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Carbon Sequestration: Field Experience in the Midwest

David Ball, Battelle

McIlvaine Web Seminar, May 22, 2008

Stabilizing atmospheric CO_2 concentrations requires fundamental change to our energy system

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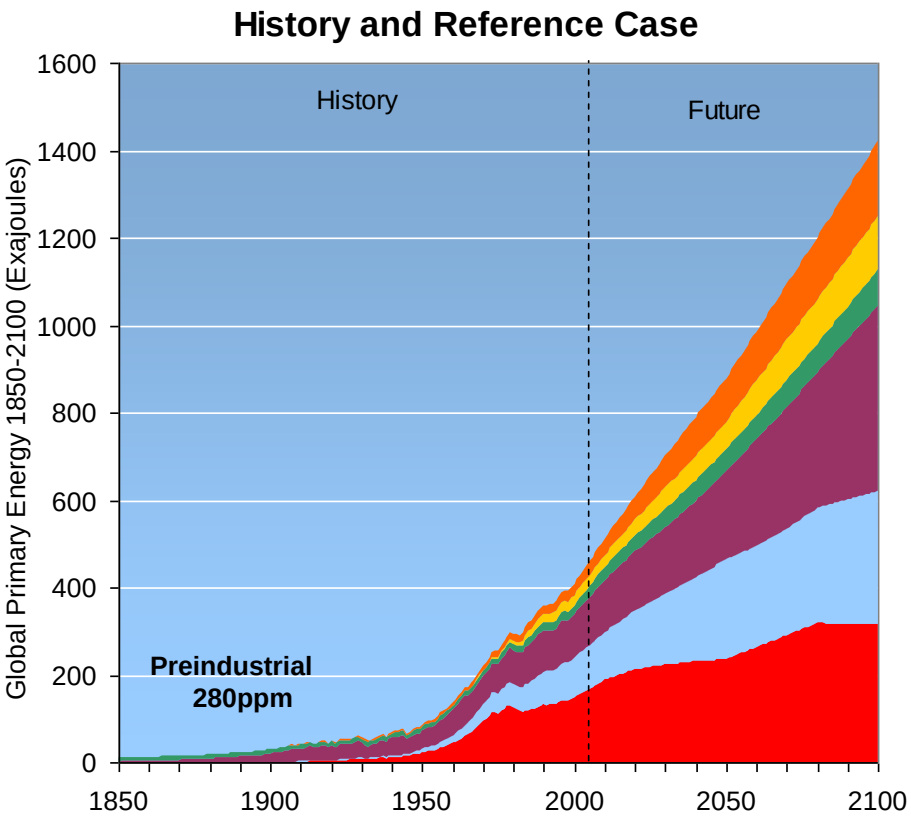
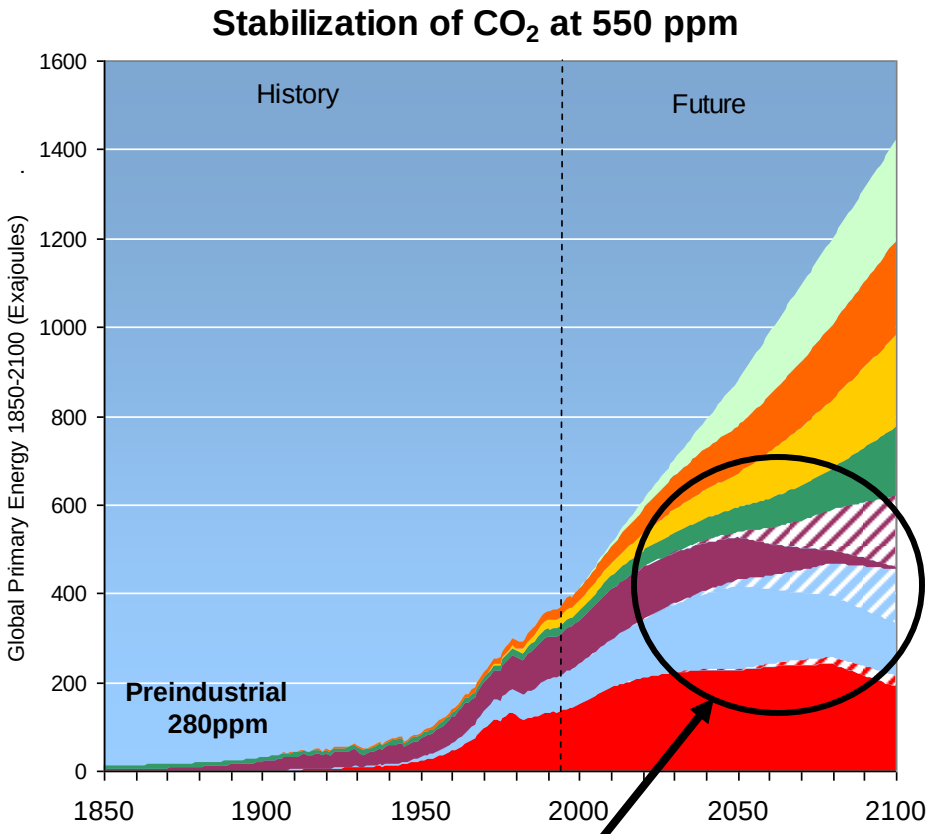
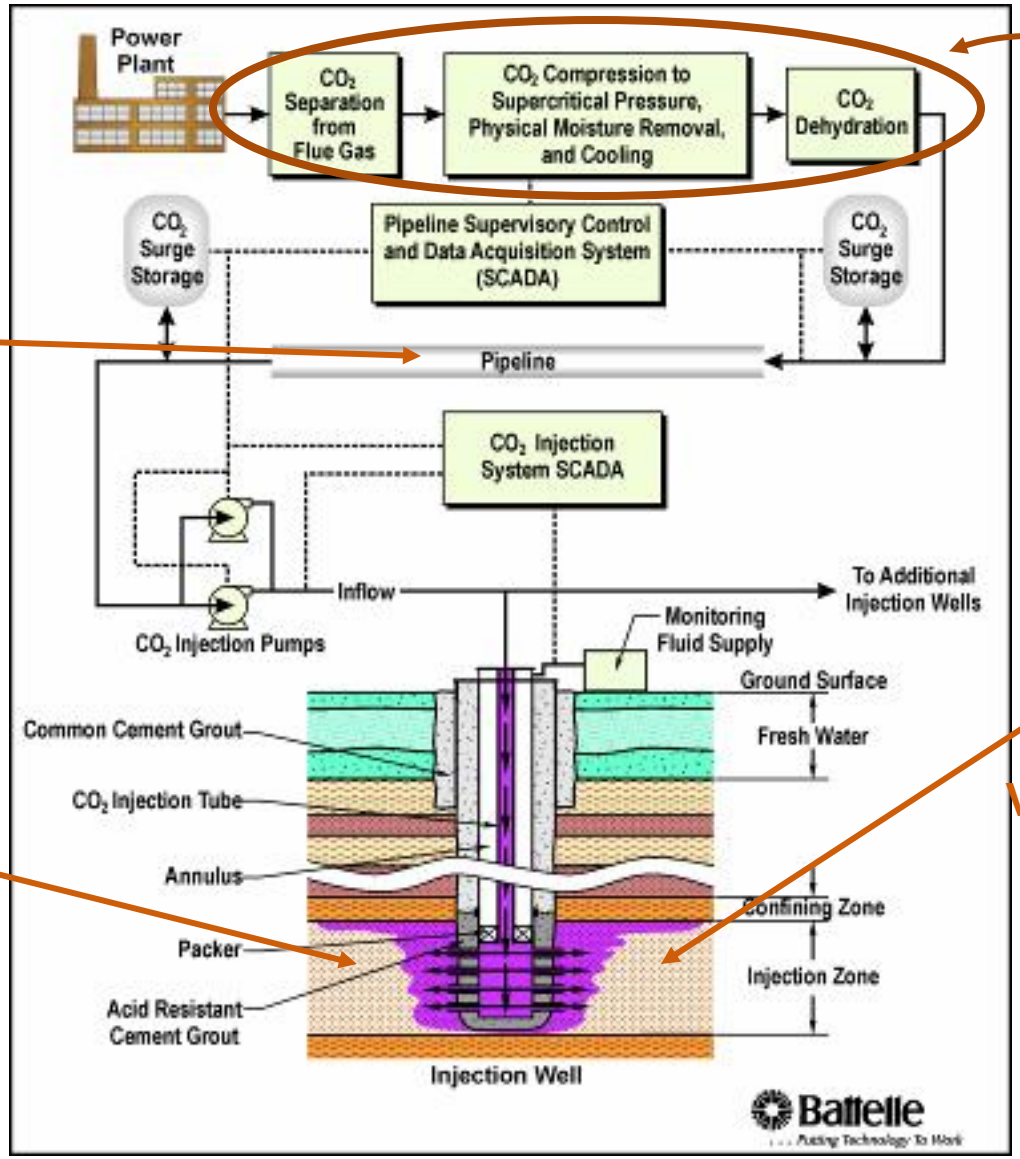




- Oil
- Natural Gas
- Coal
- Biomass Energy
- Non-Biomass Renewable Energy
- Oil + CCS
- Natural Gas + CCS
- Coal + CCS
- Nuclear Energy
- End-use Energy

Carbon Capture and Geologic Storage (CCS) will play an important role in meeting this goal in the most cost effective manner

The CCS process is relatively simple but involves challenges



CO2 capture and processing

Transport >100 atm

Measurement Mitigation and Verification (MMV)

Injection >2500 ft deep

Battelle plays a key role in a number of sequestration projects.

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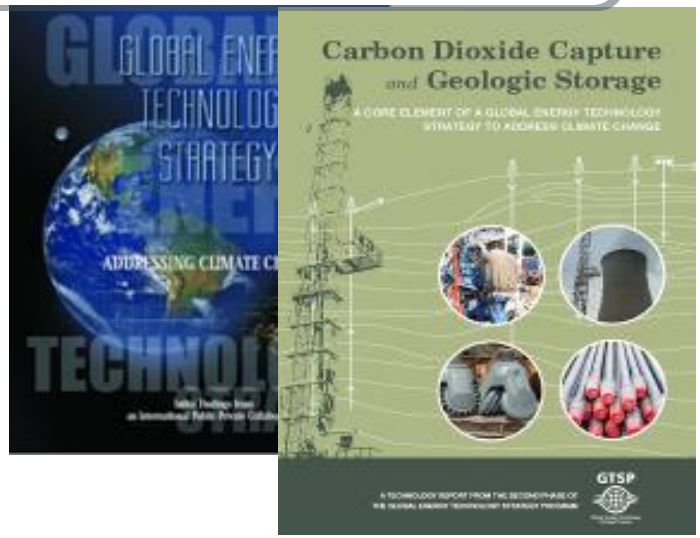
Global Energy Technology Strategy Program (GTSP)



DOE Regional Partnership Program

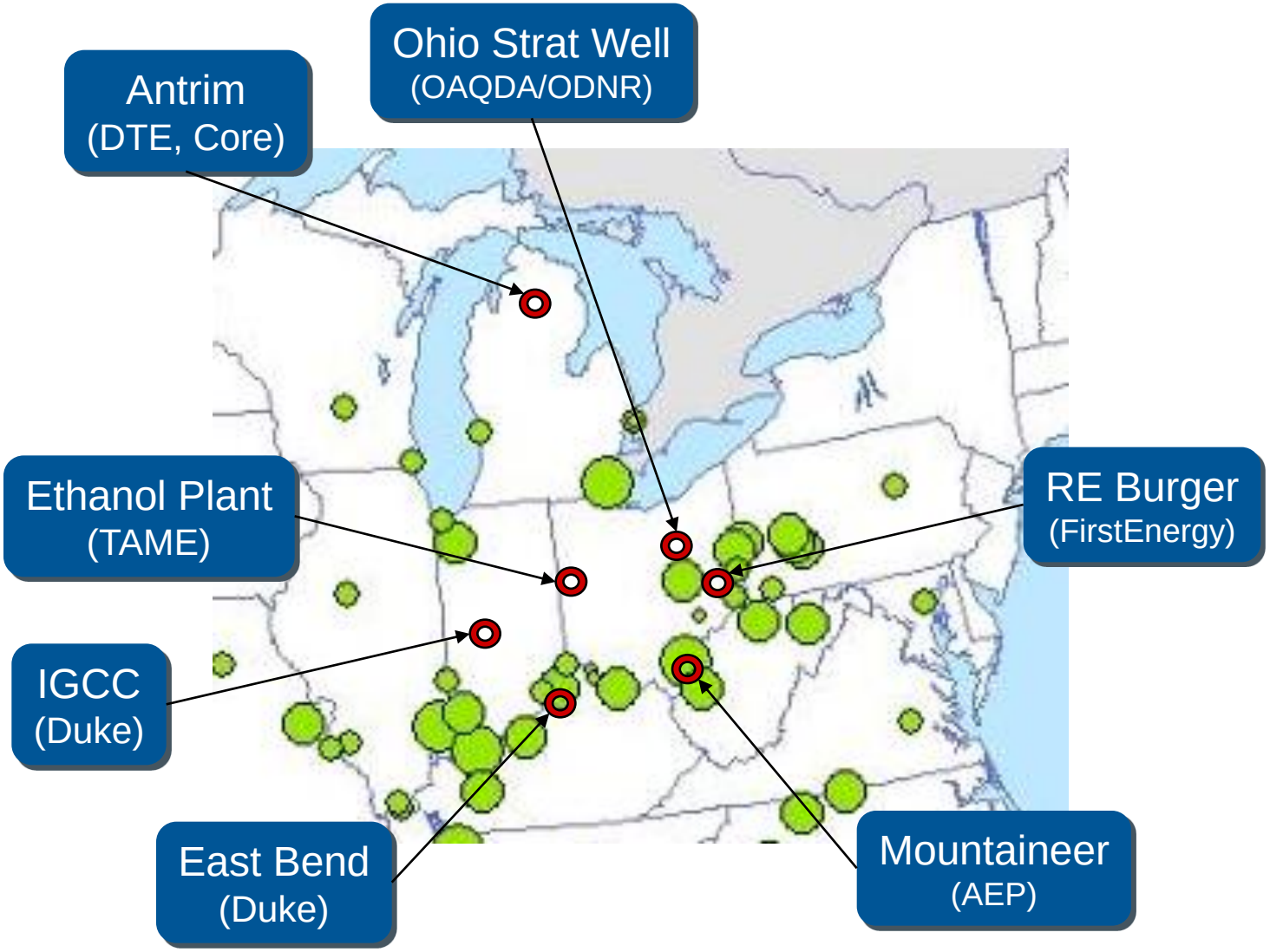
MRCSP
MIDWEST REGIONAL
CARBON SEQUESTRATION
PARTNERSHIP

BIGSKYCARBON
SEQUESTRATION PARTNERSHIP

Mountaineer

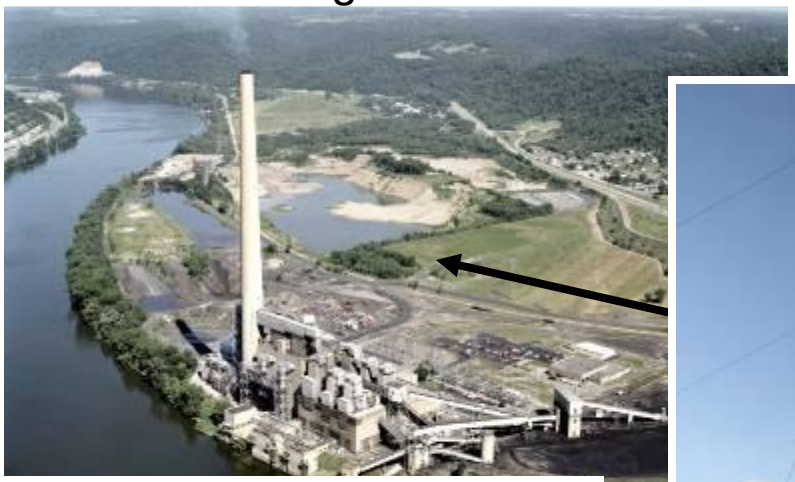
FutureGen

Geologic (CCS) projects in the Midwest



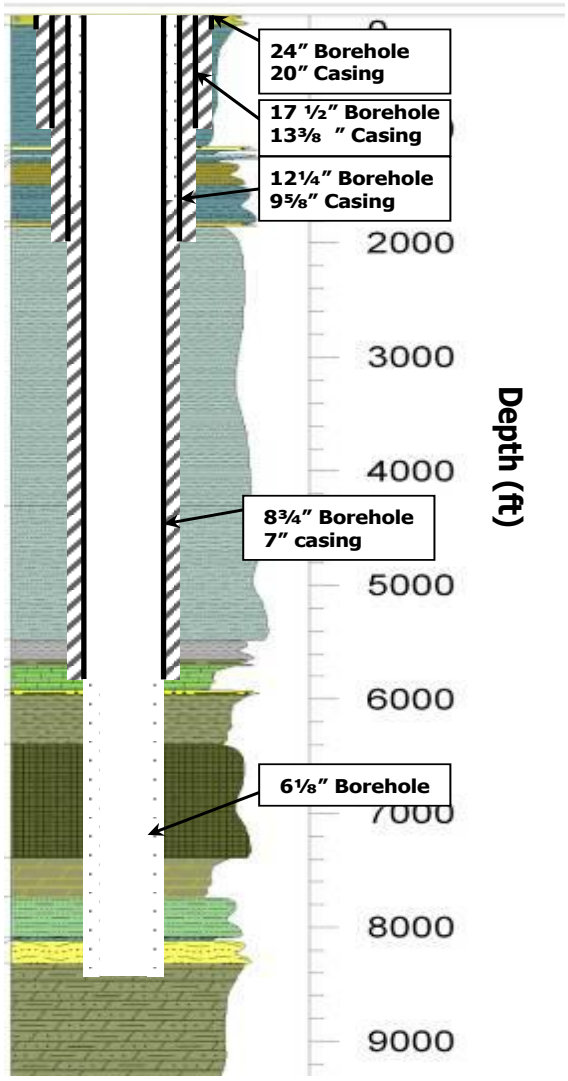
RE Burger Power Plant (FirstEnergy)

R. E. Burger Power Plant



Seismic Survey, July 2006

Drill Rig, Jan 2007

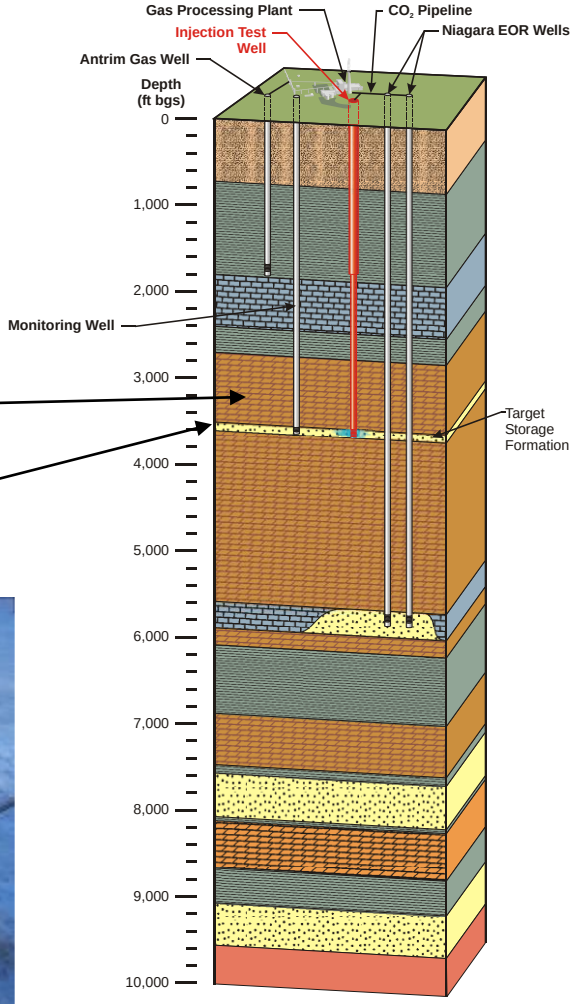


8000 Foot Test Well

At our Michigan site we completed injection of 10,000+ tonnes of CO_2 in March '08

5000 Foot Deep Test Well Drilled in November 2006

180 feet of core taken



Well Column

Confining Layer: Amherstburg Limestone

Injection Target: Bass Islands Dolomite

Injection Operations

Starting Injection

MRCSP
MIDWEST REGIONAL CARBON SEQUESTRATION PARTNERSHIP

AEP Mountaineer Project

- 1300 MW pulverized coal plant near New Haven, WV
- The area surrounding the plant is one of intense power production and future expansion
- AEP has announced plans to implement an integrated CO_2 capture and sequestration project at the plant.

9,000 ft deep test well (c.2003)

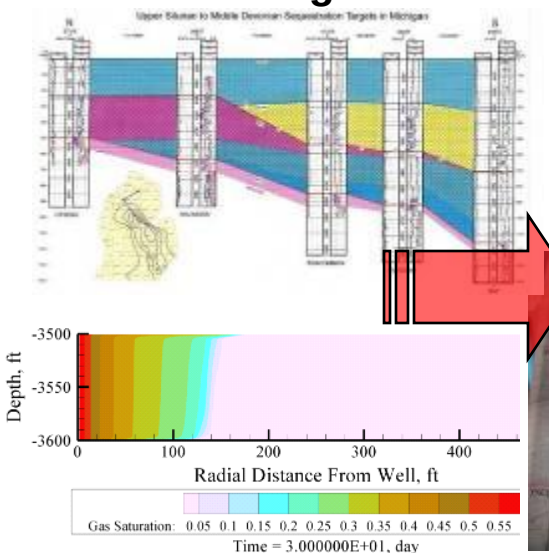
New Haven, WV

Mountaineer Plant

1,300 MW Generator

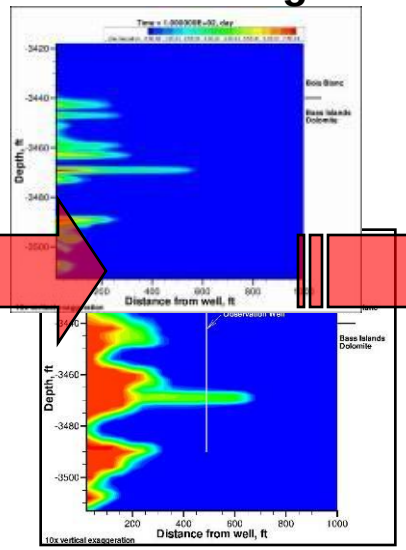
Field validation tests like these allow us to improve and validate our models

Preliminary Modeling Based on Regional Data

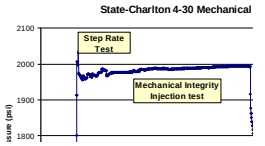


Site Drilling and Testing

Site Specific Modeling



Post-Injection Calibration/Validation



Conceptualize → Characterize → Design → Monitor → Calibrate → Validate

----------Communicate----------

Thank You

The sight and sound of 600 tons of CO_2 being injected at 3,500 ft in Northern Michigan