

Chilled Ammonia Gets a Warm Reception

TACKLING CARBON DIOXIDE

BY SALVATORE SALAMONE

■ ■ ■ WE ENERGIES, THE ELECTRIC

■ ■ ■ Power Research Institute and equipment and service provider Alstom have started a pilot project to test an ammonia-based absorption system to remove carbon dioxide from the emissions of an existing coal-fueled power plant.

The pilot uses chilled ammonia to cool fuel gas. Cooling increases the volume and rate at which carbon dioxide can be isolated in a highly concentrated form. The participants in this pilot believe the technology has the potential to capture up to 90 percent of the carbon dioxide from a plant's flue gas emissions.

One benefit of conducting this test in Wisconsin is that there will be a small cooling assist from Mother Nature. Summer and winter temperatures at the plant are naturally lower than for a plant in the South.

That small benefit aside, development of the technology at the heart of this pilot program has been a joint effort. Alstom, We Energies, and more than about 30 companies from around the world worked together to advance this technology. One appeal of the approach is that it can be retrofitted to existing plants as well as work with new plants.

Construction of the absorber at We Energies' Pleasant Prairie, Wis., plant started in the fall. Similar projects are under way elsewhere. For instance, last year American Electric Power and Alstom signed a memorandum of understanding with the aim of bringing the same technology to full commercial scale by 2011. They are working on a plant with as much as 200 megawatts of capacity.

OFF TO THE RACES

The 1.7-megawatt system used in the We Energies pilot is designed to capture CO₂ from a portion of the coal-fired boiler flue gas at the Pleasant Prairie plant.

Over the next year, the participants will evaluate the technology in several areas. "We'll look at the sustainability and durability of the technology," said Hank Courtright, vice president of environmental and energy analysis sector at the institute. "And we'll look at the economics and performance."

Others emphasized this point. "The pilot plant is essential to test the technology," said Jean-Michel Aubertin, senior vice president of Alstom's energy and environment systems group. "We will look at the reliability of the operations."

Additionally, the group will see how close to the 90 percent capture rate this system can achieve and will look at the performance/cost analysis of this operational system versus other carbon capture technologies.

Participants in the pilot stressed that the objective here was to test technology for new plants "and to develop technology that can be applied worldwide to the installed base," Aubertin said.

A SMALL STEP FORWARD

The pilot project is just the beginning of what is envisioned as a longer-term commitment. "This is an important step, but a small step," Courtright said.

For instance, this project is designed to support 1.7-megawatt operations while the plant's capacity is about 1,000 times that. So, operational and technological successes demonstrated with this pilot will still need to be scaled up significantly.

Additionally, this project only deals with one aspect of the total carbon issue – the capture part. A complete system would also have to address



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The 1.7-megawatt carbon-capture pilot project at We Energies' Pleasant Prairie, Wis., plant.
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carbon storage. According to Aubertin and Courtright, this pilot is a catch and release program. The carbon that is captured will be released into the atmosphere, as it would have been anyway.

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Operational costs must also be factored in. This pilot will examine such factors as cost to maintain the absorber and the energy required to run the absorber.

If the chilled ammonia technology meets its expected potential, it might be used for other purposes in the future. For example, most of the attention today is focused on coal-fueled plants because they are so widely used and emit significant amounts of CO₂.

If this technology proves out and CO₂ emissions are cut by 90 percent, attention could be shifted to other types of plants. For example, natural gas-fueled plants emit about half the CO₂ as compared with comparable coal plants. If the chilled ammonia technology cuts a coal plant's emissions so it is only emitting 10 percent of its current amount, the emissions of a gas-fueled plant would contribute more CO₂ to the atmosphere than a coal-fueled plant.

Additionally, the participants in this trial hope to expand the usefulness of this technology to plants around the world. As noted, the work done to bring the chilled ammonia technology to its current state has already benefited from the cooperation of nearly three dozen organizations from around the world.