

CO₂ AND THE CLIMATE: AN ENGINEER'S POINT OF VIEW

Paris Tech Review is publishing two different perspectives on climate change: one from Christian G rondeau, [the other from Michel Petit](#).

Rarely has a debate preoccupied the media and public opinion as much as the one that is raging today on climate change and the possible impact of human activities.

Climatologists themselves are divided into two warring factions. The majority seems to be aligned with the “official” camp, which supports a point of view that can be summarized in four points:

- The temperature of the Earth is rising and will continue to do so in a dangerous way
- Human activities and more specifically carbon dioxide (CO₂) emissions are the root cause of the phenomenon
- Action thus needs to be taken to control and reduce CO₂ emissions
- There are means to achieve this and they must be implemented as soon as possible to “save the planet”

But other climatologists, who are increasingly making themselves heard, are challenging the very foundations of this reasoning. They argue that variations in the climate have always existed, and that there is no evidence that human activities, particularly CO₂ emissions, have a significant influence on its evolution or average global temperature.

Without being a climatologist—and there are very few in the world—is it possible to have an opinion? Faced with the difficulty

of the subject and the scope of the controversy, it is tempting to say no. This article will try to show that it is not the case, and that a rational approach—which could be qualified as that of an engineer, i.e., based on facts—leads to a number of conclusions that are hard to dispute and shines new light on this complex topic.

Rather than enter the debate between climatologists about climate change and the possible role of human activities in this respect, this article proposes to look at the problem upside down, starting with a simple question: How much room for maneuver do we have with regard to CO₂ emissions? Can we do anything about them?

Instinct leads us to respond positively. When we turn off the lights upon leaving a room, when we buy a car that uses less fuel, or when we insulate our homes, we reduce our energy consumption and thereby our carbon emissions. It is the same when a factory or power plant is modernized to improve its energy efficiency.

Intuitively, we therefore feel that it is possible to act on CO₂ emissions and to reduce them at individual, country, and consequently global level.

However, instinct is sometimes misleading, as shown by an alternative approach. This involves first of all going over some basic facts about the presence of CO₂ in the atmosphere. We know with a fair degree of accuracy through various observation posts located in Hawaii in particular, that in the early 20th century, the Earth's atmosphere contained approximately two trillion tons of CO₂. The figure may seem impressive, but it corresponds to a very low concentration of 280 parts per million (ppm).

Then, throughout the 20th century, the exploitation of coal, oil, and natural gas produced massive CO₂ emissions, increasing the

amount now present in the atmosphere to 2,800 billion tons, corresponding to 380 ppm. There are other sources of greenhouse gas emissions, but it is the use of hydrocarbons that is by far the most significant.

And the trend continues as worldwide emissions now stand at 30 billion tons per year, of which 15 billion are added to the existing concentration, and the other half are absorbed by oceans and vegetation.

Is it thus possible to reduce the corresponding emissions, as asked by climate change theory protagonists and as instinct leads us to believe?

The answer could be yes if the Earth had unlimited supplies of oil, natural gas, and coal. But everyone knows that is not the case, which leads us to ask the question differently: Is it realistic to think that mankind will leave all or part of the hydrocarbons lying under the Earth's surface untouched?

Clearly, the answer is no. Hydrocarbons are far too precious to be left unexplored until the last drop of oil, the last cubic meter of natural gas, and even the last ton of economically viable coal have been attained.

In other words, it is the quantities of hydrocarbons still present in the depths of the Earth that will determine the volume of CO₂ that we emit into the atmosphere, and nothing else.

The only thing that would be possible is to spread the waste over time. But comparing the flow—15 billion tons per year—and the current concentration—soon 3,000 billion tons—shows that this would have no visible effect. Also, it is a perfectly theoretical hypothesis given that it would involve substantial spending for

such a poor result. This is even less conceivable since the majority of emissions now come from emerging countries that lack the necessary financial means to ebb them and have other priorities.

As for the capture and sequestration techniques designed to bury CO₂ produced in power plants or heavy industrial facilities underground, they are not yet developed. And, even more importantly, they are far too expensive to be realistic solutions. The estimated cost is at least \$50 per sequestered ton, to be weighed against the 30 billion tons emitted each year and which are rapidly increasing.

From the moment we assume that deposits will be exhausted one day, and that almost all oil, natural gas, and coal remaining in the depths of the Earth will give rise to CO₂ emissions, it is possible to estimate their total volume from simple data.

According to the noted authority (BP Statistical Review of World Energy), *proven* hydrocarbon reserves stand at 40 years for oil, 60 for natural gas, and 120 for coal at current consumption rates. We also know that the combustion of oil currently generates 11 billion tons of CO₂ per year, that of natural gas 6 billion, and that of coal 13 billion. A simple calculation then shows that the combustion of *proven* hydrocarbon reserves will give rise to emissions totaling nearly 2.4 trillion tons of CO₂.

However, two factors must be taken into account. As everyone knows, today's proven reserves are much lower than those that will actually be usable. The recent discovery of new techniques to exploit shale gas once again highlights this. Conversely, we realized that the quantity of CO₂ emitted into the atmosphere every year was twice what we thought.

It is obviously impossible to know which of these two factors will prevail, but we can draw one conclusion for sure. The amount of

CO₂ in the atmosphere, currently 2.8 trillion tons, will continue to grow considerably in the decades to come. It could double during this century and there's nothing we can do about it. This does not imply, however, that we are necessarily courting disaster.

During the time of the dinosaurs, concentrations of CO₂ in the atmosphere were five times higher than what they are today, and yet life flourished on Earth. As will be shown at the end of this article, it is thus justified to question the doomsday theories that loom over our heads.

The failure of the Copenhagen Summit last December was inevitable. The purpose was to reduce global CO₂ emissions and even to halve them by 2050. This was an unattainable goal, not due to lack of political will as has been proclaimed, but to purely physical reasons.

China will increase its emissions by more than half by 2020. It is continuously building one or two coal fired power plants (1000 megawatts) each week, and its fleet of cars and trucks will triple again by 2020. After becoming the world's leading manufacturer of trucks, cars, and ships, it can also boast of an aviation industry. Is all this being done with the intention of leaving plants unused, vehicles in the garage, and planes grounded?

When one realizes that China builds 5,000 km of highways every year, that Beijing is completing its seventh beltway, and that only 300 million out of 1.4 billion Chinese now have access to a "Western" standard of living, it is understandable why the Chinese President has said that his country will not sign any commitment in Copenhagen—be it a reduction of domestic or global emissions.

The four billion inhabitants of India, Brazil, Indonesia, and the rest of the emerging world are following the same path. As a result of projects currently in progress, seen as the way out of poverty, their emissions will also increase at a very rapid pace over the decades to come. Four hundred million Indians still lack access to electricity. How could they reduce emissions that they don't even produce? India, like China, has vast deposits of economically accessible coal because of the existence of abundant and cheap labor. We must look at reality. For them, this is the only way to produce electricity for which they have a great need at an affordable cost.

Despite Barack Obama's speeches, the United States can only reduce its emissions marginally (4% as compared to 1990 at best!). American homes are twice as large as European ones, the distances to cover twice as long, and the country needs coal to make half of its electricity. As for the climate, everyone knows it is continental. Without air conditioning, the southern half of the United States would be uninhabitable. In contrast, Chicago is known to experience cold waves with temperatures dipping to around minus 27 degrees Fahrenheit. It is not surprising therefore that the potential for energy saving is limited, although not totally absent.

Finally, with one eighth of global emissions, Europe cannot do anything meaningful. Even if it were to eliminate all emissions, the impact would be minimal at the global level and quickly made up elsewhere. Who could imagine for a moment that mankind would leave the Earth's oil, natural gas, and even coal deposits untouched? Everyone knows that they will be exhausted one day. What is not consumed by some will be consumed by others!

Efforts to reduce European CO₂ emissions are as ruinous as they are futile and constitute a serious handicap in worldwide competition.

The only way to diminish CO₂ emissions around the globe would be to definitively eliminate or at least reduce the extraction of oil, natural gas, or coal, which produces most of them. Who could believe it? Mankind has never drilled so many oil wells, built so many pipelines, and opened so many coal mines.

It is therefore necessary to face the facts: the objective of reducing worldwide emissions is unattainable and the concentration of CO₂ in the atmosphere will continue to grow rapidly, leaving room for only two hypotheses.

If United Nations officials in charge of the Intergovernmental Panel on Climate Change (IPCC) are right, the world is heading towards disaster: uncontrolled global warming, rising oceans, famines, and mass migrations of populations. Fortunately, several observations lead us to question the veracity of their claims.

First of all, contrary to their assertions, there is no unanimity in the academic community. In all countries of the world, there are countless scientists who claim that the role of CO₂ in climate change has yet to be proven. In the United States, over 30,000 scientists, including leading climatologists, have signed a petition (Oregon Petition) saying that global warming does not exist. To deny that there is a debate is thus untrue and casts a doubt on the intellectual honesty of those who claim peremptorily that “the debate is closed” and vilifies those who disagree with their assertions.

It has to be known that the first president of the IPCC, John Houghton, was quoted on taking office, as saying: “If we do not announce disasters, no one will listen.” This sheds a disturbing

light on two major arguments put forward by current IPCC leaders to influence public opinion and the views of world leaders.

The first argument recently made headlines. All of Asia was traumatized when IPCC officials proclaimed from the rooftops in 2007 that the Himalayan glaciers would disappear by 2035, if not before. It must be noted that these are the main source of water and thus of life for billions of people in the region. Concerned governments got scared and started considering the construction of dams to prevent this supposed threat. It was only earlier this year that the IPCC had to recognize that the date 2035 was not based on anything, and that it had been taken from a non-scientific publication of an environmental NGO, and which besides, spoke of 2350 and not 2035. So a mere typo led IPCC officials to run all over Asia predicting an impending disaster!

The approach is the same for the rising sea level. [In a syndicated article picked up by the world press in June 2009](#), the IPCC Chairman, Dr. Rajendra Pachauri, declared: “The mega-deltas where cities like Shanghai, Calcutta, and Dhaka are located are extremely vulnerable to rising sea levels ... ” raising the worst fears for entire regions of the world. But it’s enough to look at the numbers to see that this is an assertion that does not withstand analysis for one second.

According to official data, average sea level rose by 18 centimeters during the 20th century (i.e., less than two centimeters per decade) and the first 10 years of the 21st century show no accelerating trend. The average forecasts of the IPCC for the current century report an increase of 30 centimeters, or three centimeters per decade.

Evidence suggests that such rough estimates cannot result in any significant consequence. We are victims of an illusion. No land

has an altitude of zero. Even the lowest cities are located several meters above sea level.

Studies conducted by the CNRS (*Centre national de la recherche scientifique*), an official French organization, have shown that the slope of the ground averaged 1% at the border between the land and the sea. A rise in sea level of three centimeters will have the sole outcome of pushing back the shore by an average of three meters, with no effect at all in areas with dams or docks or which are simply rocky. We must listen to reason. Invoking the possibility of the demise of cities and entire regions due to rising sea levels is inane, unless centimeters and meters are being confused, just as 2035 has been mistaken for 2350.

Source : <http://www.paristechreview.com/2010/10/15/co2-climate-engineer/>