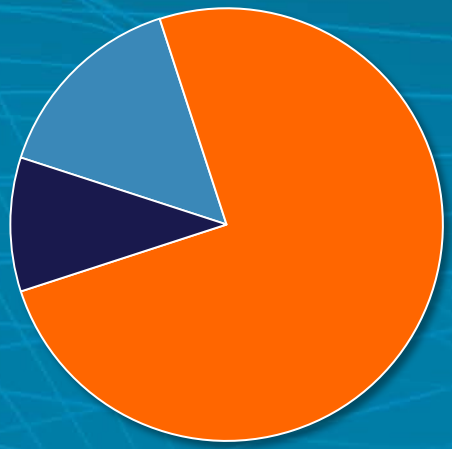


Point In Time Analysis – Comparing the Alternative

Baseload Natural Gas Cost of Electricity



BD3 Carbon Capture Cost of Electricity



Capital Investment

Fuel Expense

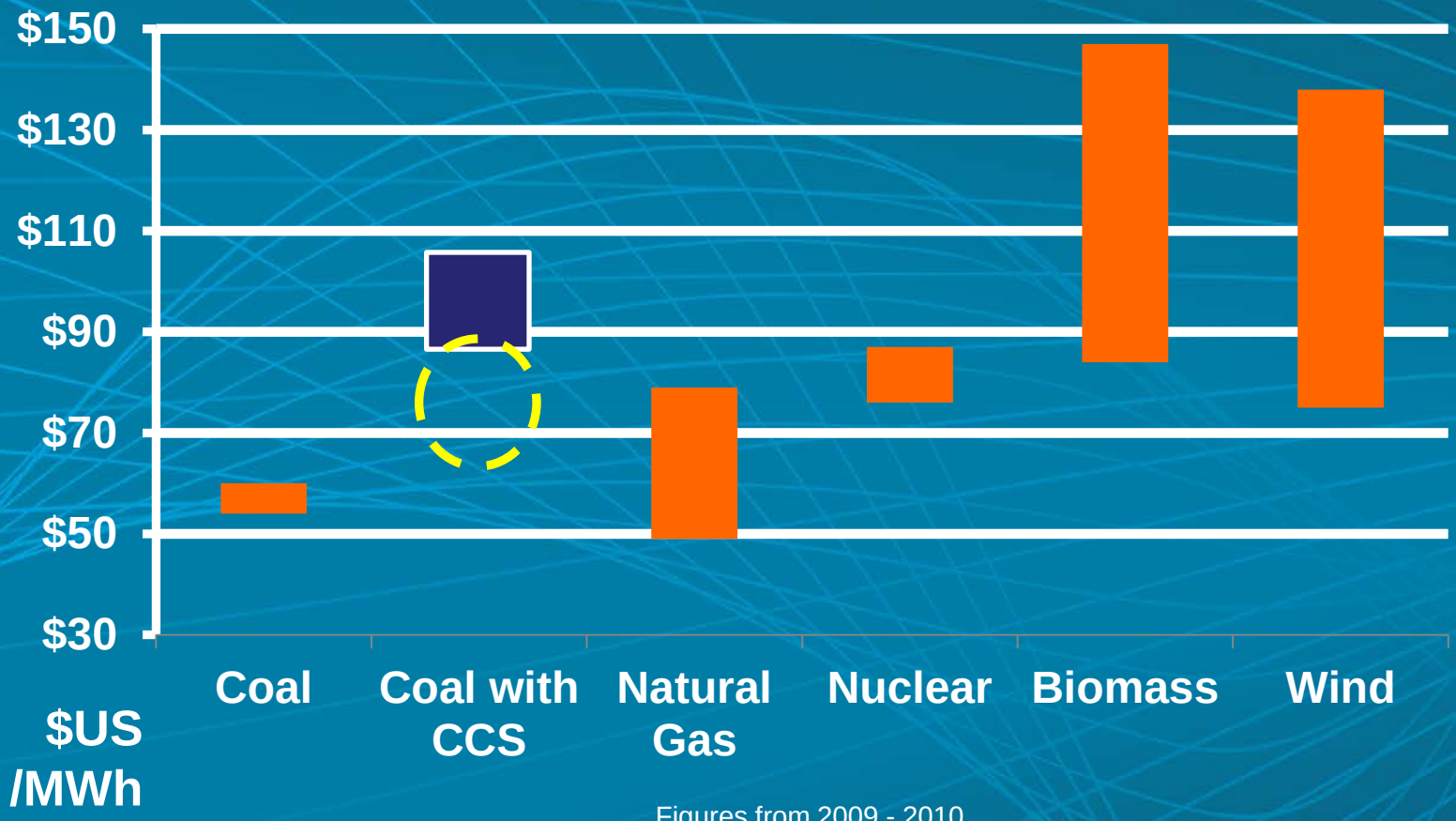
O & M

Figures from 2009 - 2010

Securing Off-takers

- Sale of sulphuric acid, used primarily for industrial purposes including fertilizer.
- Sale of flyash for concrete production 100%.
- Sale of CO_2 to oil company for EOR.

GENERATION COSTS

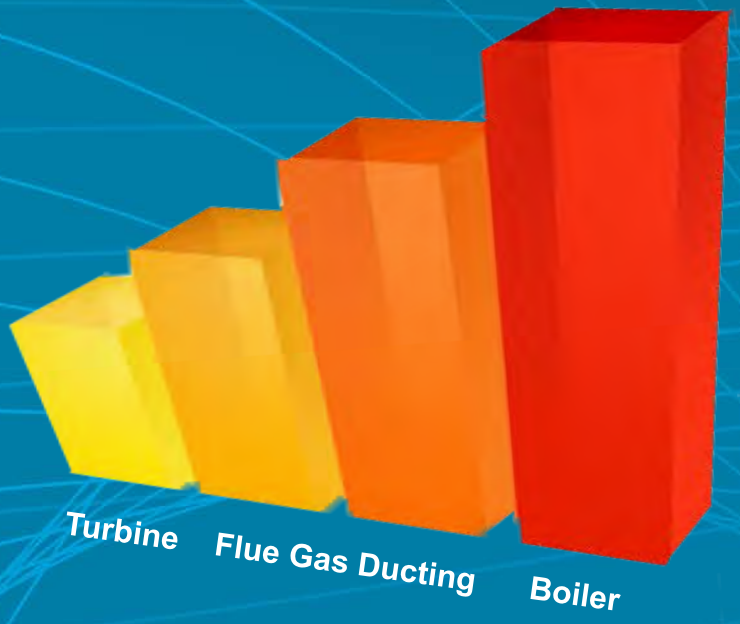


Figures from 2009 - 2010

Data Source: 2010 Electrical Power Research Institute, Program on Technology Innovation: *Integrated Generation Technology Options*

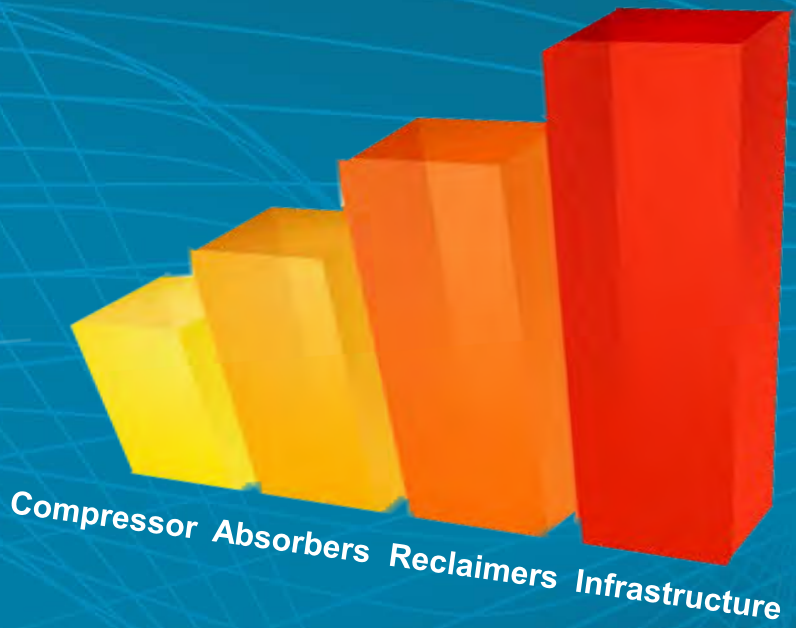
Current Project Cost Breakdown

Unit 3 Power Plant Refurbishment



Initial estimate $326M CND
Anticipated 8% overage

New CCS Facility



Actual $860M CND
6% under budget

Estimate - Power Plant Key Milestones

Milestone	Current Forecast	Previous Report
All permits Off in Prep for Steam Blows	Apr. 16, 2014	Apr. 11, 2014
Steam Blows Complete	Apr. 27, 2014	Apr. 24, 2014
All permits off - Prep for steam to turbine	May 20, 2014	May 20, 2014
Steam to Turbine	May 28, 2014	May 30, 2014
Unit Synchronization	June 8, 2014	June 7, 2014
50% load Flue Gas & Steam available to CC	June 17, 2014	June 13, 2014

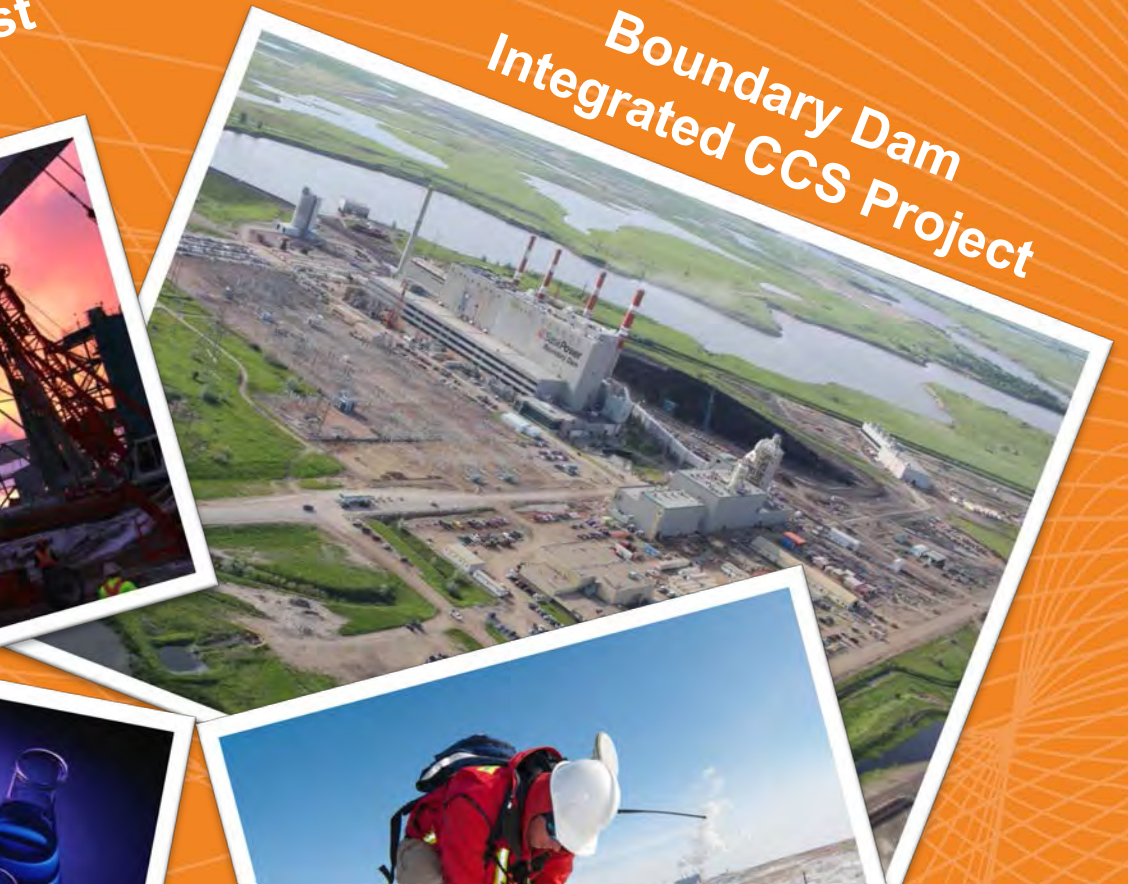
Estimate - Capture Facility Key Milestones

Milestone	Current Forecast	Previous Report
Flush/Clean Amine Systems	Mar. 3, 2014	Mar. 9, 2014
Heat Rejection System Ready	Apr. 24, 2014	Apr. 10, 2014
Water Commission Amine Systems	Apr. 16, 2014	Apr. 16, 2014
Ready for 1st steam	May 16, 2014	New item
First steam and flue gas to Carbon Capture	June 18, 2014	June 13, 2014
Amine Commissioning	June 19, 2014	June 14, 2014
Integrated CCS Commissioning	June 28, 2014	June 24, 2014
First CO_2 to Compressor	June 30, 2014	June 25, 2014
First CO_2 in Pipeline	July 10, 2014	July 5, 2014

Current SaskPower CCS Projects

Shand Carbon Capture Test Facility (CCTF)

Boundary Dam Integrated CCS Project

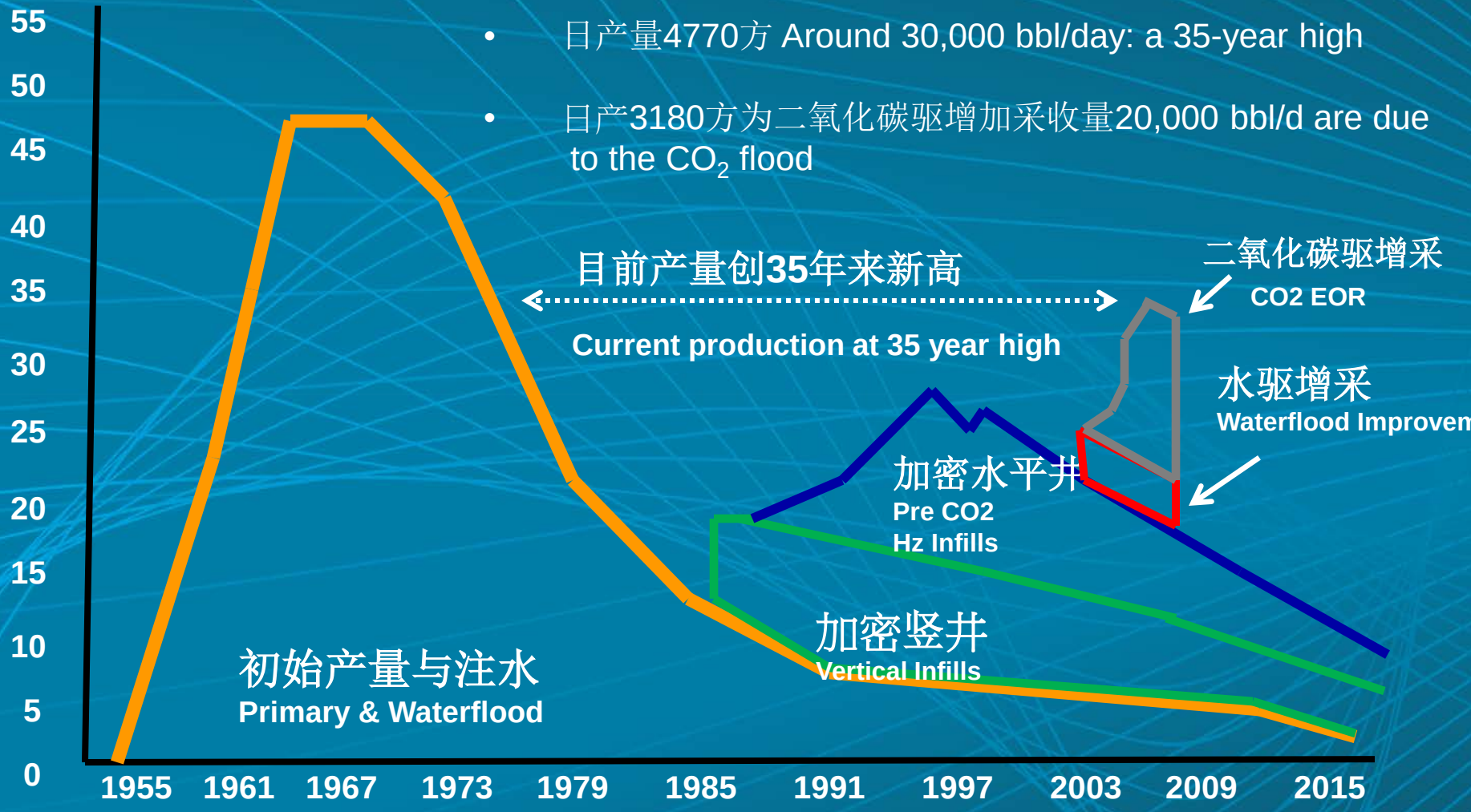


Other Initiatives

Carbon Storage Research Centre

ENHANCED OIL RECOVERY

- 日产量4770方 Around 30,000 bbl/day: a 35-year high
- 日产3180方为二氧化碳驱增加采收量20,000 bbl/d are due to the CO_2 flood



STORAGE

- 二氧化碳深藏于地下**3.4**公里 **(**第一口井已完钻**)** Storing CO_2 3.4 km underground in the Deadwood formation (first well drilled)
- 管道输送**,** 距离现场**4**公里以内电厂范围内 Pipeline to site less than 4 km away
- **2013** 年工业示范准备就绪 Pilot underway in 2013
- 石油技术研究中心负责监测二氧化碳封存 PTRC will monitor the CO_2

萨斯喀彻温省：碳捕集，利用与封存技术创新的中心
Saskatchewan: A Centre of CCUS Innovation

- 萨斯喀电力 碳捕集与封存综合工业示范项目 Integrated Carbon Capture & Sequestration Demonstration Project
- 萨斯喀电力碳捕集技术验证设施 Saskatchewan Carbon Capture Test Facility
- 韦本-米达尔国际能源署CO_2 监测与封存工业示范项目 **IEA** Weyburn-Midale CO_2 Monitoring & Storage Project
- **3400**米咸水层CO_2深度封存工业示范项目 Aquistore –Deep Saline CO_2 Storage Demonstration (3,400m)
- 重油藏CO_2 驱油与封存示范项目
- CO_2 EOR / Sequestration piloting in Heavy Oil Reserves (SRC/Husky Energy）
- 加拿大与中国共同领导二氧化碳地质封存国际标准制定
- Standard Council of Canada is co-leading with China developing ISO standards for CCS （TC 256)
- 加拿大石油技术研究中心 **Petroleum Technology Research Centre (PTRC)**
- 萨省研究院 Saskatchewan Research Council (SRC)

The world’s first coal-fired post-combustion CCS facility.

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