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Seeking cleaner coal plants

Ill. firm is working with DOE on method to remove pollutants

BY TRACY HAYHURST

Coal-fired power plants, the largest source of mercury emissions in the U.S., may have a practical way to capture mercury and carbon dioxide using the combination of a patented combustion technology and a new pollutant removal process.

Jupiter Oxygen Corp. and the U.S. Department of Energy (DOE), through its Albany Research Center in Albany, Ore., have developed a process that removes mercury and carbon dioxide as well as other pollutants, making coal-fired plants cleaner and more efficient.

Jupiter's oxy-fuel combustion technology has been used at its aluminum plant in Hammond, Ind., for seven years and is now being applied to coal-fired plants, says Mark Schoenfield, vice-president and general counsel for Jupiter, which is based in Schiller Park.

Under a cooperative research and development agreement, Jupiter and the Albany Research Center designed and built a 75-kilowatt-per-hour power-generating test unit that used oxy-fuel combustion technology and the research center's pollutant removal process.

Jupiter's oxy-fuel technology uses pure oxygen as the combustion agent for the coal, which cuts nitrogen out of the equation and reduces other pollutants typically scrubbed at the end of the process, Mr. Schoenfield says.

The process also allows a plant to use a smaller gas stream so there is much less gas to clean, making the Albany center's pollution removal process more effective, he says.

"We use less coal and other fossil fuels, so there are fewer pollutants to begin with," he says. "(Albany's) technology then, because of what ours can do, cleans up the gases more effectively in a series of compression, liquefaction and filtering steps."

In addition to being cost-competitive, the combined processes are able to effectively handle all emissions from coal-fired power plants, which current designs are incapable of handling at any cost, according to a joint research and development report released in September by Jupiter and Albany.

"As you start removing more and more (pollutants) from a system, it becomes less efficient because it takes energy to remove the pollutants," says Tom Ochs, a research mechanical engineer at Albany. "We're talking about removing all pollutants, and we used to believe that if we did that, we would not have any energy left."

Coal provides 52% of the electricity in the U.S., according to the American Coal Council, and it is regarded as one of the most cost-efficient fuels.

The next step in testing the process will include the DOE's National Energy Technology Laboratory, according to Jupiter. The plan is to retrofit a 20-megawatt conventional coal-fired plant and design and build a 25-megawatt plant to demonstrate the technologies to commercial operators and the U.S. Environmental Protection Agency. The parties did not identify where these plants might be built but say they hope to have them operational by 2007.

Jupiter also is working with a Canadian firm to obtain certification from the Canadian Environmental Technology Verification program.

Greenhouse Gas Separation Systems Inc. in Red Deer, Alberta, works to recapture and separate flue gases in industrial processes, such as aluminum smelters. The firm, which started 11 years ago, is focusing on the combustion process in coal-fired plants, says Albert



Combustion technology used at Jupiter Oxygen's aluminum plant is now being applied to coal-fired plants.

Cerenzie, president and CEO of the company. He also invented the separation process his firm uses to capture carbon dioxide.

By using Jupiter's oxy-fuel combustion process, his firm achieves higher efficiency in capturing gases, and that works to the advantage of Canadian firms which, under the Kyoto Protocol to reduce the emission of greenhouse gases, can earn credits for recapturing higher percentages of carbon dioxide, Mr. Cerenzie says.

"Newer technologies come along and firms have an incentive to upgrade," says Mr. Cerenzie. "The Jupiter technology makes it more feasible. Even though oxygen is expensive, the credits make it worth it."

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