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## **EcoFocus: There's no time to waste to stem warming trend**

By William H. Schlesinger

Like it or not, global warming is upon us. The real questions we face are: is this warming unusual and does it result from human activities?

As a global change scientist, I am often asked these questions, and I believe the answer to both of them is "yes."

Throughout its geologic history, the Earth has experienced large temperature fluctuations. About 18,000 years ago, much of North America was covered with ice. This ice was at least a mile thick over most of New York state. During the past two million years, the natural cycles of climate have included more than 12 glacial periods. At the end of the last ice age, the climate warmed rapidly to the favorable conditions we enjoy today.

The climate we are familiar with has persisted, more or less, for the past 8,000 years. This period encompasses the history of organized human society - the development of agriculture, cities, trade, culture and the amenities of modern life. There have been minor fluctuations in the Earth's average temperature - a Medieval Warm Period from 890 to 1170 A.D. and the Little Ice Age from 1580 to 1850 A.D. - but those periods were only about 1 degree Fahrenheit warmer or cooler than the long-term average global temperature.

Carbon dioxide (CO<sub>2</sub>) is a gas that naturally cycles in and out of Earth's atmosphere, where it affects climate. Prior to the Industrial Revolution (in the mid-1880s), carbon dioxide concentrations were tied to natural processes and relatively stable. Volcanoes release a small amount each year - about 0.05% of the atmospheric content. Plants take up carbon dioxide as they grow. Animals and decomposing organisms release carbon dioxide into the air. A large amount of carbon dioxide also moves in and out of the world's oceans each year.

### **Industrial Revolution started change**

With the advent of the Industrial Revolution, humans began to burn fossil fuels (coal, oil and natural gas), which release large amounts of carbon dioxide into the atmosphere. Even then physicists agreed that carbon dioxide emissions would warm Earth's atmosphere - carbon dioxide absorbs outgoing heat radiation. Over the past 150 years,

atmospheric carbon dioxide has increased by over 28%, leading to distinct warming patterns.

Long-term records of overall average temperature, logged by weather stations across the globe, indicate our planet is getting warmer. In the Catskills, recent data show an increase of 1 degree Fahrenheit over the past 50 years. Before the end of the century, New York state temperatures are projected to rise between 5 and 9 degrees Fahrenheit. Larger increases are projected for polar regions, where melting ice caps in Greenland and Antarctica are expected to cause the sea level to rise about 18 inches. Greenland's ice is already in rapid retreat; the Antarctic ice pack has been slowly melting since measurements began in 1978.

What can we do? Weaning ourselves from fossil fuels won't be easy. Their concentrated energy has been the economic driver behind modern society. Before fossil fuels, manual labor limited how much we could accomplish each day. Yet when our fossil fuel dependence affects the basic characteristics of our planet, such as its climate, it's time to ask if we are fouling our nest, with real costs to our health and economy.

Time is of the essence: each molecule of CO<sub>2</sub> added to the atmosphere will affect our climate for more than 100 years. To learn more about the science of global warming, including ways to minimize your personal CO<sub>2</sub> profile, attend the Institute's free Global Warming Panel at 6 p.m. April 19.

*William H. Schlesinger will assume the presidency of the Institute of Ecosystem Studies in May of this year.*