



Carbon Capture Technology for New and Existing Fossil Plants

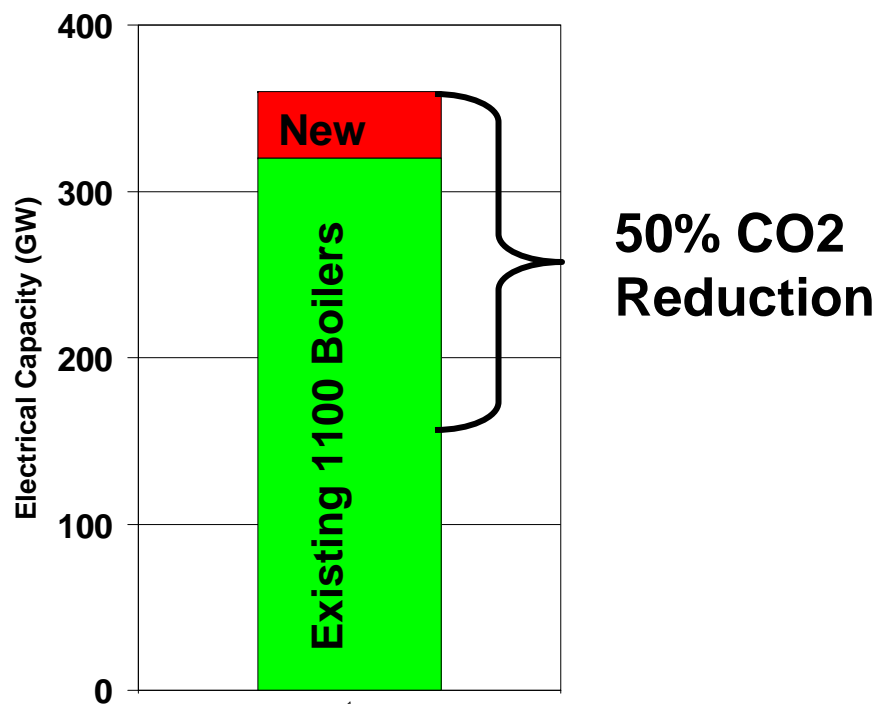
**ADA Environmental Solutions
(NASDAQ:ADES)
A Leader in Clean Coal Technology**

**ADA-Environmental Solutions
8100 SouthPark Way Unit B
Littleton, CO 80108
303 734-1727**

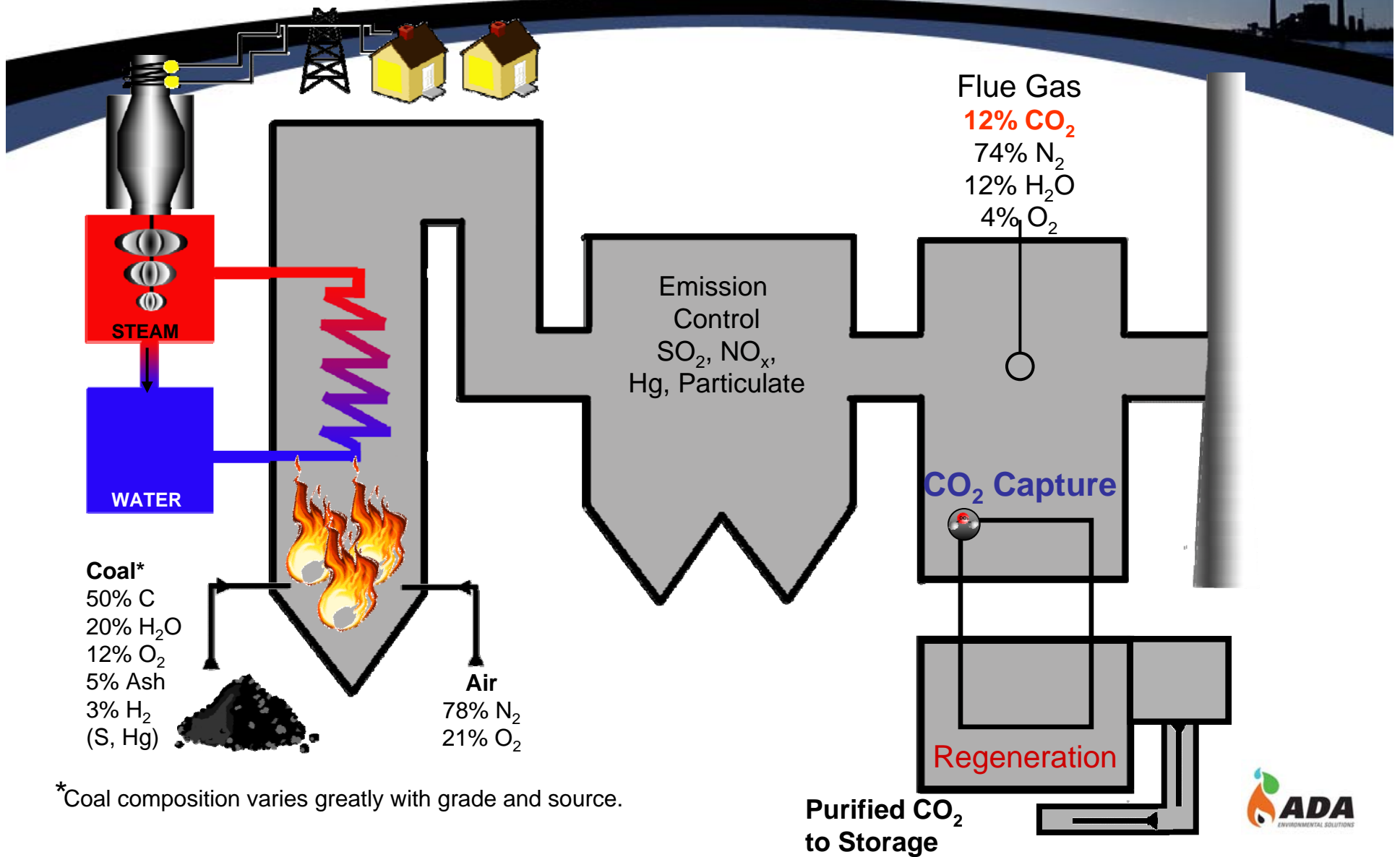


Carbon Capture and Storage (CCS) for the Existing Fleet

- International, Federal, and State Regulations are being proposed requiring 50% to 80% reduction in CO₂ emissions
- Requires development of technology to capture carbon from existing plants



Post-Combustion CO₂ Capture



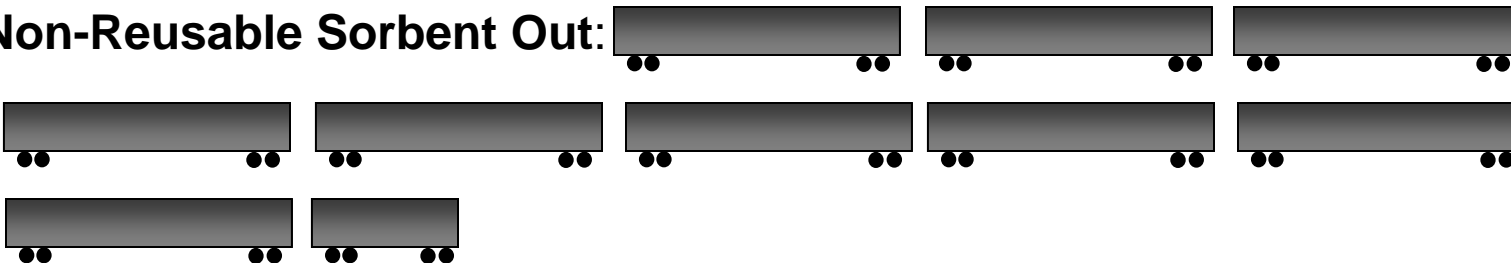
*Coal composition varies greatly with grade and source.

Why Are Regenerable Sorbents Necessary?



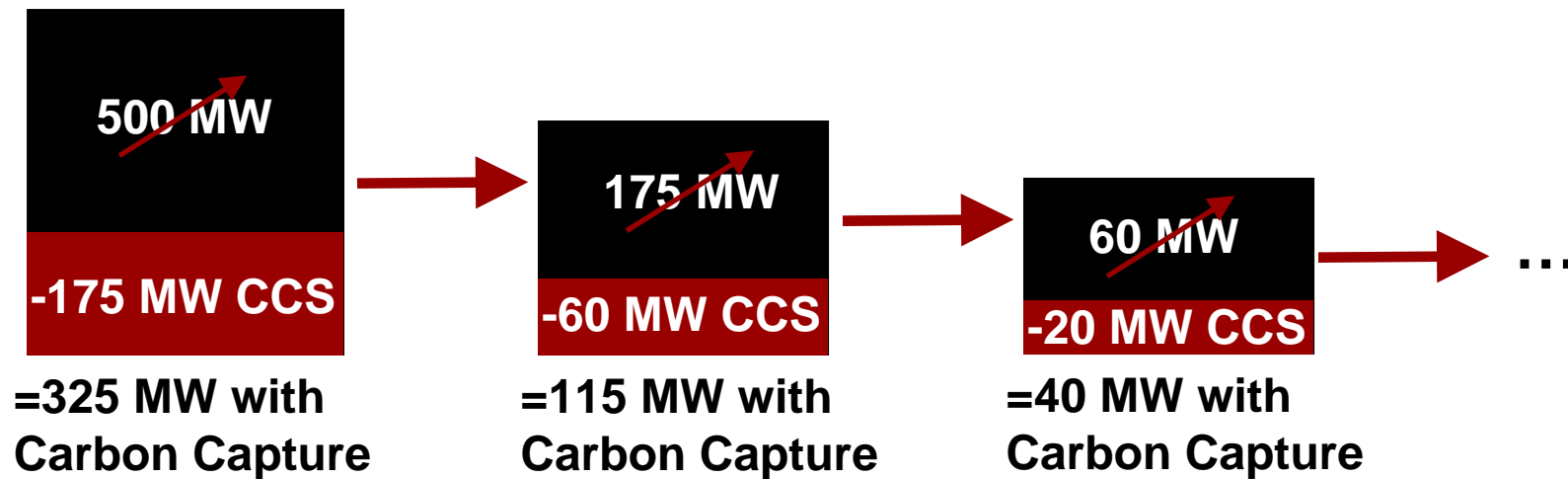
Coal In: 

CO₂ Out: 

Non-Reusable Sorbent Out: 

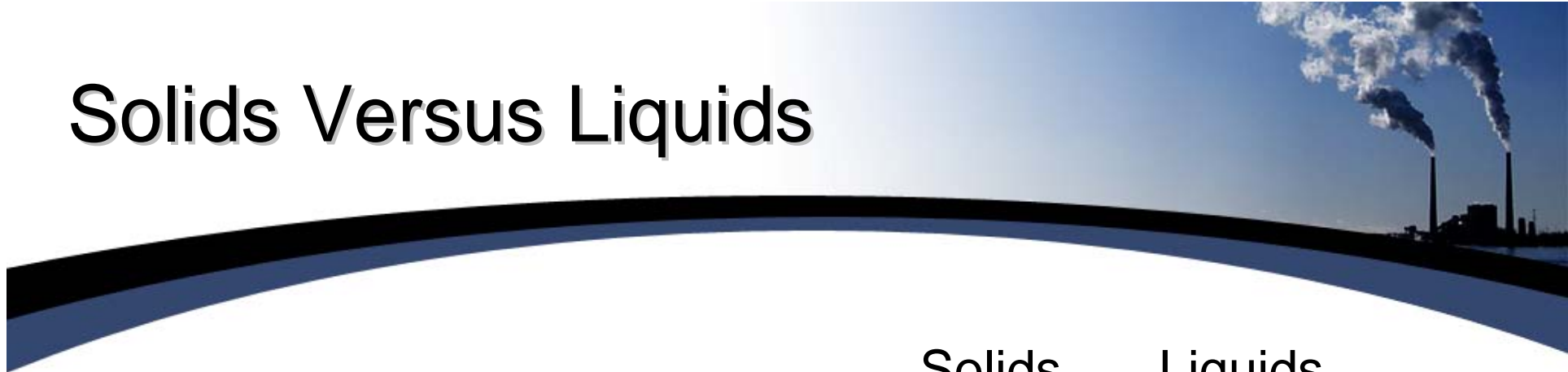
Energy Costs for Carbon Capture

Aqueous MEA May Require Up to 35% of the Plant's Power



Reducing the Energy Penalty is Key

Solids Versus Liquids



Solids

Liquids

No Energy Loss Due to Evaporation



Less Energy Required to Heat Material



Higher Concentration of Active Chemical



Interferences

Depends

SO₂

DOE NETL Phase I Project: 2-year \$3.4M Feasibility Study

Cost Share Participants

- ADA (Prime Contractor)
- AEP
- Ameren
- EPRI
- Luminant
- North American Power
- Southern Company
- Xcel Energy

DOE Cooperative Agreement: DE-NT0005649



Phase I Project Approach

Dual Focus Viability Assessment



Sorbents

- 1st Generation Screening
- 2nd Generation Screening
- Bench-Scale Testing



Equipment

- Survey & Assessment
- Costs & Impacts
- Design
 - 500 MW Conceptual
 - 1MW Detailed

Sorbent Assessment Task

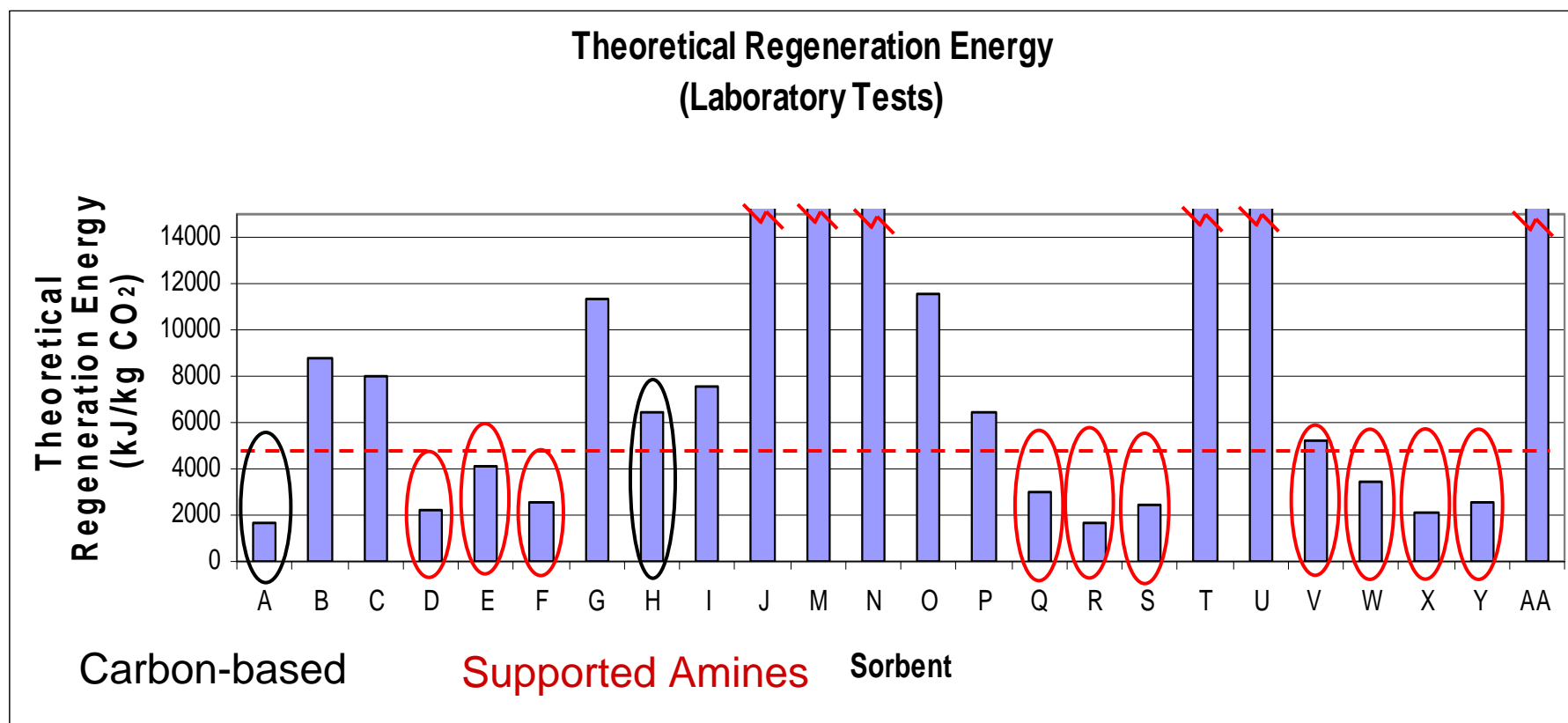
- **Screening** at lab-scale (< 3g sorbent) on simulated and actual flue gas (20 to 30 materials)
- Supplemental sorbent characterization tests in lab (Scale-up candidates)
- **Parametric testing** at bench-scale (~ 100 lbs sorbent)

3 test sites:

- *Xcel Energy Sherco: scrubbed PRB,*
- *Alabama Power Gaston: scrubbed bituminous,*
- *Luminant Martin Lake: scrubbed lignite*

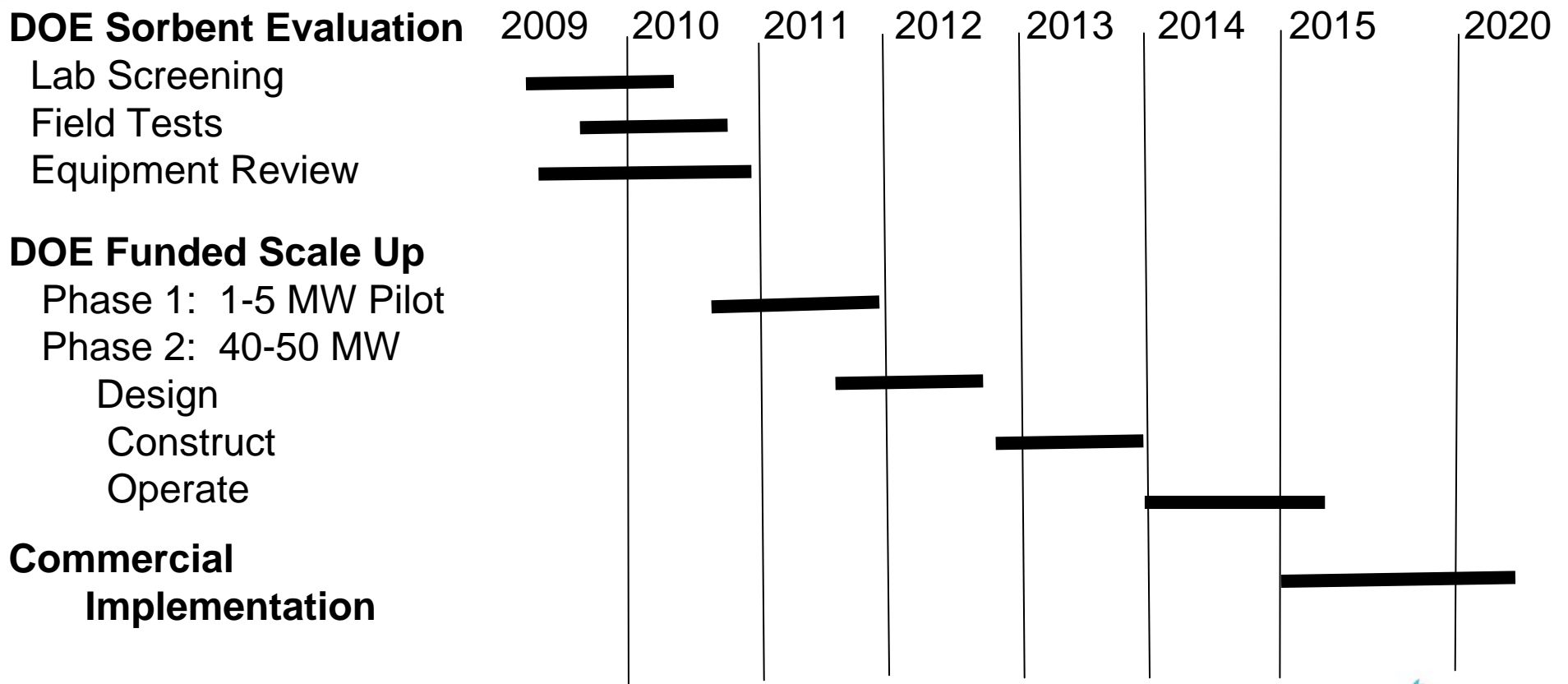
Is $\geq 90\%$ CO₂ capture **continuously** achievable ??

Laboratory Screening Results



Sorbents A through J tested through EPRI contract

Commercialization of Carbon Capture Technology





Creating a Future with Cleaner Coal

Michael Durham, Ph.D., MBA
President and CEO, ADA Environmental Solutions
miked@adaes.com
(303) 734-1727

