



Energy & Environmental Research Center (EERC)

CCUS Developments on the Northern Great Plains

Annual CO₂ Conference
EOR & Carbon Management Workshop

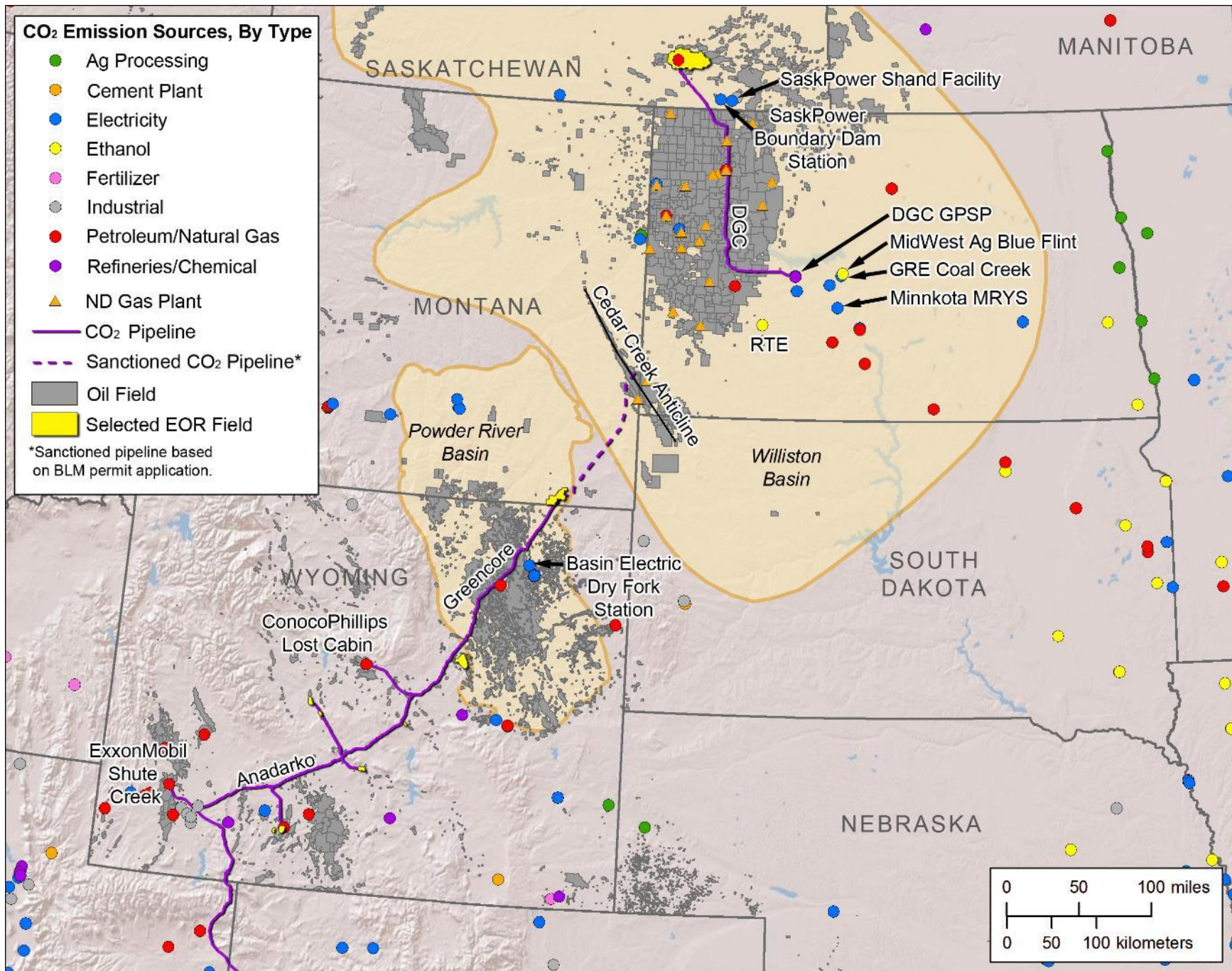
Midland, Texas
December 9, 2019

John Harju – Vice President of Strategic Partnerships

John Hamling – Director for Subsurface Initiatives

Kevin Connors – Assistant Director, Regulatory Compliance & Energy Policy

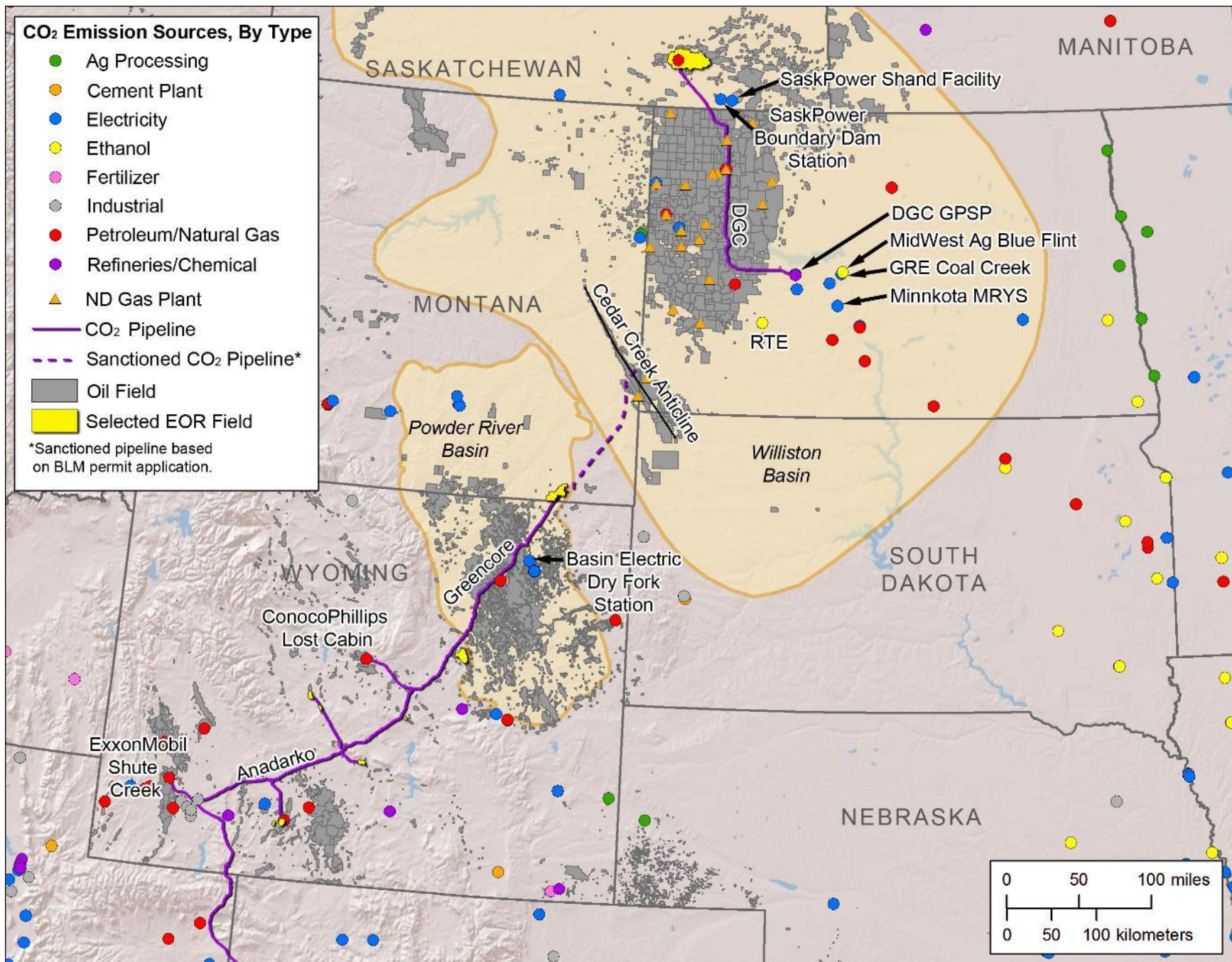




Industrial CCUS Projects

- Basin Electric Power Cooperative, Dakota Gasification Company (DGC) Great Plains Synfuels (commercial)
- Basin Electric Power Cooperative Urea Process Liquefaction Plant (commercial)
- SaskPower Boundary Dam Carbon Capture Project (commercial)
- Exxon Mobil Shute Creek Natural Gas Processing (commercial)
- ConocoPhillips Lost Cabin Natural Gas Processing (commercial)
- Shell Quest CCS Facility* (commercial) – Alberta, Canada

*not pictured.



Announced Industrial CCUS Projects

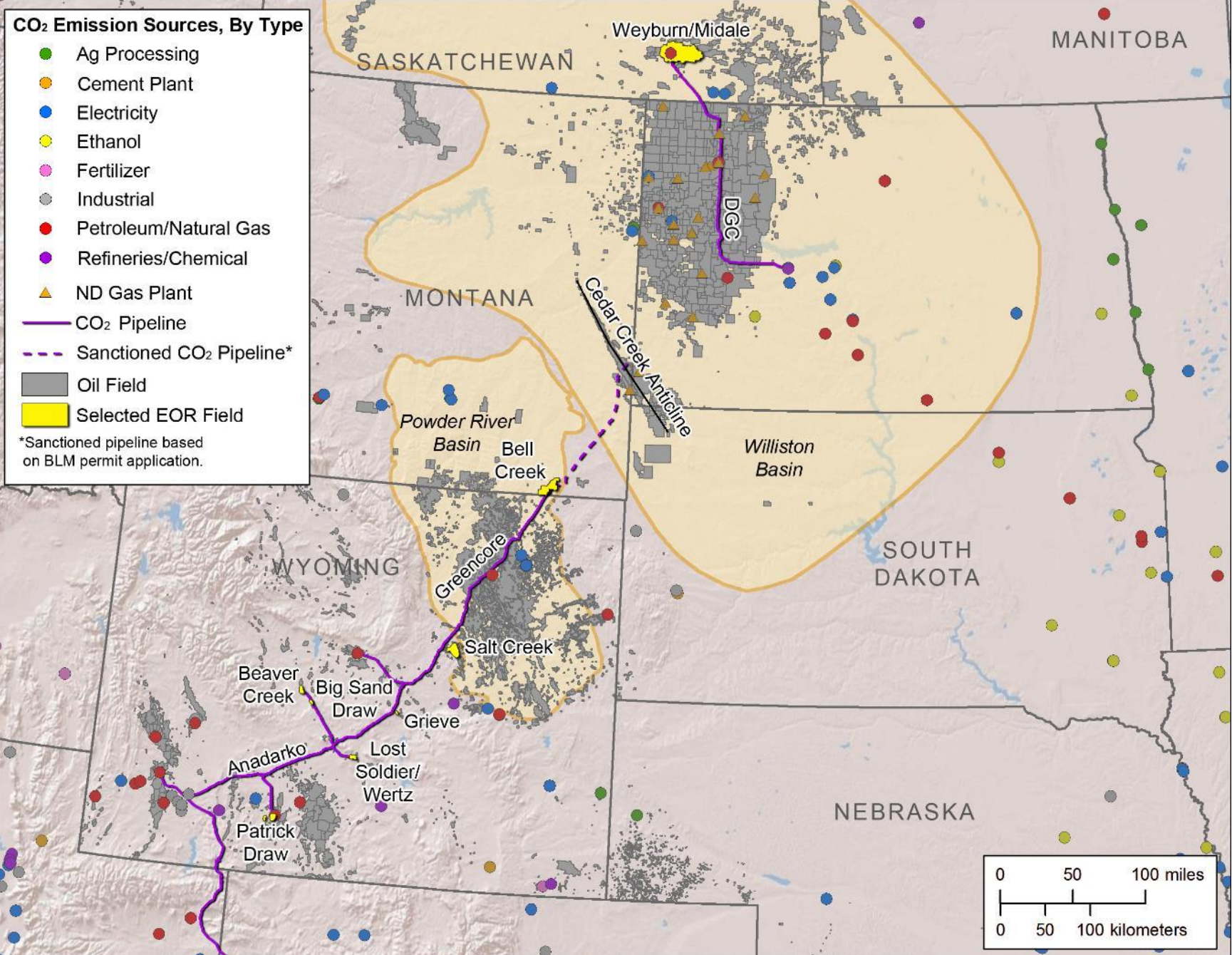
- Red Trail Energy – **Richardton Ethanol Facility** (development/build)
- Minnkota Power Cooperative **Project Tundra** – Milton R. Young Station (precommercial/FEED)
- Basin Electric Power Cooperative Dry Fork Station (precommercialization/FEED)
- Great River Energy **CCS²** – Coal Creek Station (feasibility)
- Midwest AgEnergy – Blue Flint Ethanol Facility (feasibility)
- SaskPower – Shand Power Station (feasibility)
- DGC - Carbon Vault
- Summit Carbon Solutions – Aggregated CO₂ from Biorefineries w/ a Transportation and Storage Hub

CO₂ Transportation Network

CO₂ Emission Sources, By Type

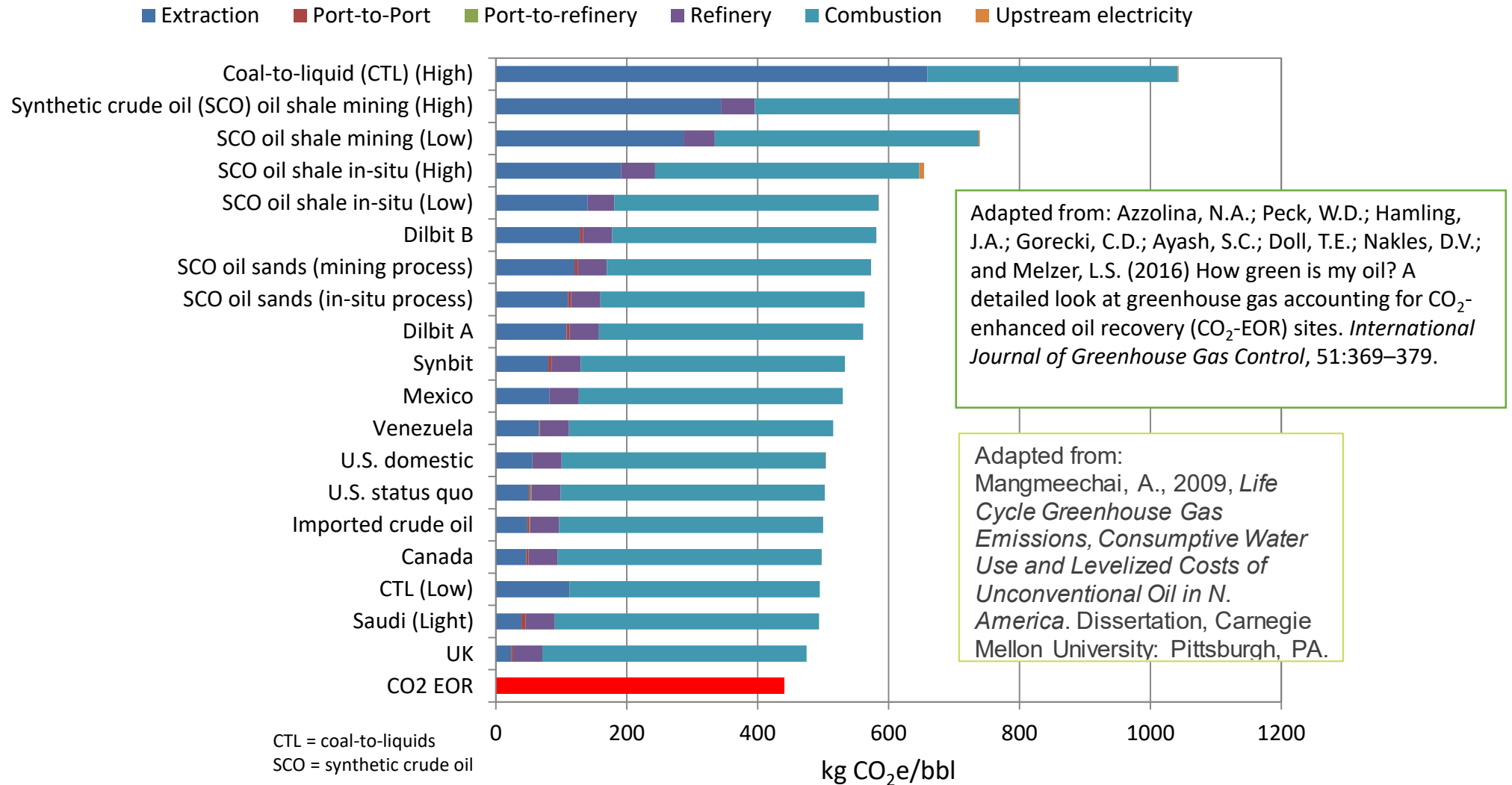
- Ag Processing
- Cement Plant
- Electricity
- Ethanol
- Fertilizer
- Industrial
- Petroleum/Natural Gas
- Refineries/Chemical
- ▲ ND Gas Plant
- CO₂ Pipeline
- - - Sanctioned CO₂ Pipeline*
- Oil Field
- Selected EOR Field

*Sanctioned pipeline based on BLM permit application.



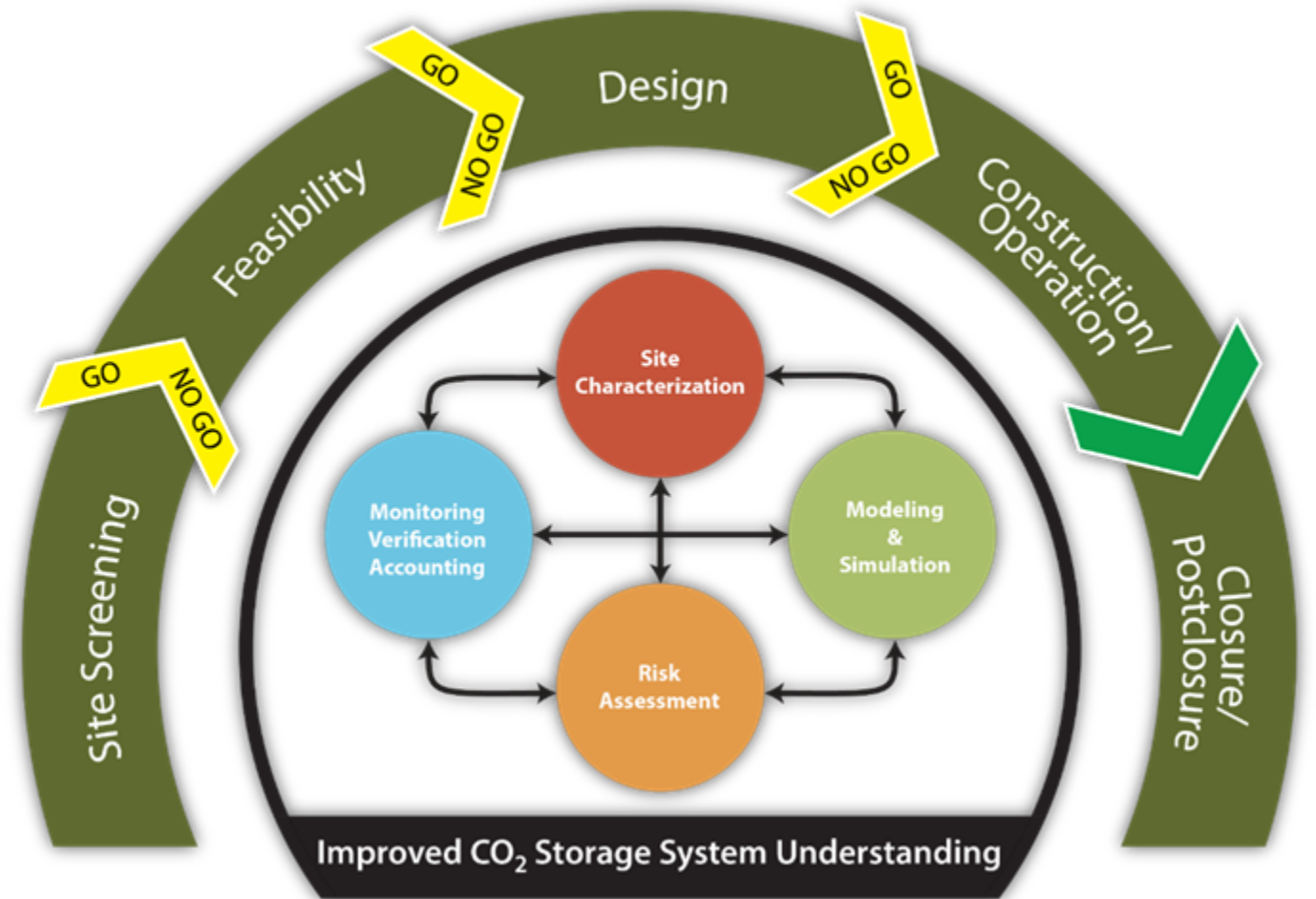
- DGC line (commercial)
 - 205-mile 14" – 12"
- Greencore Pipeline (commercial)
 - 232-mile long 20"
 - (725 MMscf/day)
 - Anadarko CO₂ pipeline interconnect
- Greencore Pipeline expansion (sanctioned)
 - 110-mile expansion to Baker, MT, and Cedar Creek Anticline
- North Dakota industrial sources line(s) (conceptual)
- DGC food-grade truck facility (commercial)

Life Cycle Analysis Results Indicate EOR with Captured CO₂ from Anthropogenic Sources Results in Lower-Carbon-Intensity Oil



ADAPTIVE MANAGEMENT APPROACH TO PROJECT IMPLEMENTATION

- Staged approach to manage uncertainty and inform investment strategy.
- Implementation can be accelerated.
 - Higher investment needed at lower levels of confidence
 - Concurrent vs. sequential development
 - Balance financial and technical risk.
 - Site qualification
 - Permitting
 - Investment
 - Lost revenue/opportunity
 - 45Q start of construction



GENERALIZED TIMELINE TO IMPLIMENT GEOLOGIC CO₂ STORAGE

