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Annual report shows 2 percent gain in global carbon emissions

WEST LAFAYETTE, Ind. — World atmospheric carbon dioxide emissions continue to rise, according to a report available online Tuesday (Nov. 17) and in the December issue of the journal *Nature Geoscience*.

The report, updated annually by a global team of climate experts, including a Purdue University researcher, shows that global carbon emissions from fossil fuels rose 2 percent last year to a record high of 1.3 metric tons per person.

Although the rate of increase is down versus the previous growth rate of 3 percent in 2007, it still comes as a surprise to the report's authors.

"A lot of us thought the economic downturn would make more of a dent in emissions, but that doesn't appear to be the case," said Kevin Gurney, one of the paper's co-authors and a Purdue associate professor of earth and atmospheric sciences and agronomy. "Emissions keep growing in spite of the financial slowdown."

The reason may be due to emissions generated by developing countries, like China, that have seen an early rebound in coal-powered manufacturing activity, a practice that is closely tied to carbon dioxide emissions.

"Coal is the backbone of the Chinese electricity production sector," Gurney said. "If production had shifted to a place that uses hydropower, emissions would have fallen, but they shifted to a place that uses an awful lot of coal."

The report also shows that the growth rate in carbon emissions from coal and other fossil fuels continues to outpace natural carbon neutralizers, or 'sinks,' such as the oceans and vegetation.

"The helping hand that we've been getting from the oceans and the biosphere looks like it continues to weaken," Gurney said.

"For decades, roughly half of each ton of carbon dioxide that was released into the atmosphere stayed there. The other half was removed by the oceans or plants. There is now

… more …

evidence that these removal processes cannot keep pace with emissions. This is extremely worrisome because the end point could be that the removal stops."

The scientific community has suggested that in order to stabilize carbon dioxide at levels that do not induce drastic climate change, emissions must be reduced by 60 percent to 70 percent below 1990 baseline levels.

"We are now 41 percent above emission levels in 1990," Gurney said. "The train is moving in the wrong direction. We have a lot of work ahead of us."

Current and future efforts to control emissions take center stage next month during international climate-change policy negotiations in Copenhagen, Denmark.

"Time is running out on some deadlines that were set two years ago, so there is a lot of pressure this year to establish a plan of action," Gurney said.

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Related Web sites:
Purdue Carbon Group: www.purdue.edu/eas/carbon/

Global Carbon Project: http://www.globalcarbonproject.org/

ABSTRACT

Trends in the Sources and Sinks of Carbon Dioxide

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Efforts to control climate change require the stabilization of atmospheric CO_2 concentrations. This can only be achieved through a drastic reduction of global CO_2 emissions. Yet fossil fuel emissions increased by 29% between 2000 and 2008, in conjunction with increased contributions from emerging economies, from the production and international trade of goods and services, and from the use of coal as a fuel source. In contrast, emissions from land-use changes were nearly constant. Between 1959 and 2008, 43% of each year's CO_2 emissions remained in the atmosphere on average; the rest was absorbed by carbon sinks on land and in the oceans. In the past 50 years, the fraction of CO_2 emissions that remains in the atmosphere each year has likely increased, from about 40% to 45%, and models suggest that this trend was caused by a decrease in the uptake of CO_2 by the carbon sinks in response to climate change and variability. Changes in the CO_2 sinks are highly uncertain, but they could have a significant influence on future atmospheric CO_2 levels. It is therefore crucial to reduce the uncertainties.