CCS from Coal to Pipelines to Enhanced Oil Recovery: A Primer

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Find me more CO$_2$!

- Fuels for power generation
- Carbon capture and sequestration
- Carbon dioxide injection
- Getting the parties to talk!
Were it not for global warming concerns, coal combustion would replace natural gas as the mainstay of growth in new electric generating plants.
Natural gas is buying us some time.
US and Canadian gas well drilling is ramping up with prices.

A decade of major onshore finds is boosting US proved gas reserves.

Source: BSA 2008, from EIA.
Barnett Shale gas is approaching the Alaskan North Slope potential.

Source: BSA 2008, from EIA, IHS, Pickering.
Meanwhile, planned new coal-fired power plants are heading off a cliff.

- TXU, WE and countless others have cancelled near term coal plants.
  - Some were needed by 2012.
- Markets are acting as though carbon reductions policies and a NAAQS for CO₂ are already in effect.
- For now, gas and wind are filling the gap.
- At this rate, US gas demand will rise by 15% to 20%.
Unfortunately, this is all we got to see in the fog!
Gas will dominate new power plant fuels for another decade.

Coal gasification – back to the future…

- Core ERDA program in late 1970s
  - Great Plains plant (0.25 Bcf/d):
    - Loan guaranty recapture nearly complete (at last!)
    - CO₂ pipeline to Saskatchewan.

- Coal gasification yields clean gas fuel plus pure, chemical-grade CO₂ suitable for pipelines.

- But CO₂ injection for EOR requires separate CO₂ pipelines….
Pipelines? Did somebody say pipelines?

- The US has >300,000 miles of large-diameter gas pipelines.
- Kinder Morgan operates 3,000 miles of CO₂ lines.
- Costs of service range up to about $.20 per 100 miles per 1,000 c.f.
- Even at $50/bbl, oil produced from EOR more than justifies CO₂ pipelines.

Note: Map courtesy of Intelligence Press, Inc.
Carbon dioxide pipelines currently in place.
Summary: CCS should pay, not cost, if done as part of EOR.

- Out:
  - New coal-fired power plants
  - CO₂ recovery from stack gases
  - Carbon sequestration without getting paid for it.

- In:
Separate languages stymie the discussion!

- Coal gasification produces a stream of clean combustible gases, or…
- Synthetic natural gas, plus…
- Relatively pure carbon dioxide, which…
- Can be used for EOR, thus…
- Sequestering the plant’s carbon production, and…
- What do we make of this?

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