**Economics of Coal Energy Conversion with Reduced GHG Emissions When Captured CO2 Is Stored via CO2 Enhanced Oil Recovery in the U.S.**

An overview of the analysis in a recent report prepared by the National Coal Council at the request of US Energy Secretary Chu on CO2 storage via enhanced oil recovery (EOR) for coal energy conversion (NCC, 2012) and an extension of that analysis are presented. Also implications for China of findings for CO2 EOR in the US are briefly discussed.

CO2 EOR is well established technology in the US, about 60 million tonnes CO2 are used annually to produce 350,000 barrels/day of crude oil—about 6% of total US crude oil production. Most of the CO2 currently used for EOR comes from natural sources. The NCC (2012) report argues that using anthro-pogenic CO2 captured at coal energy conversion plants could lead to a substantial increase in US crude oil production via EOR and that the economic value of CO2 in these markets could be used to offset in part or in full the cost of CO2 capture.

A National Energy Technology Laboratory report (US DOE NETL, 2011) provides an important con-text for this analysis. That NETL report estimated that the potential economic and technical demands for anthropogenic CO2 to increase crude oil production in the US via next-generation CO2 EOR tech-nology are 18 and 43 billion tonnes of CO2, respectively. If the technical potential could be converted via R&D and experience into a realizable potential it would represent 25-30 years of CO2 storage for all US coal power generation—suggesting a significant potential for delaying widespread CO2 storage in deep saline formations (for which captured CO2 has no market value other for carbon mitigation).

The present analysis discusses, for alternative coal energy conversion options involving CO2 capture, the economics of CO2 EOR as a function of EOR market conditions and conversion plant location relative to the EOR market. Both the CO2 capture cost and internal rate of return on equity (IRRE) are considered as economic metrics. The IRRE analysis is carried out for prices on GHG emissions ranging from $0 to $100 per tonne of CO2eq.

Post-combustion, oxycombustion, and pre-combustion capture options are considered for power generation, and pre-combustion capture options are also considered for making synthetic fuels and for coproducing synthetic fuels and electricity. In addition, coprocessing some biomass with coal is considered for plants coproducing synthetic liquid transportation fuels and electricity.

Findings for prospective crude oil prices are that: (i) the most profitable options are systems providing synthetic liquid transportation fuels; (i) systems coproducing electricity + liquid transportation fuels are more profitable than any systems providing only electricity, (iii) coproduction systems will be more profitable than a linear combination of systems making liquid fuels and electricity in separate facilities, (iv) options coprocessing some biomass will become the most profitable options at high GHG emission prices, and (v) synfuel and coproduction plants sited even remotely from CO2 EOR market opportunities are likely to be competitive in EOR markets if an adequate CO2 pipeline infrastructure were in place. An important implication of the final two findings is that if coal/biomass coproduction systems were to become the norm for coal-based power generation in the US, most CO2 storage requirements to midcentury in the US could plausibly be met via CO2 EOR.

**References**

NCC (National Coal Council), 2012: *Harnessing Coal’s Carbon Content to Advance the Economy, Environment, and Energy Security*, 22 June.

US DOE NETL (2011): *Improving Domestic Energy Security and Lowering CO2 Emissions with “Next Generation” CO2-Enhanced Oil Recovery (CO2-EOR),* DOE/NETL-2011/1504 Activity 04001.420.02.03, June.