Can Carbon Dioxide Be A Good Thing?

Physicist Explains Benefits Of Carbon Dioxide

June 1, 2007 — A physicist from Colorado State University and his colleagues from the North American Carbon Program (NACP) have discerned and confirmed the unforeseen advantages of rising carbon dioxide levels. Through the processes of photosynthesis and respiration, scientists have been able to elucidate why plants are growing more rapidly than they are dying. The NACP is employing methods, such as the use of cell phone and aircraft towers to monitor and retrieve carbon data for their continuing study.

Too much carbon dioxide can be a bad thing, but sometimes it can have a positive effect on plants and trees. The more carbon emissions we dump into the air, the faster forests and plants grow.

This new revelation is the result of research done by the North American carbon program. Scott Denning, Ph.D., a physicist from Colorado State University in Fort Collins, Colorado, explains the North American Carbon Program, "We are measuring CO_2 in the atmosphere at dozens of places every hour around the United States and Canada."

About 100 cell phone and aircraft towers dotting the North American landscape are providing a network to measure CO_2 in the atmosphere. Physicists tracking the data have found an unexpected benefit of rising carbon dioxide levels. Dr. Denning says it's unusual. "Stuff is growing faster than it's dying, which is weird," he says.

The answer may have more to do with how plants use CO_2. During photosynthesis, plants take in carbon dioxide from the air to make food, but as a plant decays, CO_2 is released back it into the air. Plans are underway to use cell phone towers worldwide for measuring CO_2, expanding the carbon program globally. The bad part is plants can't clean the air as fast as we are polluting it.

BACKGROUND: Carbon, in the form of carbon dioxide, is a greenhouse gas released into the atmosphere as a direct result of human activities all the time. This in turn raises the temperature of the earth, leading to global climate change. The concentration of atmospheric CO_2 has already increased by about 30% since the beginning of the industrial revolution in the late 1800s. Most of this increase comes from using fossil fuel -- coal, oil and natural gas -- for energy, but approximately 25 percent of the carbon came from changes in land use, such as the clearing of forests and the cultivation of soils for food production. Natural sources of atmospheric carbon include gases emitted by volcanoes, and respiration of living things. We breathe in oxygen, and breathe out carbon dioxide.

CAPTURING CARBON: It is possible to reduce the amount of CO_2 released into the atmosphere by modern power plants by as much as 80-90% through carbon capture and storage technologies. The downside is that the fuel needs of a plant would increase by 10-40% in order to capture and store the carbon dioxide, thereby increasing operating costs by 30-60%. There are three basic ways to capture carbon. One is the remove it after burning fossil fuels, an approach that is already being used

on a small scale by conventional power plants. Or the fossil fuel can be turned into a gas before the burning process and captured from the exhaust stream in a purer form of CO_2 and water vapor. A third emerging option is called chemical looping combustion, in which metal particles interact with the fuel and produce solid metal particles and a mix of CO_2 and water vapor than can be captured and transported to a storage site.

STORING CARBON: There are many alternatives for storing the captured CO_2. The most promising is storing the CO_2 deep in rocky formations in the earth, including oil and gas fields, and unminable coal seams, using various trapping mechanisms to ensure the CO_2 doesn't escape back to the surface. In fact, injecting CO_2 into oil fields can increase oil recovery, thereby offsetting the extra cost of storage. Another option is ocean storage, in which CO_2 in injected deep into the ocean, where it dissolves, or deposited onto the ocean floor, where it is denser than water and therefore forms a "lake" of CO_2. The downside is that an excess of CO_2 in ocean waters increases acidification and can kill marine organisms. A third option is trapping the carbon in stable minerals permanently by reacting the CO_2 with metal oxides. But the reaction rate is slow. You need expensive pre-treatment to speed up the process, which would increase energy costs as much as 60-180%.

The American Geophysics Union and the American Meteorological Society contributed to the information contained in the video portion of this report.