

# Carbon Sequestration R&D



*Annual Regional Carbon  
Sequestration Partnership*

*Review Meeting*

*Dec 13, 2007*

*Sean Plasynski, PhD*

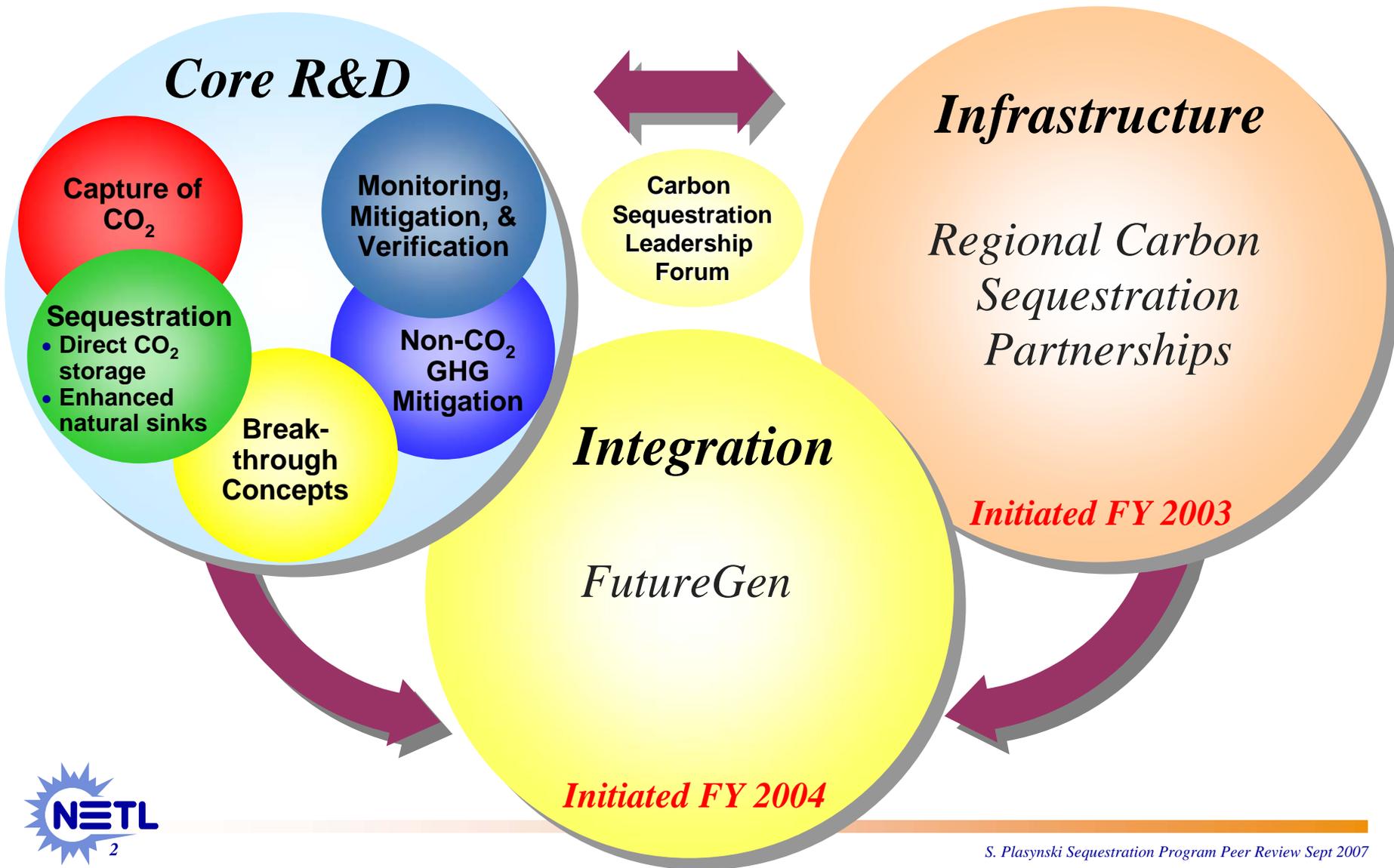
*Sequestration Technology  
Manager*

**National Energy Technology Laboratory**

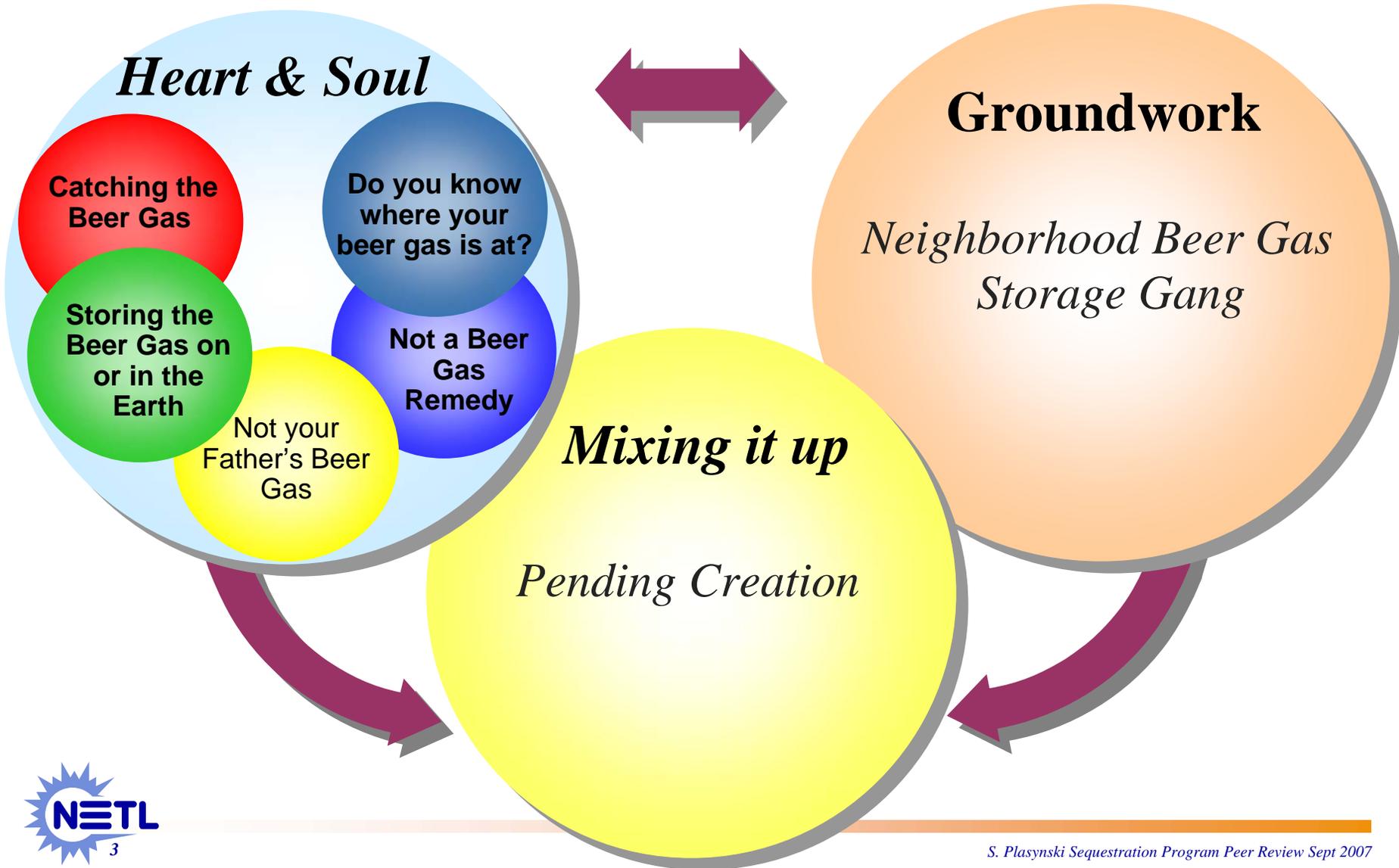
**Office of Fossil Energy**



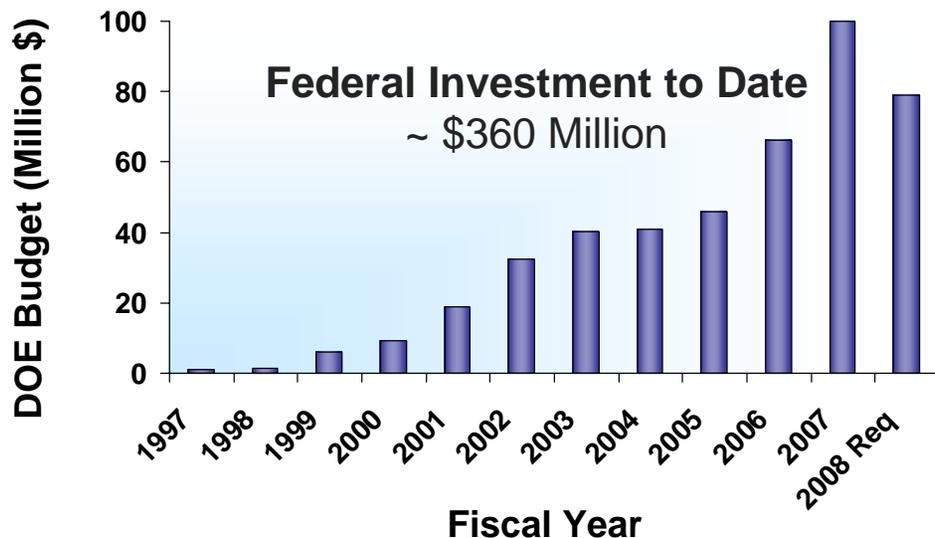
# Sequestration Program Structure



# Carbon Capture & Safe Storage Line-up



# Sequestration Program Statistics FY2007/08



**President Req \$79MM**

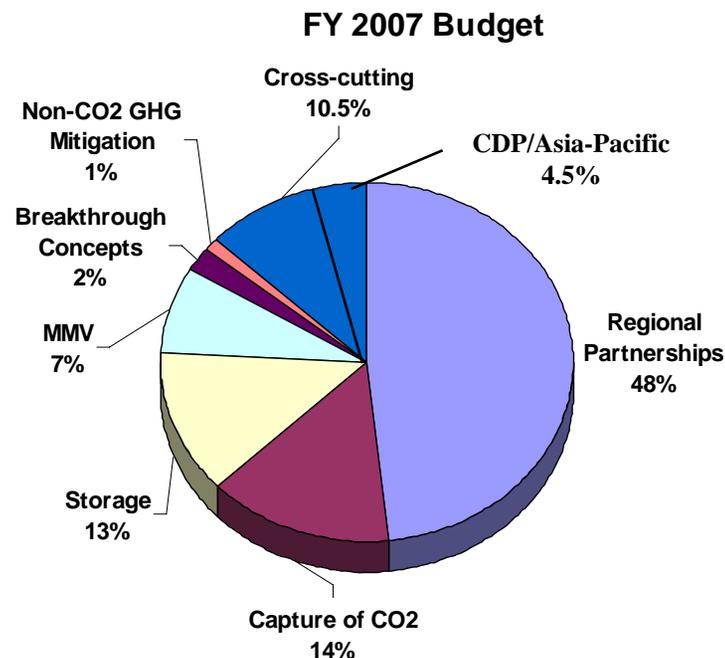
- House/Senate ~\$132 MM
- FY08 currently 2<sup>nd</sup> CR
- 3<sup>rd</sup> CR thru next week?
- Final Budget ?

**Diverse research portfolio**

~ 70 Active R&D Projects

**Strong industry support**

~ 39% cost share on projects



# Program Documentation



Atlas published web (March) & print (May)

- **Updated Web-site**
  - Added FAQ Information Portal
  - Revamped Reference Shelf
- **2006 Roadmap won APEX Award**



# Carbon Sequestration Program Structure

## Core R&D

Capture of CO<sub>2</sub>

Monitoring, Mitigation, & Verification

Sequestration

- Direct CO<sub>2</sub> storage
- Enhanced natural sinks

Break-through Concepts

Non-CO<sub>2</sub> GHG Mitigation



Carbon Sequestration Leadership Forum

## Infrastructure

7 Regional Partnerships

- Engage regional, state, local governments
- Determine regional sequestration benefits
- Baseline region for sources and sinks
- Establish monitoring and verification protocols
- Address regulatory, environmental, & outreach issues
- Validate sequestration technology and infrastructure

*Initiated FY 2003*

## Integration

Power/Sequestration Complex

- First-of-kind integrated project
- Verify large-scale operation
- Highlight best technology options
- Verify performance & permanence
- Develop accurate cost/performance data

*Initiated FY 2004*

# Regional Carbon Sequestration Partnerships

## Characterization Phase

- 24 months (2003-2005)
- \$16M DOE funds

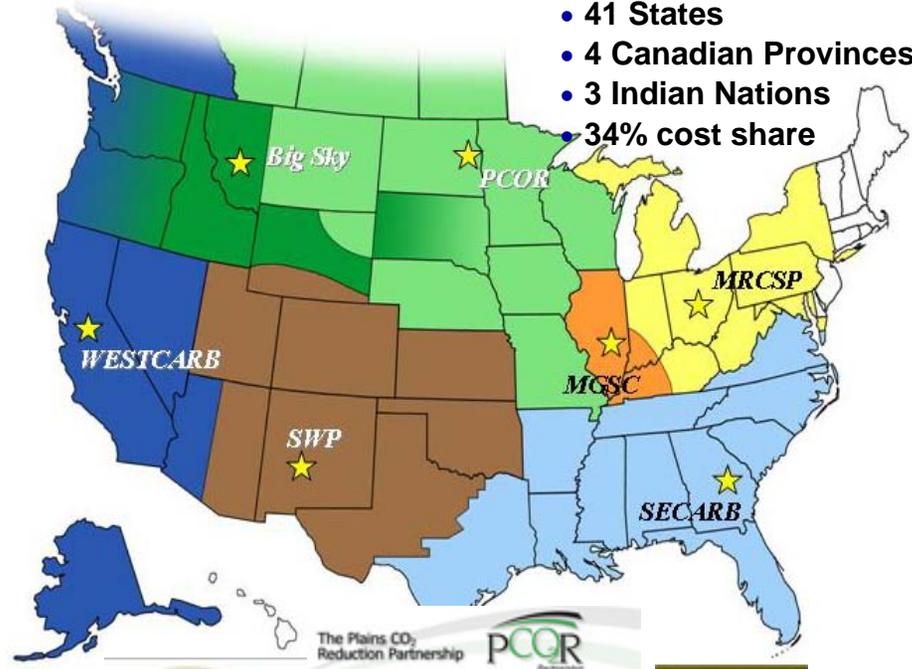
## Validation Phase

- 4 years (2005 - 2009)
- 7 Partnerships (41 states)
- 25 Geologic field validation tests
- \$112M DOE funds

## Deployment Phase

- 10 years (2008-2017)
  - FY07 Initiated
- Several large injection tests in different geology

- Representing:**
- >350 Organizations
  - 41 States
  - 4 Canadian Provinces
  - 3 Indian Nations
  - 34% cost share



# Validation Phase Field Tests

## Geologic Tests (25 injection tests)

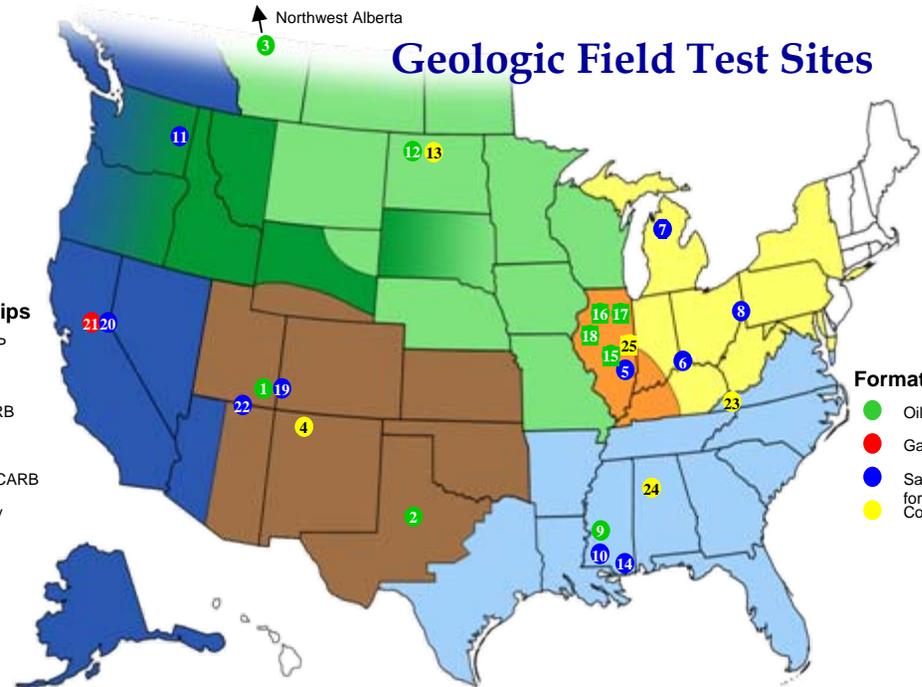
- Injections 750-525,000 Tons CO<sub>2</sub>
- Validating geologic formation capacities
- Validating injectivity
- Monitoring mitigation and verification technologies (reservoir modeling)
- Permitting requirements
- Public outreach and perception
- Testing formation seals
- Investigating well bore construction methods

### Partnerships

- MRCSP
- MGSC
- SECARB
- SWP
- WESTCARB
- Big Sky
- PCOR

### Formation Type

- Oil bearing
- Gas bearing
- Saline formation
- Coal seam



## Terrestrial Field Test Sites

## Terrestrial Tests (11 field tests)

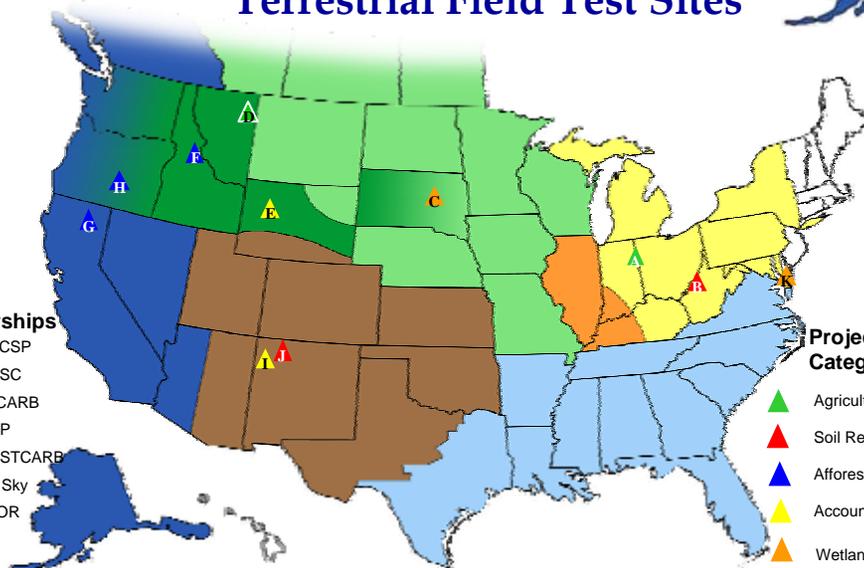
- Tree-plantings
- No-till farming
- Wetlands restoration
- Land management: grasslands, grazing lands
- Fire management
- Forest preservation
- Monitoring, mitigation, and verification technologies
- Accounting protocols for trading markets (CCX)

### Project Categorization

- Agricultural soils
- Soil Reclamation
- Afforestation
- Accounting/Aggregation
- Wetlands Reclamation

### Partnerships

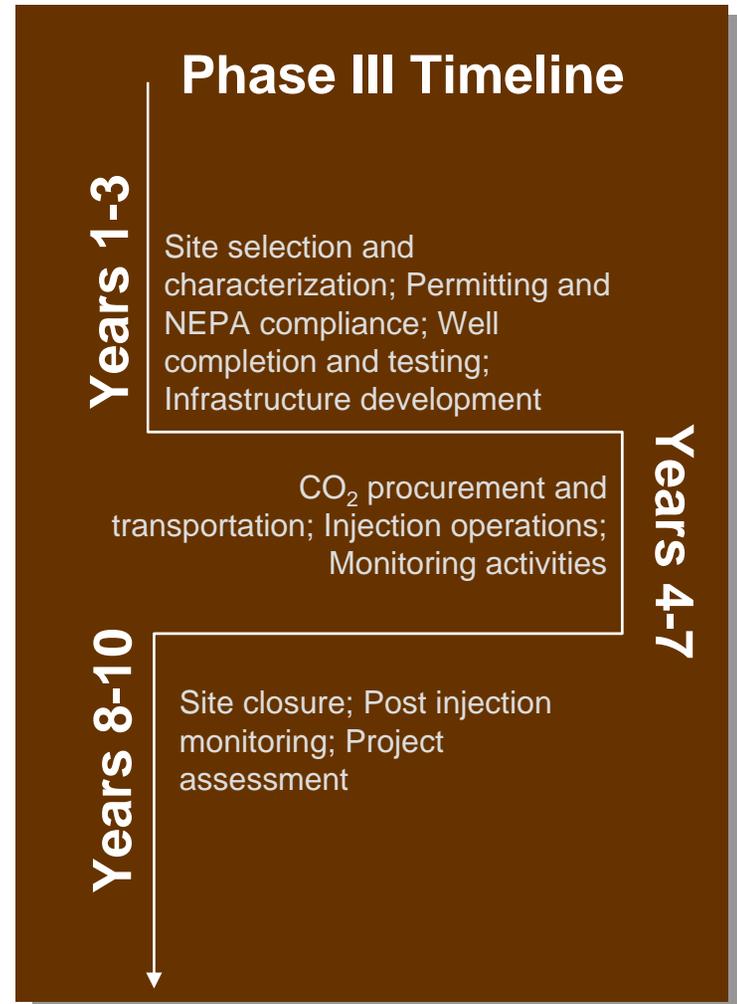
- MRCSP
- MGSC
- SECARB
- SWP
- WESTCARB
- Big Sky
- PCOR



# Deployment Phase

## *Scaling Up Towards Commercialization*

- **FY 2008-2017 (10 years)**
- **Several Large Volume Sequestration tests in North America**
- **Injection rates up to 1,000,000 tons per year for several years**
- **Scale up is required to provide insight into several operational and technical issues in different formations**



# Benefits of the RCSP Initiative

- **Better understanding of regional opportunities**
  - Match sources and sinks
  - Define scenarios for implementation
- **Test and refine geologic models**
- **Measure fate of CO<sub>2</sub> and compare technologies**
- **Best management practices to address site selection, well design, operations, monitoring, and closeout**
- **Engagement of regional stakeholders**
  - Implement public outreach and education

# Additional Information

The screenshot shows the National Energy Technology Laboratory (NETL) website. The header includes the NETL logo and the tagline "THE ONLY U.S. NATIONAL LABORATORY DEVOTED TO FOSSIL ENERGY TECHNOLOGY". The main navigation menu on the left lists sections such as "ABOUT NETL", "KEY ISSUES & MANDATES", "ONSITE RESEARCH", "TECHNOLOGIES", "SOLICITATIONS & BUSINESS", and "CAREERS & FELLOWSHIPS". The "TECHNOLOGIES" section is expanded, showing sub-categories like "Oil & Natural Gas Supply", "Coal & Power Systems", and "Carbon Sequestration". The "Carbon Sequestration" sub-category is further detailed with links to "CO<sub>2</sub> Capture", "CO<sub>2</sub> Storage", "Monitoring, Mitigation, Verification", "Non-CO<sub>2</sub> Greenhouse Gases", "Breakthrough Concepts", "Regional Partnerships", "FAQs", and "Contacts". The main content area displays the breadcrumb "Home > Technologies > Carbon Sequestration" and the sub-section "Technologies Carbon Sequestration". A photograph of a forest with birch trees is shown. The text describes NETL's portfolio of laboratory and field R&D focused on reducing greenhouse gas emissions and controlling global climate change. It mentions that most efforts focus on capturing carbon dioxide from large stationary sources such as power plants, and sequestering it using geologic, terrestrial ecosystem, or oceanic approaches. Control of fugitive methane emissions is also addressed. The text further states that carbon sequestration work directly implements the President's Global Climate Change Initiative, as well as several National Energy Policy goals targeting the development of new technologies. It also supports the goals of the Framework Convention on Climate Change and other international collaborations to reduce greenhouse gas intensity and greenhouse gas emissions. The programmatic timeline is to demonstrate a portfolio of safe, cost effective greenhouse gas capture, storage, and mitigation technologies at the commercial scale by 2012, leading to substantial deployment and market penetration beyond 2012. These greenhouse gas mitigation technologies will help slow greenhouse

Navigation and sidebar elements include: "Site Map" and "GO>" in the top right; "NEWS & FEATURES // All >" with links to "Carbon Sequestration Technology Roadmap [PDF-4542KB]", "Carbon Sequestration Program Outreach Plan [PDF-1438MB]", "DOE-Advances Commercialization of Climate Change Technology", and "Regional Carbon Sequestration Partnerships Program Adds Canadian Provinces"; "EVENTS CALENDAR // All >" with a link to "The 2006 EIC Climate Change Technology Conference - Engineering Challenges and Solutions in the 21st Century"; and "PUBLICATIONS & PROJECTS // All >" with links to "Carbon Sequestration Reference Shelf" and "Carbon Sequestration Project Portfolio [PDF-4301751]".

[http://www.netl.doe.gov/technologies/carbon\\_seq/index.html](http://www.netl.doe.gov/technologies/carbon_seq/index.html)

