

**SECOND PLACE: U. S. DEPARTMENT OF ENERGY**  
**NATIONAL ENERGY TECHNOLOGY LABORATORY**

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**“AMMONIA-BASED SCRUBBING PROCESS  
TO CAPTURE CO<sub>2</sub> FROM POWER GENERATION”**

Over 50% of the electric power generated in the U.S. comes from coal-burning power generators. A major concern for power generation systems that use coal as an energy source is the gaseous emissions from the plant. Although certain emissions are currently regulated, such as sulfur dioxide and nitric oxides (precursors to acid rain), a very large potential exists that carbon dioxide (CO<sub>2</sub>), a greenhouse gas, may be regulated in the not too distant future. It is suggested by the scientific community that global warming can be impacted by an increase in CO<sub>2</sub> concentration in the atmosphere. Coal-burning power generators (new ones that may be constructed or the vast majority of older ones that will not be retired in the next 30 years) may need to adopt techniques to mitigate the CO<sub>2</sub> emissions. Carbon sequestration, CO<sub>2</sub> capture followed by permanent storage, is a viable technology as outlined in the U.S Department of Energy's (DOE) Fossil Energy Program. The technology that was patented, licensed, and transferred through a CRADA by the U. S. Department of Energy, National Energy Technology Laboratory (NETL) will aid in the mitigation of CO<sub>2</sub> emissions and provide to the power generation industry an affordable and advantageous technique to capture CO<sub>2</sub> from power generation point sources. In this project, researchers within the in-house research effort at NETL developed a novel technology to capture CO<sub>2</sub> and other gaseous components from flue gas that are emitted from coal-fired power plants. The technology was transferred to Powerspan Corp. for commercialization. The technology transfer activities included the licensing of a patent that describes a technique to capture CO<sub>2</sub> from flue gas by using an aqueous-based scrubbing solution. This regenerable process uses an ammonia-based solution to remove acid gases, primarily sulfur dioxide (SO<sub>2</sub>), nitric oxides (NO<sub>x</sub>) and CO<sub>2</sub>, from flue gas. As an added benefit, fertilizer, a salable commodity, is produced in the process, while the spent ammonia solution is regenerated and recycled to the scrubbing unit, which minimizes cost. Additionally, a CRADA between NETL and Powerspan was executed. Powerspan wished to obtain the intellectual property within the patent since the CO<sub>2</sub> capture technology vastly expands the usefulness of a process that Powerspan had been investigating. Powerspan realized the significance of CO<sub>2</sub> capture and sequestration in the current use of carbonaceous fuels in the power generation industry. NETL's idea for CO<sub>2</sub> capture was licensed to Powerspan under the CRADA. The potential market for the technology is significant. When the technology is implemented, this new wet scrubbing technique provides the utility industry as well as the American public with a solution for mitigating global warming and for pollution control, while also offering the ability to maintain electricity at affordable, reasonable prices.