Lower carbon dioxide emissions from coal-fueled power plants possible with technology development

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A more economical technology for a 90 percent reduction of carbon dioxide emissions from coal-fueled power plants is being developed by a chemical engineer and his colleagues at The University of Texas at Austin as part of the TXU Carbon Management Program.

TXU Power, a subsidiary of TXU Corp., will donate $1.8 million to the university in support of Chemical Engineering Professor Gary Rochelle and his research. The donation will cover a six-year program to improve an existing process for capturing carbon dioxide so it uses at least 10 percent less energy.

“The work we’re doing at The University of Texas at Austin will provide the technical understanding for companies to use this technology in prototype and commercial scale plants,” said Rochelle.

“With the current mix of new power plants, by the year 2030,” he said, “about two-thirds of all carbon dioxide emissions will come from existing coal-fueled power plants, so it is critical that we demonstrate technology to address these releases.”

The funds from TXU Power will be matched by funds from a dozen or more other power companies and process suppliers who will participate in the TXU Carbon Management Program. With these funds, Rochelle, holder of the Carol and Henry Groppe Professorship in Chemical

Engineering, will optimize the chemical and mechanical features of a carbon capture technology that uses a liquid amine chemical.

“We are thrilled to team with a prestigious university such as UT Austin,” said Richard Wistrand, senior vice president and chief fossil officer, TXU Power. “TXU has outlined a vision to lower carbon dioxide emission rates through development of new technologies, and Dr. Rochelle’s research will undoubtedly make great strides toward this development.”

Rochelle spent the past six years developing the technology with funding from the U.S. Department of Energy and the Texas Advanced Technology Program. Like its commercial counterparts, his process captures carbon dioxide gas by dissolving it in a solution containing the chemical monoethanolamine or a related amine. The solution is then boiled to produce pure carbon dioxide.

In Rochelle’s campus laboratory, he will work to improve this approach by using a chemical additive to increase the rate of carbon dioxide absorption into the solution, and assessing the overall capture process using computer models. Actual tests of the carbon capture process will be run on a small, pilot plant at the J.J. Pickle Research Campus.

Rochelle is an expert on reducing industrial emissions. For these studies, he will draw upon two decades of experience developing and testing similar technology to remove hydrogen sulfide and carbon dioxide from natural gas.

Rochelle will share one third of the TXU funds with other colleagues in the university’s College of Engineering and in the Jackson School of Geosciences. These colleagues will help test how well the process works and evaluate an option for storing captured carbon dioxide.

For process verification, Rochelle will work with colleagues at the college's Center for Energy and Environmental Resources at the Pickle Campus. The colleagues, part of the Separations Research Program, oversee the small, pilot plant housed alongside the center's building.

In the college's Department of Petroleum and Geosystems Engineering, the Joint Industry Project for Geologic CO2 Storage will investigate how carbon dioxide captured using Rochelle's process will behave if stored underground in a high-pressure, liquid form. Sandstone formations common in Texas and some other states are already being considered nationally for this type of storage.

Colleagues at the Jackson School's Bureau of Economic Geology will also study this storage option at the bureau's Gulf Coast Carbon Center. They will evaluate using this liquid carbon dioxide to improve enhanced oil recovery, an approach already in use by petroleum companies.

Source: University of Texas at Austin

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