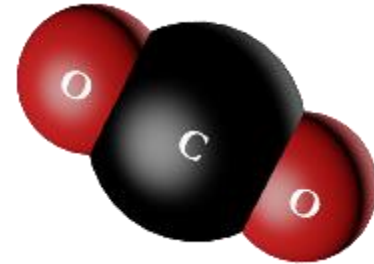


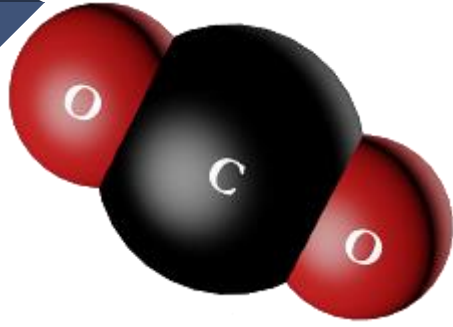
NPPD Carbon Project / Monolith Update



John Swanson
Generation Strategies Manager
Nebraska Public Power District (NPPD)

Power Summit October 19, 2019

Topics



- Background
- Department of Energy (DOE) Projects
 - Carbon Capture (C3DC) Phase 1
 - Carbon Capture (C3DC) Phase 2
 - CarbonSAFE Phase 1 and 2
- Monolith Update



Commercial Carbon Capture Design and Costing (C3DC) Phase 1

- C3DC is an ongoing, DOE funded, project for the design of a 300 MW slipstream CO₂ capture plant at Gerald Gentleman Station (GGS) Unit 2
- ION Clean Energy (ICE), Sargent & Lundy, Koch Modular Systems, and NPPD staff
- Engineering effort is focused on an integrated design
- Results expected 4th Quarter 2019



Commercial Carbon Capture Design and Costing (C3DC) Phase 2

- “Commercial Carbon Capture Design & Costing: Part 2 (C3DC2)”
 - Awarded September 2019
- Integrated design for a 600 MW CO₂ capture plant on GGS Unit 2
- Project Period of Performance: October 1, 2019 – March 31, 2021
- Funding
 - DOE-NETL: \$4,593,486
 - ION & Partners: \$1,148,372



C3DC2 Study Project Team and Roles



ION Clean Energy

- Award Recipient
- Technology Developer
- Process Design and Project Management



Koch Modular Process Systems

- Carbon Capture pilot experience and expertise
- Capture Process Oversight, Design and Costing



Nebraska Public Power District
Always there when you need us

Nebraska Public Power District

- Host Site (GGS)
- Power Generation Engineering, Operational and Financial Expertise



Siemens (Formerly Dresser-Rand / Ramgen)

- Compressor Technology Provider
- Supersonic CO₂ Compressor Design & Costing



Sargent and Lundy

- World Renowned Engineering Firm
- Conducted the Petra Nova FEED
- All Balance of Plant Engineering
- Overall Cost Estimate Development

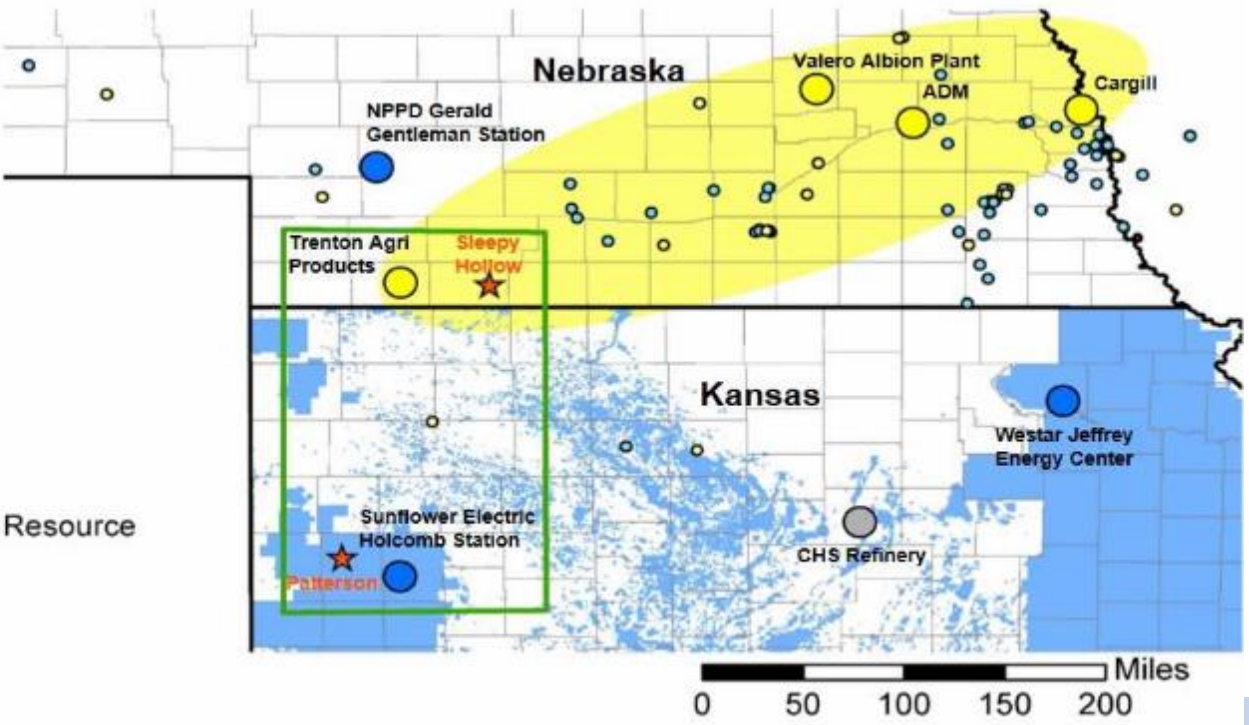
CarbonSAFE Phase 2

- DOE funded program for CO₂ stacked storage (CO₂ sequestration and enhanced oil recover in the same field) and a CO₂ pipeline
- Battelle National Labs in Columbus, Ohio, is the principle investigator
- Team consists of petroleum companies, ethanol plants, power plants
- Meeting with NDEE, NO&GCC, NPPD to discuss CO₂ options in Nebraska

CarbonSAFE Phase 2

Legend

- Participating Power Plant
- Participating Ethanol Facility
- Other Participating Source
- Other Ethanol Facility
- Other Sources
- Ethanol Source Corridor
- Stacked Storage Corridor
- ★ Study Area
- Oil Resource/Stacked Storage Resource
- ▭ State Line
- ▭ County Line



Monolith Update

- ~85% of procured equipment, structural steel, piping, and equipment have arrived at site
- ~50% of construction is complete
- ~300 Fagan craft on site
- Initial production anticipated in the first quarter of 2020
- Electricity demand will increase in late Q1 2020
- First Carbon Black sale in Q2 2020

Q1 = 1st Quarter
Q2 = 2nd Quarter











Monolith Update

Company Overview

- Monolith headquarters is now located downtown Lincoln
- ~70 employees in Nebraska
 - 15 who moved from California to Nebraska
 - Created 55 new jobs
- Only ~10 employees remain in California
- Three locations in Nebraska:
 - Headquarters downtown Lincoln
 - Olive Creek near Hallam
 - Monolith Technical Center
 - State-of-the-Art facility where Carbon Black performance is tested



Sheldon Station Unit 2 Conversion – Current Status

- Babcock & Wilcox (Barberton, OH)
 - Sheldon Station Unit 2 original equipment manufacturer (OEM)
 - Initial designs for firing arrangement and boiler surface
 - Initial emissions profile – needed for permitting
 - Initial arrangement of back-end equipment
- Sargent & Lundy (Chicago, IL)
 - NPPD's owners engineer
 - Responsible for needed permit development
 - Completion of regulatory review
 - Initial design for new fuel lines (HRG/NG) to Sheldon Unit 2 Boiler

Questions?

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