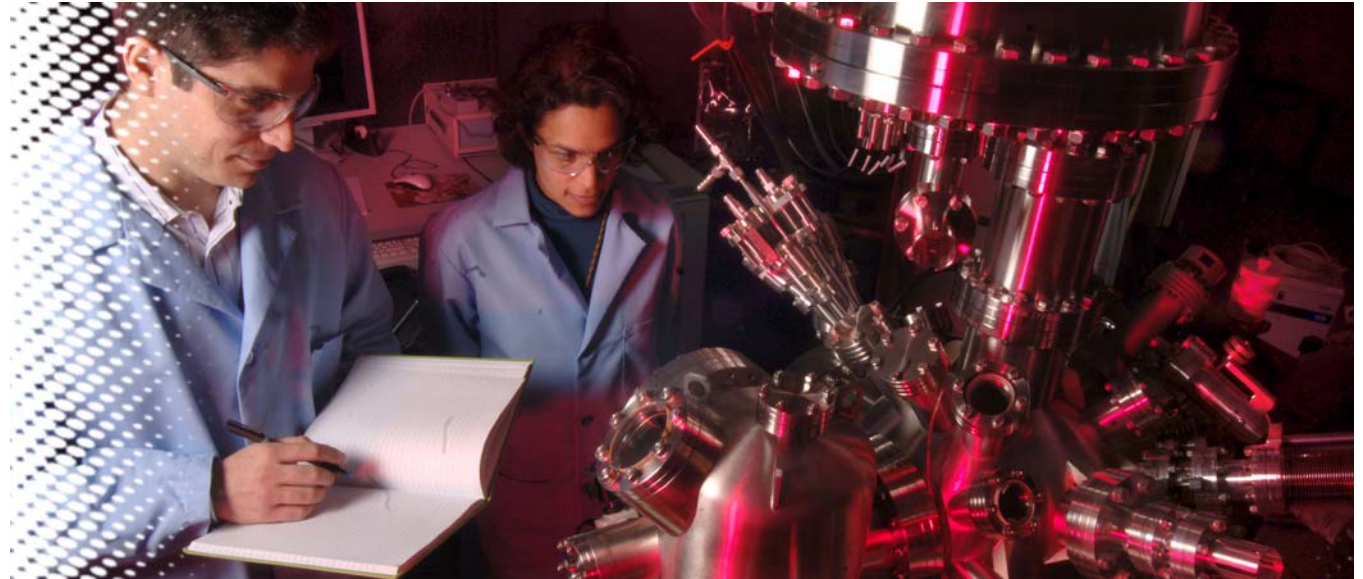




NATIONAL ENERGY TECHNOLOGY LABORATORY



NARUC Summer Meeting 2008

Climate Change Panel – Tom Sarkus



Comparison of Coal-Based Power Generation Platform Technologies

- **Pulverized Coal (PC) Boilers**
 - Commercialized in 1920s-1930s
 - 5000 units world-wide; >1100 in US
 - Unit sizes up to ~1400 MW
- **Fluidized Bed Combustion (FBC) Boilers**
 - Commercialized in 1970s-1980s
 - 500 units world-wide; 150 in US
 - Unit sizes up to ~300 MW
 - Costs ~5-10% higher than PC units
- **Integrated Gasification Combined-Cycle (IGCC) Power Plants**
 - Commercialized in 1980s-1990s
 - 7 coal-based units world-wide; 2 in US
 - Unit sizes up to ~300 MW
 - Costs ~ 10-20% higher than PC units

Technological Carbon Management Options

Pathways for Reducing GHGs -CO₂

Reduce Carbon Intensity

- Renewables
- Nuclear
- Fuel Switching

Improve Efficiency

- Demand Side
- Supply Side

Sequester Carbon

- Enhance Natural Sinks
- Capture & Store

All options needed to:

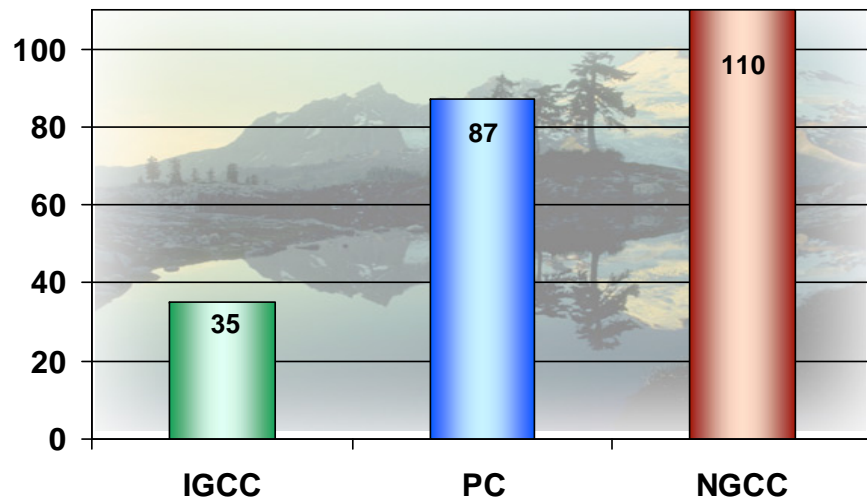
- Affordably meet energy demand
- Address environmental objectives



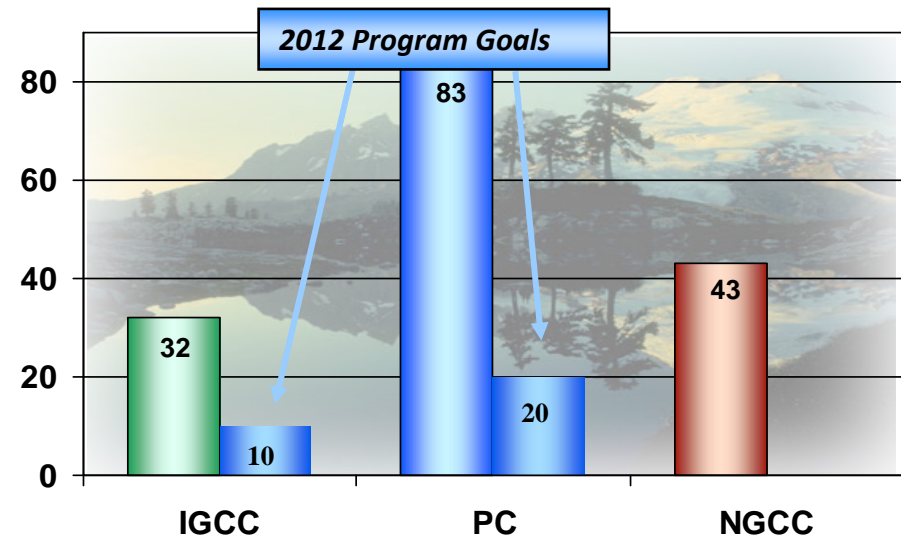
CCS Is Expensive

- 5–30% parasitic energy loss
- 35–110% increase in capital cost
- 30–80% increase in cost of electricity

Effect of CO₂ Capture on Capital Cost
(% Increase Resulting From CO₂ Capture)



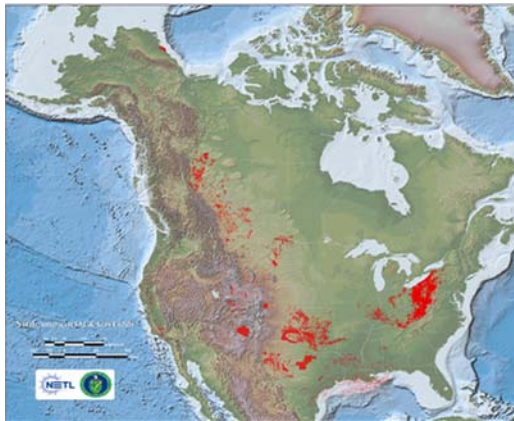
Effect of CO₂ Capture on Cost of Electricity
(% Increase Resulting From CO₂ Capture)



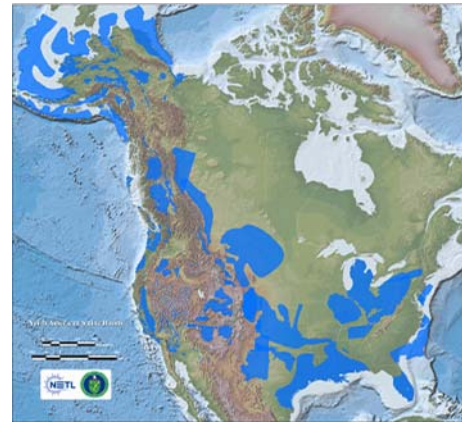
National Atlas Highlights

Adequate Storage Projected

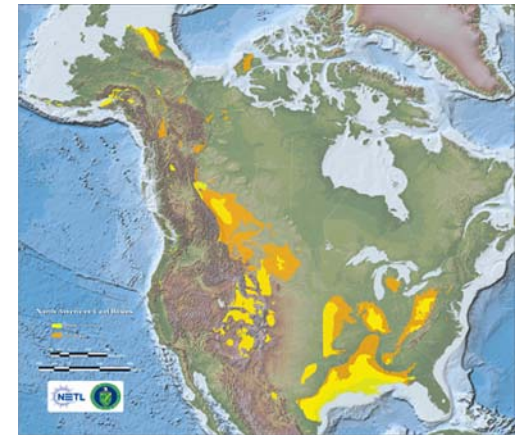
U.S. Emissions ~ 6 GT CO₂/yr all sources



Oil and Gas Fields



Saline Formations



Unmineable Coal Seams

North American CO₂ Storage Potential
(Giga Tons)

*Conservative
Resource
Assessment*

Sink Type	Low	High
<i>Saline Formations</i>	969	3,223
<i>Unmineable Coal Seams</i>	70	97
<i>Oil and Gas Fields</i>	82	83

*Hundreds of
Years of
Storage
Potential*

Available for download at http://www.netl.doe.gov/publications/carbon_seq/refshelf.html