

Identifying CO₂ Sequestration Opportunities

Data Collection and Organization

One of the goals of the Plains CO₂ Reduction (PCOR) Partnership project is to match regional carbon dioxide (CO₂) sources with sequestration options objectively. To accomplish this goal, data have been gathered regarding more than 1000 CO₂ sources and geologic sinks contained in the PCOR Partnership region; terrestrial sinks, including modified farming practices and wetlands; CO₂ capture and separation technologies, including those currently in use as well as those still under development; transportation options; and deployment issues, including permitting, measurement, monitoring, and verification.

These data have been input into a series of Excel™ spreadsheets. One spreadsheet contains the data for the entire PCOR Partnership region, while the other spreadsheets contain the information specific to a particular state or Canadian province.

Data Screening and Matching

The CO₂ sources can be screened according to their physical properties, including:

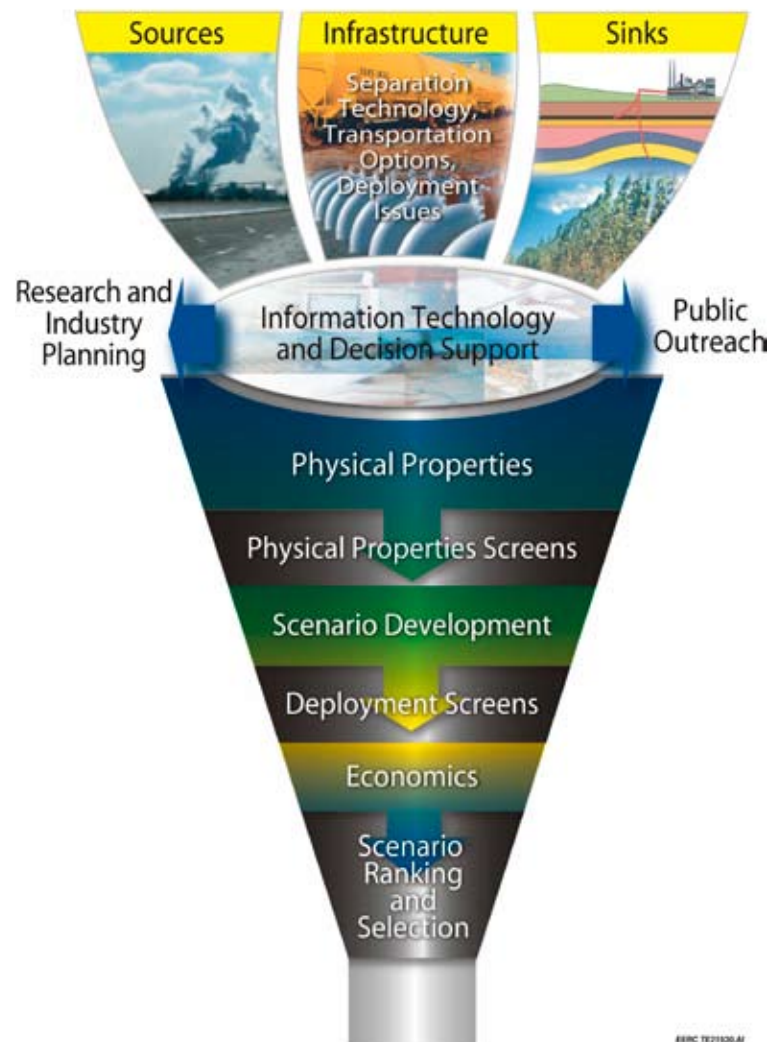
- Quantity of CO₂ produced.
- Percentage of CO₂ in the exit stream.
- Presence of sulfur dioxide (SO₂), nitrogen oxides (NO_x), or other compounds.

The CO₂ sources are screened to identify those that match a desired set of physical property criteria. One example of a set of physical property criteria is all sources emitting streams containing at least 20% CO₂ but without SO₂ and having a minimum CO₂ output of 500,000 tons/yr. The CO₂ sources meeting those criteria are then filtered to sort them into source types (such as electricity generation, ethanol production, or metals processing) to group sources that produce gas streams of similar composition.

Similarly, geologic sinks are screened based on their physical properties. Physical properties that are taken into account include volume available for sequestration (including porosity and permeability) and CO₂ leak potential.

Scenario and Strategy Development

The PCOR Partnership Decision Support System (DSS), developed for PCOR partners, is then accessed to locate the individual CO₂ sources. Sources of a similar type that are located in relatively close proximity to each other are consolidated into a single source. A buffer of a desired distance is drawn around the center of the consolidated sources, and viable geologic sinks located within that buffer are identified. The type of sequestration that could



be performed in those sinks (e.g., enhanced oil recovery, deep-well injection) is determined from the data in the DSS. If the physical properties of the CO₂ stream do not meet the sink sequestration requirements (for example, CO₂ stream purity), then the match is rejected. For each match of geologic sink and consolidated CO₂ source, called a scenario, the type(s) of technologies that might be used to separate and capture the CO₂ are noted.

It is anticipated that when the entire data set is filtered, many scenarios will be identified at locations around the PCOR Partnership region, some of which will be similar in type (e.g., a consolidation of coal-fired power plants from which the CO₂ will be sequestered during enhanced oil recovery). These similar scenario types are called sequestration strategies. During initial protocol checks, this method of identifying CO₂ sequestration opportunities was found to quickly identify promising scenarios for further investigation.

Selecting and Ranking Scenarios and Strategies

Transportation options and deployment issues such as permitting and methods of measuring, monitoring, and verifying sequestration will be defined for the most promising scenarios and/or strategies. Preliminary economic evaluations will be performed on those strategies that appear to hold the most promise for successful sequestration. While not designed to calculate actual costs for sequestering a given volume of CO₂, the economics will provide a relative cost ranking for the strategies. Those strategies offering the best opportunity to demonstrate cost-effective, successful CO₂ sequestration will be proposed for investigation during the Phase II activities.



Data from the PCOR Partnership DSS are used to develop scenarios that pair specific sinks and sources in our region. Economic analysis will be performed on selected scenarios to develop general strategies that have the greatest chance for success in our region.

The Plains CO₂ Reduction (PCOR) Partnership is a group of public and private sector stakeholders working together to better understand the technical and economic feasibility of sequestering CO₂ emissions from stationary sources in the central interior of North America. The PCOR Partnership is managed by the Energy & Environmental Research Center (EERC) at the University of North Dakota and is one of seven regional partnerships under the U.S. Department of Energy's National Energy Technology Laboratory Regional Carbon Sequestration Partnership Initiative. To learn more, contact:

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Visit the PCOR Partnership Web site at www.undeerc.org/PCOR. New members are welcome.

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