ARTICLE 3 – NATURE IN THE BALANCE
THE CAPTURE AND LONG-TERM STORAGE OF CARBON DIOXIDE

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Since the 1800s and the industrial revolution, humans have relied on better energy sources to fuel trains and automobiles and provide energy to generate electricity and heat homes and businesses. In the next 15 years, the global population is expected to increase by 1.5 billion, increasing the need for affordable energy. But today's fossil energy technologies release carbon dioxide (CO_2) to the environment, and there is growing concern that this excess CO_2 in the atmosphere might affect global climate and weather.

CO_2 is a colorless, odorless gas. We come in contact with CO_2 every day: it's produced when we breathe, it's emitted from plants, it makes our soft drinks fizz, and a small amount of CO_2 is naturally present in the atmosphere. CO_2 is also present in the emissions from factories, power plants, vehicles, homes, and businesses.

CO_2 emissions from human sources may have to be controlled to reduce the risk of global warming. Governments around the world are investigating methods to manage human CO_2 emissions, including a method called sequestration (the capture and long-term storage of CO_2).

The University of North Dakota Energy & Environmental Research Center (EERC) is leading an international team to develop opportunities for CO_2 sequestration in the Great Plains. The Plains CO_2 Reduction (PCOR) Partnership includes a diverse group of more than 40 public and private sector partners in nine states and three Canadian provinces, representing experts in agriculture, forestry, geology, engineering, economics, energy exploration and production, and the environment. It is part of a Department of Energy (DOE) program looking at sequestration options in different regions. The project is funded by DOE's National Energy Technology Laboratory (NETL) in Morgantown, West Virginia, and partnership members.

Sequestration either pulls CO_2 from the atmosphere using natural biologic processes (indirect or terrestrial sequestration) or prevents CO_2 from entering the atmosphere (direct sequestration). Direct sequestration captures CO_2 at a source before it can be emitted to the atmosphere. For example, specialized equipment would capture CO_2 at a factory or a power plant. Next, the CO_2 is concentrated, compressed, and transported to a storage location, usually by pipeline. Finally, the CO_2 is injected into a permanent storage zone deep underground (geologic sequestration), such as an unminable coal bed, a depleted oil or gas reservoir, or a very deep saltwater reservoir.

Geologic sequestration is a critical component of DOE's proposed FutureGen concept. This 10-year program would design, build, and test a small-scale, zero-emission facility that would utilize coal to generate electricity, provide hydrogen for transportation, and emit no CO_2 (CO_2 would be sequestered underground).

CO_2 capture and geologic sequestration are being investigated right now in our region, and many of these activities involve the members of the PCOR Partnership. Basin Electric Power Cooperative's Dakota Gasification Plant at Beulah, North Dakota, provides CO_2 to EnCana's Weyburn Oil Field in Saskatchewan via pipeline in order to increase the amount of oil produced. Over the life of the CO_2 flood, about 20 million metric tons of CO_2 will be sequestered in the production zones, which is equal to taking 3.2 million cars off the road for 1 year.

The Weyburn sequestration project is coordinated by one of the PCOR Partnership's members, the Petroleum Technology Research Centre (PTRC) at the University of Regina, and receives funding from the International Energy Agency, Natural Resources Canada, the U.S. DOE, and numerous energy companies. Results of the project and others around the world are showing that CO_2 can be sequestered safely and effectively.

SaskPower (a utility company) and the PTRC are also investigating capture and separation at SaskPower's Boundary Dam electrical generation plant in Estevan, Saskatchewan, using a small-scale test unit. The demonstration currently captures about 4 tons of CO_2 daily.

Geologic and terrestrial sequestration offer the potential to control CO_2 emissions and stabilize CO_2 at an acceptable level in the atmosphere. The United States is playing a critical role in providing the solutions to global climate change. Revamping the world's energy sector won't happen by chance, but DOE, the EERC, and all of the PCOR Partnership members in our region have already begun laying the groundwork to manage CO_2 emissions to ensure a prosperous and environmentally responsible future.

To learn more, check out the Plains CO_2 Reduction Partnership Web site at www.undeerc.org/PCOR and tune in to Prairie Public Television on May 12, 2005, to watch "*Nature in the Balance: CO_2 Sequestration*" (check your local listings). The show provides a 30-minute introduction to CO_2 management with a focus on the North American heartland. The video introduces audiences to NETL's seven Regional Carbon Sequestration Partnerships and describes their role in assessing opportunities for carbon sequestration across North America.

PCOR Partnership

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