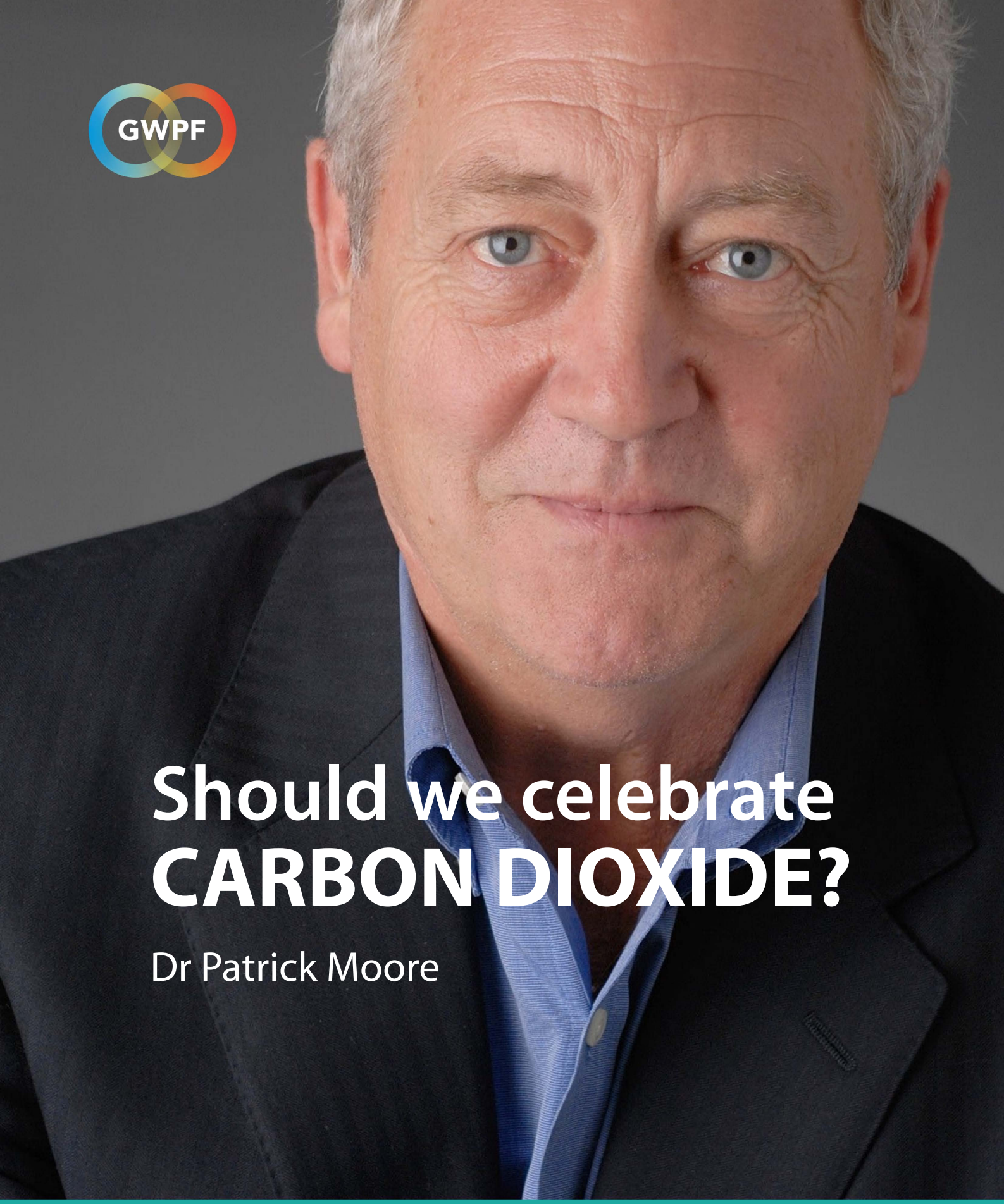

Should we celebrate CARBON DIOXIDE?

Dr Patrick Moore

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About the lecturer

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The 2015 GWPF Annual Lecture: Should we celebrate carbon dioxide?

by Dr Patrick Moore

Thank you for the opportunity to set out my views on climate change. As I have stated publicly on many occasions, there is no definitive scientific proof, through real-world observation, that carbon dioxide is responsible for any of the slight warming of the global climate that has occurred during the past 300 years, since the peak of the Little Ice Age. If there were such a proof, through testing and replication, it would have been written down for all to see.

The contention that human emissions are now the dominant influence on climate is simply a hypothesis, rather than a universally accepted scientific theory. It is therefore correct, indeed verging on compulsory in the scientific tradition, to be skeptical of those who express certainty that 'the science is settled' and 'the debate is over'.

But there is certainty beyond any doubt that carbon dioxide is the building block for all life on Earth and that without its presence in the global atmosphere at a sufficient concentration this would be a dead planet. Yet today our children and our publics are taught that carbon dioxide is a toxic pollutant that will destroy life and bring civilization to its knees. Tonight I hope to turn this dangerous human-caused propaganda on its head. Tonight I will demonstrate that human emissions of carbon dioxide have already saved life on our planet from a very untimely end. That in the absence of our emitting some of the carbon back into the atmosphere from whence it came in the first place, most or perhaps all life on Earth would begin to die less than two million years from today.

A little history

But first a bit of background. I was born and raised in the tiny floating village of Winter Harbour on the northwest tip of Vancouver Island, in the rainforest by the Pacific. There was no road to my village so for eight years myself and a few other children were taken by boat each day to a one-room schoolhouse in the nearby fishing village. I didn't realize how lucky I was, playing on the tide flats by the salmon-spawning streams in the rainforest, until I was sent off to boarding school in Vancouver where I excelled in science. I did my undergraduate studies at the University of British Columbia, gravitating to the life sciences – biology, biochemistry, genetics, and forestry – the environment and the industry my family has been in for more than 100 years. Then, before the word was known to the general public, I discovered the science of ecology, the science of how all living things are interrelated, and how we are related to them. At the height of the Cold War, the Vietnam War, the threat of all-out nuclear war and the newly emerging consciousness of the environment I was transformed into a radical environmental activist. While doing my PhD in ecology in

1971 I joined a group of activists who had begun to meet in the basement of the Unitarian Church, to plan a protest voyage against US hydrogen bomb testing in Alaska. We proved that a somewhat rag-tag looking group of activists could sail an old fishing boat across the north Pacific ocean and help change the course of history. We created a focal point for the media to report on public opposition to the tests.

When that H-bomb exploded in November 1971, it was the last hydrogen bomb the United States ever detonated. Even though there were four more tests planned in the series, President Nixon cancelled them due to the public opposition we had helped to create. That was the birth of Greenpeace.

Flushed with victory, on our way home from Alaska we were made brothers of the Namgis Nation in their Big House at Alert Bay near my northern Vancouver Island home. For Greenpeace this began the tradition of the Warriors of the Rainbow, after a Cree Indian legend that predicted the coming together of all races and creeds to save the Earth from destruction. We named our ship the Rainbow Warrior and I spent the next fifteen years in the top committee of Greenpeace, on the front lines of the environmental movement as we evolved from that church basement into the world's largest environmental activist organization.

Next we took on French atmospheric nuclear testing in the South Pacific. They proved a bit more difficult than the US nuclear tests. It took years to drive these tests underground at Mururoa Atoll in French Polynesia. In 1985, under direct orders from President Mitterrand, French commandos bombed and sank the Rainbow Warrior in Auckland Harbour, killing our photographer. Those protests continued until long after I left Greenpeace. It wasn't until the mid-1990s that nuclear testing finally ended in the South Pacific, and it most other parts of the world as well.

Going back to 1975, Greenpeace set out to save the whales from extinction at the hands of huge factory whaling fleets. We confronted the Soviet factory whaling fleet in the North Pacific, putting ourselves in front of their harpoons in our little rubber boats to protect the fleeing whales. This was broadcast on television news around the world, bringing the Save the Whales movement into everyone's living rooms for the first time. After four years of voyages, in 1979 factory whaling was finally banned in the North Pacific, and by 1981 in all the world's oceans.

In 1978 I sat on a baby seal off the East Coast of Canada to protect it from the hunter's club. I was arrested and hauled off to jail, the seal was clubbed and skinned, but a photo of me being arrested while sitting on the baby seal appeared in more than 3000 newspapers around the world the next morning. We won the hearts and minds of millions of people who saw the baby seal slaughter as outdated, cruel, and unnecessary.

Why then did I leave Greenpeace after 15 years in the leadership? When Greenpeace began we had a strong humanitarian orientation, to save civilization from destruction by all-out nuclear war. Over the years the 'peace' in Greenpeace was grad-

ually lost and my organization, along with much of the environmental movement, drifted into a belief that humans are the enemies of the earth. I believe in a humanitarian environmentalism because we are part of nature, not separate from it. The first principle of ecology is that we are all part of the same ecosystem; as Barbara Ward put it, 'One human family on spaceship Earth', and to preach otherwise teaches that the world would be better off without us. As we shall see later in the presentation there is very good reason to see humans as essential to the survival of life on this planet.

In the mid 1980s I found myself the only director of Greenpeace International with a formal education in science. My fellow directors proposed a campaign to 'ban chlorine worldwide', naming it 'The Devil's Element'. I pointed out that chlorine is one of the elements in the Periodic Table, one of the building blocks of the Universe and the 11th most common element in the Earth's crust. I argued the fact that chlorine is the most important element for public health and medicine. Adding chlorine to drinking water was the biggest advance in the history of public health and the majority of our synthetic medicines are based on chlorine chemistry. This fell on deaf ears, and for me this was the final straw. I had to leave.

When I left Greenpeace I vowed to develop an environmental policy that was based on science and logic rather than sensationalism, misinformation, antihumanism and fear. In a classic example, a recent protest led by Greenpeace in the Philippines used the skull and crossbones to associate Golden Rice with death, when in fact Golden Rice has the potential to help save 2 million children from death due to vitamin A deficiency every year.

Global warming politics

The Keeling curve of carbon dioxide concentration in the Earth's atmosphere since 1959 is the supposed smoking gun of catastrophic climate change. We presume carbon dioxide was at 280 parts per million (ppm) at the beginning of the Industrial Revolution, before human activity could have caused a significant impact. I accept that most of the rise from 280 to 400 ppm was caused by human carbon dioxide emissions with the possibility that some of it was due to outgassing from warming of the oceans.

NASA tells us that 'Carbon dioxide controls Earth's temperature', in child-like denial of the many other factors involved in climate change. This is reminiscent of NASA's contention that there might be life on Mars. Decades after it was demonstrated that there was no life on Mars, NASA continues to use it as a hook to raise public funding for more expeditions to the Red Planet. The promulgation of fear of climate change now serves the same purpose. As Bob Dylan prophetically pointed out, 'Money doesn't talk, it swears', even in one of the most admired science organizations in the world.

On the political front the leaders of the G7 plan to 'end extreme poverty and hunger' by phasing out 85% of the world's energy supply including 98% of the energy used to transport people and goods, including food. The emperors of the world

appear clothed in the photo taken at the close of the meeting but it was obviously photoshopped. They should be required to stand naked for making such a foolish statement.

The world's top climate body, the Intergovernmental Panel on Climate Change (IPCC), is hopelessly conflicted by its makeup and its mandate. The panel is composed solely of the World Meteorological Organization – weather forecasters – and the United Nations Environment Program – environmentalists. Both these organizations are focused primarily on short timescales, days to maybe a century or two. But the most significant conflict is with the panel's mandate from the United Nations. They are required only to focus on 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the atmosphere, and which is in addition to natural climate variability'. So if the IPCC found that climate change was not being affected by human alteration of the atmosphere or that it is not 'dangerous' there would be no need for them to exist. They are virtually mandated to find on the side of apocalypse.

Scientific certainty, political pandering, a hopelessly conflicted IPCC, and now the Pope, spiritual leader of the Catholic Church, in a bold move to reinforce the concept of original sin, says the Earth looks like 'an immense pile of filth' and that we must go back to pre-industrial bliss (or is that squalor?).

And then there is the actual immense pile of filth fed to us more than three times daily by the green-media nexus, a seething cauldron of imminent doom, like we are already condemned to damnation in Hell and there is little chance of redemption. I fear for the end of the Enlightenment. I fear an intellectual gulag, with Greenpeace as my prison guards.

The science

Let's begin with our knowledge of the long-term history of the Earth's temperature and of carbon dioxide in the Earth's atmosphere. Our best inference from various proxies indicate that carbon dioxide was higher for the first 4 billion years of Earth's history than it has been since the Cambrian period until today. I will focus on the past 540 million years, since modern life forms evolved. It is glaringly obvious that temperature and carbon dioxide are in an inverse correlation at least as often as they are in any semblance of correlation. Two clear examples of reverse correlation occurred 150 million years and 50 million years ago. At the end of the Jurassic, temperature fell dramatically while carbon dioxide spiked. During the Eocene Thermal Maximum, temperature was likely higher than any time in the past 550 million years, while carbon dioxide had been on a downward track for 100 million years. This evidence alone is sufficient to warrant deep speculation of any claimed lock-step causal relationship between carbon dioxide and temperature.

The Devonian period, beginning 400 million years ago, marked the culmination of the invasion of life onto the land. Plants evolved to produce lignin, which in com-

bination with cellulose created wood ,which in turn for the first time allowed plants to grow tall, in competition with each other for sunlight. As vast forests spread across the land, living biomass increased by orders of magnitude, pulling down carbon as carbon dioxide from the atmosphere to make wood. Lignin is very difficult to break down and no decomposer species possessed the enzymes to digest it. Trees died atop one another until they were 100 metres or more in depth. This was the making of the great coal beds around the world, as this huge store of sequestered carbon continued to build for 90 million years. Then, fortunately for the future of life, white rot fungi evolved to produce the enzymes that can digest lignin and, coincident with that, the coal-making era came to an end.

There was no guarantee that fungi or any other decomposer species would develop the complex of enzymes required to digest lignin. If they had not, carbon dioxide, which had already been drawn down for the first time in Earth's history to levels similar to todays, would have continued to decline as trees continued to grow and die. That is until carbon dioxide approached the threshold of 150 ppm, below which plants begin first to starve, then stop growing altogether, and then die. This applies not just to woody plants but to all plants. It would have brought about the extinction of most, if not all terrestrial species, as animals, insects, and other invertebrates starved for lack of food. And that would have been that. The human species would never have existed.

This was only the first time that there was a distinct possibility that life would come close to extinguishing itself, due to a shortage of carbon dioxide, a molecule which is essential for life on Earth. A well-documented record of global temperature over the past 65 million years shows that we have been in a major cooling period since the Eocene Thermal Maximum 50 million years ago. The Earth was an average 16°C warmer then, with most of the increased warmth at the higher latitudes. The entire planet, including the Arctic and Antarctica, was ice-free and the land there was covered in forest. The ancestors of every species on Earth today survived what may have been the warmest time in the history of life. It makes one wonder about dire predictions that even a 2°C rise in temperature from pre-industrial times will cause mass extinctions and the destruction of civilization. Glaciers began to form in Antarctica 30 million years ago and in the northern hemisphere 3 million years ago. Today, even in this interglacial period of the Pleistocene Ice Age, we are experiencing one of the coldest climates in the Earth's history.

Coming closer to the present, we have learned from Antarctic ice cores that for the past 800,000 years there have been regular periods of major glaciation followed by interglacial periods, in 100,000-year cycles, coinciding with the Milankovitch cycles that are tied to the eccentricity of the Earth's orbit and its axial tilt. It is highly plausible that they are related to solar intensity and the seasonal distribution of solar heat on the Earth's surface. There is a strong correlation between temperature and the level

of atmospheric carbon dioxide during these successive glaciations, indicating a possible cause–effect relationship between the two. Carbon dioxide lags temperature by an average of 800 years during the most recent 400,000-year period, indicating that temperature is the cause, as the cause never comes after the effect.

Looking at the past 50,000 years of temperature and carbon dioxide levels, we can see that changes in carbon dioxide follow changes in temperature. This is as one would expect, as the Milankovitch cycles are far more likely to cause a change in temperature than a change in carbon dioxide. And a change in the temperature is far more likely to cause a change in carbon dioxide due to outgassing of carbon dioxide from the oceans during warmer times and an ingassing (absorption) of carbon dioxide during colder periods. Yet climate alarmists persist in insisting that carbon dioxide is causing the change in temperature, despite the illogical nature of that assertion.

It is sobering to consider the magnitude of climate change during the past 20,000 years, since the peak of the last major glaciation. At that time there were 3.3 km of ice on top of what is today the city of Montreal, a city of more than 3 million people. Ninety-five percent of Canada was covered in a sheet of ice. Even as far south as Chicago there was nearly a kilometre of ice. If the Milankovitch cycle continues to prevail, and there is little reason aside from our carbon dioxide emissions to think otherwise, this will happen gradually again during the next 80,000 years. Will our carbon dioxide emissions stave off another glaciation, as James Lovelock has suggested? There doesn't seem to be much hope of that so far as, despite one third of all our carbon dioxide emissions being released during the past 15 years, the UK Met Office contends there has been no statistically significant warming during this time.

At the height of the last glaciation the sea level was about 120 metres lower than it is today. By 7000 years ago all the low-altitude, mid-latitude glaciers had melted. There is no consensus about the variation in sea level since then, although many scientists have concluded that the sea level was higher than today during the Holocene Thermal Optimum from 9000–5000 years ago when the Sahara was green. The sea level may also have been higher than today during the Medieval Warm Period.

Hundreds of islands near the Equator in Papua, Indonesia, have been undercut by the sea in a manner that gives credence to the hypothesis that there has been little net change in sea level in the past thousands of years. It takes a long time for so much erosion to occur from gentle wave action in a tropical sea.

Coming back to the relationship between temperature and carbon dioxide in the modern era, we can see that temperature has risen at a steady slow rate in Central England since 1700, while human carbon dioxide emissions were not relevant until 1850 and then began an exponential rise after 1950. This is not indicative of a direct causal relationship between the two. After freezing over regularly during the Little Ice Age, the River Thames froze for the last time in 1814, as the Earth moved into what might be called the Modern Warm Period.

The IPCC states it is 'extremely likely' that human emissions have been the dominant cause of global warming 'since the mid-20th century', that is since 1950. They claim that 'extremely' means 95% certain, even though the number 95 was simply plucked from the air like an act of magic. And 'likely' is not a scientific word but rather indicative of a judgment, another word for an opinion.

There was a 30-year period of warming from 1910 to 1940, then a cooling from 1940 to 1970, just as carbon dioxide emissions began to rise exponentially, and then a 30-year warming from 1970 to 2000 that was very similar in duration and temperature rise to the rise from 1910 to 1940. One may then ask 'What caused the increase in temperature from 1910 to 1940 if it was not human emissions? And if it was natural factors, how do we know that the same natural factors were not responsible for the rise between 1970 and 2000?' You don't need to go back millions of years to find the logical fallacy in the IPCC's certainty that we are the villains in the piece.

Water is by far the most important greenhouse gas, and is the only molecule that is present in the atmosphere in all three states: gas, liquid, and solid. As a gas, water vapour is a greenhouse gas, but as a liquid and solid it is not. As a liquid, water forms clouds, which send solar radiation back into space during the day and hold heat in at night. There is no possibility that computer models can predict the net effect of atmospheric water in a higher carbon dioxide atmosphere. Yet warmists postulate that higher carbon dioxide will result in positive feedback from water, thus magnifying the effect of carbon dioxide alone two to three times. Other scientists believe that water may have a neutral or negative feedback on carbon dioxide. The observational evidence from the early years of this century tends to reinforce the latter hypothesis.

How many politicians or members of the media or the public are aware of this statement about climate change from the IPCC in 2007?

> …we should recognise that we are dealing with a coupled nonlinear chaotic system, and therefore that the long-term prediction of future climate states is not possible.

There is a graph showing that the climate models have grossly exaggerated the rate of warming that confirms the IPCC statement. The only trends the computer models seem able to predict accurately are ones that have already occurred.

The currency of life

Coming to the core of my presentation, carbon dioxide is the currency of life and the most important building block for all life on Earth. All life is carbon-based, including our own. Surely the carbon cycle and its central role in the creation of life should be taught to our children rather than the demonization of carbon dioxide, that 'carbon' is a 'pollutant' that threatens the continuation of life. We know for a fact that carbon dioxide is essential for life and that it must be at a certain level in the atmosphere for the survival of plants, which are the primary food for all the other species alive today. Should we not encourage our citizens, students, teachers, politicians, scientists, and

other leaders to celebrate carbon dioxide as the giver of life that it is? Or will we capitulate to an intellectual Gulag, with Greenpeace and company as our prison guards?

It is a proven fact that plants, including trees and all our food crops, are capable of growing much faster at higher levels of carbon dioxide than present in the atmosphere today. Even at the today's concentration of 400 ppm plants are relatively starved for nutrition. The optimum level of carbon dioxide for plant growth is about five times higher – 2000 ppm – yet the alarmists warn it is already too high. They must be challenged every day by every person who knows the truth in this matter. Carbon dioxide is the giver of life and we should celebrate it rather than denigrate it as is the fashion today.

We are witnessing the 'greening of the Earth' as higher levels of carbon dioxide, due to human emissions from the use of fossil fuels, promote increased growth of plants. This has been confirmed by scientists with CSIRO in Australia, in Germany, and in North America. Only half of the carbon dioxide we are emitting from the use of fossil fuels is showing up in the atmosphere. The balance is going somewhere else and the best science says most of it is going into an increase in global plant biomass. And what could be wrong with that, as forests and agricultural crops become more productive?

All the carbon dioxide in the atmosphere has been created by outgassing from the Earth's core during massive volcanic eruptions. This was much more prevalent in the early history of the Earth when the core was hotter than it is today. During the past 150 million years there has not been enough addition of carbon dioxide to the atmosphere to offset the gradual losses due to burial in sediments.

Let's look at where all the carbon is in the world, and how it is moving around. Today, at just over 400 ppm, there are 850 billion tons of carbon as carbon dioxide in the atmosphere. By comparison, when modern lifeforms evolved over 500 million years ago there was nearly 15,000 billion tons of carbon in the atmosphere, 17 times today's level. Plants and soils combined contain more than 2000 billion tons of carbon, more that twice as much as the entire global atmosphere. The oceans contain 38,000 billion tons of carbon in the form of dissolved carbon dioxide, 45 times as much as in the atmosphere. Fossil fuels, which were made from plants that pulled carbon dioxide from the atmosphere, account for 5–10,000 billion tons of carbon, 6–12 times as much carbon as is in the atmosphere.

But the truly stunning number is the amount of carbon that has been sequestered from the atmosphere and turned into carbonaceous rocks. 100,000,000 billion tons, that's one *quadrillion* tons of carbon, have been turned into stone by marine species that learned to make armour-plating for themselves by combining calcium and carbon into calcium carbonate. Limestone, chalk, and marble are all of life origin and amount to 99.95% of all the carbon ever present in the global atmosphere. The white cliffs of Dover are made of the calcium carbonate skeletons of coccolithophores, tiny

marine phytoplankton.

The vast majority of the carbon dioxide that originated in the atmosphere has been sequestered and stored quite permanently in carbonaceous rocks where it cannot be used as food by plants.

Beginning 540 million years ago at the beginning of the Cambrian period, many marine species of invertebrates evolved the ability to control calcification and to build armour plating to protect their soft bodies. Shellfish such as clams and snails, corals, coccolithophores (phytoplankton) and foraminifera (zooplankton) began to combine carbon dioxide with calcium and thus to remove carbon from the life cycle as the shells sank into sediments; 100,000,000 billion tons of carbonaceous sediment. It is ironic that life itself, by devising a protective suit of armour, determined its own eventual demise by continuously removing carbon dioxide from the atmosphere. This is carbon sequestration and storage writ large. These are the carbonaceous sediments that form the shale deposits from which we are fracking gas and oil today. And I add my support to those who say, 'OK UK, get fracking'.

The past 150 million years has seen a steady drawing down of carbon dioxide from the atmosphere. There are many components to this but what matters is the net effect, a removal on average of 37,000 tons of carbon from the atmosphere every year for 150 million years. The amount of carbon dioxide in the atmosphere was reduced by about 90% during this period. This means that volcanic emissions of carbon dioxide have been outweighed by the loss of carbon to calcium carbonate sediments on a multi-million year basis.

If this trend continues, carbon dioxide will inevitably fall to levels that threaten the survival of plants, which require a minimum of 150 ppm to survive. If plants die, all the animals, insects, and other invertebrates that depend on plants for their survival will also die. How long will it be at the present level of depletion until most or all of life on Earth is threatened with extinction by lack of carbon dioxide in the atmosphere?

During this Pleistocene Ice Age, carbon dioxide tends to reach a minimum level when the successive glaciations reach their peak. During the last glaciation, which peaked 18,000 years ago, carbon dioxide bottomed out at 180 ppm, which is extremely likely to be the lowest level in the history of the Earth. This is only 30 ppm above the level at which plants begin to die. Paleontological research has demonstrated that even at 180 ppm there is a severe restriction of growth as plants began to starve. With the onset of the warmer interglacial period carbon dioxide rebounded to 280 ppm. But even today, with human emissions causing carbon dioxide to reach 400 ppm, plants are still restricted in their growth rate, which would be much higher if carbon dioxide were at 1000–2000 ppm.

Here is the shocking news. If humans had not begun to unlock some of the carbon stored as fossil fuels, all of which had been in the atmosphere as carbon dioxide before sequestration by plants and animals, life on Earth would have soon been starved of

this essential nutrient and would have begun to die (see Figure 1). Given the present trends of glaciations and interglacial periods, this would likely have occurred less than 2 million years from today, a blink in nature's eye, 0.05% of the 3.5-billion-year history of life. No other species could have accomplished the task of putting some of the

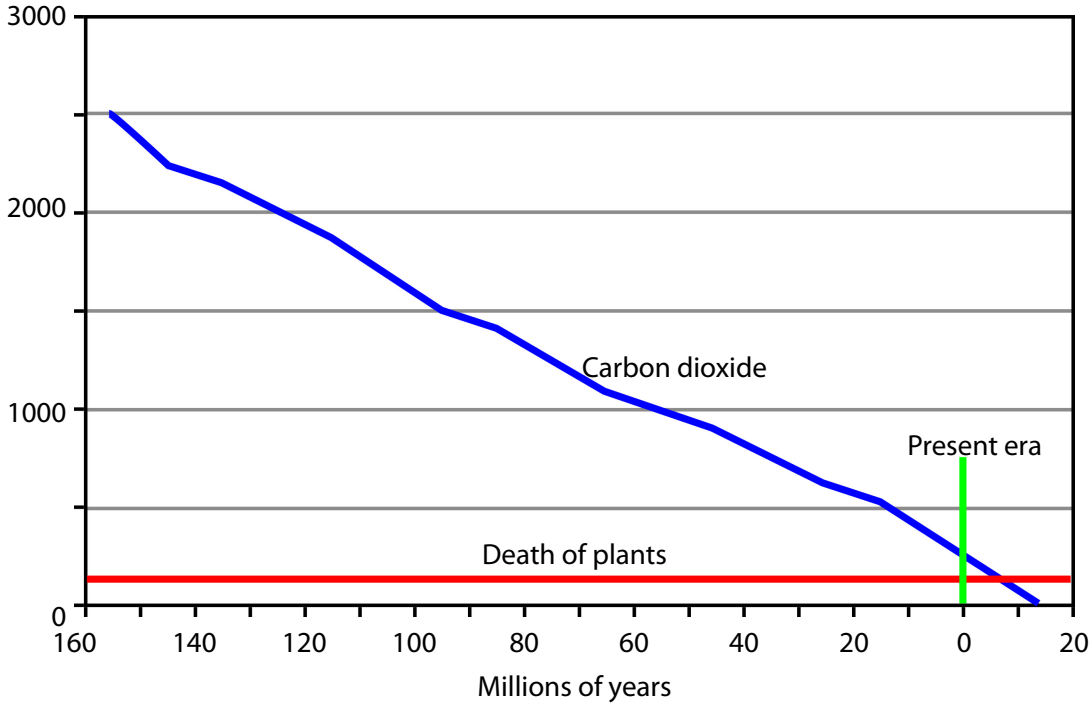

Figure 1: Projected carbon dioxide levels in absence of humans

Carbon dioxide concentrations in parts per million by volume.

carbon back into the atmosphere that was taken out and locked in the Earth's crust by plants and animals over the millennia. This is why I honour James Lovelock in my lecture this evening. Jim was for many years of the belief that humans are the one-and-only rogue species on Gaia, destined to cause catastrophic global warming. I enjoy the Gaia hypothesis but I am not religious about it and for me this was too much like original sin. It was as if humans were the only evil species on the Earth.

But James Lovelock has seen the light and realized that humans may be part of Gaia's plan, and he has good reason to do so. And I honour him because it takes courage to change your mind after investing so much of your reputation on the opposite opinion. Rather than seeing humans as the enemies of Gaia, Lovelock now sees that we may be working with Gaia to 'stave off another ice age', or major glaciation. This is much more plausible than the climate doom-and gloom scenario because our

release of carbon dioxide back into the atmosphere has definitely reversed the steady downward slide of this essential food for life, and hopefully may reduce the chance that the climate will slide into another period of major glaciation. We can be certain that higher levels of carbon dioxide will result in increased plant growth and biomass. We really don't know whether or not higher levels of carbon dioxide will prevent or reduce the eventual slide into another major glaciation. Personally I am not hopeful for this because the long-term history just doesn't support a strong correlation between carbon dioxide and temperature.

It does boggle the mind, in the face of our knowledge that the level of carbon dioxide has been steadily falling, that human carbon dioxide emissions are not universally acclaimed as a miracle of salvation. From direct observation we already know that the extreme predictions of carbon dioxide's impact on global temperature are highly unlikely given that about one-third of all our emissions have been discharged during the past 18 years and there has been no statistically significant warming. And even if there were some additional warming, that would surely be preferable to the extermination of all or most species on the planet.

You heard it here. 'Human emissions of carbon dioxide have saved life on Earth from inevitable starvation and extinction due to lack of carbon dioxide'. To use the analogy of the atomic clock, if the Earth were 24 hours old, we were at 38 seconds to midnight when we reversed the trend towards the End Times. If that isn't good news I don't know what is. You don't get to stave off Armageddon every day.

I issue a challenge to anyone: to provide a compelling argument that counters my analysis of the historical record and the prediction of carbon dioxide starvation based on the 150-million-year trend. Ad hominem arguments about 'deniers' need not apply. I submit that much of society has been collectively misled into believing that global carbon dioxide and temperature are too high when the opposite is true for both. Does anyone deny that below 150 ppm carbon dioxide that plants will die? Does anyone deny that the Earth has been in a 50-million-year cooling period and that this Pleistocene Ice Age is one of the coldest periods in the history of the planet?

If we assume human emissions have to date added some 200 billion tons of carbon dioxide to the atmosphere, even if we ceased using fossil fuels today we have already bought another 5 million years for life on earth. But we will not stop using fossil fuels to power our civilization, so it is likely that we can forestall plant starvation for lack of carbon dioxide by at least 65 million years. Even when the fossil fuels have become scarce we have the quadrillion tons of carbon in carbonaceous rocks, which we can transform into lime and carbon dioxide for the manufacture of cement. And we already know how to do that with solar energy or nuclear energy. This alone, regardless of fossil fuel consumption, will more than offset the loss of carbon dioxide due to calcium carbonate burial in marine sediments. Without a doubt the human species has made it possible to prolong the survival of life on Earth for more than 100

million years. We are not the enemy of nature but its salvation.

On energy

As a postscript I would like to make a few comments about the other side of the alleged dangerous climate change coin: our energy policy and in particular the much-maligned fossil fuels – coal, oil, and natural gas. Depending how it's tallied, fossil fuels account for between 85–88% of global energy consumption and more than 95% of energy for the transport of people and goods, including our food.

Earlier this year the leaders of the G7 countries agreed that fossil fuels should be phased out by 2100, a most bizarre development to say the least. Of course no intelligent person really believes this will happen, but it is a testament to the power of the elites that have converged around the catastrophic human-caused climate change that so many alleged world leaders must participate in the charade. How might we convince them to celebrate carbon dioxide rather than to denigrate it?

A lot of nasty things are said about fossil fuels, even though they are largely responsible for our longevity, our prosperity, and our comfortable lifestyles. Hydrocarbons, the energy components of fossil fuels, are 100% organic, as in organic chemistry. They were produced by solar energy in ancient seas and forests. When they are burned for energy the main products are water and carbon dioxide, the two most essential foods for life. And fossil fuels are by far the largest storage battery of direct solar energy on Earth. Nothing else comes close, except nuclear fuel, which is also solar in the sense that it was produced in dying stars.

Today, Greenpeace protests Russian and American oil operations with 3000 horsepower diesel-powered ships and uses 200 horsepower outboard motors to board the rigs and hang anti-oil plastic banners – made with fossil fuels – on them. Then they issue a media release telling us we must 'end our addiction to oil'. I wouldn't mind so much if Greenpeace rode bicycles to their sailing ships and rowed their little boats into the rigs to hang organic cotton banners. We didn't have an H-bomb on board the boat that sailed on the first Greenpeace campaign against nuclear testing.

Some of the world's oil comes from my native country in the Canadian oil sands of northern Alberta. I had never worked with fossil fuel interests until I became incensed with the lies being spread about my country's oil production in the capitals of our allies around the world. I visited the oil sands operations to find out for myself what was happening there.

It is true it's not a pretty sight when the land is stripped bare to get at the sand so the oil can be removed from it. Canada is actually cleaning up the biggest natural oil spill in history, and making a profit from it. The oil was brought to the surface when the Rocky Mountains were thrust up by the colliding Pacific Plate. When the sand is returned back to the land, 99% of the so-called 'toxic oil' has been removed from it.

Anti-oil activists say the oil-sands operations are destroying the boreal forest of Canada. Canada's boreal forest accounts for 10% of all the world's forests and the oil-

sands area is like a pimple on an elephant by comparison. By law, every square inch of land disturbed by oil-sands extraction must be returned to native boreal forest. When will cities like London, Brussels, and New York that have laid waste to the natural environment be returned to their native ecosystems?

The art and science of ecological restoration, or reclamation as it is called in the mining industry, is a well-established practice. The land is re-contoured, the original soil is put back, and native species of plants and trees are established. It is possible, by creating depressions where the land was flat, to increase biodiversity by making ponds and lakes where wetland plants, insects, and waterfowl can become established in the reclaimed landscape.

The tailings ponds, to where the cleaned sand is returned, look ugly for a few years but are eventually reclaimed into grasslands. The Fort McKay First Nation is under contract to manage a herd of bison on a reclaimed tailings pond. Every tailings pond will be reclaimed in a similar manner when operations have been completed.

As an ecologist and environmentalist for more than 45 years, this is good enough for me. The land is disturbed for a blink of an eye in geological time and is then returned to a sustainable boreal forest ecosystem with cleaner sand. And as a bonus we get the fuel to power our weed-eaters, scooters, motorcycles, cars, trucks, buses, trains, and aircraft.

Conclusions

To conclude, carbon dioxide from burning fossil fuels is the stuff of life, the staff of life, the currency of life, indeed the backbone of life on Earth.

Thank you for listening to me this evening. I am honoured to have been chosen to deliver your annual lecture. I hope you have seen carbon dioxide from a new perspective and will join with me to celebrate carbon dioxide!

GWPF ANNUAL LECTURES

2010	Vaclav Klaus	The Climate Change Doctrine
2011	George Pell	One Christian Perspective on Climate Change
2012	Fritz Vahrenholt	Second Thoughts Of An Environmentalist
2013	John Howard	One Religion Is Enough
2014	Owen Paterson	Keeping The Lights On
2015	Patrick Moore	Should We Celebrate Carbon Dioxide?

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Our main focus is to analyse global warming policies and their economic and other implications. Our aim is to provide the most robust and reliable economic analysis and advice. Above all we seek to inform the media, politicians and the public, in a newsworthy way, on the subject in general and on the misinformation to which they are all too frequently being subjected at the present time.

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