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Has global warming come to Blue Grass?

By Curtis Seltzer

BLUE GRASS, Va.—I am being stalked at this moment by three big farm gates.

They have become unhinged in this summer's heat.

In each case, one of their two pegs -- the metal supports on which they swing -- has worked out of its deteriorating, 20-year-old locust post. In the best case, I will drill a new hole with an old-fashioned brace and bit, screw in the metal peg using a pipe wrench for leverage and reset the 12-foot-long gate—no fun when you only have two hands.

In the worst case, I'll have to take down the fence at the post, yank out the old one, insert a new one, nail up the fence and rehang the gate from scratch. A nine-foot-long corner post that supports a gate can weigh 200 pounds or more.

Instead of confronting these stalkers, I am sitting in my office next to an air conditioner. I am in here and not out there because it's too hot out there and just right in here.

I am comfortably cool because coal is being burned somewhere to make steam to turn a turbine to generate electricity that travels by wire into my heat-fighting appliance.

More than 30 years ago I was part of a research team in the Congressional Office of Technology Assessment that produced The Direct Use of Coal: Prospects and Problems of Production and Combustion (April, 1979). All OTA reports are available at [www.princeton.edu/~ota/](http://www.princeton.edu/~ota/).

The study's environmental analysis -- which I had nothing to do with -- identified land, water and air impacts from America's coal production and use, including the idea that the "...most widely accepted [school of thought] is that global warming [associated with carbon dioxide and other greenhouse gases] will occur sometime in the next century or so as a result of man's activities, and that any manifestation of natural climatic cycles will eventually be overwhelmed by this induced warming."

Is "sometime in the next century" right now, outside my closed window? Has global warming come to Blue Grass?

Here is what passes for my "data base." When we moved to our farm at about

2,200 feet in 1983, we never used an air conditioner. Occasionally, we'd turn on a fan.

About 15 years ago, we bought one air conditioner and then a couple more during the next decade. All neighbors agree that summers used to be cooler and winters, with the exception of 2010, colder. A breath-stealing hot day, everyone says, was rare, and no one needed air conditioning.

Direct Use reported in 1979 that "...the scientific community generally agrees that the probability of significant global warming and other climatic changes is sufficiently high to warrant exceptional attention in the form of expanded research and monitoring, and caution in weighing any decisions that might tend to tie us irrevocably to a fossil-based energy economy."

That was stronger-than-normal warning for a Congressional report that was sent to 535 Senators and Representatives, some of whom believed that man-made global warming would bring disastrous change, some didn't and some didn't know what to believe.

Direct Use concluded: "With the possible exception of carbon dioxide pollution, all the significant problems associated with substantially increased coal use appear to be solvable." And, indeed, federal policies have reduced acid rain and air-pollution-related mortality since then.

Carbon dioxide, however, remains unsolved, and atmospheric carbon buildup is getting worse. Its concentration, now 391 parts per million by volume (ppmv), is the highest level in at least 800,000 years. America, like China and most -- but not all -- large economies, is still tied to fossil-based energy.

The Newt Gingrich-controlled 104th Congress abolished its Office of Technology Assessment in 1995 after 23 years, saving \$22 million.

Since 1979, scientists around the world have "expanded research and monitoring." Most of it, though not all, still points in the same general direction. Greenhouse gases -- and primarily carbon dioxide generated from human activity and mostly from burning fossil fuels, and particularly coal -- are warming the planet.

The National Research Council (NRC) is one of four institutions, collectively referred to as the National Academies, which provide non-partisan policy advice on science, engineering, technology and health issues to our government, elected leaders and people. The NRC does not receive federal funds, but individual research projects often do. The NRC has done research since 1916.

The NRC issued a study last week, [Climate Stabilization Targets: Emissions,](#)

Concentrations and Impacts over Decades to Millennia that projects climate changes and impacts if greenhouse gases are stabilized at particular concentration levels. ([www.nationalacademies.org/newsroom](http://www.nationalacademies.org/newsroom))

Carbon dioxide builds up when emissions exceed the planet's ability to process it. The excess hangs around. Global warming will increase our current emission level of 391 ppmv.

At 340 ppmv, average global temperature is estimated to rise 1.8 degrees F; at 430 ppmv, temperature is estimated to rise 3.6 degrees; at 540 ppmv, temperature rise is estimated at 5.4 degrees; at 670 ppmv, the rise is 7.2 degrees; and at 840 ppmv, the rise is estimated at 9 degrees.

Each of these temperature steps would produce a 5-to-10 percent change in precipitation in a number of regions; 3-to-10 percent increase in heavy rainfall; 5-to-15 percent yield reduction in a number of crops; 5-to-10 percent change in stream flow in many river basins; and about 15-to 25-percent decrease in the extent of annually averaged and September Arctic sea ice.

While some crops and areas will benefit from higher carbon dioxide levels, most impacts are expected to be harmful in most places, and the degree of harm grows with rising temperature and its duration.

The NRC study found that emission reductions larger than about 80 percent of any future peak global emission rate reached would be required to stabilize carbon dioxide concentrations for a century or so at any chosen target level.

Nuclear power and natural gas seem to be the obvious carbon-lowering choices for generating electricity from big plants for the next 40 years. Building those plants to replace coal and oil plants would allow a shift toward a more electric-centric economy and away from the most carbon-rich fossil fuels. Even if lots more wind and solar capacity is added, big base-load plants are needed to provide the continuous generation that wind and solar can't.

Individuals and business will undoubtedly adapt on their own to warmer, drier conditions just as I've done with my air conditioners. The problem is that some adaptations -- like my coal-fired air conditioners -- can make the problem worse.

Global warming is hard to understand and harder to solve. You have to be model-savvy to sit at any serious debate table. Keeping up is a full-time job. It's not the type of problem that lends itself to political consensus in this country or among countries. And not everyone agrees that the "problem" is real.

My inclination is to spend a ton of money on research while moving toward a lower-carbon, electricity-based economy. I think research will eventually find better energy technologies than nuclear and natural gas, as well as feasible ways of reducing carbon emissions. Mine is a faith-based, buy-time strategy; it tries to avoid putting our money into horseshoes in 1900.

I'm skeptical about whether a cap-and-trade system -- currently being mashed around in Congress -- will produce significant reductions at an acceptable cost. A tax-incentive program that encourages utilities to invest in lower-carbon fuels might work better.

A carbon tax would discourage coal and oil just the way high cigarette taxes have lowered smoking rates. My guess is that sequestering coal-generated carbon dioxide will prove to be feasible environmentally and technologically only at a cost that makes it unfeasible economically.

And I would not be surprised if we find ourselves forced to bite the coal bullet—ending its direct use.

Meanwhile, I'm benefiting from local warming by staying cool, avoiding work and thinking globally. Carbon dioxide buildup is such a handy excuse, I intend to use it often.

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