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A handwritten signature in blue ink, appearing to read "John Beddington".

Thank you for your very full response to my book, as set out in your letter of 22 April and the accompanying attachment. It is clearly desirable that this important issue should be fully and rationally debated; and it is in that spirit that I now reply to the points you make, having given them the most careful consideration. Please forgive the delay in replying: I have been somewhat distracted by the election and its aftermath.

I should, however, first make clear that, as you know, the main focus of my book, as of the Global Warming Policy Foundation which I have founded, is not the science but the question of what policies it is sensible to pursue, and which it is not sensible to pursue, in the light of all we know or think we know about prospective global warming, and of our best estimates of the likely economic (and indeed human) costs and benefits of such policies.

I quite understand that, as the Government's Chief Scientific Advisor, you "do not feel placed to comment directly on the arguments [I] present on the economic costs of tackling climate change", even though it is on this, reinforced by political reality, rather than on the very real scientific uncertainties, that I principally rest my case. But I do not believe that the crucial importance of this aspect of the policy issue can be trumped, as it seems to me you seek to trump it, by asserting, without either evidence or quantification, that the risks we face are "potentially catastrophic in the absence of strong global action to reduce emissions".

Mike Hulme, incidentally, has on a number of occasions warned against the use by politicians and scientists of the journalistic phrase 'catastrophic climate change', and he makes a good point.

Let me now turn to some of the specific points you make, mostly in the attachment to your letter.

First, you claim that the recorded temperature standstill so far this century does not undermine the AGW theory. Maybe; but it certainly does not support it. The essence of your point seems to be the assumption that, while the temperature record over 20 years (from 1980, the start of the recent warm period, to 2000) is immensely significant, the temperature record over 10 years (the first decade of the 21<sup>st</sup> century) is of no significance at all. I know of no scientific basis for this seemingly arbitrary distinction. While I accept that 10 years' evidence should be given less weight than 20 years' evidence, the difference is surely merely one of degree, and indeed even 25 years must be inconclusive. Most climate scientists when pressed, accept that the sources of natural temperature variability have scales which probably run up to centuries, which makes attribution impossible unless the models accurately portray this variability, which they do not.

Moreover, as the HadCRUT3 chart which you reproduce makes clear, the rate of warming over the 20 years from 1980 to 2000 is nothing special. Virtually identical rates of warming were recorded over the 30 years from 1910 to 1940 and the 20 years from 1860 to 1880. This has been explicitly conceded by Professor Phil Jones (see eg his interview last February with the BBC's environmental analyst, Roger Harrabin). Since, according to the IPCC (AR4, p12) man's influence on the climate became important only after 1960, these earlier warming phases must be due to natural factors (presumably part of the gradual emergence from the Little Ice Age).

In passing, to state (as you do) that the earth has warmed 'dramatically' over the past 150 years is, surely, a gross misuse of language. 'Marginally' would be rather more accurate. And although undoubtedly interesting, I do not see how the fact that the first decade of this century has been warmer than any other decade over the past 150 years proves anything at all. There have been other warm periods in the more distant past.

You claim that you can be "certain" about the amount of warming that would occur from, say, a doubling of CO<sub>2</sub> concentrations. There is no basis whatever for this. I take it that this 'certainty' derives from climate models, whose reliability depends entirely on the assumptions programmed into them, which may or may not be correct (and are inevitably incomplete, as our knowledge is incomplete). While it may well be that the majority of climate scientists accept the reliability of these climate models, there are many distinguished climate scientists who do not. There is clearly no certainty about all this.



To return to the global average temperature record over the past 50 years, which I am prepared to accept for want of anything better (although to refer to it as “robust” because “advanced statistical techniques” are used in its construction, not always wholly correctly it would seem, goes much too far), I am baffled why you should apparently feel that referring to carefully selected phenomena such as the extent of sea ice or the advent of Spring in the UK proves anything at all about either the extent of any warming that has occurred or its probable cause. The temperature is the temperature. Incidentally, the 10cm recorded rise in global sea level over the past 50 years, to which you refer, is the same as the recorded rise in the previous 50 years, when man’s influence is regarded as having been minimal.

Among other points, (a) the significance of urbanisation is still contested, (b) the IPCC’s more than 90% probability claim about the cause of warming over the past 50 years is (so far as I am aware) devoid of any statistical basis, (c) the effect of sulphate aerosols is simply assumed, as explained in my book: this is sheer curve-fitting, (d) I am surprised that you seek to defend the ‘hockey-stick’ (even though you do concede it to be ‘a much weaker conclusion’), given the evidence that has subsequently come to light of the misuse of statistical techniques and other shortcomings, and the recent admission by Professor Phil Jones that the medieval warm period (which is now accepted to have been a worldwide phenomenon) may well have been warmer than today. Moreover, on this last point, the statement in your attachment that the ‘hockey-stick’ has not been discredited but simply “improved” is somewhat disingenuous. The ‘hockey-stick’ which was used by the IPCC to try and demonstrate the effect of man on the temperature of the planet, and which eliminated the Roman warm period, the Little Ice Age and the Medieval Warm Period, has been abandoned and replaced even by the very authors who devised it in the first place.

So far as water vapour is concerned, I cannot see the significance of the point you are making. But I should add that I have become increasingly puzzled by the proposition that warming brings about more water vapour, which in turn causes more warming, which then presumably produces more water vapour, and so on *ad infinitum*. This implies a runaway instability which, if true, would have made the planet uninhabitable long ago.

Finally, to return from the attachment to your letter, you make a couple of points of a more general nature.

First, and most important, you claim that ‘it is clear that the world will face serious detrimental impacts to which many people and ecosystems will be unable to adapt, if greenhouse gas concentrations continue to rise’. I would rephrase this to say, more accurately, that ‘it is possible that the world may face a range of impacts, some of which may prove seriously detrimental, to which some people and ecosystems might find it difficult to adapt, if greenhouse gas concentrations continue to rise’. This, in addition to being more accurate, points to the question of the cost of the possible (net) adverse impact, which has to be weighed against the cost (if, indeed, it is politically possible on a global scale) of preventing greenhouse gas concentrations from rising.

Second, you raise the issue of climate modelling, and what it can tell us. You imply that we are obliged to regard the current crop of models as being able reliably to project the future because they are 'based on fundamental laws of physics'. If I may say so, that is a *non sequitur*. Of course the models are based on fundamental laws of physics. But they also incorporate a large number of assumptions (notably about feedbacks) which are crucial and which may or may not be correct, and of necessity also leave out the large part of climate science which is still unknown, but which may or may not be highly relevant. It would be possible to construct climate models, also based on fundamental laws of physics, but incorporating a number of different assumptions, which produced different projected outcomes. If the present crop of models had an impressive record of accurate temperature prediction that would indeed appear to validate them. But that is not the case.

Finally, to come back to the election and its aftermath, I was delighted that my old friend and former private secretary, David Willetts, has been appointed Science Minister in the new Government. I am sure you will enjoy working with him.

