

Saving the Planet

Global Warming: The New Secular Religion

A secret report, suppressed by US defence chiefs and obtained by The Observer, warns that major European cities will be sunk beneath rising seas as Britain is plunged into a 'Siberian' climate by 2020. Nuclear conflict, mega-droughts, famine and widespread rioting will spread across the world . . . deaths from war and famine run into the millions, until the planet's population is reduced by such an extent the Earth can cope. Access to water becomes a major battleground . . . Rich areas like the US and Europe would become 'virtual fortresses', to prevent millions of migrants from entering, after being forced from land drowned by sea-level rise or no longer able to grow crops.

The Observer, 2004¹

This disaster is not set to happen in some science fiction future many years ahead, but in our lifetime. Unless we act now . . . these consequences, disastrous as they are, will be irreversible.

Prime Minister Tony Blair, 29 October 2006²

It is irresponsible, reckless and deeply amoral to question the seriousness of the situation. The time for diagnosis is over. The time to act is now.

Gro Harlem Bruntland, 9 May 2007³

Almost everywhere, climate change denial now looks as stupid and as unacceptable as Holocaust denial.

George Monbiot, the Guardian, 21 September 2006

Some say the world will end in fire, some say in ice . . .

Robert Frost, 'Fire and Ice'

It was as early as 1991 that Aaron Wildavsky, a respected professor of political science at the University of California, Berkeley, first described global warming as ‘the mother of all environmental scares’.⁴

In a way it had all started some 20 years earlier, when a number of scientists and environmentalists, followed by the media, first began to predict that Planet Earth could be facing a disastrous change in its climate.

In December 1972, following a conference of academic scientists at one of the USA’s leading universities, its two organizers wrote to warn President Nixon of the strong possibility that the world’s climate might be about to go through a change for the worse, by an ‘order of magnitude larger than any hitherto experienced by civilised mankind’.⁵

‘There are ominous signs’, reported *Newsweek* some time later, ‘that the earth’s weather patterns have begun to change dramatically, and that these changes may portend a dramatic decline in food production – with serious implications for just about every nation on earth’.⁶

Newsweek quoted a report by the US National Academy of Sciences that ‘a major climactic change would force economic and social adjustments on a worldwide scale’. The evidence cited for such a change ranged from a two-week shortening since 1950 of the English grain-growing season to ‘the most devastating outbreak of tornadoes ever recorded’ in the USA, where, in 1974, ‘148 twisters killed more than 300 people’.

The science section of *Time* had already reported on how ‘a growing number of scientists’, reviewing ‘the bizarre and unpredictable weather pattern of the past several years’ were beginning to suspect that ‘a global climactic upheaval’ might be under way.⁷ The article opened:

In Africa drought continues for the sixth consecutive year, adding terribly to the toll of famine victims. During 1972 record rains in parts of the US, Pakistan and Japan caused some of the worst flooding in centuries. In Canada’s wheat belt a particularly chilly and rainy spring has delayed planting ... rainy Britain, on the other hand, has suffered from uncharacteristic dry spells ... a series of unusually cold winters has gripped the American Far West, while New England and

northern Europe have recently experienced the mildest winters within anyone's recollection.

The fear they were all expressing, of course, was not that the earth was warming but that it was dangerously cooling. It had been noted that, for more than three decades, average temperatures across the globe had been dropping. As a *New York Times* headline put it, 'Scientists ponder why world's climate is changing: a major cooling widely considered to be inevitable'.⁸ *Time* reported how 'telltale signs are everywhere – from the unexpected thickness of pack ice in the waters around Iceland to the southward migration of a warmth-loving creature like the armadillo'.

In 1973 *Science Digest* had run an article headed, 'Brace yourself for another ice age'. This described how, as the earth gradually cooled and the icecaps of Greenland and Antarctica grew, winter would eventually last the year round, cities would be 'buried in snow and an immense sheet of ice could cover North America as far south as Cincinnati'.⁹

For several years the fear of global cooling continued to inspire a spate of articles and books, such as Stephen Schneider's *The Genesis Strategy* and *Climate Change and World Affairs* by a British diplomat, Crispin Tickell. *The Cooling* (1976) by the US science writer Lowell Ponte claimed that 'the cooling has already killed hundreds of thousands of people in poor nations'. In 1975 Nigel Calder, a former editor of the *New Scientist*, wrote that 'the threat of a new ice age must now stand alongside nuclear war as a likely source of wholesale death and misery for mankind'.¹⁰

But then, quite suddenly, around 1978, global temperatures began to rise again. The panic over global cooling subsided faster than it had arisen.

Cooling and Warming

There was a simple explanation for this temporary hysteria over cooling in the 1970s. In imagining the future, as we know from the history of science fiction, human beings like to project onto it an exaggerated version of some tendency already evident in their own time. And what scientists were noticing in the 1970s was that, for more than 30 years, the average temperature of the earth had been in decline.

After many decades of rising temperatures in the earlier twentieth century, particularly between 1920 and 1940, the earth had suddenly begun to cool again. In Britain, for 30 years we became used to harsher winters, like those of 1946/7 and 1962/3, when snow remained on the ground for nearly three months between December and March. This phase was to become known to climate scientists as ‘the Little Cooling’, to distinguish it from the generally higher temperatures in the decades before and after it.

The one thing certain about climate is that it is always changing. And in our own time we now have so many ways of measuring the changes in climate and temperature of the past, from the width of tree rings and organic residues in marine sediments to ice cores dating back hundreds of thousands of years, that we can get a pretty accurate picture of how the earth’s temperature has fallen and risen, stretching back to the start of the Ice Age a million years ago and even way beyond.

We have become accustomed, for instance, to the idea that we are still living in the period known as ‘the Ice Age’. At least four times in the last million years, since the start of the Pleistocene, the world has gone through long periods of freezing so intense that up to 30 per cent of its land surface has been covered in ice, drastically lowering sea levels and reducing much of the remaining land to cold, dry deserts.* But these have been punctuated by warmer, interglacial periods, lasting up to 20,000 years before the ice returns. It is in one of these ‘interglacial warmings’, that which began around 18,000 years ago, that we are living today.**

By 15,000 years ago the earth had warmed sufficiently for glaciers to be in retreat and for sea levels to begin rising. Since the end of the last glaciation, the average temperature of the earth has risen by around 8.8 degrees Celsius, and the sea by 300 feet

* Although it has long been recognized that there were four major stages of glaciation in the Pleistocene period, these between them contained up to 14 individual glaciations.

** For a general account of temperature and climate changes over the past 10,000 years, based on a wide range of sources, see *Unstoppable Global Warming: Every 1,500 Years* (2007) by Fred Singer and Dennis Avery. Chapter Seven, citing 62 sources, is based on human recorded evidence. Chapter Nine, citing 121 sources, shows how this has been confirmed by a mass of recent physical studies, covering every continent and ocean, using data ranging from pollen and stalagmites to boreholes and tree lines.

(separating Asia from Alaska 8,000 years ago and Britain from mainland Europe 6,000 years ago).

But this rise in temperature has been far from consistent. Within the general overall rise, there have been marked fluctuations between warmer and cooler times. During the warmest period of man's time on earth, known as the Holocene Maximum or Climate Optimum, roughly between 7000 and 3000 BC, the evidence shows that the world was on average hotter than it is today.

Average temperatures then declined slowly, dropping even more sharply in the three centuries around 700–400 BC, to create what is known as the 'pre-Roman Cold' phase. But this was followed by another rapid rise. Between around 200 BC and the sixth century AD, coinciding with the pre-eminence of Rome, the world enjoyed what is called 'the Roman Warming'. Vine-growing for the first time spread up through Italy into northern Europe, as far as Britain. By the fourth century AD the climate in many parts of the globe was warmer than it is now.¹¹

The Roman Warming came to an abrupt end in the sixth century, coinciding with dramatic meteorological events around 540 AD, which were followed by a sharp cooling. This ushered in the cold period of the Dark Ages, lasting more than three centuries. But around 900 AD temperatures again began to rise, leading to the 400-year-long period known as 'the Mediaeval Warming'. The Vikings colonized Greenland. Vines returned to Britain. The European civilization of the High Middle Ages flowered, as a new prosperity and spiritual and artistic confidence gave rise to the great Gothic cathedrals. Physical evidence from across the world again indicates that temperatures at the height of the Mediaeval Warming were generally higher than those of the present day.¹²

Around 1300, shortly before the Black Death reached Europe in 1347/8, temperatures again began to drop significantly, leading to the four centuries of what is called 'the Little Ice Age'. This became particularly severe after 1550, when average temperatures dropped to their lowest level since the end of the last glaciation.

As usual, there were temporary reversals of the trend. The 1730s in Central England, for instance, recorded seven of the eight hottest years since accurate records began to be kept in 1659.¹³ But in general the Little Ice Age was to last until the early nineteenth century. In human terms we associate the chilling winters of those centuries with the snowscapes of Pieter Brueghel, images of ice fairs

on the River Thames and records of the sea freezing for miles around the coasts of Europe and Iceland. Glaciers all over the world advanced dramatically. Greenland became uninhabitable. All this reflected an exceptional period of cooling which has again been confirmed by physical data from all over the world.

The last recorded freezing-over of the Thames was in the winter of 1813/4, a year after much of Napoleon's Grande Armée froze to death in the snows of Russia. Slowly, average temperatures again began to rise through the nineteenth century, giving rise to what is known as 'the Modern Warming'.

As always, however, there have been anomalies. A temporary advance of glaciers across the world at the end of the nineteenth century first prompted speculation about the approach of a new ice age, which was to continue on and off for several decades. In 1923, under the front-page headline 'Scientist says Arctic ice will wipe out Canada', the *Chicago Tribune* quoted Professor Gregory of Yale University warning that North America would disappear as far south as the Great Lakes and that huge parts of Asia and Europe would be 'wiped out'.¹⁴

In fact already, as we have seen, temperatures in those decades between the two world wars were rising rapidly, faster than in any other phase of the Modern Warming. By the end of the 1920s this too was attracting attention. A US government meteorologist in 1933 noted that 18 of the previous 21 winters in Washington DC had been warmer than normal. In light of this 'widespread and persistent tendency towards warmer weather', he asked, 'is our climate changing?'¹⁵

Within a decade he had an answer: that sharp drop in temperatures which was to lead to nearly four decades of the Little Cooling. But no sooner had this given rise, by the 1970s, to those widespread predictions that the world was fast heading for a new ice age than 'climate-change' again went into reverse. By the 1980s it was obvious that surface temperatures were again quite rapidly rising. Increasingly we began to hear two hitherto generally unfamiliar phrases: 'global warming' and 'the greenhouse effect'.

The 'Greenhouse Effect'

As early as 1827, the French mathematician and engineer Joseph Fourier had theorized that the earth's atmosphere plays a crucial

part in determining surface temperatures by trapping heat radiated by the sun, thus preventing it from escaping back into space. This 'greenhouse effect' was crucial to the survival of life on earth because, without it, the global average temperature of around 15°C. would drop to minus 18°C, creating an intense, worldwide ice age.¹⁶

In 1860 John Tyndall, the Irish physicist, reported that only certain gases in the atmosphere had this invaluable property. As the earth is heated by the sun, the commonest gases, nitrogen and oxygen, do not prevent this heat, in the form of infrared radiation, escaping back into space. But the 'greenhouse gases' do, thus retaining the sun's heat. By far the most important of these greenhouse gases is water vapour, contributing around 95 per cent of the 'greenhouse effect'. This is followed by carbon dioxide (CO₂) (3.62 per cent); nitrous oxide (0.95 per cent); methane (0.36 per cent) and others, including CFCs, or chlorofluorocarbons, (0.07 per cent).¹⁷

In 1896 the Swedish chemist Svante Arrhenius attempted to calculate what might be the consequences of mankind continuing to burn vast amounts of fossil fuels, thus adding to the natural quantity of CO₂ in the atmosphere. If CO₂ was to double, he suggested, this would increase the average temperature by 5°C, equivalent to more than half the warming which had carried the earth from the depths of the last ice age to its present state.

In 1938, inspired by the rapidly rising temperatures of the 1920s and 1930s, a British meteorologist, Guy Callendar, suggested that the cause of this rise might be the marked increase in the burning of coal and oil in the age of mass industrialization, electricity and the motorcar. Far from seeing this as an unqualified disaster, however, he saw it as likely in several ways 'to prove beneficial to mankind'; not least in allowing for greater agricultural production. It might even hold off the return of a new ice age 'indefinitely'.¹⁸

What Callendar was recognizing, of course, was that although CO₂ makes up only a minuscule proportion of all the gases in the earth's atmosphere – compared with nitrogen, oxygen and the rest it represents a mere 0.04 per cent of the total – it plays an absolutely vital role in the survival of life. Of the estimated 186 billion tons of CO₂ that enter our atmosphere each year from all sources, only 3.3 per cent comes from human activity. More than 100

billion tons (57 per cent) is given off by the oceans. 71 billion tons (38 per cent) is breathed out by animals, including ourselves. And on that supply of CO₂ depends the survival of the entire plant kingdom, without which the rest of life could not exist.

Trees and all other plants absorb CO₂ from the atmosphere, transforming it by photosynthesis into the oxygen essential to all animal life. And, as Callendar was aware, an increase in CO₂ serves to promote plant growth, which was why he foresaw a higher CO₂ level as likely to boost human food production.

Scarcely had Callendar made his prediction, however, than the Little Cooling arrived. As temperatures began dropping again, there now seemed little immediate cause for concern over global warming. But the essence of what he and Arrhenius had been saying was not forgotten. This was particularly true when the 1960s saw the rise of the modern environmentalist movement, rooted in a conviction that man's reckless greed in despoiling the planet was threatening to disturb the balance of nature to such an extent that the very survival of life was in doubt.

Even at the height of that 1970s panic over a new ice age, the article cited earlier from the *Science Digest* ended by quoting two geologists that 'man's tampering with the environment' might lead to the opposite effect: a 'global heatwave' caused by an excess of carbon dioxide emissions. Through 'the so-called "greenhouse effect"', they said, this could lead to such a rise in temperatures that the 'nine million cubic miles of ice covering Greenland and the Antarctic' would melt. The world's sea levels would be raised to such an extent that every coastal city would be flooded.

When, shortly afterwards, measurements showed surface temperatures sharply rising again, all might have seemed set for a revival of the belief that the ever-increasing emissions of CO₂ resulting from human exploitation of the planet's resources were about to lead to a wholly unnatural and potentially catastrophic degree of global warming. This belief was reinforced by the findings of a team of American scientists who, for more than 20 years, had been systematically recording the amount of CO₂ in the atmosphere from a weather station on top of a Hawaiian volcano, Mauna Loa.

Dr Roger Revelle of the University of California's Scripps Institution of Oceanography was an outstanding scientist in his field. He and his colleagues were well aware that, as part of the

earth's climatic regulatory system, the oceans not only give out a huge amount of carbon dioxide but also absorb it from the air above them. At the time of the International Geophysical Year in 1957 they had surmised that so much carbon dioxide was now being pumped out by the burning of fossil fuels that there might be too much for the oceans to absorb it all. Might this excess be leading to a gradual build-up of the CO₂ in the atmosphere?

To test this theory, Revelle commissioned Dr Charles Keeling and a Scripps team to begin taking detailed readings at Mauna Loa. In 1959, the first year of their study, they measured the amount of CO₂ in the atmosphere at 316 parts per million (316 ppm). By 1980 this had risen to nearly 340 ppm, an increase of more than 7 per cent in just 20 years. Since even this represented less than one 3,000th of all the gases making up the atmosphere, it might still have seemed insignificant – had not readings based on ice cores taken by the Vostok research station in East Antarctica begun to show that CO₂ levels stretching 650,000 years back into the Pleistocene age had been as low as 180 ppm during glaciations, only rising occasionally as high as 300 during interglacial warmings.

Furthermore, it seemed widely accepted that, until the late eighteenth century, CO₂ levels had for 10,000 years not been higher than around 280 ppm. Only with the coming of the Industrial Revolution and the ever-increased burning of fossil fuels had this level begun to increase. Now, according to Keeling's researches, it was rising at such a rate that, within a few decades, it might be above 400 ppm.*

Here, it seemed, was the 'smoking gun'. The obvious explanation for why CO₂ was rising to record levels was the reinforcing of the 'greenhouse effect' by man's unprecedented burning of coal, oil and other fossil fuels. This created too much CO₂ for oceans and plants to absorb the excess. The earth's natural regulatory system was breaking down. The result, as Arrhenius and others had long indicated, was the rise in global temperatures.

* For long periods of geological time, covering some 250 million of the last 600 million years, isotope readings and other evidence indicate that CO₂ levels in the atmosphere were far higher than in more recent times, rising as high as 3,000ppm. The last such epoch was in the Jurassic, the 'age of the dinosaurs', between 150 million and 200 million years ago.

Unless urgent and drastic action was taken to curb CO₂ emissions, the temperature rise would soon be so great as to unleash catastrophic consequences. The ice caps would melt. Sea levels would rise. Deserts would expand. The world's climate systems would be thrown into chaos. Thus was the fear of 'global warming' born.

IPCC 1: The Forging of a 'Consensus'

There were two striking features of the alarm over global warming which emerged to such prominence around 1988 and 1989. One was the speed with which it became the prevailing orthodoxy of the time. The other was the conviction of its adherents that their case was so self-evident that scientifically it was no longer open to question. To emphasize the transcendent importance of their cause they felt the need to insist repeatedly that it was supported by an overwhelming 'consensus' of scientists.

There was no more dramatic indication of both these points than what followed when, in 1988, responsibility for the collective response of the human race to global warming was assumed by the United Nations. Under the auspices of its World Meteorological Organization and the United Nations Environment Programme, the UN set up an 'Intergovernmental Panel on Climate Change' (IPCC). The purpose of this was threefold: to assess (a) the scientific evidence for climate change; (b) the likely environmental, social and economic impacts of such change; and (c) what should be the political response.

An active lobbyist for the planned IPCC had been the UK's permanent representative at the UN, Sir Crispin Tickell, now an evangelist on global warming (although a decade earlier his book *Climate Change And World Affairs* had warned of the dangers of global cooling). He had briefed Britain's prime minister Mrs Thatcher on the overriding importance of global warming, although, as a former scientist herself, she was insistent that any political response must be based on 'good science to establish cause and effect'.¹⁹ The man chosen to be the first chairman of the IPCC's Working Group was Sir John Houghton, director of the UK's Meteorological Office.

The summer of that year 1988 was unusually hot in the USA. As the topic of the moment, climate change was being discussed in

Washington by the Senate Committee on Science, Technology and Space, under its chairman Senator Al Gore of Tennessee.

Gore had first been introduced to global warming at Harvard in the late 1960s, when he attended classes given by Dr Roger Revelle. It was here he first heard of the findings by Revelle's Mauna Loa team that CO₂ levels in the atmosphere were sharply rising. One of the witnesses before his committee was James Hansen, director of the Goddard Institute for Space Studies, who said he was virtually certain that world temperatures were rising and that his computer model provided evidence of a man-made 'greenhouse effect'.²⁰

Inconclusive though Hansen's evidence was, his testimony was warmly welcomed by Gore and widely publicized; unlike that of Lester Lave, a professor of economics, who received short shrift for his suggestion that the issue of global warming was still 'controversial'; i.e. that not all scientists were agreed on it. Lave was so surprised to be thus dismissed by Gore's committee that he wrote to one of America's leading climate scientists, Richard Lindzen, professor of meteorology at the Massachusetts Institute of Technology, to check that he was right. Lindzen confirmed that the case for global warming was not only 'controversial' but also, in his own view, implausible.²¹

In 1992 Lindzen was to write an informal paper recalling the extraordinary pressure which had built up in the late 1980s to convey the idea that there was 'scientific consensus' on global warming. He described how fervently the cause had been taken up at that time by environmental lobby groups, such as Greenpeace, Friends of the Earth and the Environmental Defence Fund, with 'budgets of several hundred million dollars' and whose support was 'highly valued by many political figures', such as Gore.

In 1989 a group known as the 'Union of Concerned Scientists', originally formed to campaign for nuclear disarmament and now campaigning against nuclear power, organized a petition urging for the recognition of global warming as potentially the greatest danger faced by mankind. Of the eventual 700 signatories, including Nobel laureates and many members of the National Academy of Sciences, 'only about three or four' were climatologists (at the 1990 meeting of the National Academy, the president went out of his way to warn members against 'lending their credibility to issues about which they had no special knowledge').

The cause became equally fashionable among leading figures in

Hollywood and show business. In the summer of 1989 Robert Redford hosted a much-publicized seminar on global warming at his Sundance Ranch in Utah, proclaiming that it was time to 'stop researching and begin acting' (as Lindzen commented, this might have seemed a 'reasonable suggestion for an actor to make'). Barbra Streisand pledged financial support to the work of the Environmental Defence Fund. Meryl Streep appealed on television for global warming to be halted.

Although, with such interest from the UN and politicians, there was suddenly a great deal of public money available for research into climate change, it soon became clear that projects that cast any doubt on global warming were not popular. Lindzen recalled how, in the winter of 1989, the National Science Foundation had withdrawn funding from one of his MIT colleagues, Professor Reginald Newell, when his data analyses failed to show that the previous century had seen a net warming ('reviewers suggested that his results were dangerous to humanity').*

Lindzen himself submitted a critique of the global warming thesis to *Science*, the journal of the American Association for the Advancement of Science. His article was rejected as being of 'no interest' to its readership, although *Science* then proceeded to attack his unpublished paper in print. Although it was eventually published by the *Bulletin of the American Meteorological Society*, the editor made 'a determined effort to solicit rebuttals', including an attack by Stephen Schneider (another prominent global warming campaigner who ten years earlier had been warning of global cooling).

Letters from the *Bulletin's* readers, however, were predominantly sceptical of the case being made for 'anthropogenic' or man-made global warming. Indeed a subsequent Gallup poll of climate scientists belonging to the American Meteorological Society and the American Physical Union showed that no fewer than 49 per cent rejected anthropogenic warming. Only 18 per cent

* At the same time Lindzen was surprised, when invited to a seminar on global warming at another university, to find he was the only scientist on a panel of 'environmentalists'. 'There were strident calls for immediate action and ample expressions of impatience with science.' A Congresswoman from Rhode Island acknowledged that 'scientists may disagree, but we can hear Mother Earth, and she is crying'.

thought that some warming was caused by man, and 33 per cent didn't know.

As one of the world's most distinguished climatologists, Lindzen's own doubts about the global warming thesis were profound. He did not deny that limited warming had taken place in the twentieth century, or that CO₂ in the atmosphere had risen. But he believed that the computer models used by the global warming advocates to make their case were much too crude. By failing to appreciate the subtle complexities and interactions of the earth's climatic system, their findings were demonstrably misleading.

In particular, by concentrating their attention on CO₂ and other man-made contributions to greenhouse gas, they had tended to overlook or to misjudge the part played by far the most important greenhouse gas of all, water vapour, comprising all but a tiny fraction of the total. They had also failed to allow for the 'negative feedback' effect of cloud-cover.²² In both these respects, the computer models had 'neither the physics nor the numerical accuracy' to come up with findings which were not 'disturbingly arbitrary'. Put these two factors properly into the equation, argued Lindzen, and it could be seen that the 'greenhouse effect' caused by rising CO₂ levels had been wildly overstated. What was more, this could be demonstrated by running those same computer models retrospectively, to 'predict' where temperatures should have been throughout the twentieth century.

It became glaringly obvious that these over-simplified programmes failed to explain the actual variations, which had taken place in twentieth-century temperature levels. In the 1920s and 1930s, when greenhouse gas emissions were comparatively low, temperatures had sharply risen. But in the very years when emissions were rising most steeply, during the Little Cooling between the 1940s and the 1970s, temperatures were in decline.

In fact, the assumptions on which the models were based would have led them to predict a twentieth-century warming four times greater than the rise that had been actually recorded (with most of that rise taking place before atmospheric CO₂ had reached anything like its present level). On this basis, how could any trust now be placed in their attempts to estimate future rises?

Clearly some significant factors were getting missed out by the modellers as they made their extravagant predictions of future warming. But the campaigners were already becoming distinctly

impatient with 'climate sceptics', such as Lindzen, who dared question their thesis. They were attacked in books and in a long article in the *New York Times* by Senator Gore, who compared 'true believers' such as himself to Galileo, bravely standing for the truth against the blind orthodoxy of his time. And in 1990 the global warming advocates won their most powerful support of all when the UN's Intergovernmental Panel on Climate Change produced its 'First Assessment Report' (FAR).

Over the years ahead the IPCC, through a succession of such reports, was to become the central player in the debate. As this initial report exemplified, these emerged from an elaborate two-stage process. The first involved compiling a three-part scientific report, under the main headings of the IPCC's agenda: assessment of climate change, assessment of its impact, and recommendations for action. This technical report was compiled by three working groups, made up of many different scientists, economists and experts of every kind. These 'authors' contributed to a series of 'chapters', under the guidance of 'lead authors' and a 'lead chapter author'. The resulting draft was then circulated to hundreds of 'expert reviewers' throughout the world for comment.

The second stage was the drafting of a 'Summary for Policymakers', under the direction of the IPCC working group's chairman Sir John Houghton. This began with the submission of the technical report to governments, each of which could insist on changes. The result, as soon became apparent, was that the 'Summary for Policymakers' often became significantly different in key respects from the main technical report itself, although it was the Summary which would be most widely read, publicized and quoted.

The way this was to work in practice was illustrated by the IPCC's first report. The Summary for Policymakers began by saying virtually everything the advocates of global warming could have hoped for. The IPCC was 'certain' that there was a 'greenhouse effect', enhanced by 'emissions from human activities'. It was 'confident' that the increase in CO₂ alone had been 'responsible for over half the enhanced greenhouse effect', and that this would 'require immediate reductions in emissions from human activities of over 60 percent to stabilise their concentrations at today's levels'.

'Based on current models', the Summary predicted that, unless

action was taken, global mean temperatures would increase through the twenty-first century by between 0.2° and 0.5°C per decade. This was an increase greater than any 'seen in the past 10,000 years'. Over the previous 100 years, it found, surface temperatures had increased by between 0.3° and 0.6°. It was thus now predicting a roughly similar increase every ten years. Hence the need for such drastic action.

The Summary did go on to admit, however, that this twentieth-century increase could have been 'largely due to natural variability'. This appeared to contradict its earlier claim that increased CO₂ was responsible for half the increase in greenhouse warming. To make the picture still more confused, the Summary hastened to add that natural and 'other human factors could have offset a still larger human-induced greenhouse warming'. Finally the Summary conceded that to reach an 'unequivocal' view of the 'enhanced greenhouse effect' would not be possible for 'a decade or more'.

These ambiguities were at least in part explained by comparing the Summary with the hundreds of pages of the main report. Here the findings of the technical experts were often much more cautious and even contradictory, supporting nothing like so straightforward a set of conclusions as the Summary tried to suggest.

As Lindzen was to comment:

The report as such has both positive and negative features. Methodologically, the report is deeply committed to reliance on large models, and within the report models are largely verified by comparison with other models. Given that models are known to agree more with each other than with nature (even after 'tuning'), that approach does not seem promising. In addition a number of the participants have testified to the pressure put on them to emphasise results supportive of the current scenario and to suppress other results. That pressure has frequently been effective, and a survey of participants reveals substantial disagreement with the final report.

Lindzen went on to underline the startling contrast between the scientific report and the Policymakers Summary, written, as he said, 'by the editor Sir John Houghton':

His summary largely ignores the uncertainty in the report and attempts to present the expectation of substantial warming as firmly based science'.²³

Another academic critic similarly observed how 'comments that were not welcomed by the main authors stood little chance of being considered seriously'.²⁴ He went on to quote Houghton himself confirming this, in admitting that:

whilst every attempt was made by the lead authors to incorporate their comments, in some cases these formed a minority opinion which could not be reconciled with the larger consensus.²⁵

Genuine consensus or no, the IPCC's report had given the global warming campaign tremendous momentum. Its most dramatic consequence came two years later in 1992, with a proposal that the world's governments should meet in Rio de Janeiro for an 'Earth Summit'.

Frenzied lobbying by environmental groups, such as Greenpeace and Friends of the Earth, ensured that 20,000 activists from all over the world were destined to meet in Rio at the same time. This evidence of remarkable popular support ensured that politicians from 170 countries arrived in Rio, including no fewer than 108 prime ministers and presidents.

While most of the activists staged a giant rally nearby, known as the 'Non-governmental Organization Forum', 2,400 of them were invited to the main conference itself, to cheer on the politicians as they signed a 'Framework Convention on Climate Change'. This was a voluntary agreement that CO₂ emissions by the year 2000 would be no higher than they had been in 1990. The intention was that this should soon be replaced by a series of 'protocols', setting mandatory targets for curbing emissions of all greenhouse gases (the first was to be agreed at Kyoto five years later).²⁶

For the campaigners on global warming this was a heady moment. No one was more eager to exploit it than Al Gore, as he stepped down from the US Senate to become the Democratic Party's vice-presidential candidate alongside Bill Clinton.

Gore had now made his stand on climate change the defining issue of his political career. In his bid to become the Democrats' nominee, he had published a book, *Earth In The Balance*. Like

much of his environmental writing, this was interspersed with personal reminiscences. One of the more important moments in his life, he recalled, was how he had been introduced to the cosmic significance of climate change at Harvard by Dr Revelle, father of the research project which had given the world those epoch-making figures on the rise in carbon emissions.

Gore seemed unaware that Revelle had for some time been taking a rather more cautious line on the panic over global warming than fitted in with his own agenda. In that summer of 1988 when Gore was conducting his Senate hearings on climate change, Revelle had written to several members of Congress urging that any action on global warming should be delayed, since not enough was yet known about the workings of the climate.²⁷

In 1990, at a conference of the American Association for the Advancement of Science in New Orleans, Revelle presented a paper on the theory that seeding the world's oceans with nutrients such as iron filings would stimulate the growth of plankton, thus increasing marine absorption of CO₂. After the lecture he was approached by an old friend, Fred Singer, professor of environmental science at the University of Virginia and formerly the first director of the US National Satellite Weather Service. Next day the two men met to discuss writing an informal paper together on global warming, later inviting Dr Chauncey Starr, an expert on energy, to join them.

Singer drafted the paper, which, after discussion, was submitted to a new, small-circulation journal, *Cosmos*. When he and Revelle met to discuss the proofs, Revelle expressed scepticism about computer climate models (Singer tried to assure him that within ten years they would be greatly improved). After they had agreed several amendments, the article was published in April 1991, entitled 'What to Do About Greenhouse Warming: Look Before You Leap'. The article's main conclusion, echoing the views that Revelle had expressed earlier in his letters to Congressmen, was that

the scientific base for a greenhouse warming is too uncertain to justify drastic action at this time. There is little risk in delaying policy responses.

The article attracted little attention at the time. Three months later, professionally active to the end of his life, Revelle died aged 82.

Later that year Singer was invited to contribute to a book on global warming and, being busy, suggested that the article be republished.

The following summer, when Gore was running hard for the vice-presidential nomination, an article in *Newsweek* contrasted his reference to Revelle in his new book with the conclusion of the article Revelle had co-authored in *Cosmos*. This was picked up elsewhere in the media and even later raised in a televised election debate. Gore angrily protested that Revelle's views had been 'taken completely out of context'.

In the middle of this embarrassing coverage, Singer was called by one of Gore's associates, Dr Justin Lancaster of Harvard University, insisting that Revelle's name be removed from the article. When told this would not be possible, Lancaster persisted in his request, suggesting that Revelle had not really co-authored the article and that his name had only been included 'over his objections'. He claimed that Singer had pressured an old man when he was sick, with his mental capacities failing.

Similar accusations were made by a member of Gore's staff to the publishers of the book in which the article was shortly to be reprinted, with a demand that it be dropped. When these allegations were repeated, in April 1993, by which time Gore had become US vice-president, Singer sued Lancaster for libel. In the course of legal discovery, Lancaster revealed that he had been rung by Gore after the *Newsweek* article appeared, asking about Revelle's mental capacity at the end of his life. He now agreed that Revelle had in fact been 'mentally sharp to the end'. He also admitted that Revelle had shown him the article before it was published, observing that there did not seem to be anything in it that 'was not true', and that 'it was honest to admit the uncertainties about greenhouse warming'.*

This was not the first occasion on which Gore had been associated with attempts to distort or suppress the views of those who disagreed with him. In one of the last of the hearings of the Senate committee he chaired, Professor Lindzen had appeared as a witness. In the course of arcane exchanges about the role of water vapour in the upper troposphere, Lindzen admitted he had now had to revise a point he had argued two years earlier about the

* These last details emerged from a computer disk containing a draft letter sent by Lancaster to Gore (Singer, 'The Revelle-Gore Story' (2003)).

effect of water vapour from clouds. Subsequent research had shown that another process, probably ice crystals from the clouds, must also be involved (even though this did not alter the overall effect).

Gore picked up Lindzen's admission that he had changed his mind, asking whether he was now rejecting what he had said two years earlier. When Lindzen agreed, Gore called for the recording secretary to note that Professor Lindzen had 'retracted his objections to global warming'.²⁸

Others present assured Gore that Lindzen had done nothing of the kind and that he was confusing matters. But soon afterwards, in the *New York Times*, Tom Wicker, a prominent journalistic ally of Gore's, repeated the charge that Lindzen had retracted his opposition to global warming. Lindzen tried to correct this with a letter, which was eventually, more than a month later, published. But this did not prevent Gore from repeating the claim yet again in his book, despite Lindzen's attempt to set the record straight.*

In February 1994, an ABC News presenter, Ted Koppel, revealed on his *Nightline* programme that Vice-President Gore had rung him to suggest that he expose the political and economic forces behind the 'anti-environmental movement'. Gore had urged him to expose the fact that several US scientists who had voiced sceptical views about global warming were receiving money from the coal industry and other dubious interests.

Such charges were to become an only too familiar feature of the debate. Any prominent scientist who dared to challenge the global warming orthodoxy would be likely to face accusations that he was funded by energy firms, 'Big Oil' or even the tobacco industry.**

* This was not the first time Wicker had been involved in similarly rewriting history. A year earlier Robert White, former head of the US Weather Bureau, had written an article for the *Scientific American* suggesting that the scientific basis for global warming predictions was totally inadequate to justify any costly actions. The only actions that should be taken were those which would be justified even if there was no warming threat. Wicker reported this in the *New York Times* as a call by White for immediate action on global warming (Lindzen, 'Global Warming' (1992)).

** Singer himself would be vilified in this way for having participated with Fred Seitz, a distinguished former president of the National Academy of Sciences, in a report criticizing the EPA's efforts to demonize passive smoking. The report's authors were described as 'corrupt' for having 'received funding through ideological partners of the tobacco companies'

Not only did Koppel call Gore's bluff by reporting their conversation on air, he observed that there was

some irony in the fact that Vice President Gore – one of the most scientifically literate men to sit in the White House in this century – (is) resorting to political means to achieve what should ultimately be resolved on a purely scientific basis. The measure of good science is neither the politics of the scientists nor the people with whom the scientist associates. It is the immersion of hypotheses into the acid of truth. That's the hard way to do it, but it's the only way that works.

Gore's attempt to use a leading news programme to denigrate his opponents in this way provoked such political embarrassment that, shortly afterwards, Lancaster settled his case with Singer by issuing a full retraction and apology.***

One bid to promote the illusion of 'consensus' had failed. But it was now to be followed by another, very much more public, and conceived on an altogether grander scale.

IPCC 2: The 'Fingerprinting' Fraud and Kyoto

By the mid-1990s, the Clinton-Gore administration had become closely involved in pushing America's energy interests across the world. In particular it was close to the new Texas-based energy giant, Enron, a significant contributor to Democratic Party funds. Washington supported Enron with \$4 billion of federal loans, and supported the company's bids for a series of huge contracts to open up new oil and gas fields and to build power stations and pipelines in India, Russia, China, the Philippines, South America and Africa.

Gore took a close interest in some of these projects. In particular, in December 1995, he was reported as visiting South Africa

(see the *ecosyn.us* website, which also accused President George W. Bush's family of having supported genocide and financed Hitler).

*** Twelve years later, in 2004, Lancaster issued a full 'retraction' of his 'retraction' on a website ('The Cosmos Myth', http://home.att.net/~espi/Cosmos_myth.html). He omitted, however, any reference to the evidence that had come to light during the discovery process of the legal action. This included his admission that Revelle had told him that he agreed with the main point the article sought to make: that the science on global warming was not yet sufficiently settled to justify drastic action.

to lobby the country's new president, Nelson Mandela, on behalf of Enron's bid to develop a large new gas field in Mozambique.*

The Vice-President had not, however, lost his interest in the battle against global warming, and his visit to South Africa coincided with final political agreement being given to the next report of the Intergovernmental Panel on Climate Change, due to be launched in May the following year.

The second IPCC report (SAR) went rather further than the first in endorsing an anthropogenic explanation for global warming. The biggest headlines were reserved for its claim that 'the balance of evidence suggests that there is a discernible human influence on global climate'. These words were to be quoted more often than any others in the report. But the story behind how they came to be included in the Summary for Policy Makers was curious.²⁹

The source of this sentence was given as Chapter Eight of the technical report, the 'lead author' of which was Ben Santer, a relatively junior scientist working for the US government's Lawrence Livermore National Laboratory. This included much the same wording; that 'the body of statistical evidence' now 'points to a discernible human influence on the global climate'.

When the report containing these sentences was published, however, the scientific reviewers who had signed off the technical chapters the previous year were dismayed. These words had not appeared in the draft they had formally approved. It seemed they had been added subsequently, by the 'lead author' himself. Santer had also, it emerged, deleted a number of key statements from the agreed text, all of which reflected serious scientific doubt over the human contribution to global warming. They included these passages:

- None of the studies cited above has shown clear evidence that we can attribute the observed changes to the specific cause of increases in greenhouse gases.

* See, 'Enrongate', www.craigslist.org. Gore's personal and family links with the oil industry went back a long way. His father Senator Albert Gore Sr had been a close friend and protégé of Armand Hammer, the head of Occidental Oil, who helped to set him up in the businesses that were the basis for the Gore family fortune. Hammer, who died in 1994, had been a friend of Lenin, and throughout the Cold War was under official suspicion for his exceptionally close ties to the Soviet Union.

- No study to date has positively attributed all or part (of the climate change observed) to (man-made) causes.
- Any claims of positive detection and attribution of significant climate change are likely to remain controversial until uncertainties in the total natural variability of the climate system are reduced.
- When will an anthropogenic effect on climate be identified? It is not surprising that the best answer to this question is ‘We do not know’.

All these sentences had been deleted from the original version. What was particularly odd about the new additions to the text was that the only source cited in support of them appeared to be two papers co-authored by Santer himself, which had not yet been published. That much-cited claim about ‘discernible human influence on climate change’ was based on what were known as ‘fingerprinting studies’. These compared the patterns of climate change predicted by computer models with changes actually observed in the real world. Where these coincided (or displayed the same ‘fingerprint’), this was taken as evidence that the computer model was correct.³⁰

However, when Santer and several colleagues published their first, all-important paper, two other scientists, Dr Patrick Michaels and a colleague, examined their evidence. They were surprised to discover that its conclusions in favour of global warming had been based only on part of the data. The supposed ‘fingerprinting’ parallel between the computer models and observed data applied only to the years between 1943 and 1970. When the full set of data was used, showing earlier years going back to 1905 and later years after 1970, the warming trend claimed by Santer and his colleagues disappeared.³¹

This was surprising enough, in view of the significance attached to Santer’s revised wording of Chapter Eight by the Summary for Policymakers and in all the publicity which followed. The realization that a comparatively junior contributor could have been allowed to make such a crucial change after the scientific text had been formally approved, gave rise to quite an uproar.

Even *Nature*, which published the Santer paper, was not happy about the rewriting of Chapter Eight to ‘ensure that it conformed’ with the Summary. The *Wall Street Journal* expressed outrage,

both in an editorial ('Cover-up in the Greenhouse'),³² and in an excoriatory article by Frederick Seitz, the much-respected former president of the National Academy of Sciences, headed 'Major Deception on Global Warming'.³³

Just as surprising, however, was the sequence of events that, it seemed, had preceded these changes to the text. Just before the wording of the report was finalized in December 1995, there had been a 'plenary' gathering in Madrid, attended by politicians and officials from 96 nations and representatives of 14 non-governmental organizations. Their task had been to go through the 'accepted' text line by line.

Shortly before this, as later emerged, the IPCC working group's chairman, and lead editor Sir John Houghton, had received a letter from the State Department in Washington, dated 15 November. This read:

*It is essential that the chapters not be finalized prior to the completion of the discussions at the IPCC Working Group I Plenary in Madrid, and that chapter authors be prevailed upon to modify their text in an appropriate manner following the discussion in Madrid.*³⁴

The senior official who gave this instruction, that chapter authors should be 'prevailed upon to modify their text', worked with Timothy Wirth, the Under-Secretary of State for Global Affairs. Not only was Wirth an ardent advocate of global warming. He was a close political ally of Vice-President Gore.³⁵

The chief purpose of the second IPCC report was to provide the underpinning for a major international conference, to be held the following year in Japan. Its purpose, based on the Rio Framework Convention on Climate Change, was to agree the first 'Protocol' which would lay the practical foundations for humanity's response to the global warming crisis.

The most obvious feature of the long and complex discussions which preceded this treaty, involving 160 countries, was a split between the industrialized countries, mainly in the northern hemisphere, held to have been responsible for most 'greenhouse forcing' up to this time, and the still-developing countries of the Third World. These were adamant that they could not be made to accept restrictions on their economic growth which would prevent them catching up with the developed world.

In these fraught negotiations Gore played a very active role. But he had something of a setback in the summer of 1997 when, on 21 July, the US Senate voted by 95 to 0 for a resolution opposing the proposed Protocol. This was precisely on the grounds that it was to be so damagingly one-sided. For it was now proposed that the already developed countries, led by the USA, would have to accept very severe restrictions on their greenhouse gas emissions, while still developing countries, such as China and India, would be excluded, even though their economies were now growing so fast that they would soon be major CO₂ contributors.

If such a treaty left out the Third World, the Senate observed, the reductions required of the industrialized world would be so great that this would 'result in serious harm to the US economy, including significant job loss, trade disadvantages, increased energy and consumer costs'.

Despite the likelihood that the world's leading economic power would not participate, the planned treaty remained on course. On 8 December 1997, representatives of 160 countries gathered in Japan to agree the 'Kyoto Protocol'. They were addressed at the start of the conference by Vice-President Gore. He told his vast audience:

Since we gathered at the Rio Conference in 1992, both scientific consensus and political will have come a long way. If we pause for a moment and look around us, we can see how extraordinary this gathering really is. We have reached a fundamentally new stage in the development of human civilization, in which it is necessary to take responsibility for a recent but profound alteration in the relationship between our species and our planet.

'The most vulnerable part of the Earth's environment', Gore went on:

is the very thin layer of air clinging near to the surface of the planet, that we are now so carelessly filling with gaseous wastes that we are actually altering the relationship between the Earth and the Sun – by trapping more solar radiation under this growing blanket of pollution that envelops the entire world ...

Last week we learned from scientists that this year, 1997, with only

three weeks remaining, will be the hottest year since records have been kept. Indeed, nine of the ten hottest years since the measurements began have come in the last ten years. The trend is clear. The human consequences – and the economic costs – of failing to act are unthinkable. More record floods and droughts. Diseases and pests spreading to new areas. Crop failures and famines. Melting glaciers, stronger storms, and rising seas.

Inspired by Gore's vision, delegates proceeded to agree the Protocol that had been hammered out through those months of hard negotiation. Signatories could begin ratifying the treaty from March the following year.

The Kyoto Protocol applied to all those industrialized countries listed in its Annex I (including Russia and its former satellites). These countries agreed, by 2008–12, to reduce their collective emissions of greenhouse gases by 5.2 per cent of their 1990 levels. Because their emissions levels would otherwise have increased, the true effect of these restrictions was estimated as equivalent to a cut by 2010 of 29 per cent.

Still developing countries, such as China and India, would not be bound by the agreement, however rapidly their own CO₂ emissions might be increasing. Some industrialized countries would be permitted to increase their emissions (Australia, for instance, by 8 per cent). The substantial emissions from international aviation and shipping were excluded from the agreement. And the Protocol would come into force only when it had been ratified by enough developed countries to have accounted in 1990 for 55 per cent of the world's CO₂ emissions.

Just how these targets were to be achieved, no one as yet had any real idea. It would be up to each country to work out its own way to meet them. But Kyoto also introduced the idea of 'emissions trading', whereby countries or firms that were failing to meet their reduction targets could buy 'carbon credits' from those which had already more than met them, thus offsetting 'failures' against 'successes'.

One of the most obvious intended consequences of Kyoto was to discourage the use of fossil fuels, such as coal, oil and gas, and to promote a switch to those energy sources which do not emit greenhouse gases, such as 'renewables' (wind, wave, solar and hydro). Nuclear power also offered a much more effective source of large-scale 'carbon free' energy than any of them. But most of

the proponents of Kyoto were strongly opposed to it, since they viewed it as potentially 'polluting the planet' in a different way, by creating dangerous wastes.

Revealingly, no official attempt was made to put a figure on just how much all this was going to cost the economies of the developed world. But in a study funded by the National Science Foundation and the Department of Energy, William Nordhaus, a Yale University economics professor, estimated the cost of the first phase of Kyoto emissions reductions at \$716 billion. Two thirds of that would fall on the USA, as the world's leading CO₂ 'polluter'. But this would only be the case if the USA agreed to participate, which, in light of that Senate vote, seemed highly unlikely.³⁶

In terms of 'saving the planet', what would all this achieve? It was generally agreed, even by supporters of the Kyoto Protocol, that, even if all its targets for emissions reductions were met, the resulting reduction in global temperatures by 2050 would be equivalent only to 0.05°C, or one twentieth of a degree.³⁷ By the year 2100, it was estimated, Kyoto in full would have delayed the process of warming by a mere six years.

Recognizing this, global warming campaigners expressed disappointment that the targets had not been tougher. But they rested their hopes on the prospect of very much more drastic emissions reductions being agreed in a new 'Kyoto Two' protocol after 2012.

For Gore's 'consensus', it had overall been quite an achievement. To top the ante still further, however, what was to follow was one of the most bizarre examples of the politicization of science in history.

IPCC 3: The Great 'Hockey Stick' Fiasco

Although it had long seemed peculiarly important to the global warming lobbyists to insist that their beliefs were supported by that 'scientific consensus', it was not always easy to see the evidence for this.

In 1996, for instance, the *UN Climate Change Bulletin* had reported on a survey of 400 American, Canadian and German climate researchers. When asked whether it was 'certain that global warming is a process already underway', only 10 per cent were prepared to express 'strong' agreement. Nearly half those surveyed, 48 per cent, said they didn't have faith in the forecasts of the global

climate models.³⁸ In 1997, a survey of climatologists employed by the 50 States of the USA found 90 per cent agreeing that 'scientific evidence indicates variations in global temperature are likely to be naturally occurring and cyclical over very long periods of time'.³⁹

One of the most awkward problems confronting those who wanted to link human activity with a sudden dramatic rise in global temperatures was how to explain that mass of evidence from every kind of historical and scientific source that there had been similarly dramatic fluctuations in temperature in the past, before man began adding to greenhouse gases. Particularly hard to explain was why temperatures during the Mediaeval Warming should have been higher than they now were at the end of the twentieth century.

Even the first two IPCC scientific reports had accepted this as not open to question, each showing a graph which reflected the received scientific view of how the world's climate had changed over the past 1,000 years. This showed temperatures during the Mediaeval Warming higher than those of the 1990s; falling steeply during the Little Ice Age; rising again in the nineteenth century with the Modern Warming; then falling during the Little Cooling between 1940 and 1975, just when CO₂ levels had been rising sharply.

The warming enthusiasts, anxious to emphasize the influence of human activity on climate, tried to explain this last point by arguing that the warming effect of rising CO₂ emissions had been masked during the Little Cooling by the 'dimming' effect of tiny aerosol particles produced by sulphur dioxide emissions from power stations burning coal and oil. These, they claimed, had shut out enough sunlight to counteract the effect of the increase in greenhouse gases. But, as even the IPCC was to accept in its next report, most of these aerosols were emitted in the northern hemisphere, which should have meant that, while its temperatures fell, the southern hemisphere continued to warm. Yet the Little Cooling had been experienced worldwide, showing no distinction between north and south.*

* The third IPCC report accepted that between 1900 and 1940 the world had warmed by 0.4°C, that between 1940 and 1975 it had cooled by 0.2°C (the Little Cooling), and that from 1975 onwards it had warmed again by 0.4°C, thus giving an overall warming trend for the twentieth century of 0.6°C.

A much larger problem to explain away were those fluctuations in temperature which had occurred in earlier times. And here in 1998 the whole debate was suddenly, dramatically transformed by a new scientific study. Its chief author was Michael Mann, a young physicist-turned-climate scientist at the University of Massachusetts, who had only just completed his PhD.

Mann published in *Nature* a paper on temperature changes over the previous 600 years.⁴⁰ In 1999 he and his colleagues published a further paper, extending their original findings over to 1,000 years.⁴¹ These had enabled them to produce a new temperature graph quite unlike anything seen before. Instead of the rises and falls shown in previous graphs, this one showed the average temperature having scarcely fluctuated at all through nine centuries, But it then suddenly shot up at the end, to by far its highest level ever recorded.

In Mann's graph such familiar features as the Mediaeval Warming and the Little Ice Age had simply disappeared. All those awkward anomalies were shown as having been illusory. The only real fluctuation that emerged from their studies was that sudden exponential rise appearing in the twentieth century, culminating in the 'warmest year of the millennium', 1998.

There were several very odd features about Mann's new graph, soon to be known as the 'hockey stick' because of its shape, a long straightish line curving up sharply at the end.⁴² But none was odder than the speed with which this, on the face of it, very obscure study by an unknown young scientist came to be adopted as the new 'orthodoxy'.

Within twelve months Mann's complete rewriting of climate science had become the major talking point of the global warming debate. In 2000, it was featured at the top of a major new report published by the US government, the *US National Assessment of the Potential Consequences of Climate Variability and Change*.

In the following year, 2001, when the IPCC's 'Working Group I' (still chaired by Houghton) published its 'Third Assessment Report' (TAR), Mann's 'hockey stick' was promoted even more dramatically. Not only was it printed at the top of page one of the Summary for Policymakers; elsewhere in the report, it was printed four more times, sometimes occupying half a page. The old graphs included in the IPCC's previous 1990 and 1996 reports, showing the Mediaeval Warming and the Little Ice Age, had vanished. Like

those articles in *The Times* rewritten by Winston Smith in *Nineteen Eighty Four*, they had been blotted out of the record.

Mann was the hero of the moment. He had been made an IPCC 'lead author' and an editor of the prestigious *Journal of Climate Change*. He was besieged by the media. But then some rather serious questions began to be asked about the basis for his study.

For a start, although he cited other evidence for his computer modelling of historical temperatures, it became apparent that he had leaned particularly heavily on data provided by a study five years earlier of tree rings in ancient bristlecone pine trees growing on the slopes of California's Sierra Nevada mountains. According to the 1993 paper, these had shown significantly accelerated growth in the years after 1900. But the purpose of this original study had not been to research into past temperatures. As its title made clear, it had been to measure the effect of increased CO₂ levels in the twentieth century on the trees' growth rate.⁴³

As the authors had specifically pointed out, temperature changes could not account for the faster growth of these long-established trees. It must have been due to the fertilizing effect of the increase in CO₂. The pine trees had been chosen for study because their position, high up on the mountains, made it likely that they would exhibit an unusually marked response to CO₂ enrichment.

Tree rings are a notoriously unreliable reflector of temperature changes, because they are chiefly formed during only one short period of the year, and cannot therefore give a full picture. This 1993 study of one group of trees in one untypical corner of the USA seemed a remarkably flimsy basis on which to base an estimate of global temperatures going back 1,000 years.*

Then there was Mann's unqualified acceptance of the recent temperature readings given by hundreds of weather stations across the earth's surface, which helped confirm the widely received view that temperatures in the closing years of the twentieth century were soaring to unprecedented levels, culminating in the record year 1998.

But this picture was already being questioned by many expert

* Mann and his colleagues did at least seem in small part to acknowledge this when, in the title of their second paper, the phrase 'Global-scale temperature patterns' was changed to 'Northern hemisphere temperatures'.

scientists who pointed to evidence that readings from surface stations were becoming seriously distorted by the 'heat island effect'. The majority of such stations were in the proximity of large and increasingly built-up population centres. It was well established that these heated up the atmosphere around them to a significantly higher level than in more isolated locations.

Nowhere was this better illustrated than by contrasting the temperature readings taken on the earth's surface with those which, since 1979, had been taken by NASA satellites and weather balloons, using a method developed by Dr Roy Spencer, responsible for climate studies at NASA's Marshall Space Centre, and Dr John Christie of the University of Alabama. Surprisingly, the readings showed that, far from warming in the last two decades of the twentieth century, global temperatures had in fact slightly cooled.⁴⁴ As Spencer was at pains to point out, these avoided the distortions created in surface readings by the heat island effect. The reluctance of the IPCC to take proper account of this, he observed, confirmed the suspicion of 'many scientists involved in the process' that the IPCC's stance on global warming was 'guided more by policymakers and politicians than by scientists'.⁴⁵

There was nothing the IPCC welcomed more in Mann's 'hockey stick' than the way it showed the line hurtling upwards at the end, to portray 1998 as having been 'the hottest year in history'. But, as many scientists had predicted at the time, 1998 was likely to be exceptionally warm because of the unusually strong 'El Niño' of that year: the result of air currents in the Pacific failing to replace warm surface water off the western coast of America with colder water, which invariably results in warming over a large area of the earth's surface.

What was also remarkable about the 'hockey stick', as was again widely observed, was how it contradicted all that mountain of evidence which supported the generally accepted picture of temperature fluctuations in past centuries. As was pointed out, tree rings are not the most reliable guide to assessing past temperatures. There were scores of more direct sources of evidence from Africa, South America, Australia, Pakistan, Antarctica – almost every continent and ocean of the world.*

* One of the first attempts to summarize this, in response to the 'hockey stick' thesis, was a paper by Willie Soon and Sallie Baliunas, published in

Whether evidence was taken from lake sediments or ice cores, glaciers in the Andes or boreholes in Greenland, the results had been remarkably consistent in confirming that the familiar view was right. There had been a Little Ice Age, all across the world. There had similarly been a Mediaeval Warming. Furthermore, a mass of data confirmed that the world had been even warmer in the early Middle Ages than it was in 1998.⁴⁶

If Mann and his colleagues had got it hopelessly wrong, nothing did more to ram this home than a study carried out in 2003 by two Canadian outsiders: Stephen McIntyre, a financial consultant on minerals, and Ross McKittrick, an academic economist. They might not have been climate scientists but they knew something about using computers to play around with statistics. They were also wearily familiar with people using hockey stick-like curves, showing an exaggerated upward rise at the end, to sell a business prospect or to 'prove' some tendentious point.

McIntyre and McKittrick approached Mann and his colleagues to ask for their original study data. This was eventually, with some difficulty, provided, but 'without most of the computer code used to produce their results', suggesting that no one else had previously asked to examine it, as should have been required both by peer-reviewers for their paper published in *Nature* and, above all, by the IPCC itself.⁴⁷

Feeding the data into their own computer, they found that it simply did not produce the claimed results. This was 'due to collation errors, unjustifiable truncation or extrapolation of source data, obsolete data, geographical location errors, incorrect calculation of principal components, and other quality control defects'.⁴⁸ 'Had the IPCC actually done the kind of rigorous review that they boast of', McKittrick was to tell the House of Lords committee in 2005,

the journal *Climate Research* in January 2003. After reviewing 240 different studies, they reported that, according to the balance of evidence, the twentieth century had not been the warmest period of the last millennium. This enraged the global warming lobby, provoking a major internal row that resulted in half the journal's ten editors resigning. An account by one of them, Clare Goodess of the Climatic Research Unit, University of East Anglia, is published on the website of SGR (Scientists for Global Responsibility).

they would have discovered that there was an error in a routine calculation step (principal component analysis) that falsely identified a hockey stick shape as the dominant pattern in the data. The flawed computer program can even pull out spurious hockey stick shapes from lists of trendless random numbers.

Using Mann's algorithm, the two men fed a pile of random and meaningless data into the computer thousands of times. Every time the graph which emerged bore a 'hockey stick' shape. Even the telephone directory would have come out like a hockey stick. They found that their replication of Mann's method failed 'all basic tests of statistical significance'.

When they ran the program again properly, keeping Mann's data but removing the bristlecone pine figures on which he had so heavily relied, they found that the Mediaeval Warming once again emerged, large as life. Indeed their 'major finding' was that Mann's own data confirmed that warming in the Middle Ages exceeded anything in the twentieth century.

But McIntyre and McKittrick reserved their most withering condemnation for the IPCC itself. Not only had it failed to subject Mann's methods to any proper professional checking, but it had then given extraordinary prominence to

the hockey stick data as the canonical representation of the earth's climate history. Due to a combination of mathematical error and a dysfunctional review process, they ended up promoting the exact wrong conclusion. How did they make such a blunder?⁴⁹

So embarrassing was this analysis that in 2004 Mann and his colleagues published a grudging 'Corrigendum'. They conceded that their proxy data had included errors, but insisted that 'none of these errors affect our previously published results'.

No admission of error came from the IPCC, for which the 'hockey stick' remained the single most prominent underpinning of its entire case on global warming. Although the graph had been as comprehensively discredited as any hypothesis in the history of science, the IPCC seemed determined to stand by it.*

* When the IPCC's Fourth Assessment Report came to be published in 2007 the 'hockey stick' graph was notably omitted. But the 'hockey stick' continued to have fanatical supporters among the scientific community,

As Orwell had written in *Nineteen Eighty Four*:

Everything faded into mist. The past was erased, the erasure was forgotten, the lie became the truth.

A Close-up of the IPCC at Work

Although the ‘hockey stick’ debate should have raised fundamental questions about the IPCC’s scientific credibility, it was by no means the only issue over which its conduct attracted criticism. One example is worth a brief further note because it gave a unique inside picture of just how the IPCC was able to arrive at the conclusions that those in charge of it wanted.

Paul Reiter, a British-born professor at the Institut Pasteur in Paris and a senior adviser to the World Health Organization, was arguably the world’s leading expert on mosquito-borne diseases. Giving evidence to members of the House of Lords in 2005, he explained how, before the 1996 report, he had been invited to join the IPCC’s Working Group II, to act as a ‘contributory author’ to Chapter 18, assessing the impact of global warming on human health.⁵⁰

Among his fellow ‘contributing authors’ he had been surprised to find one whose ‘principal interest was the effectiveness of motorcycle helmets (plus a paper on the health effect of cell phones)’. Not one of the chapter’s ‘lead authors’ had ever written a research paper on mosquito-borne diseases. Two were fulltime ‘environmental activists’, one of whom had written articles on topics ranging from mercury poisoning to land mines.

It soon became clear that the preoccupation of the lead authors was to demonstrate that global warming would increase the range and intensity of ‘vector-borne’ diseases (those spread by insects and other carriers), as ‘predicted’ by a ‘highly simplistic’ computer model. Reiter tried to explain that malaria was not a disease confined to hot countries, as was familiar to anyone versed in the history of the disease, but this appeared to fall on deaf ears.

environmentalists and the media. An account of that time recalled how Mann’s defenders ‘united in organised efforts’ to rebuke and discredit anyone who dared criticize the ‘hockey stick’, often ‘resorting to personal attacks against the critical party’ (‘Hockey Stick, 1998–2005, R.I.P.’, www.worldclimatereport.com.)

When he saw the resulting chapter, he was shocked at how ‘the amateurish text’ reflected the ‘limited knowledge’ of the ‘21 authors’. Almost the only texts cited were ‘relatively obscure’ articles, almost all suggesting that disease became more prevalent in a warm climate. The text was riddled with ‘glaring indicators of the ignorance of the authors’, such as a claim that ‘mosquito species that transmit malaria do not usually survive where the mean winter temperature drops below 16°–18°C’ (some species, Reiter pointed out, can survive temperatures of 25° below zero).

In their determination to prove that greater warming was already causing malaria to move to higher altitudes, the authors quoted claims that ‘had repeatedly been made by environmental activists’, but which had been ‘roundly denounced in the scientific literature’.

‘In summary’, Reiter went on, ‘the treatment of this issue by the IPCC was ill-informed, biassed and scientifically unacceptable’. Yet the Summary for Policymakers, drafted at political level, was able to use this chapter to support a claim that ‘climate change is likely to have wide-ranging and mostly adverse impacts on human health, with significant loss of life’. It went on to predict that climate change at the upper end of the IPCC’s predicted range would increase the proportion of the world’s population vulnerable to malaria to 60 per cent, leading to 50–80 million additional cases every year.

Following the publication of the report, Reiter was shocked to see how

these confident pronouncements, untrammelled by details of the complexity of their subject and the limitations of these models, were widely quoted as ‘the consensus of 1,500 of the world’s top scientists’ (occasionally the number quoted was 2,500). This clearly did not apply to the chapter on human health, yet, at the time, eight out of nine major websites that I checked placed these diseases at the top of the list of adverse impacts of climate change, quoting the IPCC.

Reiter went on to describe how, when he was invited back to take part in preparing the third, 2001 report, he and a colleague, who were the only authors with any knowledge of vector-borne diseases, repeatedly found themselves ‘at loggerheads with persons who insisted on making authoritative pronouncements, although

they had little or no knowledge of our speciality'. Reiter eventually resigned, although when he saw a first draft of the report he was shocked to see his name still listed as a contributor. Only with great difficulty did he eventually succeed in having it removed.

For the IPCC's fourth report, due to be published in 2007, Reiter was nominated by the US government as a 'lead author'. He was rejected by the 'IPCC Working Group II Bureau' in favour of two 'lead authors', a hygienist and a specialist in fossil faeces. Neither had any knowledge of tropical diseases but they had both co-written articles with 'environmental activists'. When Professor Reiter questioned this with a relevant IPCC official (who worked for the UK Meteorological Office in Exeter), she thanked him for his 'continued interest in the IPCC' and told him that selection was decided by governments: 'it is the governments of the world who make up the IPCC, define its remit and direction' according to 'the IPCC Principles and Procedures which have been agreed by governments'. To his question as to why the 'lead authors' chosen appeared to have no expertise in the chapter's subject matter, he got no answer.

Faced with such evidence, Reiter went on to muse how:

the issue of consensus is key to understanding the limitations of IPCC pronouncements. Consensus is the stuff of politics, not of science ... in the age of information, popular knowledge of scientific issues – particularly issues of health and the environment – is awash in the tide of misinformation, much of it presented in the 'big talk' of professional scientists.

Alarmist activists operating in well-funded advocacy groups have a lead role in creating this misinformation. In many cases they manipulate public perceptions with emotive and fiercely judgmental 'scientific' pronouncements, adding a tone of danger and urgency to attract media coverage ... these notions are often reinforced by drawing attention to peer-reviewed scientific articles that appear to support their pronouncements, regardless of whether these articles are widely endorsed by the scientific community. Scientists who challenge these alarmists are rarely given priority by the media, and are often presented as 'sceptics'.

The democratic process requires elected representatives to respond to the concerns and fears generated in this process. Denial is rarely an effective strategy, even in the face of preposterous

claims. The pragmatic option is to express concern, create new regulations and increase funding for research ...

In reality a genuine concern for mankind and the environment demands the inquiry, accuracy and scepticism that are intrinsic to authentic science. A public that is not aware of this is vulnerable to abuse.

It was an admirably acute analysis of the essence of the scare phenomenon – from an ‘authentic’ scientist, puzzled by how mad the world had grown.

The Great Wind Power Fantasy

If the IPCC’s ‘consensus’ had made clear with just what a crisis global warming was facing the world – not least thanks to that terrifying exponential upward flick at the end of the ‘hockey stick’ – what was the world going to do about it?

Nearly seven years after its signing, the Kyoto Protocol still hadn’t come into force. This could not happen until it had been ratified by countries representing 55 per cent of all the world’s human CO₂ emissions in 1990. The only real hope of this happening was that it would be ratified by either the USA or Russia. The USA had so far been ruled out by that unanimous Senate veto in 1997. As for Russia, in December 2003 President Vladimir Putin reiterated that it had no intention of ratifying, because the treaty was ‘scientifically flawed’ and ‘even 100 per cent compliance with the Kyoto Protocol won’t reverse climate change’.⁵¹

In fact this continuing delay had not prevented various richer countries, led by those making up the European Union, from already taking steps towards meeting those Kyoto targets on limiting carbon emissions. But even if Kyoto did one day come into force, there were limits to what these nations could hope on their own to achieve,

One problem was that, because it only applied to developed countries, there were so many sources of carbon emissions the developed world could do little or nothing about. The second largest human cause of CO₂ emissions, for instance, accounting for some 18 per cent or nearly a fifth of the world total, was deforestation. But this was mainly centred in countries not affected by Kyoto, such as Indonesia and Brazil, where the destruction of their

rainforests contributed 85 and 70 per cent of their total carbon output.

Just behind this, contributing around 14 per cent each, were agriculture, industry and transport. Again a significant part of agricultural emissions, as in those from rice growing which is particularly 'carbon-intensive', came from countries which would be unaffected by Kyoto. Some of the world's most polluting industries were in China and India, which would also be unaffected. Marginal steps were already being taken in industrialized countries to reduce carbon emissions from cars and lorries, but aviation (contributing around 3 per cent) and shipping (slightly more) were again not covered by Kyoto.

By far the biggest single contributor to carbon emissions, however, responsible for around 40 per cent or two-fifths of the total, was the use of fossil fuels for generating electricity. Inevitably it was here that the attention of those countries that wished to show their determination to 'fight global warming' had to be focused.

The most effective way to generate 'carbon-free' electricity would have been to revive the use of nuclear power, which for 20 years, after the scare over a relatively minor nuclear incident at Three Mile Island in 1979 and the rather more serious emergency at Chernobyl in 1986, had become distinctly unpopular. The most nuclear-dependent country in the world was France, which, after its scare over future sources of energy in the 1970s, following the Yom Kippur war, had built the 58 new nuclear power plants which now supplied 83 per cent of its electricity. But from the environmentalists, so much in the ascendant, any talk of a return to nuclear power provoked howls of outrage, even though it offered by far the most practical solution to the problem they claimed to care about more than any other: the rise in greenhouse gases.

This left those 'renewable' energy sources, solar, wave and tidal power and, above all, wind, which had now seized the imagination of the environmentalists as being the answer to all their dreams. Everything about 'green' energy seemed appealing. It relied directly on the beneficence of nature itself, on such elemental forces as the sun, water and wind. It was pure, it was clean, it gave off no 'polluting' greenhouse gases, and, bar a little initial investment, it was free.

Thus it was that, from the early 1990s onwards, many of the

countries of the western world had embarked on a love affair with the idea of 'renewable' energy as something which governments should do all in their power to encourage. As early as 1989, the British government introduced a 'non-fossil fuel obligation' (NFFO), whereby its newly-privatized electricity supply companies were obliged to buy a percentage of their power from 'renewable' sources.

In 1997, no one was more enthusiastic for the Kyoto Protocol than the EU, which was soon aiming to set its own 'Kyoto targets' whereby, within 13 years, 10 per cent of all the EU's energy would be 'renewable'. In 2001 the member states committed themselves to an even more ambitious target, issuing a directive which laid down that, by 2010, 'of the total electricity consumption of the Community', no less than 22.1 per cent, more than a fifth, must be derived from renewable energy sources.⁵² In 2002 this prompted the British government to introduce a Renewable Obligations Order, replacing the NFFO with a new system whereby electricity suppliers were obliged to buy an annually increasing percentage of their electricity from renewable sources. For this they would have to pay an inflated price, designed to encourage further investment in 'renewables', which would then be paid for by their customers through their electricity bills.

The most obvious source of additional renewable energy in Europe was wind.* The three EU countries that led the way in building thousands of wind turbines were Denmark, Germany and Spain. By 2002 little Denmark was claiming to be generating nearly 20 per cent of its power from the giant turbines which now dominated vast tracts of its flat countryside and coastline.

But it was around this time the penny began to drop that wind power was not all it been imagined to be. Its most serious failing was the simple fact that wind does not blow at a consistent speed, and often not at all. The wind companies invariably liked to talk of their turbines in terms of 'installed capacity': as, for instance, 'two megawatts'. The politicians and the media almost invariably fell

* Apart from in the handful of countries, such as Switzerland, that had mountains large enough to allow extensive use of hydro-electric power. In the UK, according to the DTI's 2006 Departmental UK Energy Statistics (DUKES 7.4), hydro-electricity in 2005 provided 29 per cent of total renewable energy, mainly from schemes built in the Scottish Highlands in the 1950s. Biofuels contributed 53 per cent, wind power only 17 per cent.

for this, imagining that such a turbine was capable of producing two megawatts (2 MW) of electricity.

Because wind speeds were so inconsistent, however, this in fact meant that the average output of a turbine in the UK was only a quarter of its capacity (known as the 'load factor'). Indeed all too often, notably on cold days in winter when electricity demand was at its highest, there was not enough wind to keep the turbines turning.

In short, wind turbines were extraordinarily unreliable. Furthermore, thanks to the vagaries of the wind, they were also unpredictable. This meant that, in order to guarantee a continuous supply of electricity to the customers, alternative sources of power had to be kept permanently on standby or 'spinning reserve', ready to step in at a moment's notice to make up for the lack of supply from the windfarms. Even when the wind was blowing, these back-up power stations, usually coal-fired, would have to be kept running, using fuel, generating steam, emitting CO₂, ready to ramp up their turbines the moment the supply from the wind machines stopped coming.

This remained one of the best-kept secrets of the wind power lobby, because what it meant was that the wind turbines were not saving anything like the amount of CO₂ they liked to claim. Some 'spinning reserve' was unavoidable, to provide back up for conventional power sources. But the greater the number of windfarms, the more it would be necessary to keep conventional plants running just to provide them with round-the-clock cover. When seeking planning permission to build a new windfarm, developers would invariably boast that it was going to help combating global warming by saving 'X thousand tonnes of CO₂' from being emitted to the atmosphere. In fact it was going to save very much less.

In reality the contribution made by wind power, both in terms of the electricity it generated and its 'carbon savings', was derisory. By 2005 Britain was priding itself on having built 1,200 turbines, covering hundreds of square miles of countryside. But the amount of electricity they produced was less than half that generated by one 1,200 MW nuclear power station; and barely an eighth of that supplied by the huge 4,700 MW coal-fired plant at Drax in Yorkshire.

When it was proposed that the largest windfarm in England should be built at Whinash in Cumbria, 27 huge turbines, each

two-thirds the height of Blackpool Tower, the developers boasted that this would save '178,000 tons of carbon emissions a year'. Yet even the *Guardian's* George Monbiot, the most prominent global warming crusader in Britain's media, had to admit that 'a single jumbo jet, flying from London to Miami and back every day, releases the climate-change equivalent of 520,000 tonnes of carbon dioxide a year'. One Boeing 757 thus cancelled out three giant wind farms.⁵³

Another illusion about wind power was that it was cheap. In fact generating electricity by wind turbines was significantly more expensive than conventional power sources. A study carried out for the Royal Academy of Engineering in 2004 showed that the cost of a kilowatt hour of electricity produced by an onshore wind turbine, including the cost of standby generation, was 5.4p; more than double that of power from gas (2.2p), nuclear (2.3p) or the more efficient coal-fired plants (2.5p). From an offshore windfarm, the 7.2p cost made it well over three times more expensive.⁵⁴

One reason why this was not more widely recognized was because of the ingenious way the government had managed to conceal the massive subsidy given to the owners of wind turbines. Under the Renewables Obligation, the electricity supply companies were required to buy an ever-higher percentage of their electricity from turbine owners, rising from 3 per cent in 2002 to 15 per cent and more in future years. In addition, they had to pay a Climate Change Levy on every MW-hour of electricity produced from conventional sources, from which renewables were exempted.

The net effect of all this was that the electricity supply companies were forced to pay twice as much for wind-generated electricity as they did for conventional power. In 2005 this amounted to around £90 per MW-hour compared with the normal price of £45. But this was hidden from the public because the additional cost, now approaching £1 billion a year, was merely added, without explanation, to their electricity bills.⁵⁵

For the turbine developers themselves this created an extraordinary bonanza. Each 2 MW turbine, although on average it produced only 500 kilowatts of electricity, earned its owners around £400,000 a year, of which £200,000 was the value of the electricity and £200,000 the hidden subsidy. A big windfarm might have dozens of such turbines, like the 140 2.3 MW giants being erected in 2006 at Whitelee, south of Glasgow, the largest on-shore

windfarm in Europe. Covering 30 square miles of moorland, with an installed capacity of 322 MW, this was due to earn its developers £32 million a year in subsidies alone. Yet its total output would be only 7 per cent of that of a nuclear power plant occupying less than a 30th of the same amount of land.*

In many people's eyes, of course, wind turbines had another serious failing. It seemed ironic that, in the name of some claimed 'environmental benefit', these vast industrial structures were all too often being erected in particularly beautiful stretches of countryside, such as the Scottish Highlands or the mountains of mid-Wales, severely intruding on their natural environment. Rising as much as 400 feet into the air, the height of a tall city office block or the spire of Salisbury Cathedral, these incongruous towers of steel, with their blades giving off a dull, low-frequency 'whump' each time they revolved, dominated the once unspoiled landscape for miles around.

To others these towers seemed beautiful, not least because they symbolized man's belated attempt to 'save the planet' from his own folly. But even the greatest enthusiasts for wind power might have had pause for thought had they bothered to discover just how little, in practice, it was solving the problem that so concerned them. And a further huge practical drawback to turbines only became really apparent as ever more thousands of them came to be built.

The European countries which led the way in building wind turbines were Denmark and Germany. In 2002, Denmark announced that its dash for wind was so unbalancing its electricity supply that it was not going to build any more. In 2004, although turbines nominally represented 20 per cent of Denmark's electricity production, the wind blew so inconsistently that it in fact provided only 6 per cent of the power the country consumed. Because at any given time it either had too little wind or too much, Denmark either had to import power at considerable cost from other countries, or, worse, it had to export its surplus wind-generated electricity at a loss to Norway (because there was no means of storing it). In 2004

* In 2005 Sir Donald Miller, the former head of Scottish Power, announced that to meet the EU's target of 20 per cent of the UK's power from renewable sources by 2020 would cost £30 billion in subsidies through higher electricity bills.

this represented a staggering 84 per cent of all the power Danish turbines produced.⁵⁶

The more dependent a country became on wind power, the more likely it was that this would create serious instabilities in its electricity grid, as conventional power stations switched on and off to compensate for the unpredictable vagaries of the wind. This was why Ireland in 2003 decided to follow Denmark by putting a moratorium on any more turbines.

The prospect of renewable energy in itself being able to make any significant contribution to the battle against global warming was beginning to look increasingly dubious. Rather more seriously for the climate change crusaders, however, the Kyoto Protocol itself, seven years after it was agreed, still remained unratified.

'Planet Savers' versus 'Holocaust Deniers'

At this point, in 2004, the temperature over global warming visibly rose. It was not that the earth's temperature itself continued to rise. The El Niño year of 1998 was still regarded as the hottest on record.* But as climate change had increasingly come to dominate the thinking and utterances of politicians, so were critics of the official orthodoxy becoming more vocal and better informed as to what the debate was about.

The real political prize was to get Kyoto ratified, and here the British government now tried to take the initiative. In January 2004, Sir David King, the British government's Chief Scientist and a close adviser to Tony Blair, published an article in *Science* warning that climate change was now 'the most severe problem we are facing today' and 'a far greater threat to the world than international terrorism'.⁵⁷

In Britain alone, said King, the number of people at high risk of flooding was expected to more than double, to nearly 3.5 million by 2080. Damage to property could run to tens of billions of pounds every year. But, asserting that the USA was responsible for more than 20 per cent of the world's greenhouse gas emissions (compared with only 2 per cent from the UK), King then attacked

* This was according to the World Meteorological Organization and the Climate Research Unit in the UK. James Hansen's Goddard Institute for Space Studies claimed that 2005 was even hotter.

the Bush administration for failing to play its proper role in tackling the crisis by refusing to sign up to Kyoto (he did not mention that it was the Senate, under the previous Clinton-Gore administration, which had voted against Kyoto).

In April 2004, Blair himself joined the assault, warning that the situation facing mankind was 'very, very critical indeed'. In May, launching 'a new alliance of governments, businesses and pressure groups' to tackle global warming, he said he could not think of 'any bigger long-term question facing the world community'.⁵⁸

Speaking on the same occasion, King claimed that the earth's temperatures had risen to their highest level for 60 million years, and that by the end of the twenty-first century Antarctica was likely to be the only habitable continent left on earth. Sixty million years ago, he claimed, CO₂ levels had risen to 1,000 parts per million, causing 'a massive reduction of life'.

With full backing from the Blair government, King then led a determined bid to pressure the Russian government to change its mind on Kyoto. In July 2004 he took a team of British scientists to Moscow, to take part in an international seminar on climate change staged under the auspices of the Russian Academy of Sciences. Mounting a ferocious attack on Russia's position, King repeatedly insisted that scientists critical of Kyoto were 'undesirable' and should not be allowed to speak. He gave an ultimatum that two-thirds of the scientific contributors invited by the Academy should be excluded. Frequently members of his team interrupted other speakers, or spoke themselves for much longer than their allotted time. On four occasions proceedings broke up in disorder. At one point, King, unable to answer Professor Reiter's evidence that the melting ice on Kilimanjaro had been shown to be caused by factors other than global warming, stormed out.

At the end of the conference Putin's chief economic adviser, Alexander Illarionov, was withering about the behaviour of King and his followers, which had shocked many of those present.⁵⁹ He declared that 'European Union pressure on Russia to ratify the Kyoto Protocol was equivalent to a war on truth, science and human welfare'.⁶⁰ He spelled out even more emphatically than Putin the previous December why Russia was not prepared to ratify Kyoto. The Russian government and its scientific advisers simply could not accept that rising temperatures were caused by rising CO₂ levels. The Roman and Mediaeval Warmings had both seen

higher temperatures when CO₂ levels were significantly lower. There were no correlations between warming and higher sea levels, the spread of diseases or extreme weather events. Furthermore, global temperature changes correlated better with the patterns of solar radiation than with the rise in CO₂ emissions.

Four months later, however, despite such vehemence from his own experts, Putin made a complete U-turn. He had struck a political deal with the EU which had no connection with climate change. Russia wished to enter the World Trade Organization on favourable terms, by being classified as a 'developing country'. In return for the EU agreeing to support him, Putin agreed to ratify Kyoto. He had also been made aware that, because Russia had closed down large parts of its most polluting industries since the collapse of the Soviet Union, its carbon emissions had already dropped drastically since the cut-off year of 1990. This meant that Russia would be able to make billions of dollars a year selling those 'carbon credits' which were a key part of the Kyoto system.

By this curious deal, the 55 per cent threshold had at last been reached. The Protocol could come into force. The Kyoto bandwagon could start rolling in earnest. And so keen now were the politicians and their advisers to talk up the threat of global warming there was scarcely need any longer for the environmental activists to egg them on.

In 2005 Blair made tackling climate change the keynote policy of his six months in the chair of the G8 nations (alongside 'making poverty history' in Africa). In announcing this he said 'the science is well established and the dangers clear. For example, the number of people worldwide at risk of flooding has increased twenty-fold since the 1960s'.⁶¹

When, later that year, the opposition Conservative Party elected David Cameron as its new leader, he at once announced that the fight against climate change would be at the top of his party's agenda. To highlight his environmental credentials, he was photographed bicycling to work at the House of Commons (his chauffeur driving discreetly behind with a clean shirt and shoes). He flew off to Spitzbergen, to be filmed watching glaciers melting and driving a team of huskies across the fast-disappearing Arctic ice. He applied for permission to erect a mini-wind turbine on the chimney of his Notting Hill home. It seemed as if the need to tackle global warming was virtually his only policy.

Of all the world's politicians trying to identify themselves with the fight to 'save the planet', however, none was more prominent than the man who had been at the centre of this battle for nearly 20 years; who now liked to introduce himself to audiences all over the world with the words 'I used to be the next President of America'.

In the summer of 2006, with the backing of the Hollywood publicity machine, Al Gore launched an unprecedented bid to project the threat of global warming to a worldwide mass audience. His screen version of *An Inconvenient Truth* raced up the charts to become the highest-earning documentary-film in history (going on in February 2007 to win two Oscars). The book version became a runaway bestseller.

The publicity-release for *An Inconvenient Truth* began:

humanity is sitting on a ticking time bomb. If the vast majority of the world's scientists are right, we have just ten years to avert a major catastrophe that could send our entire planet into a tail-spin of epic destruction involving extreme weather, floods, droughts, epidemics and killer heat waves beyond anything we have ever experienced.

As with everything Gore did, his presentation was heavily larded with very personal autobiography, packed with pictures of his wife, children, parents and sister (who, he wanted to emphasize, had died of smoking-related cancer because she believed the lies told by tobacco companies). He recounted how he had first come to see global warming as by far the greatest threat mankind had ever faced when he attended those classes given by his hero Roger Revelle in the 1960s; the man who had first alerted mankind to the soaring levels of CO₂.

With the aid of powerful imagery and dramatic graphs, Gore pulled out all the emotional stops. Beginning with shots of fragile Planet Earth from space, vanishing glaciers and those fast-disappearing snows of Kilimanjaro, he moved on to a cleverly redrawn version of the Mann 'hockey stick', allowing for the 'Mediaeval Warm Period' as a tiny 'blip', then showing temperatures suddenly shooting up at the end to levels never before known. He took a sideswipe at the 'global warming sceptics', a group 'diminishing almost as fast as those mountain glaciers', who had 'launched a fierce attack on the "hockey stick"'. But, fortunately,

other scientists had since confirmed Mann's 'basic conclusions in multiple ways'.⁶²

Nothing was missing from Gore's recital: poignant images of polar bears struggling to survive, even drowning as the Arctic ice melted; penguin populations plummeting by 70 per cent as their Antarctic ice shelves crumbled; chilling shots of the tragedy which had engulfed New Orleans only a few months earlier when it was devastated by Hurricane Katrina.

The horrors he used to illustrate his points fell into three main categories. The first was that the melting of all that ice, at the Poles, in Greenland, on the world's glaciers, would produce too much water. Sea levels would rise by 20 feet, inundating many of the most populous places on the planet. Computer-enhanced satellite images showed how part or all of many of its most famous cities would disappear, from Shanghai and Beijing to New York and San Francisco. 60 million people would be displaced in Calcutta and Bangladesh alone; another 20 million in China. As the world's climate systems were thrown into chaos, there was already evidence of cyclones, tornadoes and floods arriving with an intensity never recorded before (cue for shots of New Orleans under water).

Elsewhere the problem would be too little water. The melting of the Himalayan ice sheet, on which seven major river systems depended, would eventually rob 40 per cent of the world's population of their water supplies. Lake Chad in Africa, once the world's sixth largest lake, had already, thanks to global warming, all but dried up: a significant factor in the tragedy wracking that whole region of Africa, from famine to the genocide in Darfur.

The third problem would be the massive disruption of nature wrought by the changing climate. This would lead to a mass extinction of species, already 1,000 times higher than the normal rate; and to an explosion in 'vector-borne' diseases, as mosquitoes and other carriers rapidly extended their range into once-cooler parts of the world where people and forests were already dying as a result.

This apocalyptic vision, claimed Gore, was now endorsed by every climate scientist in the world (apart from that tiny handful of 'sceptics', who were vanishing as fast as the glaciers). Citing a recent study by Naomi Oreskes, he presented a graphic showing that the 'number of peer-reviewed articles dealing with "climate change" published in scientific journals in the previous 10 years'

was '928'. 'Percentage of articles in doubt as to the cause of global warming', it went on, was 'zero'.

But all was not lost. What was called for was an unprecedented human effort to avert this catastrophe. Greenhouse gas emissions must be cut back by 60 per cent. And on all sides there was evidence of how this could be done: from the tens of thousands of wind turbines appearing in America and Europe to carbon emission trading schemes ('the European Union has adopted this US innovation and is making it work effectively').

Everyone, Gore exhorted, could make a contribution to this cosmic battle, by such means (he listed them) as using energy-efficient light bulbs; insulating homes; walking or using a bicycle instead of a car; eating less meat; composting food waste; unplugging the TV and computers instead of leaving them on standby.

Urged on by such a call to arms, it was not surprising that, for those who shared Gore's view, their impatience with anyone still daring to question it reached new heights. For a long time, like Gore himself, they had liked to claim that the only scientists who 'denied' global warming were those who were in some way funded by energy companies or 'Big Oil'. But in April 2006, they had been given a new term of abuse for all these 'deniers', when a long-time media crusader in the cause, Scott Pelley of CBS, was asked why his two latest reports on global warming on *60 Minutes* had not featured a single contribution from a scientist who was sceptical.⁶³ 'If I do an interview with Elie Wiesel', replied Pelley (referring to the concentration camp survivor who won the Nobel Peace prize in 1986), 'am I required as a journalist to find a holocaust denier?'

This attempt to draw a parallel between global warming sceptics and those who denied the historical facts of Hitler's murder of six million Jews quickly caught on. By September, the *Guardian's* George Monbiot (in the words quoted at the head of this chapter) was writing that 'climate change denial now looks as stupid and as unacceptable as Holocaust denial'. He may well have been inspired by the contributor, two days earlier, to an American 'green' blog, praising Monbiot's latest book, who had carried this even further, exclaiming (in words that were themselves to win wide currency):

When we've finally gotten serious about global warming, when the impacts are really hitting us and we're in a full worldwide

*scramble to minimize the damage, we should have war crimes trials for these bastards – some sort of climate Nuremberg.*⁶⁴

'Holocaust deniers' or not, the chorus of media acclaim given to Gore's film had already begun to arouse some very different responses, from scientists such as Professor Bob Carter, an outspoken Australian expert in palaeoclimatology. So shocked was Carter by Gore's cavalier approach to the facts that, shortly after the film's launch, he exploded to a journalist that Gore's 'propaganda crusade is mostly based on junk science'. 'His arguments are so weak that they are pathetic. It is incredible that they and his film are commanding public attention.'⁶⁵

Inconvenient truths

Over the following months, other academics began to subject the claims in Gore's film to rather more measured analysis. In general they agreed that he had produced nothing but a caricature of the familiar case for global warming. He had picked over the literature for almost every extreme projection he could find, then exaggerated them still further. But it was when each of his claims came to be tested in detail against the latest scientific knowledge that the real flaws in his argument began to be exposed.

For a start there was his unabashed reliance on Mann's 'hockey stick'. As a nod to the fact that it had been so comprehensively discredited, he did have it carefully redrawn to include three tiny warming 'blips' between 1100 and 1400. But even of these, only one was allowed to represent the 'Mediaeval Warm Period', by the trick of showing the Middle Ages as having begun in 1200, rather than two centuries earlier as is common usage.

Then there were those iconic 'snows of Kilimanjaro', cited in the US Senate by Hilary Clinton and John McCain as evidence for global warming which could 'not be refuted by any scientist'.⁶⁶ In fact observers had first noted the receding of the ice cap on the summit of Africa's highest mountain shortly after it was first climbed in 1889. Detailed recent studies by an international team had shown that this was due not to global warming but to a drier climate recorded in the area from 1880 on, the effects of which were probably reinforced by local deforestation.⁶⁷

Few images in Gore's film were made to seem more shocking

than those of retreating glaciers in the Andes, the Alps and the USA, implying that glaciers were sharply receding all over the world. But the film ignored a number of recent studies reflecting a much more complex picture.⁶⁸ Glaciers have been perpetually retreating and advancing for millennia, not in response to changes in CO₂ but synchronous with changing patterns of solar radiation.⁶⁹ They were thus generally in retreat during the Mediaeval Warming but advanced dramatically during the Little Ice Age, between the fifteenth and nineteenth centuries. The current retreat began with the start of the Modern Warming, long before any marked rise in CO₂. But there were significant exceptions to this pattern, not least in Greenland and the Antarctic, which between them contain 99.4 per cent of all the ice on the planet. In each case, although there was melting on the periphery of the landmass, the overall ice mass in the interior was increasing, and many of their glaciers were advancing.⁷⁰

The Polar regions inevitably played a central part in Gore's thesis: partly because they provided emotive imagery in themselves (polar bears drowning, vast ice shelves collapsing into the sea); and partly because all that melting ice would provide the mass of water needed to raise the world's seas to unprecedented levels. But, again, almost every detail of his scenario was contradicted by expert evidence.

A series of studies, for instance, had shown that the Arctic was, in general, warmer at the end of the 1920–40 warming phase than it was 60 years later.⁷¹ After a drop in temperatures during the decades of the Little Cooling, they had risen again from the 1980s onwards, without yet reaching their levels of the 1930s. Far from heading rapidly for extinction, polar bears across most of the region were in fact flourishing. Of 13 main polar bear groups in eastern Canada, 11 were growing in numbers or stable, only two were declining (it was on one of these, in west Hudson Bay, that environmentalists liked to focus attention).⁷² An extensive study published in 2007 by the US National Biological Service similarly found that polar bear populations in western Canada and Alaska were so thriving that some had reached optimum sustainable levels.⁷³

The myth of those 'drowning polar bears', it emerged, was based on a single incident when four bears had been found drowned following a violent Alaskan storm.⁷⁴

Similarly in Greenland, home to 9.9 per cent of the world's ice, the evidence again showed that temperatures had been higher in the 1930s than in the 1990s.⁷⁵ Gore's computerized graphics showed a dramatic melting of the ice around the periphery of the world's largest island, particularly in the south, where there had been significant warming. This was based on a much-publicized paper which had claimed that in 2005 alone the ice had been melting at more than 200 cubic kilometres a year.⁷⁶

Although this sounded immense, it in fact amounted to only eight-thousandths of one per cent of the total mass of the Greenland ice sheet (and very much more than this would have melted before Greenland could first be extensively inhabited during the Mediaeval Warming). But what both this paper and Gore's film ignored was a study published the previous year in the same journal showing that the peripheral loss was also being accompanied by a sizeable increase in the size of the ice-cap in Greenland's interior.⁷⁷

Even more remarkable was the skewing of the evidence for what was happening at the other end of the world. The audiences for Gore's film were treated to more of those already familiar images of colossal chunks of ice calving off into the sea from the edge of the Antarctic, holding 89.5 per cent of all the world's ice. But almost all the studies of the effects of global warming on the world's fifth largest continent, larger than Europe, had focused on just one tiny corner of that immense frozen landmass, the Antarctic Peninsula, stretching up towards South America.

Here there had indeed been dramatic evidence of warming, caused by a 0.3°C temperature rise in the surrounding Southern Ocean. But a table of recorded temperatures across the rest of Antarctica showed that, almost everywhere else, the preceding decades had seen a distinct cooling. This, combined with increased precipitation as the surrounding ocean warmed, had led, as in Greenland, to a thickening of the continent's vast ice-sheet and a lengthening of many of its glaciers.⁷⁸

Gore's misrepresentation of the amount of water being released by melting of ice at the Poles then led him on to absurdly exaggerating the projected rise in sea levels. Those computer graphics purporting to show the drowning of many of the world's major cities were based on his prediction that by the end of the century sea levels would rise by as much as 20 feet. But even the IPCC,

scarcely known for its understatement, forecast a rise only between 4 and 17 inches.*

When Gore blamed global warming for the fact that London's Thames Flood Barrier had already had to be raised far more frequently in recent years than ever before, he omitted to explain that the decision to build the barrier had been taken in the 1970s, when the fear was of global cooling. The reason for this was that London had long been sinking by inches every year, thanks to abstraction of water from subterranean aquifers and the general slow subsidence of Britain's east coast. To reinforce his point, Gore also took his graph back to 1930, to show that there had been virtually no flood alerts in those earlier decades. His cut-off point was significant. Had he taken it back just two more years, to 1928, he would have had to include the worst Thames flood on record.**

Gore did, however, take the fullest possible advantage of the recent flooding of New Orleans in the wake of Hurricane Katrina, using it to support his claim that global warming had produced a huge increase in the frequency of hurricanes and other 'extreme weather events'. This flatly contradicted the historical evidence, which showed that Atlantic 'Category 3-5' hurricane activity after 2000 was actually lower than it had been in the 1950s, a decade into the Little Cooling. It had fallen off between the 1960s and the 1990s, before rising again. Whatever caused these oscillations, it was not global warming.***

* The third IPCC report (2001) found that the average sea-level rise in the twentieth century had been around 1.5mm a year (B4, 'observed changes in sea-level'), and that 'no significant acceleration in the rate of sea level rise during the 20th century has been detected'. This gave a total rise of 6 inches. The IPCC's predicted rise in the twenty-first century was between '11 and 43 centimetres' (4.3-16.9 inches). Predictions that Pacific coral islands such as Tuvalu would soon disappear had already been generally discounted, not least since coral growth would more than make up for any minimal rise in sea levels.

** The truth about the increased number of closures was even more complicated. In recent times, particularly in two 'freak' years between 2000 and 2003, the barrier had much more often been closed to retain river water rather than to shut out the sea (Hansard, HC, Written Questions, col. 1251W, 18 January 2007; and see also, www.ecn.ac.uk/liccuk/indicators/10.htm).

*** Graph showing hurricane activity 1900-2005 from the National Oceanic and Atmospheric Administration (NOAA) and National Hurricane Center (NHC). Oceanographers and climate scientists had long

Virtually every point in Gore's case was based on similarly misrepresenting, distorting or even inverting the scientific evidence. According to researchers using data from NASA, for instance, the chief reason for the shrinking of Lake Chad (only a very shallow lake at the best of times, which had dried up completely more than once in the past) was over-abstraction for human and animal use, following a succession of local droughts unconnected to global warming.⁷⁹

The predicted 'mass-extinction' of species caused by global warming was another popular myth which Gore had then vastly exaggerated. This had been largely inspired by local studies in the USA and central America shown to have been based on seriously misinterpreting the data (if anything, warming encouraged many species to extend their geographical range).⁸⁰ As for Gore's excitable claim that warming was already leading to a spread of 30 diseases, including malaria, this was based not least on further exaggerating those basic errors by the IPCC which had already been magisterially dismissed by Professor Reiter.⁸¹

Just as worrying as Gore's wholesale abuse of the science, however, were his recommended prescriptions as to how humanity should respond to this unprecedented threat. Having conjured up the prospect of a fast-approaching apocalypse, drowning cities, raging hurricanes, billions of people deprived of water and threatened with diseases running out of control, he ended in thudding anti-climax, with those suggestions that the human race might somehow avert catastrophe by using low-energy light bulbs and not leaving television sets and computers on standby.

But he also suggested two further ways in which global warming might be tackled on a more collective scale. One was that the power for these gadgets could be provided from renewable sources, such as wind turbines. The other was that the world should cut back its output of CO₂ by adopting 'carbon emissions trading schemes', of the kind in which he claimed the EU had so

pointed out that the effect of climate change, which warmed the Polar regions more than the Equator, would be to level out disparities in sea temperature, thus reducing rather than increasing the likelihood of hurricanes and cyclones. Gore's film similarly exaggerated the recent US incidence of tornadoes. For discussion of how data on extreme weather events had been distorted to promote the global warming thesis, see Michaels (2006) (note 70 above).

‘effectively’ led the way. And it was here as much as anywhere that Gore and his allies showed how completely their vision had parted company with reality.

Paying the price

Until this time, all the increasingly frenzied talk about the threat of global warming had been little more than that: just talk. But, as with any scare, the tipping point had now come, when the politicians wanted action.

In October 2006, only months after Gore’s film hit the cinema screens, Tony Blair launched a huge 570-page report by a former Treasury economist Sir Nicholas Stern. Blair claimed that this was ‘the most important report on the future ever published by this government’.⁸² It showed how the scientific evidence of global warming was now ‘overwhelming’ and that the consequences of failing to take action would be ‘literally disastrous’.

Stern went even further than Gore’s film. His report predicted that up to 200 million people could become refugees as their homes were hit by drought. Floods from rising sea levels could displace up to 100 million more. Melting glaciers could cause water shortages for one in six of the world’s population. Wildlife could be so devastated that up to 40 per cent of the world’s species might become extinct. Climate change would be so damaging to the world’s economies that it could reduce global GDP by up to 20 per cent.

But all was not lost. If drastic action was taken immediately, advised Stern – which need cost no more than 1 per cent of GDP – the worst of this apocalypse could be averted.

One means of doing this would be to give a huge boost to renewable energy. Shortly after Stern’s report appeared came an episode which illustrated one rather serious flaw in this strategy. No country in the world had gone more overboard for wind turbines than Germany. Despite the Danish lesson, it had continued to build wind machines so quickly that by 2006 it had no less 31 per cent of the world’s entire wind capacity.⁸³ But power experts were keenly aware that, although this represented more than 20,000 MW of installed capacity, in reality Germany’s thousands of giant turbines were generating only 2,000 MW of usable electricity, less

than that produced by a single medium-sized fossil-fuel power station.

To produce this derisory amount of power, the Germans were already becoming worried about the amount of their country they needed to cover not just with the turbines themselves but with costly high-voltage transmission lines to move the power to where it was needed. They were now having to plan another 2,700 kilometres just to cope with new windfarms.⁸⁴

In addition to this, thanks to the wind's unpredictability, there was the threat of growing instability to the grid. On the evening of Saturday, 4 November 2006 a huge area of Western Europe suddenly blacked out. Because of high winds and a surge of power into the 'pan-European grid' from German wind turbines, power from conventional generators had hurriedly to be closed off, causing repeated failures when they had to be reconnected. From France to Italy, it was reported that 'a real catastrophe' had been only narrowly averted. Heinz Kaupa, director of Austria's Power Grid, bluntly explained that his own country's system was becoming so unbalanced by the 'excessive' building of wind turbines that within two years the whole of Europe would be 'confronted with massive connector problems'.⁸⁵

Despite these dire practical warnings, the blind faith of Europe's politicians in wind power seemed unshakeable. In the 2007 election campaign for the Scottish Parliament, the governing Labour Party promised that by 2020 Scotland would be producing no less than 40 per cent of its energy from renewable sources. At the time, Scotland was producing only 12 per cent from 'renewables', almost all of it from hydroelectric schemes built 50 years earlier. Only a fraction was coming from the country's 640 turbines.

To achieve this new target would require building at least 8,000 more turbines, covering 7 per cent of Scotland's entire land area. But even these would generate only 3,300 MW of electricity, equal to the output of the coal-fired power station at Didcot in Oxfordshire.⁸⁶

The infatuation with wind power had become as much of a fantasy as those windmills which Don Quixote took for giants. Yet, on 9 March 2007, amid a fanfare of publicity, the European Union's 27 heads of government meeting in Brussels pledged themselves to a new 'mandatory target'. By 2020, they announced, no less than 20 per cent of the EU's energy must be derived from

renewable sources (they must have forgotten that they had already issued a directive to that effect six years earlier).

It was clear from the woolliness of their communiqué that not one of them had the faintest practical idea how such a target could be achieved. But this was meant to show, in the words of Jose Manuel Barroso, the President of the European Commission, that 'Europe is now able to lead the way on climate change'.*

As Gore had pronounced in his film, the EU was also already leading the way in the other main strategy devised to cut back on carbon emissions. On 1 January 2005, as recommended by the Kyoto Protocol, it had launched the world's largest 'Emissions Trading Scheme' (ETS). Each country had agreed to 'cap' its CO₂ emissions at a certain figure, and individual enterprises within that country had then been allocated their own 'carbon allowances'. If they exceeded their allowance, they could continue to 'pollute', but only so long as they bought 'carbon credits' from those firms or countries which were emitting less than they were allowed.

A major flaw in this scheme was that each EU country was allowed to nominate its own national allowance, fixed for the first three years the scheme was in operation. Some, notably Britain, playing by the spirit of Kyoto, nominated figures substantially

* 'Europe agrees renewable energy target', *BBC News* website, 9 March 2007. It was this same meeting of the European Council which arbitrarily decided that, as from 2009, it would become illegal to sell or manufacture standard incandescent light bulbs in the European Union and that only 'long-life low-energy' Compact Fluorescent Lamps (CFLs) would be permitted. Clearly the heads of government had not been properly briefed on this proposal, since its practical drawbacks would be immense. Since, to maximize their life, CFLs need to operate continuously, the energy savings would be minimal. For many purposes they cannot be used (e.g. in microwaves, ovens, freezers or enclosed spaces). A study carried out for Defra in 2005 ('Energy scenarios in the lighting sector') had found that 'less than 50 per cent of the fittings installed in UK homes can currently take CFLs'. Replacing hundreds of millions of fittings in UK homes alone would thus cost upwards of £3 billion. Many people dislike the harsher light given off by CFLs, which are larger and heavier than normal light bulbs, and when used for reading their rapid flicker can produce eye-strain. The Council's decision was yet another quixotic gesture prompted by the warming scare and would almost certainly prove impossible to implement by 2009 (even Philips, a giant EU lighting firm which had been lobbying for the change because it had invested heavily in CFLs, had not suggested that the transition could be made in less than 10 years).

lower than their existing emissions level. Others, notably Germany, chose figures higher than their existing level. The total allowable emissions in the EU of 1,829 million tons a year were thus larger than its existing emissions of 1,785 million tons.⁸⁷

A year later the first results of this lop-sided scheme became apparent. Several countries, including Poland, had not participated at all. Only four countries had been forced to buy carbon credits to remain within the allowances they had set themselves. By far the worst hit country was Britain, which had paid out £470 million. Germany, on the other hand, had been able to make a profit of £300 million selling carbon credits to the losers. Over the first three years of the scheme, it appeared that British firms would be transferring nearly £1.5 billion to their competitors.

An even greater anomaly was revealed by comparing those organizations in Britain that were forced to pay out for credits with those that made a profit from selling them. NHS hospitals, for instance, had been obliged to spend £1.3 million on buying credits, while giant oil and energy firms had enjoyed a bonanza from selling them. BP had sold '1.4 million tons' of emissions credits across the EU, thus earning £17.9 million for doing nothing. Shell's first-year profit was £20.7 million. Even these sums were dwarfed by comparison with the profits enjoyed by the electricity generating companies, which, according to UK government figures, had enjoyed a windfall of up to £1.3 billion.*

The business pages were soon full of articles reporting on how the new 'carbon trading market' had become either the best new investment going or a scandalous racket, according to taste. Unwittingly, the biggest contributors were electricity consumers who had seen their bills rise by between 7 and 12 per cent to pay for the scheme, without their being told why.

But the most telling comment on the ETS, which had been praised by Gore as being so effective, was the revelation that, in its first two years of operation, the EU's total carbon emissions, far from falling, had risen by up to 1.5 per cent.⁸⁸ At the same time, it

* 'Carbon trade scheme is failing', *BBC News* website, 5 June 2007. Most of the 'carbon permits' on which the generating companies made these immense profits were given to them free. Across the EU as a whole the windfall profits enjoyed by the electricity supply industry under the Emissions Trading Scheme' were estimated at £13.6 billion a year (*Financial Times*, 18 June 2007).

was announced that emissions in the USA, now universally reviled for its continuing refusal to sign up to Kyoto, had in 2006 fallen by 1.6 per cent.⁸⁹

In face of figures like these, it was salutary to recall that the EU's leaders, led by Germany's Angela Merkel, were calling for a worldwide reduction in carbon emissions of 60 per cent by 2050.⁹⁰ A McKinsey study in March 2007 had estimated that for the EU alone to reach its target of a 20 per cent cut by 2020 would cost up to 1.1 trillion (£747 billion).⁹¹ Yet, in 2004, EU countries had spent 5.6 billion subsidizing the production of coal, and in 2006 Germany opened a giant new mine in the Ruhr producing brown coal, the most polluting fossil-fuel of them all.

It was equally salutary to recall just what a huge percentage of all the worldwide sources of CO₂ emissions was not covered by the Kyoto Protocol at all. These included aviation, shipping, and deforestation, the second largest contributor, and, of course, the two fastest-growing and potentially most polluting economies on the planet, China and India.

In face of such myriad contradictions, it seemed only appropriate that in the very week of February 2007 when Gore was being fêted by Hollywood for his efforts to save the planet, it was revealed that his own 20-room home in Nashville, Tennessee, used 221,000 kilowatt-hours of electricity a year, 20 times the US national average.⁹²

Having exhorted each of his fellow-American citizens to reduce their personal 'carbon footprint', Gore's only defence was that, as a multi-millionaire, he had bought 'renewable energy credits' to 'offset' his own carbon use. But it then emerged that he bought them from a London-based company called Generation Investment Management, run by one of his former staffers and of which he himself was chairman, which had been set up specifically to cash in on the multi-billion dollar 'carbon offsets' boom.⁹³

It was hard to recall any historical precedent for the outpouring of hypocrisy that had come to shroud the issue of global warming. So overwhelming now was the collective pressure to subscribe to the prevailing orthodoxy that scarcely a single politician in the western world dared challenge it.

Particularly in the EU, it was being used to justify almost any action governments might wish to take, from raising new taxes to requiring building-owners to pay for expensive 'energy efficiency

certificates', or overriding established planning laws to force through the building of new windfarms against the democratic wishes of local communities. Yet the EU's emissions were still rising, And somehow this craze to impose new laws and costs in all directions did not seem to affect plans to increase the capacity of Europe's airports to handle millions more passenger-flights per year.

Governments were now annually pouring billions of dollars, pounds and euros into every kind of research related to global warming. But almost all these funds were conditional on that research coming up with results that the governments wanted to hear. Since few grants were available to those scientists who might challenge the official orthodoxy, the only surprise was how many were still prepared to express a sceptical view.⁹⁴

So rare had it become for the mainstream media, led by organizations such as the BBC, CBS and NBC, to voice anything but that orthodoxy that when one broadcaster dared put forward a dissenting view, as did Britain's Channel Four in March 2007, with a 90-minute documentary 'The Great Global Warming Swindle', featuring many of the leading academic dissidents on both sides of the Atlantic, this made headline news for days.*

Yet at the heart of this supposedly overwhelming political, scientific and media 'consensus' remained a glaring contradiction. On one hand, upholders of the orthodoxy were only too happy to proclaim that, unless the most drastic steps were taken to combat the threat of global warming caused by fast-rising greenhouse gas emissions, Planet Earth faced unprecedented catastrophe. On the other, surveying the range of measures that were actually being taken to avert this apocalypse, it was quite clear that, even on their own terms, they were still at this stage astonishingly trivial. Not all

* So unquestioningly had most of the media now assimilated the global warming thesis that whenever there was any kind of unusual weather event, heatwaves, storms, droughts or floods, some broadcaster could be relied on to describe it as 'further confirmation of climate change'. This became particularly comical when, unthinkingly, they described some event as the 'hottest/coldest/wettest' since some specific date in the past, unaware of how this implied that weather might have been just as extreme before 'global warming' began. In 2007, for instance, they had no hesitation in ascribing to climate change Britain's 'warmest April since 1865', and then Britain's 'wettest summer since 1912'.

of them combined would have the slightest effect on the world's climate. Even if the aspirations of Kyoto were met in their entirety, this would only supposedly delay the global temperature rise predicted for 2100 by six years. On the evidence of what had actually been achieved so far, it was obvious that even this was only wishful thinking.

The politicians of the developed world might well exhort the less developed nations to join them in a crusade which would deprive the vast majority of mankind of any hope of ever catching up with the rich minority; asking the peoples of rural Africa, for instance, to remain in the kind of abject poverty which would continue to kill them in tens of millions a year. But there was not the slightest chance that fast-developing nations such as China and India would agree to halt their drive to greater material prosperity, necessitating an explosion in carbon emissions which might before long put them even ahead of America as the world's leading 'polluters'.

Nothing more vividly brought home the unreality of all this than the fact that in 2006 alone China increased its electrical generating capacity by 25 per cent. The 102 GW (gigawatts) of capacity it added to its existing 400 GW in twelve months was almost equivalent to the entire 112 GW generating capacity of France. Furthermore, 88.5 per cent of this came from new, heavily CO₂-emitting coal-fired power plants. By mid-2007 China was building a new coal-fired generating station every four days. It was on course to exceed the 978 GW capacity of the USA within four years, and probably to become the world's leading CO₂-emitting nation even sooner.⁹⁵

The rich Western nations themselves might be prepared to cover their countryside with wind turbines, impose new taxes on airline passengers, introduce regulations to curb emissions from the vehicles on their roads and play around with their 'carbon trading schemes'. But just as those wind turbines did nothing whatever to reduce carbon emissions, so in reality did their airline traffic continue growing and their numbers of vehicles continue to increase. Measured against the scale of the forthcoming disaster about which they so liked to fantasize, none of these amounted to anything more than sentimental gestures.*

* A startling exception in 2007 was the EU's decree that by 2020 'biofuels' must account for 10 per cent of all transport fuels. A major source of this

When the leaders of the G8 countries met at Heiligendamm in Germany in June 2007, they were invited to talk grandly of limiting the world's future temperature rise to just 2°C.** How heady it must have felt to imagine they might between them have the power to determine the future climate of the planet with such fine-tuned precision. England's King Canute might have smiled to know of it, as he sat enthroned on his beach to demonstrate to his courtiers that even a great ruler like himself could not order a halt to the advance of the incoming tide.

So what hope was left that Planet Earth could be saved? There was perhaps just one ground for hope: that in conjuring up their vision of that future apocalypse and blaming it all on *homo sapiens* for allowing CO₂ to soar to 383 parts per million of the atmosphere, those scientists who set the whole fear of global warming in motion might in fact have been looking in completely the wrong direction.

The Missing Piece of the Jigsaw

That the earth had warmed in the twentieth century no one could sensibly deny, according to the IPCC by 0.6°C. Equally generally accepted was that the level of CO₂ in the atmosphere had risen in 200 years from around 280 ppm to more than 380.

According to the orthodox global warming thesis, the second of these two facts provided a full and sufficient explanation for the first. The only possible explanation for the rise in temperatures was the rise in levels of CO₂ and other greenhouse gases. The only

would be wheat (BP, in June 2007, announced plans to build a £200 million plant in Hull to process a million tons of wheat a year into fuel). To meet the EU's target from wheat alone, Britain would need to grow 14 million tons a year, against its total harvest for food production in 2006 of 11 million tons. By 2020 she would thus need to import 13 million tons of wheat annually. But this target was laid down just when a world wheat shortage had already led to a doubling of prices in two years. Even if other crops, such as sugar beet, were used to meet the 10 per cent biofuel target, this would still take up a similar area of farmland (*Sunday Telegraph*, 22 July 2007).

** This was a proposal put forward to her fellow G8 members by the German Chancellor, Angela Merkel, in her role as G8 president. Although supported by several other heads of government present, the proposal was not accepted.

explanation for the rise in CO₂ was the activity of man. This in turn led inexorably to the conclusion that, if only some way could be found to reduce those levels, then the rise in global temperatures might be halted.

One particularly worrying feature of this thesis was how much of the story of the earth's climate its supporters seemed to need to distort or suppress in order to make their case. The most glaring instance of this was the lengths to which they had gone to strike out of the record all the evidence for temperature fluctuations in the past, notably the Mediaeval Warming, the Little Ice Age and the twentieth-century Little Cooling. This was because these events appeared to contradict the simplicity of their theory: not least in that the Mediaeval Warming had long preceded any rise in CO₂ levels and that the Little Cooling had coincided with a time when CO₂ levels were sharply rising.

Was there then any other explanation that might more plausibly fit the facts? One of the most interesting features of the debate as it developed in the early years of the twenty-first century had been the increasing number of scientists from many countries coming round to the view that one hugely important factor had been overlooked. This was the link between what were far and away the two most conspicuous determinants of the earth's climate.

Whenever we talk of climate, even just of today's weather, two considerations dominate everything else. One is the sun. The other is cloud cover. It is this which determines the extent to which the earth is exposed directly to the sun's heat.

All attention in the public debate over global warming had been focused on the contribution man might be making to shaping the climate by producing gases which make it harder for heat from the earth to escape back into space. But nothing like enough attention had been paid to the source of all that heat in the first place: the great radiant ball of fire in the heavens without which no life could exist, and which is far and away the most powerful determinant of all the variations in climate on earth.

One of the first scientists to note an apparent connection between the state of the weather and that of the sun itself was the astronomer William Herschel, who in 1801 suggested that there seemed to be a correlation between the price of wheat and the number of sunspots. These are the seemingly dark patches which appear on the sun's disk, associated with intense magnetic activity.

The regularity of their appearance is generally governed by various overlapping cycles, of which the shortest is every 11 years.*

Later in the nineteenth century, a German astronomer Gustav Spörer and then Edward Maunder, in charge of keeping sunspot records at the Greenwich Royal Observatory, noted the remarkable decline in sunspot activity between 1645 and 1715. In one 30-year period barely 50 sunspots had been recorded, instead of the usual 40,000–50,000. The particular significance of what is now known as the ‘Maunder Minimum’ is that it coincided with the coldest period of the Little Ice Age.

For a long time no one was aware of quite what mechanism might allow sunspot activity to influence the earth’s climate, although scientists from many different disciplines contributed what would eventually be seen as vital pieces of the jigsaw. One was Victor Hess, an Austrian physicist, who was to win a Nobel prize in 1936 for having discovered the constant bombardment of the earth by what he called ‘cosmic rays’. These are fast moving, highly charged atomic particles originating from astronomical events in many parts of the universe, such as exploding stars. Some of these particles manage to penetrate the earth’s lower atmosphere (indeed the earth itself), taking the form of secondary particles known as muons, or ‘heavy electrons’.

Two pieces of the jigsaw were particularly important. One was the discovery that sunspot activity, creating what is known as the solar wind, stretching out throughout the solar system, determines how many of these cosmic particles reach the earth. When the magnetic force from the sunspots is high, cosmic rays are deflected from the earth. When sunspot activity is low, the quantity reaching the earth increases.**

The other more recent discovery has been how these cosmic particles are related to the cloud-cover in the lower atmosphere, which plays such a crucial part in shaping the earth’s climate.

* The economist William Stanley Jevons (1835–82), who had some scientific background, also suggested that there appeared to be a link between the rises and falls of sunspot activity and business cycles.

** As early as 1962, a landmark paper by Minze Stuiver, a University of Washington biophysicist, correlating tree-ring records with solar activity over the past 1,000 years, showed that whenever the sun was active, creating more solar wind to deflect cosmic rays, less carbon-14 was available to be absorbed by the trees.

Many scientists have played a part in this story, one of the most remarkable in modern science.⁹⁶

In 1991 two Danish scientists, Knud Lassen and Eigil Friis-Christensen of the Danish Meteorological Institute, published a paper noting a striking correlation between quickening of sunspot activity and the rise in temperatures in the Northern Hemisphere in the twentieth century.⁹⁷ At the end of 1995 their colleague Henrik Svensmark, a physicist, began studying data compiled by NASA's Goddard Institute for the International Cloud Climatology Satellite Project. Drawn from satellites all over the world, this charted changes in cloud-cover between 1983 and 1990. They showed a remarkable correlation between the extent of cloud and the relative intensity of cosmic rays.

In 1996 Svensmark and Friis-Christensen decided that their findings were so striking that they should be published.⁹⁸ It was not until 1997 that they appeared, because they diverged so far from the generally received view, which wanted to see CO₂ as the only driver of climate change. In 1992, when a Danish delegation had suggested to the IPCC that the influence of the sun on climate should be added to the list of topics worthy of further research, the proposal was rejected out of hand. In 1996, when the IPCC's overall chairman Professor Bert Bolin was asked to comment on the two men's findings, after they had been previewed at a conference of the Royal Astronomical Society in Birmingham, he angrily dismissed them as 'scientifically extremely naïve and irresponsible'.⁹⁹

Threatened with loss of funding, the two men continued to receive derisive comments from fellow scientists, not least at a conference of Nordic scientists addressed by Svensmark later that same year; although when Markku Kumala, the Finnish chairman of the International Commission on Clouds and Precipitation, was invited to join in the general scorn he surprised everyone present by observing that Svensmark's idea 'could be right'.

At the end of 1997 Friis-Christensen became director of what was to become the Danish National Space Centre. In 1998 he asked Svensmark and an English colleague Nigel Marsh to join him, giving them the opportunity for a much more systematic review of the data linking solar radiation with cloud cover round the globe. By 2000, they had reached their conclusions. The link between 'solar variability' and 'low clouds' was inescapable.

By this time other studies were beginning to lend credibility to the theory that variations in global temperature had been influenced by fluctuations in cosmic rays, not just in recent times but far back into prehistory.

In 2001 a team led by a Columbia University geologist, Gerard Bond, came up with remarkable confirmation of this point, correlating evidence of past cosmic ray levels from beryllium-10 isotopes in sediment cores with the pattern of climate shifts shown by fragments dropped by 'armadas' of icebergs in the North Atlantic during different Ice Age glaciations.¹⁰⁰ Although Bond and his Swiss colleague Jurg Beer could not accept Svensmark's view that the final explanation lay in cloud-cover (they were not cloud experts), their overall findings significantly reinforced the thesis that climate change over the past 10,000 years had been much more plausibly driven by solar radiation and cosmic rays rather than by CO₂. Their rises and falls simply coincided much better with the evidence, including that for all the major climate shifts up to the present day.

Other studies were following thick and fast. When Charles Perry, of the US Geological Service, and Kenneth Hsu looked at the correlation between solar radiation and carbon-14 in tree rings over 90,000 years, they found the matches so exact that any idea of modern global warming being 'caused solely by an increase in CO₂ concentrations' must be regarded as 'questionable'.¹⁰¹

A cross-disciplinary study published in 2003 by Nir Shaviv, an astrophysicist at the University of Jerusalem, and Jan Veizer, a University of Ottawa geologist, analysed data showing world temperature levels going back 500 million years. They found little correlation between the earth's climate and CO₂ levels (at times CO₂ levels had been as much as 18 times higher than today's and were 10 times higher even during the intense Ordovician glaciation).¹⁰²

The more evidence that became available, the more the correlation with solar activity and cosmic rays seemed to explain all those past fluctuations in temperature that had previously been such a puzzle, from the Mediaeval Warming and the Little Ice Age (coinciding with the Maunder Minimum) to the Little Cooling (when solar magnetic activity again fell) and the resumed warming of recent decades.¹⁰³

Such coincidences were all very well, but the one thing missing

was a proper explanation of how the ‘stardust’ particles of cosmic rays could in themselves have a part in forming those clouds, which are such an important factor in shaping the world’s climate. Building on all that was known about the processes behind cloud formation, going back to researches carried out in the nineteenth century by a British engineer John Aitken, a final clue was provided by a series of experiments begun by Svensmark in Copenhagen in 2004.

It had long been established that the molecules of water vapour that form clouds require an initial ‘seed’ to begin forming up together. Most often this consists of minute droplets of sulphuric acid in the atmosphere. But a question that had never been answered was how such ‘seeds’ themselves are formed. Do they in turn require some even smaller speck of matter to begin the process?

Svensmark and his colleagues created a large box, full of artificial pure air, together with traces of sulphur dioxide and ozone as are found in unpolluted air in the atmosphere. For months they subjected it to rigorous experiments, designed to replicate conditions in which sulphuric-acid droplets form in the air to set the process of cloud-forming in train. By the summer of 2005, after checking and crosschecking every detail, they had their cloud formation. The results were even more conclusive than they had anticipated.

The SKY project had shown that the seeding which initiated the process leading to cloud vapour could only have originated from the electrons liberated by cosmic-ray muons passing through the box. It looked as though those muon particles did indeed play a key part in cloud formation. The more cosmic rays enter the earth’s atmosphere, the more clouds are likely to form and thus the more the climate is likely to cool. The more solar radiation deflects the cosmic rays, the fewer the clouds that can form and the more the temperature will rise.¹⁰⁴

So challenging were the findings of Svensmark’s experiment to the prevailing scientific orthodoxy that one scientific journal after another refused to publish them. Eventually they were accepted by the Royal Society of London for publication in 2007, under the title ‘Experimental evidence for the role of ions in particle nucleation under atmospheric conditions’. In October 2006, the society released an advance draft of the paper online. A press notice

went out from the Danish National Space Centre, accompanied by a comment from its director Professor Friis-Christensen:

*Many climate scientists have considered the linkages from cosmic rays to clouds to climate as unproven. Some said there was no conceivable way in which cosmic rays could influence cloud cover. The SKY experiment now shows how they do so, and should help put the cosmic ray connection firmly onto the agenda of international climate research.*¹⁰⁵

By the early months of 2007, so much attention was being drawn to Svensmark's theory (not least by Channel Four's *The Great Global Warming Swindle*) that some riposte from the upholders of climate change orthodoxy was inevitable. On 11 July it came. Bearing all the signs of a carefully planned operation, the media, led by the BBC and *Nature* (both long-time champions of the orthodoxy), suddenly came out with a rash of news items trailing a new study which, it was claimed, had completely demolished the 'solar warming' thesis.¹⁰⁶

The paper, published online by the Royal Society, was by Professor Mike Lockwood, a physicist at the Rutherford Appleton laboratory, and Claus Frölich of the World Radiation Center in Davos, Switzerland.¹⁰⁷ They claimed that a fresh look at the data for the previous 100 years showed that Svensmark's solar data were seriously wrong. Although they admitted that the sun's magnetic activity had been higher in the twentieth century than in previous centuries, and that in earlier years this had significantly influenced global temperatures, in 1985 it had peaked and started to decline. Yet global surface temperatures had continued to rise. This proved, they claimed, that solar activity could not be the cause of recent warming.

Supporters of the official dogma were exultant at their coup. 'This paper is the final nail in the coffin for people who would like to make the Sun responsible for present global warming', one German climate scientist told *Nature*.¹⁰⁸ 'This should settle the debate', said Lockwood himself, expressing particular anger at the Channel Four programme, which he described as 'so bad it was almost fraudulent'.¹⁰⁹

Yet the Royal Society's paper had a number of odd features. One was that its seven pages of text were written so opaquely,

citing so many sources, that it looked as though the authors' chief purpose was just to put across their central headline message.

They were at pains, for instance, not to argue with the mass of research showing that, up to recent times, solar effects had played a significant part in influencing global temperatures ('it is becoming feasible', they conceded, 'to detect genuine solar forcing in climate records'). The focus of their concern was the period since 1985, in assessing whether 'solar variations could have played any role in observed present-day global warming'. Here, having established that solar activity had weakened, they could put across their central message: that, because surface temperatures had continued to rise, there could be no connection between current warming and the sun.

But here was an even odder feature of their argument. Why had they only included a graph of recent surface temperatures, and not one showing satellite data? The latest NOAA satellite record of lower air temperatures since 1979 showed that, following the El Niño year 1998, levels had fallen markedly, even, in 2000, by as much as a full degree. In May 2007 the temperature level was 0.6° lower than it had been in 1998. Indeed it was slightly lower than the level it had first reached in 1983.¹¹⁰

Not to include this was suspect enough. But even the record of surface temperatures on which Lockwood and Frölich hung their case was curiously selective. Looked at more closely, the latest data from the Climate Research Unit of East Anglia gave a very different picture from the averaged graph shown in their paper. The data showed that, in the six years between 2000 and 2006, even surface temperatures had not continued to rise, flattening out around an average level more than 0.2° lower than in 1998.

Why did the authors prefer long-term averages to the simpler message of year-by-year data? The latter would have exposed a crucial flaw in their argument. If rising CO₂ levels were the main driver of global warming, then temperatures should also have continued to rise. If temperatures were flattening out at a time when CO₂ levels were still increasing, this raised a fundamental question mark over the entire case for man-made global warming.

There were now two quite different theories as to why global temperatures had risen in the twentieth century. Each, according to its supporters, would account for all of the observed temperature rise of 0.6°. The explanation could not lie in both equally.

Which one more closely fitted the evidence? The next few years would provide powerful clues as to which was nearer the truth.

A New Marxism or the New Secular Religion?

In the early years of the twenty-first century, the world's astronomers were observing something very odd going on in different parts of the solar system.

It had first been noticed in 1998, when researchers at the Massachusetts Institute of Technology reported that, according to observations by the Hubble telescope, Triton, the largest moon of the planet Neptune, seemed to have heated up significantly since it was visited by the Explorer space probe in 1989. Frozen nitrogen on the moon's surface appeared to be melting into gas.¹¹¹

In 2002 there were reports that the atmospheric pressure on Pluto had tripled in 14 years, indicating a 2°C rise in temperature.¹¹² In 2006 this was confirmed by astronomers in Tasmania, who said that if anything Pluto's atmosphere had got even denser.¹¹³

In 2003 the project manager for NASA's Odyssey mission, orbiting Mars, reported that there was also evidence of global warming on Mars.¹¹⁴ In 2005 NASA confirmed that the CO₂ 'ice caps' near Mars's South Pole had been diminishing three summers in a row.¹¹⁵ Habibullo Abdussamatov, head of the Pulkovo Observatory in St Petersburg, described this as evidence that the current global warming on earth was being caused by changes in the sun. 'Man-made greenhouse warming', he said, 'has made a small contribution to the warming seen on Earth in recent years, but it cannot compete with the increase in solar irradiance'.

In 2006, scientists from Berkeley reported that Hubble was now providing evidence, from the emergence of a new red 'storm spot' on Jupiter, that temperatures on that planet too seemed to be rising, in places by as much as 10°.¹¹⁶

In other words, there seemed surprising evidence that warming was taking place throughout the solar system. Even though the mechanism for this might not yet be clear, it implied that some common cause was at work which was not limited just to events on Planet Earth. And how many other bodies orbiting round the sun were suffering from a sharp rise in man-made greenhouse gas emissions?

If man-made global warming does turn out to have been no more than a colossal 'scare', it will certainly be by far the greatest the world has ever seen. The practical implications of this are so immense that they can scarcely be measured.

One distinguished scientist prepared to contemplate this was Nigel Weiss, emeritus professor of applied mathematics and theoretical physics at the University of Cambridge, a past president of the Royal Astronomical Society and known for several major contributions to physics including the theory of 'flux expulsion', which explained the process whereby magnetic flux is expelled from the sun and other stars.

In January 2007, Weiss observed in an interview that, throughout the earth's history, its climate had been driven by factors other than man. 'Variable behaviour of the sun is an obvious explanation', he said, 'and there is increasing evidence that Earth's climate responds to changing patterns of solar magnetic activity.'

While insisting that the science was far from settled, he maintained that there was one virtual certainty. The world was about to enter a period of cooling. 'We live', he explained, 'in a period of abnormally high solar activity'. Such hyperactive periods do not last long, he went on, 'perhaps 50 to 100 years, then you get a crash. It's a boom-bust system, and I would expect a crash soon.' The sun's polar field, he noted, was now at its weakest since measurements began in the early 1950s.¹¹⁷

For well over a decade observers had noted that the peculiar passion with which many enthusiasts for the man-made global warming thesis argued their case fitted a very recognizable ideological pattern. They firmly laid the blame for the catastrophe they were sure was now hanging over the world on the greed and materialism of the richer Western nations in general, and on the USA and the giant corporations in particular.

Never did this show more obviously than in their visceral hatred for President George W. Bush for 'his' refusal to sign up to the Kyoto Protocol: a hostility equally shared by environmentalists and political 'progressives' in the USA itself and by the political class of Europe, for whom it helped feed their general resentment of America and its political, financial and cultural 'hegemony' in the world.

Any scientist who dared question the global warming orthodoxy

was immediately anathematized as being in the pay of 'Big Oil' or other capitalist vultures determined to exploit the world's resources, and the vast majority of mankind, to their own advantage at any cost.

In the name of their 'green' ideology, the environmentalists and their allies might dream of returning to a purer, simpler, more natural way of life, in which people would reduce their 'carbon footprint' by using bicycles for transport and drawing their electricity only from wind, waves and sun. But what seemed to fire them more than anything was their wish to see the 'rich' deprived of their luxurious lifestyle: their 'gas-guzzling' vehicles, their 'polluting' air travel, electronic gadgetry and all the other trappings of a self-indulgent existence lived at the expense of the planet (even if it was not unknown for the 'environmentalists' themselves, exemplified by Al Gore, to enjoy their share of the same collective Western materialism).

Indeed it was equally noticeable how such sentiments were very much less evident outside the developed, Western world itself. The fast-developing nations, led by China and India, had shown how reluctant they were to accept the restrictions on their economic growth implicit in the measures being urged on them by the developed world in the name of saving the planet. They could not see why they should voluntarily renounce the chance to emulate the kind of material prosperity the societies of the West already enjoyed, even if some of those societies, led by the European Union, were now talking of restrictions on their own economic growth (such as were implicit in a 60 per cent cut in carbon emissions within a few decades), which might bring about a drastic cut in their own material standard of living.

Even more anomalous was the plight of the peoples in those undeveloped regions of the world, such as Africa, who saw the West exhorting them to renounce any chance to struggle out of the material deprivation which condemned countless millions of them to premature deaths. A telling vignette of this was included at the end of Channel Four's *The Great Global Warming Swindle*.

A doctor in charge of a clinic in rural Kenya showed how his surgery had been only permitted to derive its electricity from solar panels. So small and unreliable was the amount of power these produced that he had to choose between running a light to examine his patients or running the refrigerator in which he kept his medical

supplies. He could not do both. Yet at the same time, not far away in an air-conditioned conference centre in Nairobi, we saw a UN-sponsored gathering of 6,000 officials and 'environmentalists' from scores of governments and non-governmental organizations, driving up in SUVs to discuss the need to combat global warming.*

It was inescapable that parallels should be drawn between the high-minded idealism of the modern environmental movement and that of the Marxist ideology of the previous century. Each had its 'narrative' to explain why the human world was in such a corrupt state, dominated by a greedy capitalist system centred on America, which ruthlessly exploited the planet for its own ends. A powerful part of the appeal of the global warming thesis was that it provided a truly moral cause, dividing the world into the 'goodies' who had seen the light and the 'baddies' whose power needed to be overthrown. And the prize was inestimable: nothing less than that the planet itself and all life that was on it should be saved.

In that sense, as we shall discuss in the Epilogue, it was perhaps not irrelevant that the rise of the modern environmentalist movement, from its beginnings in the 1960s, should have finally come into its own in the years around 1990, with the fading away of the Cold War nuclear threat, as the one truly global cause left for progressive idealists to fight for.

Few, by the turn of the twenty-first century, could dispute that man had created all sorts of horrendous problems and was courting some ultimate disaster by the reckless speed and scale on which he was exploiting the resources of the planet to his own material ends. Few could dispute that it would be wise to husband those resources

* This was a point that had been powerfully argued by the Danish political scientist Bjørn Lomborg, not least in his book *The Skeptical Environmentalist: Measuring the Real State of the World*, originally published in Danish in 1998. Although he accepted a measure of man-made contribution to global warming, he regarded the measures proposed to tackle it as being both unrealistic and likely to inflict disproportionate damage on the undeveloped world. In 2004 he convened a meeting of eight leading international economists, who agreed what was known as the 'Copenhagen Consensus'. This listed what they believed should be the top 20 economic priorities confronting mankind. Top of the list was HIV/AIDS. This was followed by the need to tackle malnourishment in the Third World, barriers to trade, and malaria. Bottom of their list were measures to halt global warming, such as Kyoto.

more carefully or that it would be morally desirable to see them being shared out more equally. Many might even agree that, in reshaping the world to his own advantage, man had committed offences against the rest of creation beyond all measure. *Homo sapiens* had become the ultimate cuckoo in the nest, capable of destroying the world.

But in projecting so much of that idealism into just that one cosmic cause, the need to save the planet from global warming, all those who had become caught up in it evoked an even older parallel from collective human experience down the ages. One of the more obvious characteristics of the believers in man-made global warming was just that: that they were 'believers'. They had committed themselves to a supreme act of faith: that global warming existed, the great sin of mankind, dooming the planet to a world-ending apocalypse unless in the nick of time humanity repented and changed its ways.

Beside that act of faith all else was secondary. The purpose of assembling all those mountains of 'evidence', exemplified in the successive portentous reports of the IPCC, was not to explore objective scientific truth but simply, like so many theological treatises, to provide support for the act of faith. That was why anyone who dared to question the faith was to be branded as a 'denier', a heretic, heaped with personal vilification, consigned to outer darkness, fit only to be hailed before some Nuremberg-style court of judgement as a criminal against mankind and revealed truth.

Students of the perversion of mankind's religious instinct down the ages were particularly struck by the hypocrisy of the 'carbon trading' scheme enshrined in the Kyoto Protocol, when it was issued in 1997 like some mediaeval papal bull. As with the system of papal indulgences introduced in the late Middle Ages, this made it possible for anyone with enough money to buy their freedom from damnation by purchasing enough 'credits'. This gave them an official licence to continue sinning, by emitting excessive amounts of CO₂, regardless of what a corrupt sham the whole system had become.

In many respects, however, the alarm over global warming was only the most extreme example of all the scares described in this book. Yet again it had followed the same familiar pattern: the conjuring up of some great threat to human welfare, which had

then been exaggerated far beyond the scientific evidence; the collaboration of the media in egging on the scare; the tipping point when the politicians marshalled all the machinery of government in support of the scare; and finally the wholly disproportionate regulatory response, inflicting immense economic and social damage for a highly questionable benefit.

In that sense the time has come to look at this extraordinary phenomenon of our modern world from a wider perspective. This we shall do in the Epilogue. But before that, as a final chapter in our narrative, we shall consider just one more story, that of the 'scare that never was': what, in terms of trying to understand the scare phenomenon, might be called the exception which proves the rule.

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