



CCUS Deployment Training

USEA

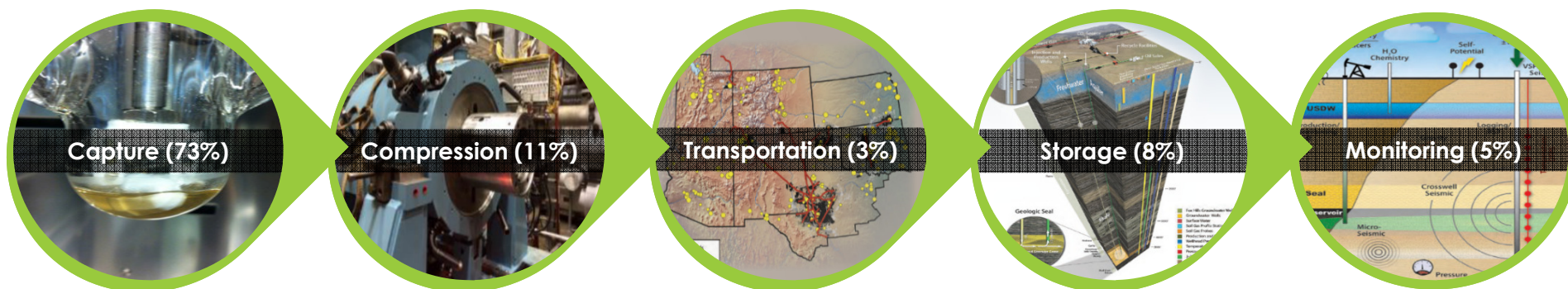
Lynn Brickett

Carbon Capture- Program Manager

Office of Clean Coal and Carbon
Management, Office of Fossil Energy

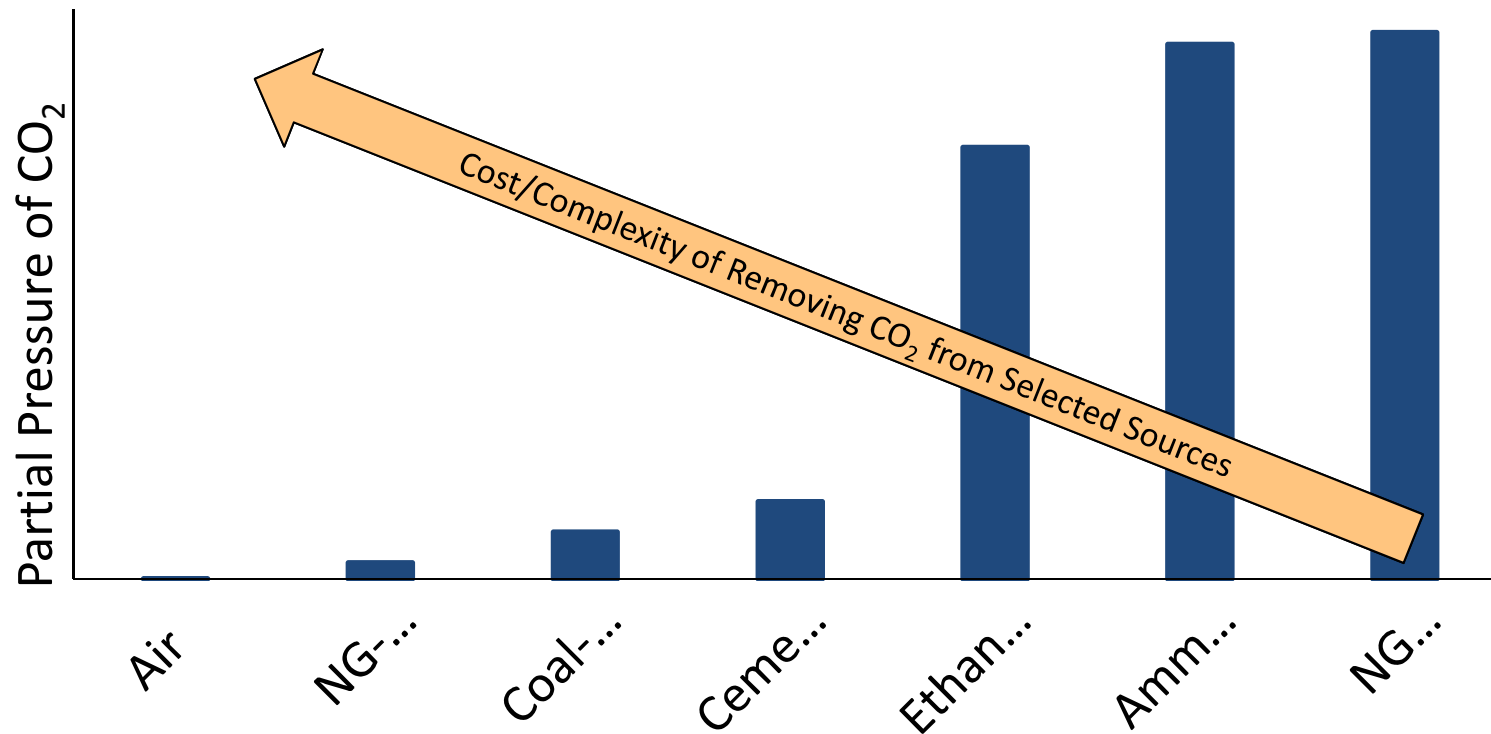
January 24, 2020

Carbon Capture and Storage Value Chain



Source: NETL, Cost and Performance Baseline for Fossil Energy Plants, Revision 3, July 2015

CO₂ PARTIAL PRESSURE AND CAPTURE COST

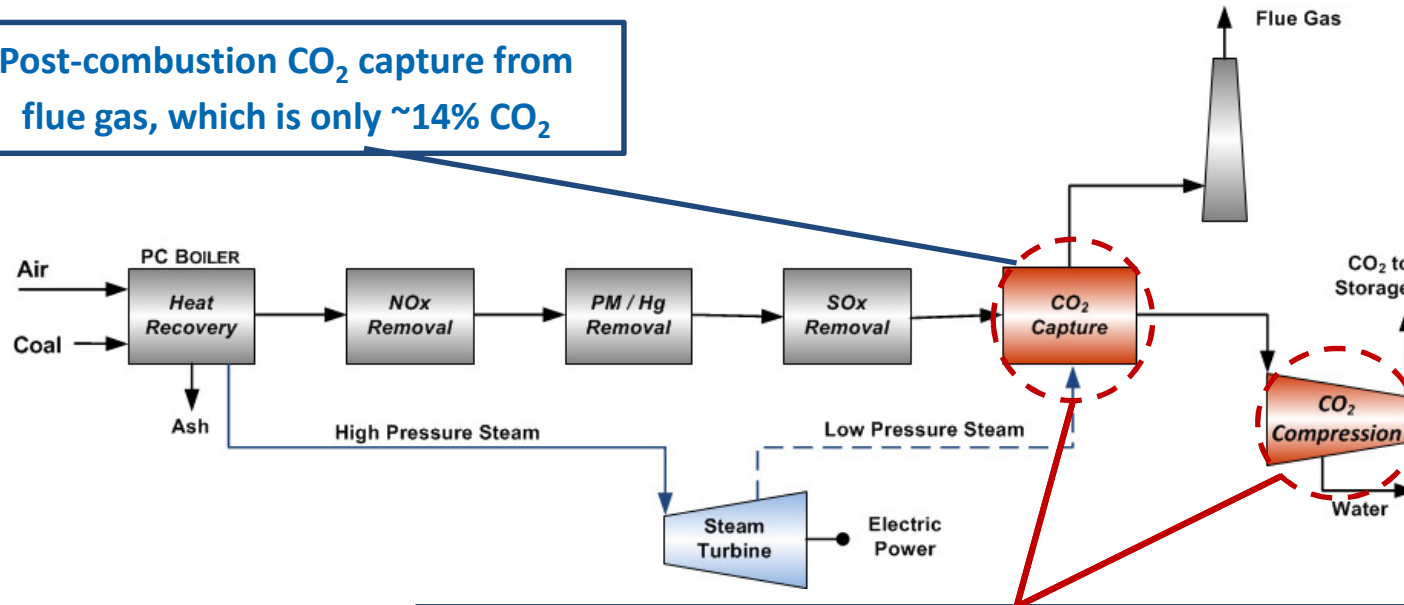


Cost of Capturing CO₂ from Industrial Sources, January 10, 2014, DOE/NETL-2013/1602



POST-COMBUSTION PROCESS CONFIGURATION

Post-combustion CO₂ capture from flue gas, which is only ~14% CO₂



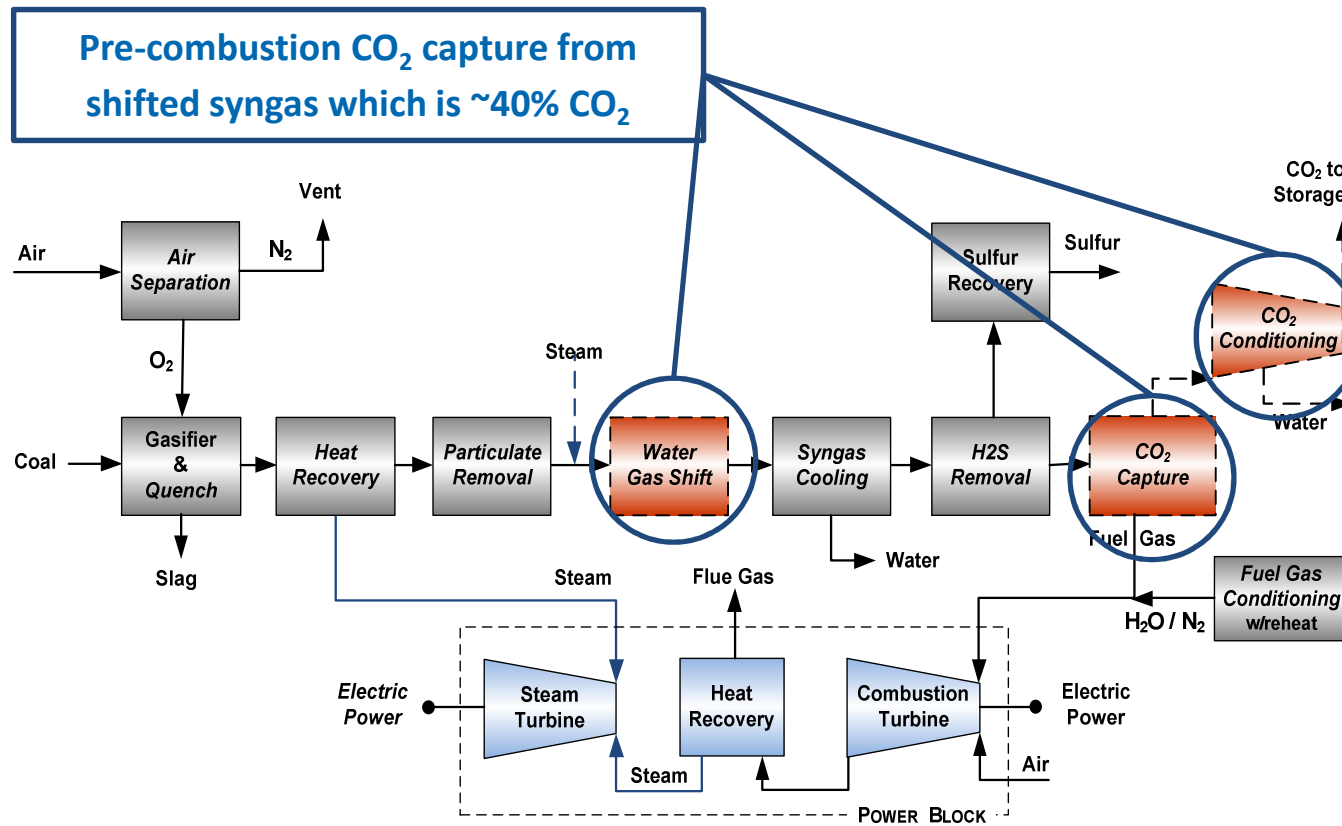
Two-step separation process requiring 5 energy inputs:

$$\text{Energy} = Q (\text{sensible}) + Q (\text{reaction}) + Q (\text{stripping}) + W (\text{process}) + W (\text{compression})$$

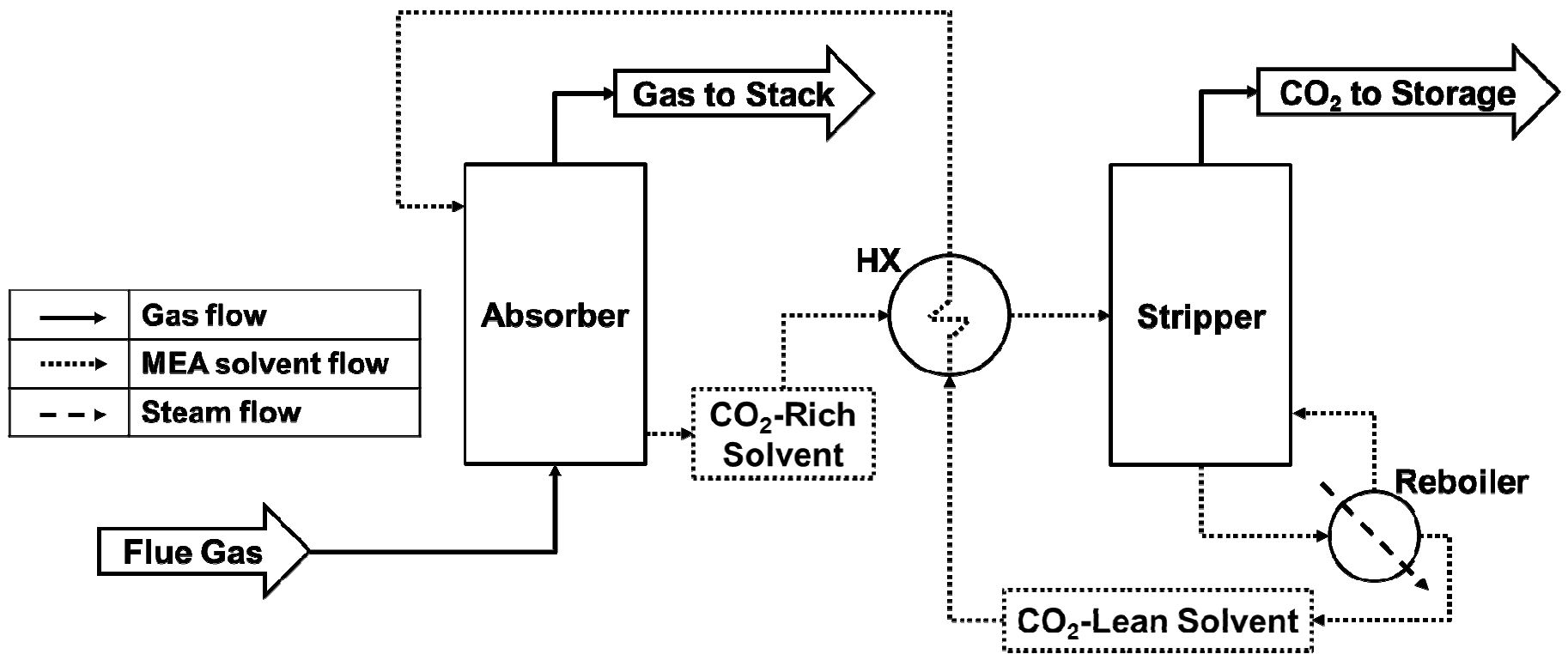
ALL must be reduced in order to significantly reduce Capture COE impact!



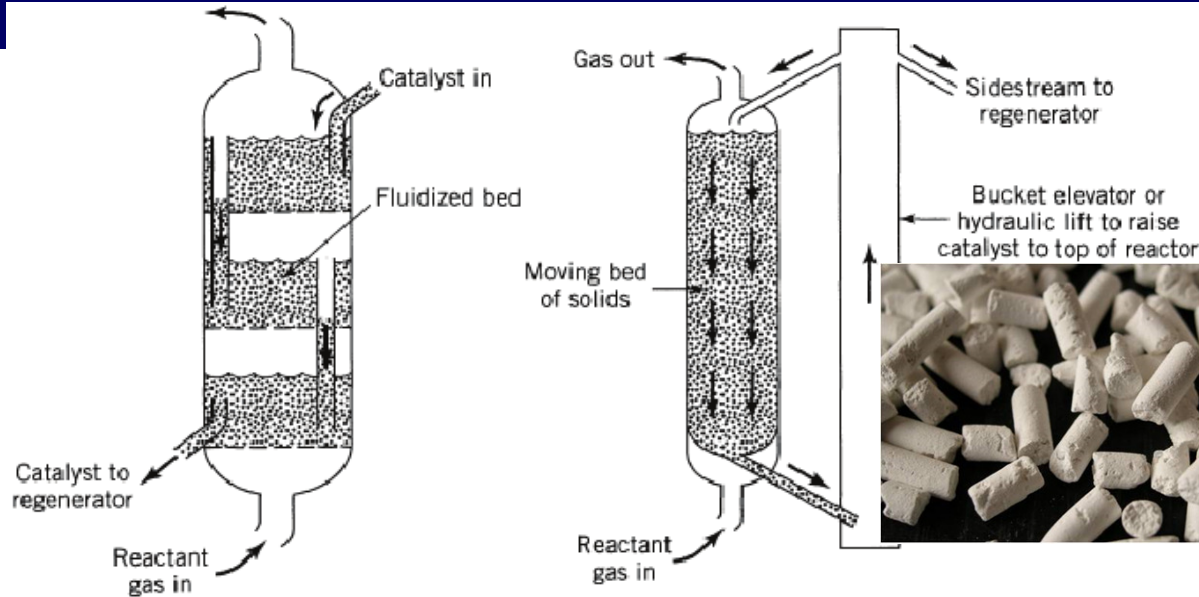
IGCC PROCESS CONFIGURATION



SOLVENT CAPTURE PROCESS



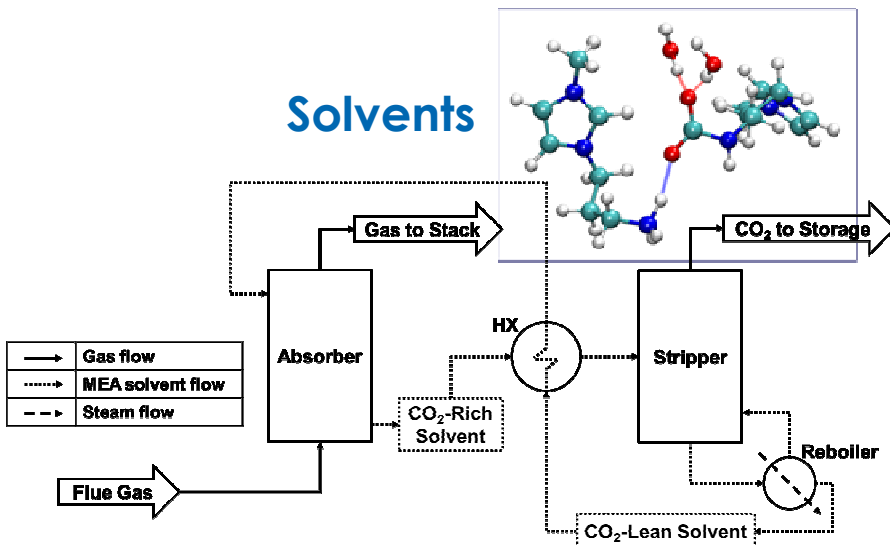
CAPTURE = MATERIALS + SPECIFIC PROCESS



Sorbents



Membranes



Flat Sheet Membrane

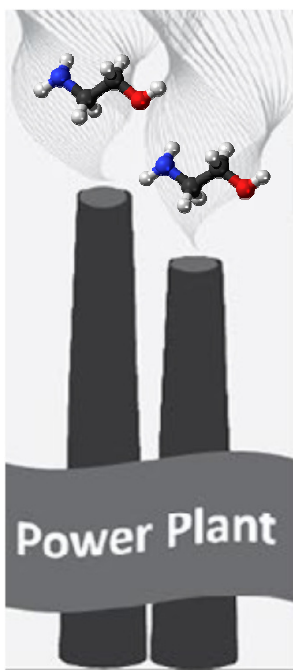


Hollow fiber membrane

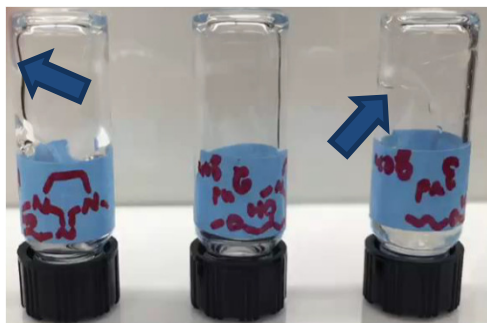


Carbon Capture Program Specific Challenges

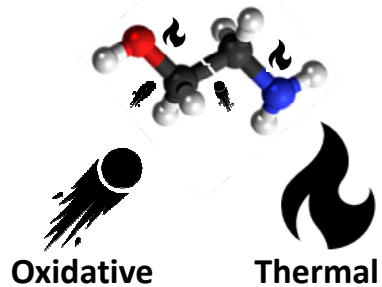
Aerosols



Viscosity



Degradation



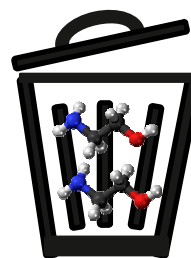
Attrition



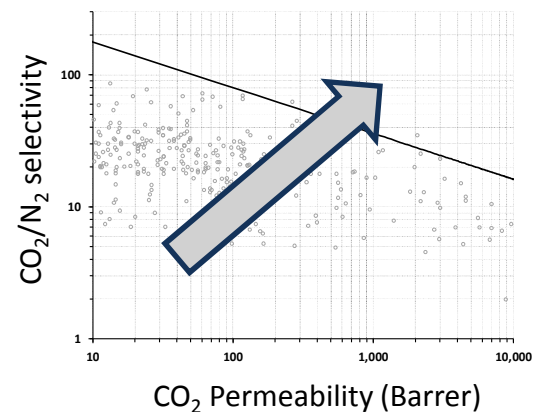
Corrosion



Disposal & Loss



Selectivity and Flux



Lloyd M. Robeson, *Journal of Membrane Science*, 320, 2008, 390-400



CARBON CAPTURE PROGRAM ADDRESSING LARGER-SCALE CHALLENGES



**NATIONAL CARBON
CAPTURE CENTER**

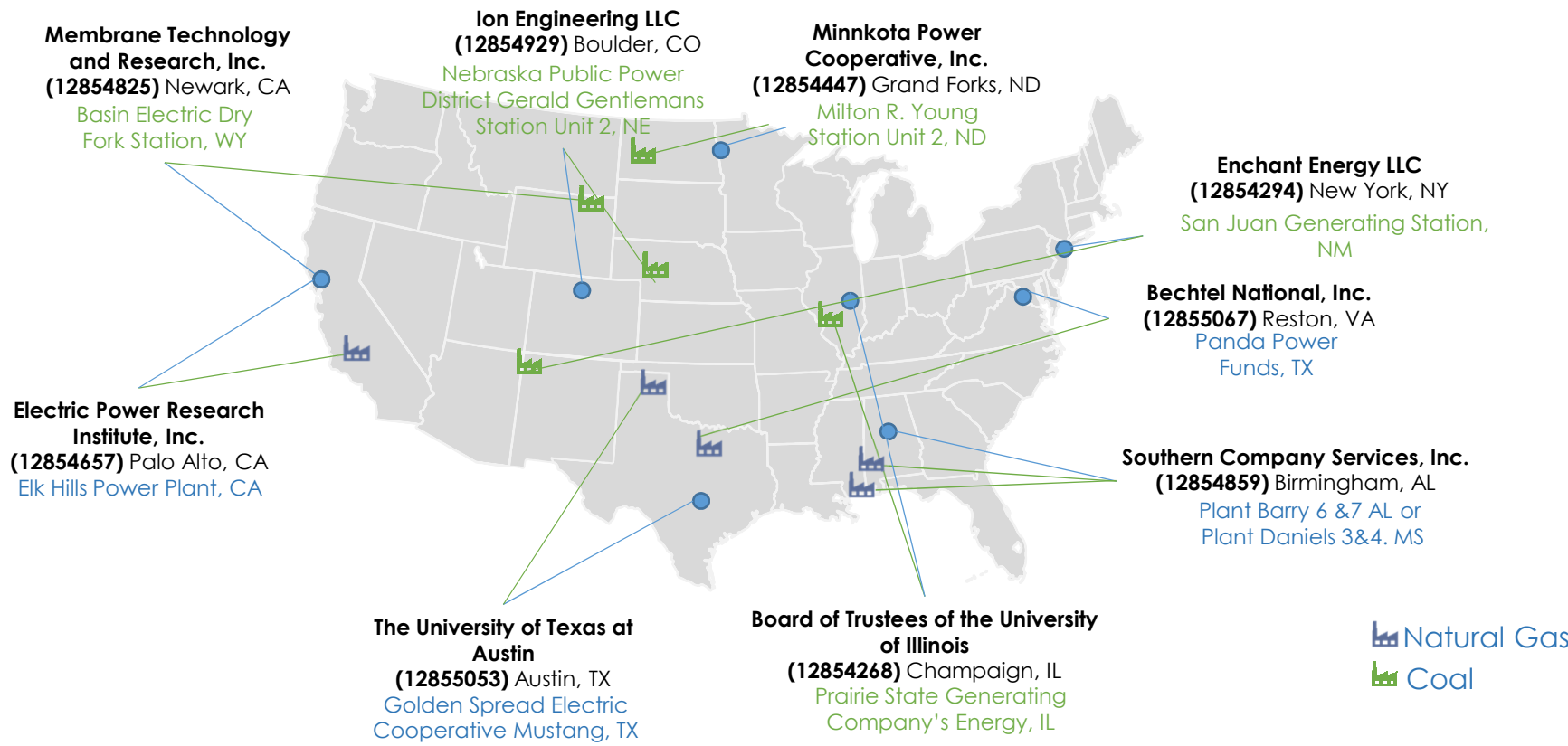


SMALL PILOTS



LARGE PILOTS

CARBON CAPTURE FRONT-END ENGINEERING DESIGN (FEED) STUDIES

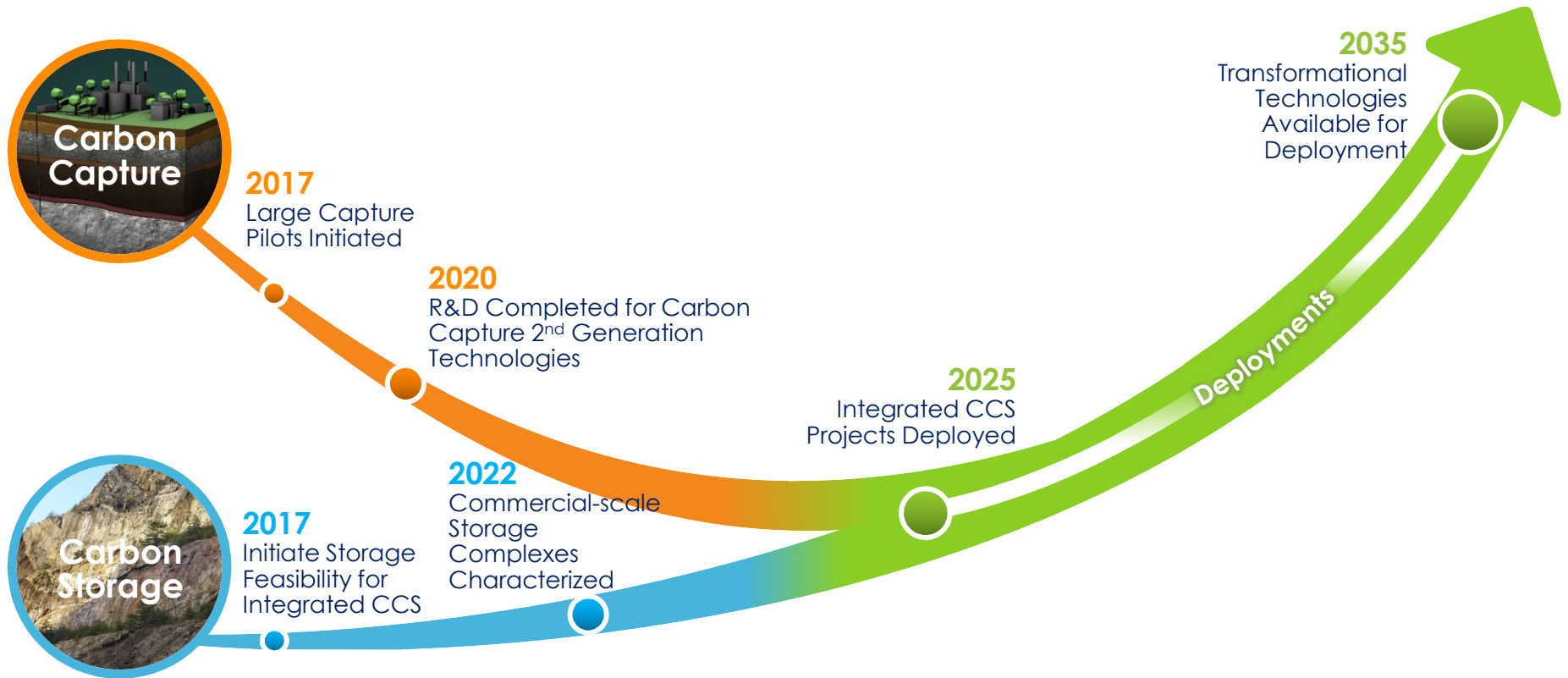


Applicant Locations and Host Sites



FUTURE COMMERCIAL-SCALE DEPLOYMENT

Integrated R&D Approach





Thank You

Questions?

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