Warmer Climate on the Earth May Be Due To More Carbon Dioxide in the Air

By WALDEMAR KAEMPFFERT

According to a theory which was held half a century ago, variation in the atmosphere's carbon dioxide can account for climatic change. The theory was generally dismissed as inadequate. Dr. Gilbert Plass re-examines it in a paper which he publishes in the American Scientist and in which he summarizes conclusions that he reached after a study made with the support of the Office of Naval Research. To him the carbon dioxide theory stands up, though it may take another century of observation and measurement of temperature to confirm it [....]

The New York Times
October 28, **1956**

Despite nature's way of maintaining the balance of gases the amount of carbon dioxide in the atmosphere is being artificially increased as we burn coal, oil and wood for industrial purposes. This was first pointed out by Dr. G. S. Callendar about seven years ago. Dr. Plass develops the implications.

Generated by Man

Today more carbon dioxide is being generated by man's technological processes than by volcanoes, geysers and hot springs. Every century man is increasing the carbon dioxide content of the atmosphere by 30 per cent—that is, at the rate of 1.1° C. in a century. [....]

Whatever the cause of the warming of the earth may be there is no doubt in Dr. Plass' mind that we must reckon with more and more industrially generated carbon dioxide. "In a few centuries," he warns, "the amount of carbon dioxide released into the atmosphere will be so large that it will have a profound effect on our climate."

Even if our coal and oil reserves will be used up in 1,000 years, seventeen times the present amount of carbon dioxide in the atmosphere must be reckoned with. The introduction of nuclear energy will not make much difference. Coal and oil are still plentiful and cheap in many parts of the world, and there is every reason to believe that both will be consumed by industry so long as it pays to do so.

Note that last sentence about coal and oil. We're now discovering the high cost of low price.

Half a century ago, scientists saw what was coming, though they underestimated how fast it would arrive because they did not sufficiently appreciate the world's appetite for fossil fuels. It's now five times greater than back then.

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The Big Picture

It was 1938 when the Earth's fever was first noticed. A finger was pointed at the carbon dioxide accumulating in the atmosphere from burning fossil fuels (coal, oil, and natural gas). It acts as insulation. The Earth was dressed too warmly, even then.

Now we have entered a period of consequences. Major symptoms have appeared. The climate doctors have been consulted. The lab reports have come back. Now it's time to pull together the Big Picture and discuss the treatment options.

The diagnosis, now certain, is CO_2 poisoning. We cause our planet to run a fever as we keep piling on those invisible blankets generated by cutting down forests, making cement, constantly tilling the soil, spreading fertilizer, and burning fossil fuels.

The outlook is for major complications, such as droughts that just won't quit. Tipping points lead to demolition derbies. The Amazon burns. Major cities drown. Deserts expand. Oceans acidify. Dwindling resources trigger genocidal wars with neighbors (think Darfur). Extreme weather keeps trashing the place.

Absent effective treatment, much of that will be on tap for later this century even if we avoid the most serious problem: sudden flips in climate. The cockroaches and mosquitoes will like our global fever; most of us will not.

What's the treatment? The obvious way to treat the fever is to remove the excess CO_2 from the air. Curiously, this is seldom mentioned today because "realists" have already scaled back their expectations—to merely slowing down the damage, rather than fixing the problem.

The climate scientists now say we need to stop the growth in worldwide carbon emissions before 2020, even for a compromise goal that will melt much of Greenland, flood major coastal cities, and make a third of all species extinct. (Some compromise.) Delay will take us into the territory of half of all species, failing crops, famines, mass migrations, and genocidal wars.

And the proposed treatments ought to sound familiar: we are told to walk, diet, change what we consume—that is to say, conserve energy, emphasize renewable energy, fill the car's tank much less often, and substitute nuclear-solar-wind-geothermal-hydro energy for coal. Like the diabetic who wants to avoid dying young, our civilization

needs to take all of these measures to avoid collapsing later this century.

By taxing the carbon pollution and reducing taxes elsewhere, we can make alternative energy sources the good deals—and create some real incentives to remodel buildings and buy plug-in hybrid cars.

But few ask if such measures are quick enough. Or reliable enough. Or if they can head off the developing world from repeating our mistakes.

Why should conserving energy work out any differently than the advice to eat less? Dieting really ought to work—and it does in the short run. But most dieters weigh *more* several years later. It's the same thing with stopping smoking (four out of five resume).

Do we really want to bet our only habitable planet on the success of a low-carbon diet? People may stop dieting because something stressful comes up. In human-induced climate disease, reactions to stress are also making things worse. Every summer, energy conservation backslides into burning more coal because of what happens when the air conditioning fails: people die. In buildings where the windows don't open, businesses close.

Getting another coal fix means that we spiral up, as hot begets hotter. To break this vicious cycle and restore CO_2 to normal levels, we need a treatment plan that's big enough to cover the contingencies—and fast enough to turn this situation around within several decades.

Coal is the worst of the fossil fuels, creating twice as much CO_2 as natural gas. But instead of decreasing, coal use in the U.S. is now projected to double by 2030. We're planning to build another new coal plant every month. In China, the current rate is a two new coal plants every *week*.

Because CO_2 mixes worldwide within several years and hangs around for many centuries, their CO_2 is ours and ours is theirs. The U.S. has been the world's largest contributor over the years, what with our dirty coal, long commutes, and big, boxy gas guzzlers.

An important reason to institute vigorous treatment now is that even if we stopped adding CO_2 today, delayed effects of past emissions would double our present fever by 2050.

Our window of opportunity appears to be rapidly closing. If we don't turn around emissions growth by 2020, we'll never hold the fever down enough to avoid the worst consequences. It's a catastrophe in slow motion but nonetheless a tragedy awaiting today's students.

Since we only get one shot at this time bomb, we must allow for contingencies—also rarely discussed. For example, it's quite likely that another supersized El Niño will occur in coming decades, again with major drought and fires. *But suppose it lasts twice as long as usual?* We did have a long one from 1986–87 but it wasn't also a big one.

A big, long El Niño would likely dry out two of the three major rain forests of the world. The resulting fires in Southeast Asia could inject five times the usual yearly

increment of anthropogenic CO_2 into the atmosphere. If the Amazon burns off, that's an additional fifteen-year hit in only a few years.

It would cause a mass extinction of both animal and plant species, about half being lost in the aftermath.

Lacking those tropical trees to extract CO_2, the earth's fever would climb half again as fast. Forced to play catch up, we might find that we lacked maneuvering room. And crash.

So for contingencies, we must quickly create a big safety margin, above and beyond implementing the gradual improvements for the long run. Though we still have some maneuvering room, seventy years of neglect have almost painted us into a corner.

So how fast must we treat climate disease? Unjustified delay in starting treatment has happened often enough in medicine that there is now a cautionary aphorism: "The doc who waits until dead certain may wind up with a dead patient." Few climate scientists or politicians, it appears, are accustomed to thinking like physicians (or, for that matter, military officers) about the tradeoffs between urgency and uncertainty.

For global warming, the usual scientific uncertainties have been dangerously oversold by the naysayers and procrastinators. The do-nothings are like the patient who puts off treatment because the doctor isn't sure which subtype of cancer it really is. And, when that is settled,

puts off chemotherapy again to shop around for "natural" treatments—then denies everything. And dies.

Rather than talk about "certainty" and the most likely climate outcome, what we need from the climate scientists and economists is a risk assessment. Risk is the likelihood multiplied by the consequences—and we have already stumbled into the high-risk zone. I'd say that we are facing a medium likelihood of widespread catastrophe, rather like flying on a plane with a 30 percent chance of losing a wing before landing.

Even though the most likely scenario is that we would arrive safely, we'd strive mightily to avoid flying on that airplane in the first place. And, presumably, work even harder to keep our kids from boarding it. But we cannot afford an endless analysis or an inconclusive debate over cost-benefit.

James Lovelock, in *The Revenge of Gaia*, is the only big thinker who seems to reflect on global warming over the next few decades like a physician thinks about the patient's situation over the next year. Lovelock says that we have to start quickly expanding a proven solution and not keep waiting for something better down the road.

When the cancer patient asks about targeted genetic treatments, the physician explains, "You don't have time to wait for them. You're in a race with a destructive process. You need something that is known to work half of the time, even though it isn't perfect and has some unpleasant side effects." The physician may silently add, "If you'd stopped smoking earlier, you wouldn't have to

use this medicine now." And so it is with stopping our industrial-scale smoking and starting "chemo."

What is Lovelock's reluctant solution? In France, this carbon-free power source supplies 78 percent of their electricity. New Jersey gets 52 percent. Worldwide it has a far better safety record than any other major power source. Still, there are as many objections to nuclear power plants as there are to chemotherapy. As with chemo, there are promising improvements down the line. They appear to overcome the reasonable worries about reactor accidents, fuel diversion into nuclear weapons, and the long-term management of waste (they can even use existing waste as fuel).

But we're going to have to quickly stop smoking coal and, until something better comes along, Lovelock says that means going with what we've got, the current approved reactor designs. I'd prefer deep geothermal heat if they can ramp it up fast enough. But those are the only two routes, so far as I can see, likely to create our safety margin during the next decade.

We are remaking the earth in dangerous ways. But this should not make anyone jump to the conclusion that we are in a hopeless bind. People have proved wonderfully inventive when confronted with big challenges. For tackling ozone smog and then acid rain, there was much moaning about the price tag (industries find that useful for improving profits via tax breaks). But the estimates proved wide of the mark. Improvements in technology such as the catalytic converter greatly reduced the costs. Inventions to

bring down global fever will stimulate the economy far better than the second home, the third car, or the fourth computer. Solar energy in particular will create many jobs.

Because we have to stop the growth in fossil-fuel emissions before 2020 to avoid the catastrophic consequences of a high fever, action must be swift. It is no longer possible to merely plan for the long run. But if we generate much of our electricity without fossil fuels and start driving plug-in hybrids, we can indeed make a big dent by 2020.

For people who seek meaningful work in life, the efficiency agenda starts at home and the public policy agenda won't happen without the grassroots becoming angry. The high stakes will draw even more good people into political life. Potentially it's a renaissance—though not for any country that buries its head in the sand.

Time's up. Do we, knowing full well the consequences of our inactions, really want to destroy our civilization and kill off half of all species? I trust we have more brains than that.

[N]umerous long-term changes in climate have been observed. These include changes in Arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones.

—Intergovernmental Panel on Climate Change (IPCC), 2007

[F]or the past twenty years, the period during which greenhouse science emerged, most of the effects of heating on the physical world have in fact been more dire than originally predicted.

The regular reader of *Science* and *Nature* is treated to an almost weekly load of apocalyptic data, virtually all of it showing results at the very upper end of the ranges predicted by climate models, or beyond them altogether.

Compared with the original models of a few years ago, ice is melting faster; forest soils are giving up more carbon as they warm; storms are increasing much more quickly in number and size.

—author Bill McKibben, 2006

GLOBAL FEVER

How to Treat Climate Change

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