

ARTICLE 2 – NATURE IN THE BALANCE AN INTRODUCTION TO STORAGE OF CARBON DIOXIDE

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The global population is expected to increase by 1.5 billion people in the next 15 years, increasing the need for affordable energy to fuel our vehicles and electrical plants, as well as our quality of life. But today's fossil energy technologies release carbon dioxide (CO₂) into the environment. Currently, about 7 billion tons of carbon (26 billion tons of CO₂) is emitted into the atmosphere each year from human activities, and there is growing concern that this excess CO₂ in the atmosphere might affect climate and weather on a global scale.

CO₂ is a colorless, odorless gas. We come in contact with it every day: it's produced when we breathe, it's emitted from plants, it makes our soft drinks fizz, and a small amount of CO₂ is naturally present in the atmosphere. CO₂ is also present in the emissions of factories, power plants, vehicles, homes, and businesses.

CO₂ from human sources may have to be controlled to reduce the risk of global warming. Governments around the world are investigating methods to manage the CO₂ emissions, including a method called sequestration (the capture and long-term storage of CO₂).

The University of North Dakota Energy & Environmental Research Center (EERC) is leading an international team to develop opportunities for CO₂ sequestration in the

Great Plains. The Plains CO₂ 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. The PCOR Partnership is part of a U.S. 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 involves either preventing CO₂ from entering the atmosphere (direct sequestration) or removing CO₂ from the atmosphere after it has been released (indirect or terrestrial sequestration). Terrestrial sequestration is a biological process involving photosynthesis. Essentially, a plant takes in existing CO₂ from the atmosphere and transfers it into the soil via the root system. When the plant dies, some of that CO₂ is released back into the atmosphere. CO₂ is also given off when plants are burned or when the carbon in the soil is exposed to air during plowing.

The soil in the prairies of the upper Midwest is historically rich in carbon. Cultivation has released some of that carbon into the atmosphere. Forested

areas also store substantial quantities of carbon in the woody plant materials and in the roots and soil below ground. There is great potential to put a substantial amount of atmospheric CO₂ back in the ground as carbon.

The PCOR Partnership is investigating various farming and land management practices that maximize the amount of plant carbon the soil can hold. Three of the PCOR Partnership research partners—North Dakota State University, the U.S. Geological Survey, and Ducks Unlimited Canada—are studying sequestration opportunities and assessing monitoring technologies that will help verify carbon sequestration in grasslands, farmland, and wetlands.

General practices that promote sequestration include conservation tillage, installing buffer strips along waterways, enrolling land in conservation programs, restoring and managing wetlands and marginal lands, eliminating summer fallow, using perennial grasses and winter cover crops, and managing forests.

There can be significant societal benefits with a well-managed landscape, including less soil erosion from wind and water. Terrestrial sequestration is intended to be a relatively short-term solution to climate change; it will give industry time to develop the technologies for reducing direct emissions to the atmosphere.

To learn more, visit the Plains CO₂ 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: CO₂ Sequestration*” (check your local listings). The show provides a 30-minute introduction to CO₂ 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.



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Visit the PCOR Partnership Web site at www.undeerc.org/PCOR.

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