



"Managing Climate Change and Securing a  
Future for the Midwest's Industrial Base"



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***MRCSP Site-Specific, R.E. Burger Field  
Demonstration Briefing, April 2006***

# Overview of the Midwest Regional Carbon Sequestration Partnership (MRCSP)

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- **Why:** Part of a national effort sponsored by the U.S. Department of Energy's National Environmental Technology Laboratory (DOE/NETL) to develop robust, strategies for mitigating carbon dioxide (CO<sub>2</sub>) emissions
- **Who:** 30+ member team, led by Battelle, and drawing from the research community, energy industry, non-government organizations, and government
- **What:** Demonstrate the safety and effectiveness of carbon sequestration and develop best approaches to carbon sequestration in the region
- **When:** Phase I launched, fall 2003; final report available, early 2006; Phase II commenced October 2005
- **Where:** Seven-state region of IN, KY, MD, MI, OH, PA, WV

# Carbon Dioxide ( $\text{CO}_2$ ) Emissions and Sequestration

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- Concern about climate change and the potential regulation of carbon dioxide – a greenhouse gas that is believed to contribute to climate change – have resulted in efforts to find ways to stabilize concentrations of  $\text{CO}_2$  in the atmosphere
- A variety of solutions will be needed
- As part of a broad portfolio of technologies, carbon sequestration can play an important role in stabilizing atmospheric  $\text{CO}_2$  concentrations

# Carbon Sequestration

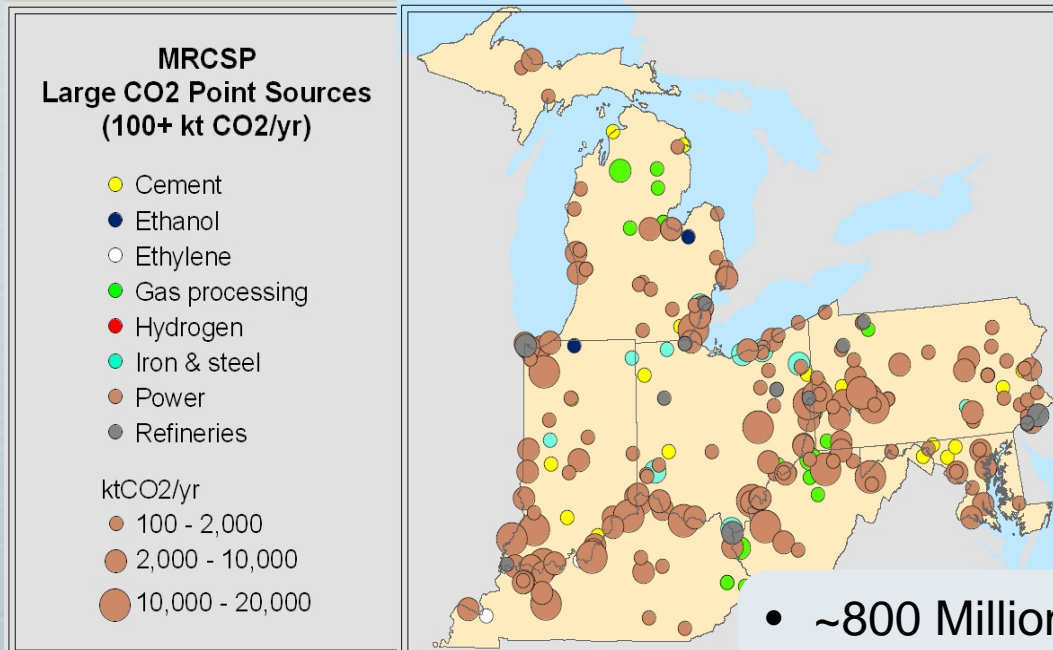
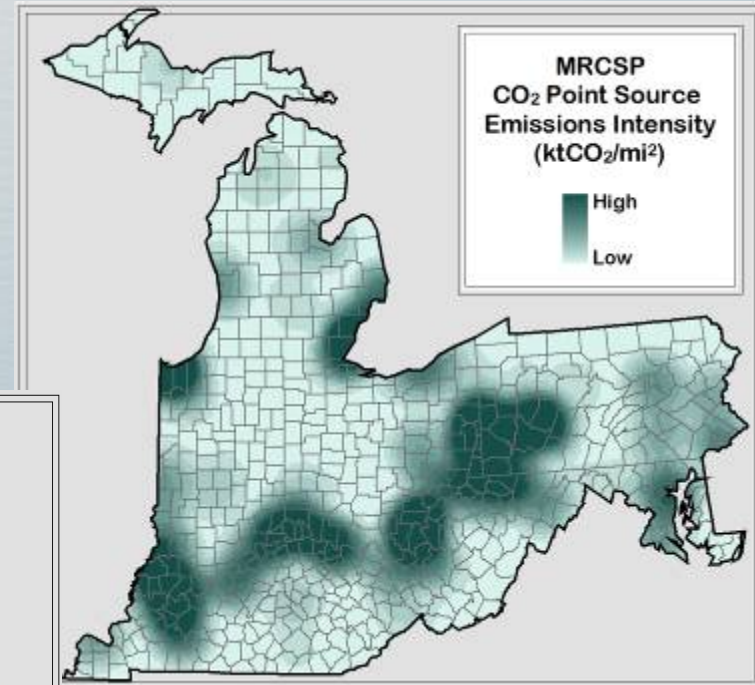
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- Sequestration is the controlled, permanent storage of CO<sub>2</sub> in the earth
- Terrestrial sequestration removes CO<sub>2</sub> already in the atmosphere and takes advantage of natural processes, such as photosynthesis, to increase the amount of carbon stored in plants and soils that serve as long-term pools or “sinks”
- Geologic sequestration involves injecting CO<sub>2</sub> into formations such as depleted oil wells, unmineable coal seams and very deep saline reservoirs to permanently store CO<sub>2</sub> in the earth



# The MRCSP Region: The Nation's Engine Room

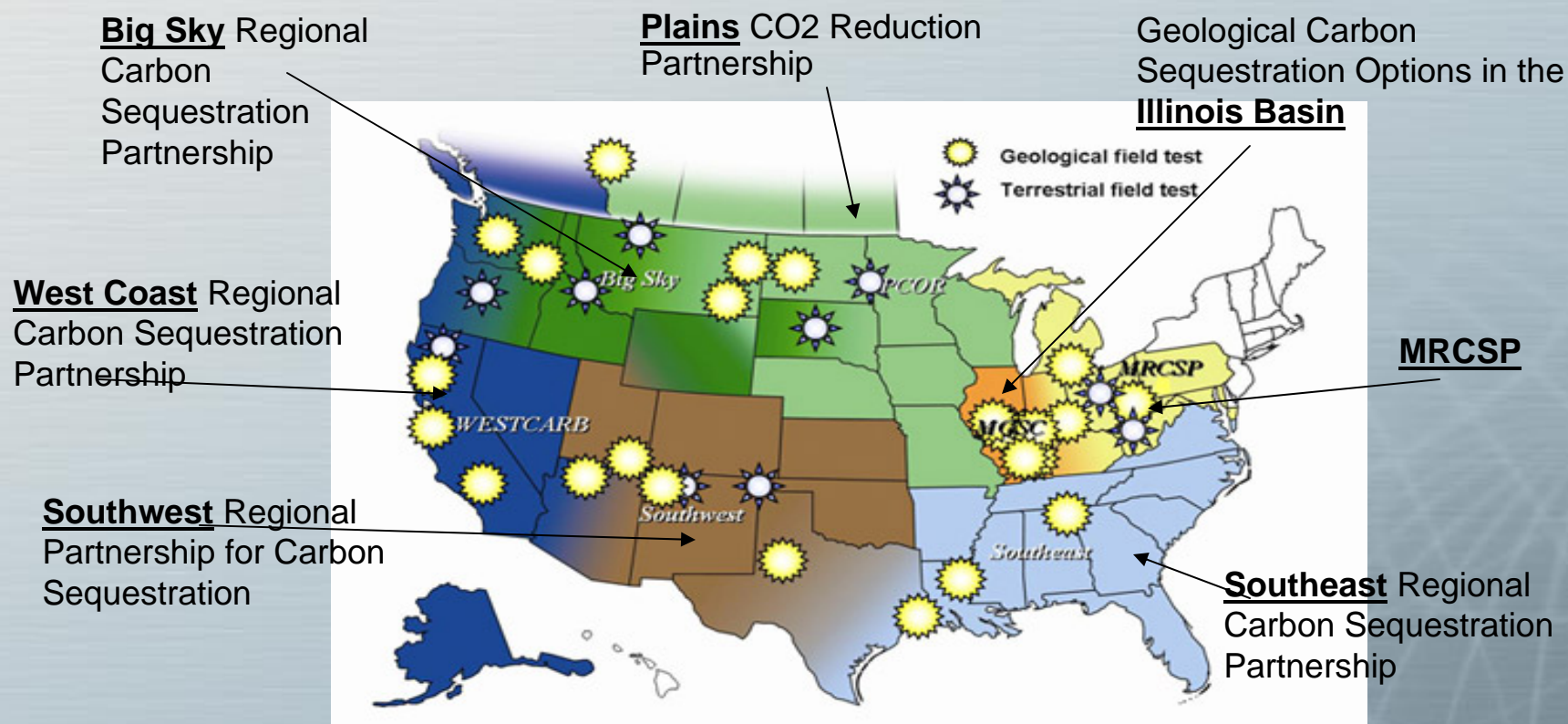
- One in six Americans
- 1/6 of U.S. Economy
- 1/5 of U.S. Electricity Generated
  - $\frac{3}{4}$  From Coal



- ~800 Million Metric Tons (MMT) CO<sub>2</sub>/year
- ~300 Large Point Sources

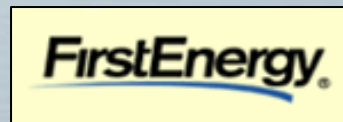
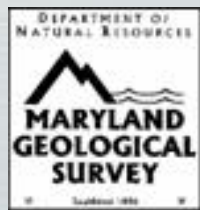
# The MRCSP is One of Seven DOE/NETL Regional Partnerships

Public/private partnerships in a nationwide effort to determine regionally-appropriate sequestration options and opportunities



See <http://www.netl.doe.gov/coal/Carbon%20Sequestration/partnerships/index.htm> for more information from NETL on the seven partnerships.

# MRCSP Phase II Partners



U.S. Department of Energy/NETL

*The Business of Innovation*



# MRCSP Activities in Phase I

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- Identified CO<sub>2</sub> sources in the MRCSP Region
- Assessed the technology options and cost of capturing CO<sub>2</sub> from these sources
- Identified more than 500 billion metric tons of potential storage capacity in the Region's deep geologic formations, forests, agricultural and degraded land systems – enough for more than 200 years of carbon dioxide emissions from our region's large point sources
- Identified issues for technology deployment, including safety, economics, regulations and public acceptability
- Engaged the public and their elected officials to inform them about carbon sequestration and to obtain their feedback on the project
- Developed recommendations for potential small-scale validation testing during a second phase of DOE/NETL's partnership program



# Phase II Objectives

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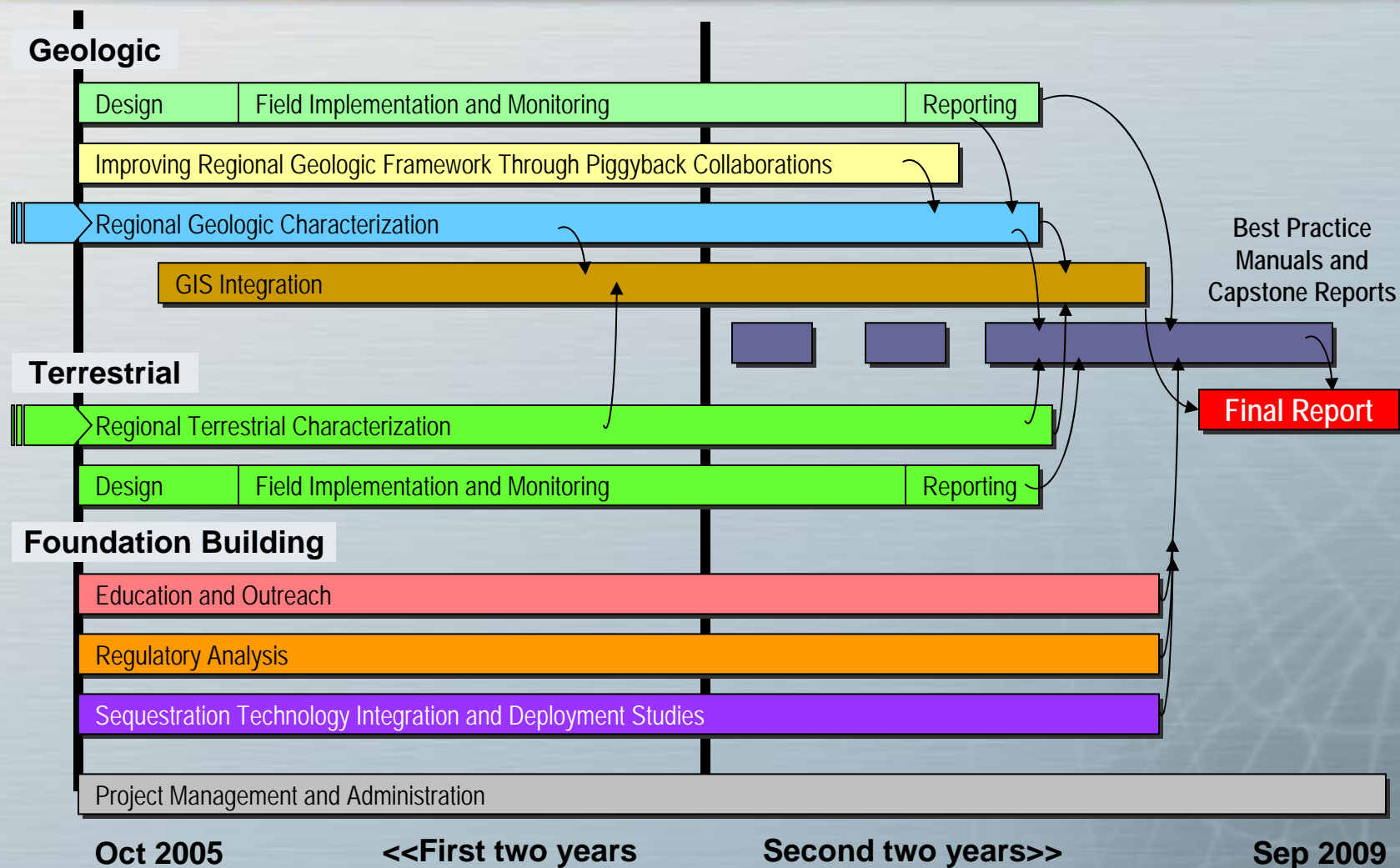
- Translate the theoretical potential for carbon sequestration defined in Phase I into tangible measures and approaches for the region
- Continue to develop the best approaches to carbon sequestration in the region by:
  - Using mapping, surveying and modeling to develop a unified conceptual framework of the region to serve as the foundation for a regional sequestration plan
  - Conducting multiple geological and terrestrial sequestration field demonstration projects in a variety of land and geology types
  - Developing innovative methods such as “piggyback” drilling to use activities already underway to generate additional geologic information about the region
  - Engaging stakeholders, including officials, industry, interest groups and ordinary citizens to inform them about the project and to obtain feedback

# Phase II Planned Activities

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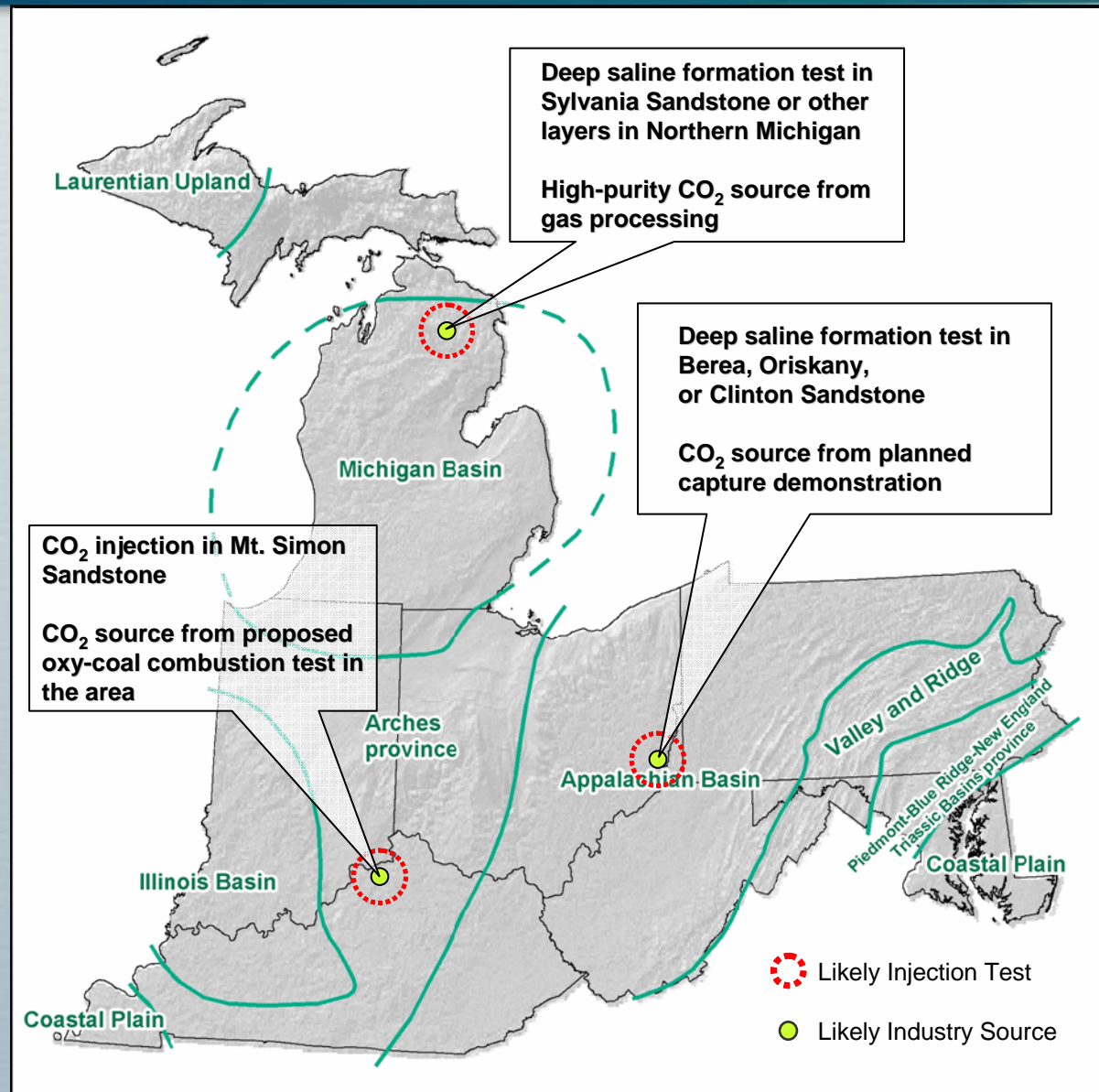
- Field validation of geologic sequestration
- Field validation of terrestrial sequestration
- Regulatory compliance
- Development of appropriate protocols for monitoring, mitigation and verification
- Refinement of regional characterization of sinks and sources
- Proactive stakeholder engagement and public outreach
- Integration of MRCSP activities with the other DOE regional partnerships

# When: Phase II Work Plan



# Phase II Candidate Geological Field Demonstrations and CO<sub>2</sub> Sources

- The primary CO<sub>2</sub> injection sites, including the R.E. Burger Plant site, are shown on the map
- Additional locations may be characterized for injection feasibility in saline formations, oil/gas fields, coal seams, and organic shales
- Additional possible sources of CO<sub>2</sub> include ethanol plants, gas processing, and commercial suppliers





# The R.E. Burger Plant Field Demonstration

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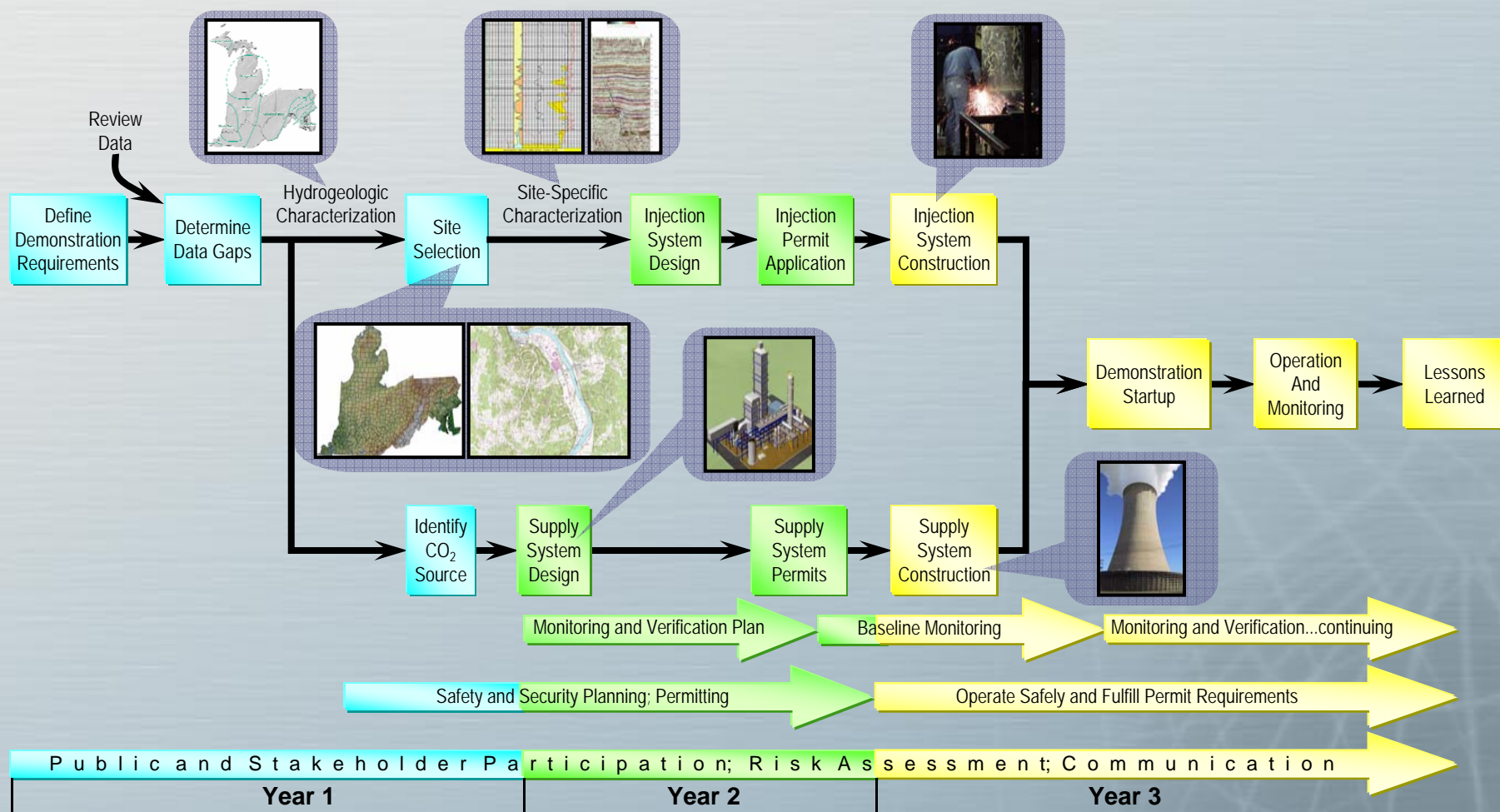
- FirstEnergy's R.E. Burger Plant in Shadyside, Ohio located in the Appalachian Basin region is one of the potential sites for geologic storage demonstration
- The site is being assessed by MRCSP to confirm suitability for injection
- Several potential injection formations, such as Berea, Oriskany, Clinton and Rose Run sandstones underlie this region, along with thick containment zones
- Some possibility exists for enhanced oil or gas recovery in the area
- Planned tests would assess the continuity and injectivity, operational approaches and monitoring mechanisms in one or more of these sandstone formations

# Other Advantages of the R.E. Burger Plant Site

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- R.E. Burger Plant is currently the site for Powerspan's Electro-Catalytic-Oxidation<sup>TM</sup>, or ECO technology test, designed to reduce NO<sub>x</sub>, SO<sub>2</sub>, fine particulates and mercury emissions
- Under an R&D agreement (CRADA) with DOE, Powerspan will pilot test a CO<sub>2</sub> capture technology integrated with their multi-pollutant ECO technology currently operating at the R.E. Burger Plant
- CO<sub>2</sub> captured during this planned pilot test will be used for the injection demonstration, based on technical and economic feasibility analysis

# Key Steps in Developing CO<sub>2</sub> Storage Demonstrations



# Timeline and Next Steps for the R.E. Burger Plant Demonstration

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- Preliminary site screening
  - Geologic data compilation and mapping based on current information
  - Regulatory review
  - Review monitoring, measurement & verification (MMV) feasibility
  - Develop research plan and safety plan
- Permitting
  - Federal, State
  - State
  - Facility-specific issues
- Site characterization
  - Seismic survey
  - Well drilling and testing of candidate formations
  - Baseline monitoring, measurement & verification



# Timeline and Next Steps for the R.E. Burger Plant Demonstration (Continued)

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- Well construction
  - Approval to begin injection
  - Continued monitoring, measurement & verification
- Injection
  - Obtain final approval to inject
  - CO<sub>2</sub> acquisition and handling
  - Well completion and injection tests
  - Continued monitoring, measurement & verification
- Post injection
  - Data analysis and review
  - Well closure or plugging
  - Post closure monitoring, measurement & verification

# Contacts

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For more information, please contact:

- FirstEnergy's R.E. Burger Plant at 740-671-1888
- MRCSP contacts: Neeraj Gupta at [gupta@battelle.org](mailto:gupta@battelle.org)
- MRCSP web site: [www.mrcsp.org](http://www.mrcsp.org)



For more information on  
the MRCSP see  
[www.mrcsp.org](http://www.mrcsp.org)