

## The Sword of Damocles

Over a year ago I wrote to Prime Minister Brown asking him to place a moratorium on new coal-fired power plants in Britain. I have asked the same of Angela Merkel, Barack Obama, Kevin Rudd and other world leaders. The reason is this – coal is the single greatest threat to civilization and all life on our planet.

Our global climate is nearing tipping points. Changes are beginning to appear, and there is a potential for explosive changes with effects that would be irreversible – if we do not rapidly slow fossil fuel emissions over the next few decades.

Tipping points are fed by amplifying feedbacks. As Arctic sea ice melts, the darker ocean absorbs more sunlight and speeds melting. As tundra melts, methane a strong greenhouse gas, is released, causing more warming. As species are pressured and exterminated by shifting climate zones, ecosystems can collapse, destroying more species.

The public, buffeted by day-to-day weather fluctuations and economic turmoil, has little time or training to analyze decadal changes. How can they be expected to evaluate and filter out advice emanating from special economic interests? How can they distinguish top-notch science and pseudoscience – the words sound the same?

Leaders have no excuse – they are elected to lead and to protect the public and its best interests. Leaders have at their disposal the best scientific organizations in the world, such as the United Kingdom's Royal Society and the United States National Academy of Sciences.

Only in the past few years did the science crystallize, revealing the urgency – our planet really is in peril. If we do not change course soon, we will hand our children a situation that is out of their control, as amplifying feedbacks drive the dynamics of the global system.

The amount of carbon dioxide in the air has already risen to a dangerous level. The pre-industrial carbon dioxide amount was 280 parts per million (ppm). Humans, by burning coal, oil and gas have increased carbon dioxide to 385 ppm, and it continues to grow by about 2 ppm per year.

Earth, with its four kilometer deep ocean, responds only slowly to changes of carbon dioxide. So more climate change will occur, even if we make maximum effort to slow carbon dioxide growth. Arctic sea ice will disappear in the summer season within the next few decades. Mountain glaciers, providing fresh water for rivers that supply hundreds of millions of people, will disappear – practically all of the glaciers could be gone within 50 years, if carbon dioxide continues to increase at current rates. Coral reefs, harboring a quarter of ocean species, are threatened, if carbon dioxide continues to rise.

The greatest threats, hanging like the sword of Damocles over our children and grandchildren, are those that are irreversible on any time scale that humans can imagine. If coastal ice shelves buttressing the West Antarctic ice sheet continue to disintegrate, the ice sheet could disgorge into the ocean, raising sea level by several meters in a century. Such rates of sea level change have occurred many times in Earth's history in response to global warming rates no higher than that of the past thirty years. Almost half of the world's great cities, and many historical sites, are located on coast lines.

The most threatening change, from my perspective, is extermination of species. Several times in Earth's long history rapid global warming of several degrees occurred, apparently spurred by amplifying feedbacks. In each case more than half of plant and animal species went extinct. New species came into being over tens and hundreds of thousands of years. But these are time scales and generations that we cannot imagine. If we drive our fellow species to

extinction we will leave a far more desolate planet for our descendants than the world that we inherited from our elders. We will leave a world haunted by the memories of what was.

Clearly, if we burn all fossil fuels, we will destroy the planet we know. Carbon dioxide would increase to 500 ppm or more. We would set the planet on a course to the ice-free state, with sea level 75 meters higher. Coastal disasters would occur continually. The only uncertainty is the time it would take for complete ice sheet disintegration.

The tragedy of the situation, if we do not wake up in time, is that the changes that must be made to stabilize the atmosphere and climate make sense for other reasons. The changes would produce a healthier atmosphere, improved agricultural productivity, clean water, and an ocean providing fish that are safe to eat.

Actions required to solve the problem are dictated by physical facts, especially fossil fuel reservoir sizes. About half of readily extracted oil has been burned already. Oil is used in vehicles, where it is impractical to capture the carbon dioxide. Oil and gas will drive carbon dioxide to at least 400 ppm. But if we cut off the largest source of carbon dioxide, coal, it will be practical to bring carbon dioxide back to 350 ppm and still lower through improved agricultural and forestry practices that increase carbon storage in trees and soil.

Coal is not only the largest fossil fuel reservoir of carbon dioxide, it is the dirtiest fuel. Coal is polluting the world's oceans and streams with mercury, arsenic and other dangerous chemicals. The dirtiest trick that governments play on their citizens is the pretense that they are working on "clean coal" or that they will build power plants that are "capture ready" in case technology is ever developed to capture all pollutants.

The trains carrying coal to power plants are death trains. Coal-fired power plants are factories of death. When I testified against the proposed Kingsnorth power plant, I estimated that in its lifetime it would be responsible for extermination of about 400 species – its proportionate contribution to the number that would be committed to extinction if carbon dioxide rose another 100 ppm. Of course, we cannot say which specific species should be blamed on Kingsnorth, but who are we to say that any species are worthless?

The German and Australian governments pretend to be green. When I show German officials that fossil fuel reservoir sizes imply that the coal source must be cut off, they say they will tighten the "carbon cap". But a cap only slows the use of a fuel, it does not leave it in the ground. When I point out that their new coal plants require that they convince Russia to leave its oil in the ground, they are silent. The Australian government was elected on a platform of solving the climate problem, but then, with the help of industry, they set emission targets so high as to guarantee untold disasters for the young and the unborn. These governments are not green. They are black – coal black.

On a per capita basis, the three countries most responsible for fossil fuel carbon dioxide in the air today are the United Kingdom, the United States, and Germany, in that order. Politicians in Britain have asked me: why am I speaking to them -- the United States must lead? But coal interests have great power in the United States – the essential moratorium and phase-out of coal likely requires a growing public demand and a political will yet to be demonstrated.

The Prime Minister should not underestimate his potential to initiate a transformative change of direction. And he must not pretend to be ignorant of the consequences of continuing coal emission, or take refuge in a "carbon cap" or some "target" for future emission reductions. Young people are beginning to understand the situation. They want to know: will you join their side? Remember that history, and your children, will judge you.