

North Dakota Vision

THE RIGHT CLIMATE FOR CARBON CAPTURE AND STORAGE

BY JOHN HARJU

THE WILLISTON BASIN IS AN AREA of significant opportunity for the demonstration and development of carbon capture and storage. It covers significant portions of North and South Dakota, Montana, Saskatchewan and Manitoba, and is a deep, seismically stable sedimentary basin with multiple stacked CO₂ sequestration targets including lignite deposits, oil reservoirs and saline formations. The oil fields of the Williston Basin are mature, with many of the fields exhibiting characteristics that hold the promise of an opportunity for commercial success utilizing CO₂-based tertiary recovery methods. Unlike the Permian Basin in Texas, which has seen the successful application of CO₂-based enhanced oil recovery for approximately three decades, there is no ready natural source of CO₂ within economically feasible distances and in sufficient quantities. This situation has led the oil producers in the region to look toward anthropogenic sources of CO₂ for oil recovery applications. At the same time, the numerous coal-fired electrical generating stations in the Williston Basin are looking at carbon capture and storage as a technology that can sustain them in the event of a carbon-managed future.

As part of the U.S. Department of Energy's Regional Carbon Sequestration Partnership Program, the Plains CO₂ Reduction (PCOR) Partnership,

managed by the University of North Dakota Energy & Environmental Research Center, is conducting a concurrent CO₂ sequestration and enhanced oil recovery demonstration in the Williston Basin of western North Dakota. The demonstration will feature all of the aspects associated with carbon capture, compression, transporta-

tion, geologic sequestration, and monitoring. In this regard, it will be a first-of-its-kind demonstration for a coal-fired power plant.

Carbon dioxide from roughly 16 percent of the flue gas produced at the Basin Electric Power Cooperative's Antelope Valley power station will be captured using Powerspan's ECO2 process,

after which it will be dehydrated, compressed and transported via pipeline to a Williston Basin oil field for enhanced oil recovery and safe, permanent storage. The demonstration is funded by the U.S. Department of Energy and the various members of the PCOR Partnership. It is possible only because of the close collaboration of many regional organizations, including state agencies, utilities, oil and gas companies, research institutions, and nongovernmental entities.

The demonstration will begin to answer some of the questions that have been raised with respect to capture at a coal-fired facility, including the size of the parasitic power load required to operate the capture plant; the space constraints of a capture system; the ease of integration of a capture plant with existing electrical, plumbing, and ductwork infrastructure; and the effect of the capture plant on plant performance – other than derating – waste management, water usage and wastewater treatment. Cost calculations performed over the entire capture-dehydration-compression system will enable utilities to better estimate the complete cost of capture when integrated into a facility.

Because this is an integrated, cradle-to-grave test, it offers the unique opportunity to begin optimization of the entire suite of technologies and infrastructure needed for safe geologic sequestration of CO₂. The work will provide data critical to CCS becoming a cornerstone of the U.S. global climate change response.

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John Harju
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NewsFlash

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The investment will be made in the next decade, according to the company.

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