GLG News Analysis

Not Your Father's Carbon Capture and Storage

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Analysis of: CCS could win private funding, finds survey | www.powergenworldwide.com

Summary

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CCS has been considered the best hope for cleaning up the greenhouse gas emissions generated by coal-fired power plants. CCS involves taking the CO2 and other emissions out of the power plant before they hit the atmosphere (capture) and sequestering them underground (storage). A 2006 atlas created by Department of Energy (DoE) identified 150 power plant sites located at or near geologic formations that could safely store captured CO2.

FutureGen was proposed in 2003 as DoE's flagship demonstration project for CCS. The original FutureGen idea proposed using a technology called Integrated Gasification Combined-Cycle (IGCC) that turns coal into a synthetic gas burned in the power plant's boilers. Gasification of coal in the IGCC process would makes it easier to remove the CO2 and other pollutants, which would then be stored underground.

In its original design, FutureGen would have been one integrated facility: a new plant built near Mattoon in southeastern Illinois by a consortium of DoE and private companies. But as the project developed, the $1 billion price tag escalated to almost $2 billion and by 2008, DoE decided to "restructure" the project, in effect stopping it in its tracks.

Obama's DoE revived FutureGen, but took a different, more modest, approach. In August, Energy Secretary Steven Chu announced plans to retrofit an existing oil-fired plant in Meredosia, Illinois some 170 miles from Mattoon, rather than building a new facility. Partnering with DoE on the new FutureGen are Ameren Energy (NYSE:AEE) Resources that owns the Meredosia plant, energy technology provider Babcock & Wilcox, and engineering services company Air Liquide Process & Construction. The overall price tag would be about $1 billion, about the same amount Bush administration had originally budgeted, funded by the Recovery Act.

The Meredosia plant will burn coal directly rather than converting it to gas, but would now add a rich oxygen mix in a technology called oxy-combustion. This method burns the coal more completely and emits CO2 -- separated for capture and storage -- and water vapor. (Oxy-combusion plants still need more equipment to remove other pollutants, however, so it takes more than just swapping out the old burners to make it work.) Under the new FutureGen plan, Mattoon will still store captured CO2. Instead of one integrated facility, however, the captured CO2 will be piped the 170 miles from Meredosia to Mattoon.

As the idea of CCS has become better known, some enterprising researchers see the stored CO2 as raw material for further business opportunities.To some extent this is already happening. At least one power plant removes CO2 and sells it to beverage gas distributors, but these newer ideas go well beyond carbonated water.

GreenFire Energy in Salt Lake City, Utah is developing a process of converting CO2 stored naturally in geologic formations in Arizona to electric power using geothermal

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recovery and generation methods. DoE is funding proof-of-concept and feasibility tests, but the company also sees the store of captured CO2 from coal-fired power plants as another source to which this process can be applied.

Krebs & Sisler LP, a Winnetka, Illinois energy research firm, has another idea for the stored CO2. The company has developed a process that combines photosynthesis and photocatalysis (using light as a catalytic agent) to purify water. The process involves taking salt water or waste water, and adding CO2 and nutrients under light-emitting diodes to grow biomass made of algae. Under photocatalysis, the algae biomass absorbs minerals and the organic and inorganic compounds dissolved in the water. Photosynthesis then purifies the water by absorbing minerals, with sufficient light, CO2, nutrients, and time. The resulting biomass is 50% carbon and can be dried for fuel, farm animal feed supplement, or human nutrients.

If the FutureGen project shows CCS is feasible in existing power plants, it should encourage the spread of CCS in the industry. However, the best opportunities will likely be in the neighborhood of geologic sites that can store the captured CO2. And having companies willing to use the captured CO2 as a raw material won't hurt either.

Council Member Comments (0)

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