

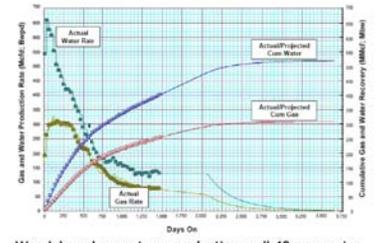
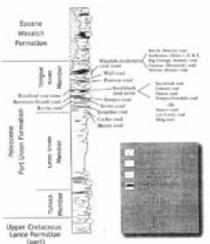
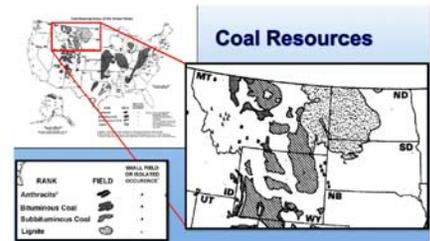
Economic Comparison of Options for Carbon Sequestration in Coal

Eric P. Robertson, INL

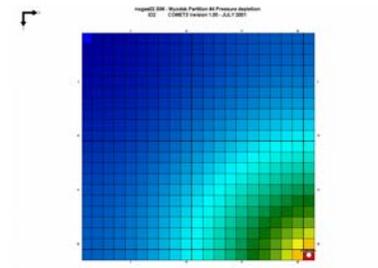
Big Sky Carbon Sequestration Partnership — CO₂ Sequestration in Coal Project

Project Goals: Compare injection of 1) flue gas and 2) CO₂

Focus on Powder River Basin

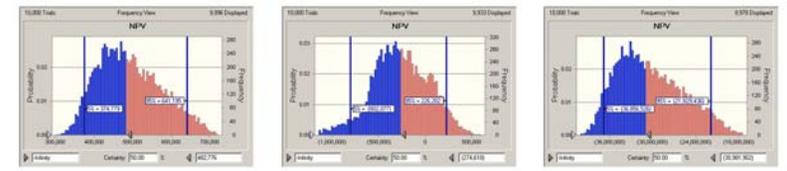


Wyodak coal seam type production well 40-ac spacing (after U.S. DOE, November 2002)



160-ac spacing for simulation of sequestration options

Economic comparisons: Probabilistic DCF after-tax analysis



No gas injection
Injection gas cost →

Flue gas injection
\$0.46/Mcf

CO₂ gas injection
\$2.91/Mcf

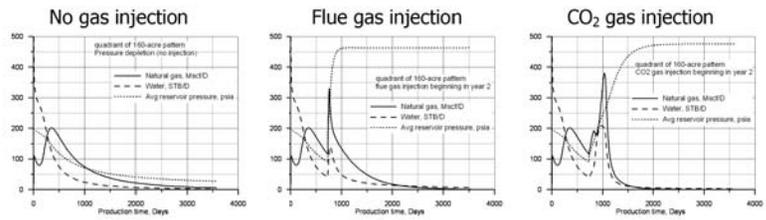
Wyodak PC Power Plant
Capacity = 335 MW
CO₂ emissions = 3,700,000 tons/yr
Thermal efficiency = 30%

Flue gas component	Concentration
N ₂	67.0%
CO ₂	11.8%
O ₂	12.0%
H ₂ O	8.0%
CO	300 ppm
SO ₂	180 ppm
NO _x	150 ppm

Conclusions:

- Forty-two 640-acre 5-spots (6.5 mi²) required for sequestration of CO₂ from Wyodak PC power plant.
- Breakeven cost for CO₂ is a *credit* of \$6/ton.
- Critical variables for
no-gas-injection: natural gas sale price
flue-gas-injection: length of flue gas pipeline
CO₂-gas injection: CO₂ separation costs

Reservoir simulation-generated production response



Bibliography:

- Powder River Basin Coalbed Methane Development and Produced Water Management Study* (2002) U.S. DOE document DOE/NETL-2003/1184 (November 2002).
- Bank and Kuuskraa: "The Economics of Powder River Basin Coalbed Methane Development," Advanced Resources International (January 2006).
- Nitrogen Removal from Natural Gas* (1999) Phase II Draft Final Report, U.S. DOE Contract Number DE-AC21-95MC32199-02 (22 December 1999).