Dissenting report

Dr Dennis Jensen MP, Hon Jackie Kelly MP, Hon Danna Vale MP, Mr David Tollner MP

We do not believe the evidence unequivocally supports the hypothesis of anthropogenic global warming (AGW)

1.1 We dissent from some of the statements made in the report *Between a Rock and a Hard Place* by the Standing Committee on Science and Innovation on its investigation into the Geosequestration of Carbon Dioxide.

1.2 We disagree with the report's unequivocal support for the hypothesis that global warming is caused by man—so-called anthropogenic global warming (AGW).

1.3 We are concerned that the Committee's report strays well outside its terms of reference. In fact, the committee did not take any evidence relating to anthropogenic global warming.

1.4 We do agree with the report's examination of the various factors relating to the geosequestration of carbon dioxide. Its coverage of the five aspects required in the terms of reference is sound.

1.5 We believe that the document is valuable in providing a resource that is detailed and up-to-date on the science, technology and other issues related to carbon dioxide geosequestration in the Australian context. It is as good as any in the public domain.

The case for AGW based theoretical models and unproven economic assumptions

1.6 The science related to anthropogenic global warming is not, despite the assurances of some, settled in the scientific community.

1.7 There is a great deal of debate and uncertainty related to this science, yet the Committee's report, in dealing with those issues, uses one-sided language that does not in any way correspond with the level of uncertainty or the low level of scientific understanding of many of the disciplines involved in global warming research.

1.8 Furthermore, the critical area of the fallibility and shortcomings of computer modelling is not mentioned anywhere. These shortcomings are exacerbated by the need to base the theoretical models on assumptions which are in turn generated by complex and also theoretical economic projections.

Many eminent scientists say that AGW is far from proven

1.9 The very first discussion paragraph of Chapter 2 in the report sets the scene in a very unfortunate manner. The evidence that human beings are changing the global climate is certainly not compelling. Many, even within the Intergovernmental Panel on Climate Change (IPCC) itself, disagree with the claimed consensus view. Remember that it is the IPCC that is the international body to whom the policy makers and AGW fanatics have looked to for direction on this subject.

1.10 The following passages report the well founded views of some eminent scientists in fields related to climate change, some of whom have made significant contributions to the IPCC's investigations. They, with good reason, disagree with the IPCC's findings in relation to AGW.

- Yuri Israel, Vice Chairman of the IPCC has stated 'There is no proven link between human activity and global warming'.[1]
- Dr Chris Landsea, a hurricane researcher, quit the IPCC in disgust due to what he viewed as the politicisation of his work. In his resignation, among other things, he stated 'I personally cannot in good faith continue to contribute to a process that I view as both

1 <http://en.rian.ru/analysis/20050623/40748412.html>, accessed 23 August 2007.

being motivated by pre-conceived agendas and being scientifically unsound'.[2]

- IPCC reviewer and meteorologist Dr. Vincent Gray, after analysing the latest available temperature measurements from satellites and weather balloons, and determining that there was no significant warming in the lower troposphere, concluded that:

> The NOAA (2006) study does not remove discrepancies between surface and lower troposphere mean global temperature anomaly records, but, instead, confirms them. It shows that for temperature sequences comparatively free from the interference of natural influences **there is no detectable warming in the lower troposphere** (our emphasis), the place where the enhanced greenhouse effect is claimed to be evident. For six out of the seven lower troposphere temperature records there is no influence of greenhouse forcing for a period of nineteen years, and even the seventh one shows no warming for ten of those years. [3]

Gray adds that the observed surface warming that is highlighted by the IPCC must therefore have a different cause, which is probably the biasing of the records by urban heat effects.[4]

- Climate scientist Dr. John Christy, specialising in satellite temperature measurements and formerly lead author of the IPCC has stated:

> I've often heard it said that there's a consensus of thousands of scientists on the global warming issue and that humans are causing a catastrophic change to the climate system. Well I am one scientist, and there are many that simply think that is not true.[5]

- Prof Richard Lindzen of MIT, a lead author of Chapter 7 of the scientific report of the IPCC TAR (2001) has also stated that the

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2<http://sciencepolicy.colorado.edu/prometheus/archives/science_policy_general/000318chris_landsea_leaves.html>, accessed 23 August 2007.

3 V. Gray, *Temperature trends in the lower atmosphere*, Energy and Environment Vol. 17, no. 5, pp 707-14, 2006.

4 V. Gray, *Temperature trends in the lower atmosphere*, Energy and Environment Vol. 17, no. 5, pp 707-14, 2006.

5 Martin Durkin (director), *The Great Global Warming Swindle* [Documentary], United Kingdom: WAGtv Ltd. for Channel 4, aired 8 March 2007.

IPCC use the Summary for Policymakers to misrepresent what scientists say.[6] He has stated that:

> …the full IPCC report is an admirable description of research activities in climate science, but it is not specifically directed at policy. The "Summary for Policymakers" is, but it is also a very different document. It represents a consensus of government representatives (many of whom are also their nations' Kyoto representatives), rather than of scientists. The resulting document has a strong tendency to disguise uncertainty, and conjures up some scary scenarios for which there is no evidence.[7]

- Dr. Martin Manning, IPCC Vice Chair of IPCC Working Group II on Impacts until 2002, and currently Vice Chair of IPCC Working Group 1 on the Science of Climate Change stated:

> The process used to produce the Summary for Policymakers (SPM) is far from ideal and may be distorting the real messages from the available science. Some government delegates influencing the SPM do not understand the methodologies being used and misinterpret or contradict the lead authors. This may need to be addressed in future through tighter rules of procedure.[8]

- Prof. Paul Reiter of the Louis Pasteur Institute, a specialist in malarial diseases, has major issues with the IPCC's view of disease, and is very damning of the IPCC process itself. He stated that:

> These confident pronouncements, untrammelled by details of the complexity of the 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 web sites that I checked placed these diseases at the top of the list of adverse impacts of climate change, quoting the IPCC. The issue of consensus is key to understanding the limitations of IPCC

6 R. Lindzen, *U.S. Scientists report doesn't support the Kyoto Treaty,* National Post, 16 June 2001.

7 C.R. de Freitas, *Are observed changes in the concentration of carbon dioxide in the atmosphere really dangerous?*, bulletin of Canadian Petroleum Geology, vol. 50, no. 2 (June 2002), p. 300.

8 M. Manning, *Report on IPCC Working Group II 6th Plenary Session*, Geneva, 13-16 February 2001.

> pronouncements. **Consensus is the stuff of politics, not of science**. Science proceeds by observation, hypothesis and experiment. Professional scientists rarely draw firm conclusions from a single article, but consider its contribution in the context of other publications and their own experience, knowledge, and speculations. The complexity of this process, and the uncertainties involved, are a major obstacle to meaningful understanding of scientific issues by non-scientists.[9]

Many others have also voiced their scepticism of the science.[10][11] In fact, according the IPCC itself, the level of understanding in six of the nine related disciplines is medium or low.[12] There are also other scientific factors that contribute to climate that are not even considered by the IPCC, such as the role of cosmic ray activity in cloud formation.[13]

Global warming observed on other planets

1.11 Another problem with the view that it is anthropogenic greenhouse gases that have caused warming is that warming has also been observed on Mars,[14] Jupiter,[15] Triton,[16] Pluto,[17] Neptune[18] and others.

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9 <http://ff.org/centers/csspp/library/co$_2$weekly/2005-09-01/paul.htm>, accessed 23 August 2007.

10<http://en.wikipedia.org/wiki/List_of_scientists_opposing_global_warming_consensusm>, accessed 23 August 2007.

11 <http://www.tsaugust.org/Scientists%20Open%20Letter.htm>, accessed 23 August 2007.

12 IPCC Fourth Assessment Report, Working Group 1: *The physical basis of climate change Technical Summary,* p. 32.

13 H. Svensmark, J. O. P. Pedersen, N. D. Marsh, M. B. Enghoff, and U. I. Uggerhoj, *Experimental evidence for the role of ions in particle nucleation under atmospheric conditions*, Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences DOI:10.1098/rspa.2006.1773, 2006.

14 <http://www.newscientist.com/article.ns?id=dn1660>; accessed 23 August 2007; <http://news.nationalgeographic.com/news/2007/02/070228-mars-warming.html>, accessed 23 August 2007.

15 <http://www.space.com/scienceastronomy/060504_red_jr.html>, accessed 23 August 2007.

16 <http://www.scienceagogo.com/news/19980526052143data_trunc_sys.shtml>; accessed 23 August 2007; <http://web.mit.edu/newsoffice/1998/triton.html>, accessed 23 August 2007; J. L. Elliot, et al "global Warming on triton", Nature Vol. 393, p765-767, 25 June 1998.

17 <http://www.space.com/scienceastronomy/pluto_warming_021009.html>, accessed 23 August 2007.

It is the natural property of planets with fluid envelopes to have variability in climate. Thus, at any given time, we may expect about half the planets to be warming. This has nothing to do with human activities.

Science relies on testing hypotheses, not consensus

1.12 The issue of consensus in science is very much misunderstood; unfortunately, in dealing with the issue of anthropogenic global warming, the Committee's report adds to that misunderstanding.

1.13 Science is a discipline which relies on testing hypotheses and exposing flaws, (scientifically known as *falsification*), not on consensus, in order to further scientific understanding. Scientific fact is not a democracy. Scientific facts are not concerned with what the majority of people or scientists think or do not think. The laws of physics are not subject to the democratic vote of a group of scientists; they cannot be repealed by a popular vote. Albert Einstein, for example, when asked to comment on the book *One Hundred Authors Against Einstein* which denounced his Theory of Relativity, stated that ***'to defeat relativity one did not need the word of 100 scientists, just one fact'***.[19]

1.14 Many examples exist of erroneous scientific consensus in the history of science:

- The earth was found, via falsification, not to be the centre of the universe;
- Sir Isaac Newton's equations of motion were found, after having been accepted as a complete description of mechanics for two centuries, to represent only the special case where velocity was low relative to that of light. The special theory of relativity generalised the field of mechanics; and

18 H. B. Hammell and G. W. Lockwood, *Suggestive correlations between the brightness of Neptune, solar variability, and Earth's temperature,* GEOPHYSICAL RESEARCH LETTERS, VOL. 34, L08203, doi:10.1029/2006GL028764, 2007.

19 <http://www.britannica.com/nobelprize/article-256586>, accessed 23 August 2007.

- Indeed, even in the field of climatology, the consensus position in the mid 1970's was that the earth was cooling as a result of mankind's activities, and we were headed to another ice age.[20]

Committee does not apply scientific method

1.15 We view it as very disappointing that the Committee on Science and Innovation has put out a report that misunderstands the nature of scientific method.

1.16 For example, section 2.2 of the Committee's report mentions the IPCC Summary for Policymakers that there is a >90% certainty that human beings have affected the climate. The problem with this statement is that this ignores the fundamental fact that this figure is not the result of some detailed statistical or any other analysis.

1.17 It is based on, yet again, simply a consensus opinion arrived at by IPCC bureaucrats. This pseudo-quantitative figure is in the bureaucratic summary for policymakers, not in the actual technical reports, and has no material basis or justification in measured fact.

Evidence does not support AGW

1.18 This report on geosequestration also gives a false impression of the importance of carbon dioxide on the greenhouse effect. All of the gases mentioned in section 2.5 are minor contributors to greenhouse. Between 75%-95% of the greenhouse effect is the result of water vapour and cloud. The understanding of the influence of the latter is low, by the IPCC's own admission.

1.19 Doubling CO_2 will only increase the natural greenhouse effect less than 2%. This would produce warming of the order of 1 degree Celsius in the absence of negative feedbacks which are the norm in sustainable physical systems. To be sure, current model projections do depend on positive feedbacks from the ill-understood clouds and water vapour (primarily above 6km).[21]

1.20 Section 2.27 of the Committee's report relies heavily on the IPCC's third assessment report (TAR). The statements made in the Committee's report, summarised from the IPCC TAR Summary for

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20 <http://www.realclearpolitics.com/articles/2006/04/cooler_heads_needed_on_warming.html>, accessed 23 August 2007.

21 R. S. Lindzen, *Private Communication*, July 2007.

Policymakers do not in any way address any of the complexities relating to the science underpinning these statements—they are simply bald statements made in an attempt to support the position taken on AGW in this report.

- IPCC states that average global surface temperatures have increased by 0.6 degrees Celsius, which is broadly correct. However, it does not explain how it is that most of this increase occurred in the first half of the 20th century, a time when increases in atmospheric carbon dioxide was not particularly rapid. The concentration of atmospheric carbon dioxide began increasing fairly rapidly following the Second World War, but the period between 1940 and 1975 was associated with a *reduction* in global surface temperatures.[22] Significantly, global surface temperatures peaked in 1998, and only NASA's Goddard Institute for Space Studies (GISS) shows any year other than 1998 as the hottest year on record. The Global Historical Climatology Network (GHCN), Hadley Centre and MSU satellite data sets show 1998 as the hottest on record.[23] In the nine years since 1998, global temperatures have been relatively stable despite rising carbon dioxide concentrations in the atmosphere.[24]

- IPCC states that snow cover and ice extent have decreased. The fact is there is some argument about the ice balance on Greenland,[25] and it is generally accepted that the main Antarctic ice cap is, in fact, both cooling and increasing its ice mass.[26] Indeed, a couple of the striking examples of the decrease in snow cover/ice extent given as examples of the effect of greenhouse gas induced global

22 IPCC Fourth Assessment Report, Working Group 1: *The physical basis of climate change,* Chapter 3, p. 242.

23 C. Idso, *A science-based rebuttal to the testimony of Al Gore before the United States Senate Environment and Public Works Committee*, p. 4, May 2007.

24 C. R. de Freitas, *Private Communication*, July 2007.

25 H. J. Zwally, M. B. Giovinetto, J. Li, H. G. Cornejo, M. A. Beckley, A. C. Brenner, J. L. Saba, and D. Yi, 2005; *Mass changes of the Greenland and Antarctic ice sheets and shelves and contributions to sea-level rise*: 1992-2002, Journal of Glaciology 51, pp. 509-527; R. B. Alley, P. U. Clark, P. Huybrechts, and I. Joughin, 2005. *Ice-sheet and sea-level changes*. Science 310, pp. 456-460.

26 D. J. Wingham, A. Shepherd, A. Muir, and G. J. Marshall, *Mass balance of the Antarctic ice sheet,* Philosophical Transactions of the Royal Society A 364, pp. 1627-35, 2006; D. H. Bromwich, Z. Guo, L. Bai, and Q. S. Chen, *Modeled Antarctic precipitation. Part I: Spatial and temporal variability,* Journal of Climate 17, pp. 427-47, 2004; W. J. Van de Berg, M.R. van den Broeke, C. H. Reijmer, and E. van Meijgaard, *Reassessment of the Antarctic surface mass balance using calibrated output of a regional atmospheric climate model,* Journal of Geophysical Research 111: 10.1029/2005JD006495, 2006.

warming by the proponents of anthropogenic global warming, such as Al Gore, are demonstrably wrong. For example, the glaciers of Kilimanjaro have been shrinking for over a century, but this is likely due to decreasing precipitation as a result of changed land use (deforestation).[27] The change of mass balance with glaciers is problematic: there are only 42 glaciers (out of 160 000 glaciers around the world) that have a fully detailed mass balance history extending more than 10 years.[28]

- Sea levels all over the globe have been rising for centuries; this is not due to anthropogenic global warming, but merely a recovery from the last ice age.[29] A recent analysis has found that no statistically significant ocean warming has occurred over the late 20th century.[30]
- Rainfall patterns have always changed around the world; this is nothing new. One needs merely examine the changes in precipitation in Australia over the last century to realise this;[31] there has been variation in Australian rainfall, but little change in long-term trends (see table below). The variations in this period are not proof that it is caused by human influence, as many populists claim. In fact, viewing history, the Mayan society collapsed due to a decrease in rainfall in the 9th century.[32]

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27 G. Kaser, D. R. Hardy, T. Molg, R. S. Bradley, and T. M. Hyera, *Modern glacier retreat on Kilimanjaro as evidence of climate change: Observations and facts,* International Journal of Climatology 24, pp. 329-39, 2004.

28 R. J. Braithwaite, and Y. Zhang, *Relationships between interannual variability of glacier mass balance and climate*, Journal of Glaciology 45, pp. 456-462, 2000.

29 <http://www.giss.nasa.gov/research/briefs/gornitz_09/>, accessed 23 August 2007; S. Jevrejeva, A. Grinsted, J. C. Moore, and S. Holgate, *Nonlinear trends and multiyear cycles in sea level records*, Journal of Geophysical Research 111: 10.1029/2005JC003229, 2006; J. A. Church, N. J. White, R. Coleman, K. Lambert, and J. X. Mitrovica, *Estimates of the regional distribution of sea level rise over the 1950-2000 period,* Journal of Climate 17, pp. 2609-25, 2004; S. J. Holgate, *On the decadal rates of sea level change during the twentieth century,* Geophysical Research Letters 34: 10.1029/2006GL028492, 2007.

30 V. Gouretski and K. P. Koltermann, *How much is the ocean really warming?*, Geophysical Research Letters 34: 10.1029/2006GL027834, 2007.

31 <http://www.bom.gov.au/cgi-bin/silo/reg/cli_chg/timeseries.cgi>, accessed 23 August 2007.

32 *Intense droughts blamed for Mayan collapse*, New Scientist, 13 March 2003, <http://www.newscientist.com/article.ns?id=dn3502>, accessed 23 August 2007.

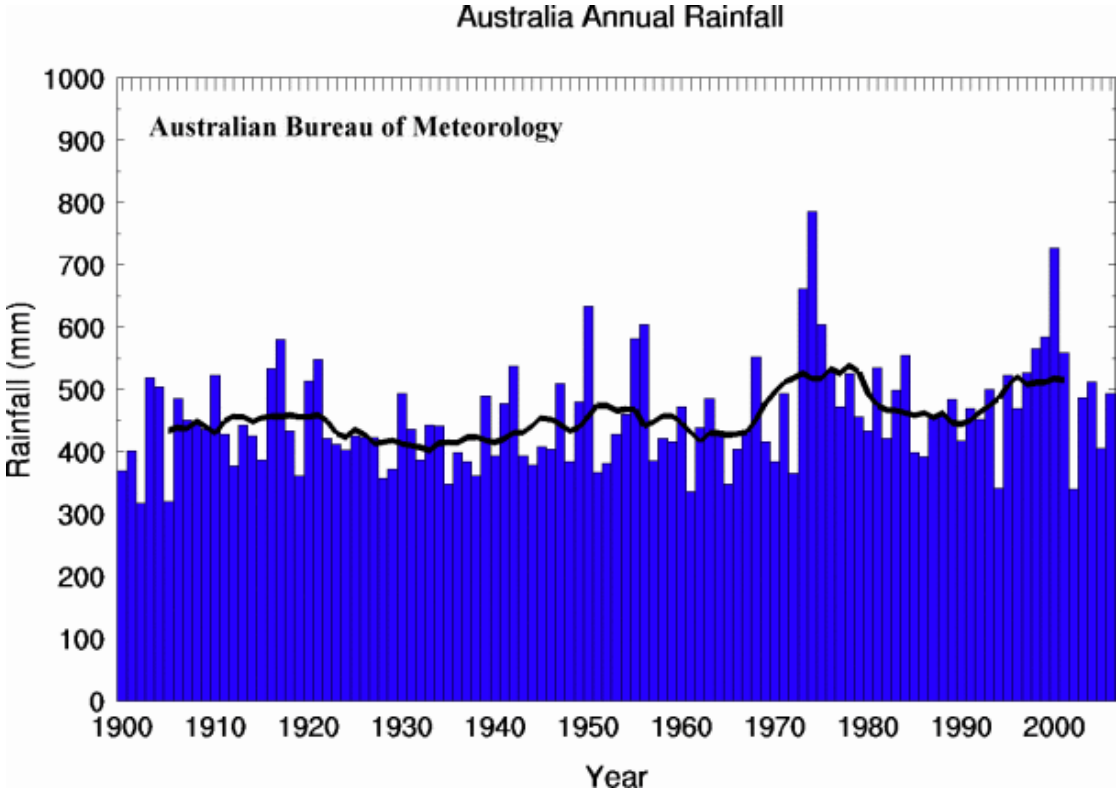

Table Graph showing the variability of aggregate rainfall in Australia

- It is a pity that the report uses the Stern Review as a basis for the scientific understanding of anthropogenic global warming. Not only has this report been thoroughly debunked in a scientific and economic sense,[33] but Stern acknowledges that he had zero understanding of the issue less than one year before the Stern Review. He stated that 'in August or July of last year (2005)… [he] had an idea what the greenhouse effect was but wasn't really sure'.[34]

  It is staggering that someone with essentially no scientific knowledge on greenhouse effect, within less than one year, had acquired the scientific knowledge to state that the 'scientific evidence is now overwhelming'. Furthermore, the Stern Review was commissioned because UK Prime Minister Blair and

33 *The Stern Review, a Dual Critique*, World Economics, Vol 7, No. 4, October-December 2006; <http://www.fnu.zmaw.de/fileadmin/fnu-files/reports/sternreview.pdf>, accessed 23 August 2007; W. Nordhaus, *The Stern Review on the Economics of Climate Change*, 2006 <http://nordhaus.econ.yale.edu/SternReviewD2.pdf>, accessed 23 August 2007; R. Tol and G. Yohe, *A review of the Stern Review*, World economics, 7 (4), Oct.-Dec. 2006.

34 <www.hm-treasury.gov.uk/media/695/8C/OXONIA_Oxford_31012006.pdf>, accessed 23 August 2007.

> Chancellor of the Exchequer Brown did not like the findings of the House of Lords Report into climate change.[35]

Audit Process

1.21 The admissions and uncertainties quoted in this dissenting report demonstrate the clear need for better methods of auditing the science used for climate change policy advice.

1.22 In a recent discussion over the Stern report, Carter *et al*.[36] and Holland *et al*.[37] pointed out that the peer review process, on which the IPCC so heavily relies, is flawed. Ensuring the quality of advice on climate change also requires a comprehensive audit of the information on climate risk that is currently being used by governments to set public policy.

1.23 It is a matter of public record that some scientists have withdrawn from the IPCC process because of dissatisfaction with its probity and methods. Valuable though it might be for IPCC to continue to provide summaries of the science of climate change, it is simply not credible to see the IPCC as an adequate audit body.

Uncertainty in IPCC Summary for Policymaker's predictions based on computer models, and the use of unqualified "celebrities"

1.24 The references to anthropogenic climate change in this report do not in any way reflect the uncertainty in the science associated with climate change science, nor do they reflect the significant debate on the issue in the scientific community, including significant debate in the peer-reviewed scientific literature. Indeed, if one paragraph clearly illustrates the one sided nature of this report, it is paragraph 5.59. Here, we have a captain of industry (Rupert Murdoch), who, by his own admission is not a scientist, quoted regarding his view on anthropogenic global warming and the need to take action:

> I am no scientist but … I do know how to assess a risk. Climate change poses clear catastrophic threats. We may not agree on the extent, but we certainly can't afford the risk of inaction

35 House of Lords Select Committee on Economic Affairs, *Second Report of Session 2005-06, The Economics of Climate Change.*

36 *The Stern Review, a Dual Critique*, World Economics, Vol 7, No. 4, October-December 2006.

37 D. Holland et al., *Response to Simmonds and Steffen, Revised Draft Response to World Economics*, 27 June 2007.

1.25 This exemplifies the more general problem that most of the public statements that promote the dangerous human warming scare are made from a position of ignorance—by political leaders, press commentators and celebrities who share the characteristics of lack of scientific training and lack of an ability to differentiate between sound science and computer-based scaremongering.

1.26 On the issue of computer models used to predict (or project, the IPCC uses the terms interchangeably) future climate, Kevin Trenberth, coordinating lead author of IPCC 4th Assessment Report, WG1 Chapter 3, has made staggering admissions about the weaknesses inherent in the modelling process in the Nature Climate Change blogsite (a longer quote is to be found in Appendix 1):[38]

> **…in fact, since the last report it is also often stated that the science is settled or done and now is the time for action.**
>
> **In fact there are no predictions by IPCC at all…But they do not consider many things like the recovery of the ozone layer, for instance, or observed trends in forcing agents…**
>
> **…none of the climate states in the models correspond even remotely to the current observed climate. In particular, the state of the oceans, sea ice, and soil moisture has no relationship to the observed state at any recent time in any of the IPCC models.**
>
> **I postulate that regional climate change is impossible to deal with properly unless the models are initialized.**
>
> **Therefore the problem of overcoming this shortcoming, and facing up to initializing climate models means not only obtaining sufficient reliable observations of all aspects of the climate system, but also overcoming model biases. So this is a major challenge.**

Conclusion

1.27 Climate change is a natural phenomenon that has always been with us, and always will be. Whether human activities are disturbing the climate in dangerous ways has yet to be proven. It is for this reason that we strongly disagree with the absolute statements and position taken in this review regarding AGW. We have taken no evidence

38 <http://blogs.nature.com/climatefeedback/2007/06/predictions_of_climate.html>, accessed 23 August 2007.

regarding the science of AGW, yet a strong position has been taken regarding this. On the other hand, statements made about the cost competitiveness of renewable energy sources have been taken out of the report, despite the fact that evidence was taken on this.

1.28 We therefore conclude this dissenting opinion by appending a long quote from Carter *et al* (Appendix 2).[39]

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5. Associate Professor C.R. de Freitas (University of Auckland)
6. W. Kininmonth (Retired Head of the National Climate Centre, Australia)

Dr Dennis Jensen MP, Hon Jackie Kelly MP, Hon Danna Vale MP, Mr David Tollner MP

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39 R. Carter, et al., *Response to comments on Part 1 The Science of the Dual Critique of the Stern Review*, World Economics in press.

Appendix 1

'I have often seen references to predictions of future climate by the Intergovernmental Panel on Climate Change (IPCC), presumably through the IPCC assessments. In fact, since the last report it is also often stated that the science is settled or done and now is the time for action.

In fact there are no predictions by IPCC at all. And there never have been. The IPCC instead proffers "what if" projections of future climate that correspond to certain emissions scenarios. There are a number of assumptions that go into these emissions scenarios. They are intended to cover a range of possible self consistent "story lines" that then provide decision makers with information about which paths might be more desirable. But they do not consider many things like the recovery of the ozone layer, for instance, or observed trends in forcing agents. There is no estimate, even probabilistically, as to the likelihood of any emissions scenario and no best guess.

Even if there were, the projections are based on model results that provide differences of the future climate relative to that today. None of the models used by IPCC are initialized to the observed state and none of the climate states in the models correspond even remotely to the current observed climate. In particular, the state of the oceans, sea ice, and soil moisture has no relationship to the observed state at any recent time in any of the IPCC models. There is neither an El Niño sequence nor any Pacific Decadal Oscillation that replicates the recent past; yet these are critical modes of variability that affect Pacific Rim countries and beyond. The Atlantic Multidecadal Oscillation, that may depend on the thermohaline circulation and thus ocean currents in the Atlantic, is not set up to match today's state, but it is a critical component of the Atlantic hurricanes and it undoubtedly affects forecasts for the next decade from Brazil to Europe. Moreover, the starting climate state in several of the models may depart significantly from the real climate owing to model errors. I postulate that regional climate change is impossible to deal with properly unless the models are initialized.

The current projection method works to the extent it does because it utilizes differences from one time to another and the main model bias and systematic errors are thereby subtracted out. This assumes linearity. It works for global forced variations, but it can not work for many aspects of climate, especially those related to the water cycle. For instance, if the current state is one of drought then it is unlikely to get drier, but unrealistic model states and model biases can easily violate such constraints and project drier conditions. Of course one can initialize a climate model, but a biased model will immediately drift back to the model climate and the predicted trends will then be wrong.

Therefore the problem of overcoming this shortcoming, and facing up to initializing climate models means not only obtaining sufficient reliable observations of all aspects of the climate system, but also overcoming model biases. So this is a major challenge.'[40]

40 <http://blogs.nature.com/climatefeedback/2007/06/predictions_of_climate.html>, accessed 23 August 2007.

Appendix 2

'Climate changes naturally all the time. Human activities have an effect on the local climate, for example in the vicinity of cities (warming) or near large areas of changed land usage (warming or cooling, depending upon the changed albedo). Logically, therefore, humans must have an effect on global climate also. This notwithstanding, a distinct human signal has not yet been identified within the variations of the natural climate system, to the degree that we cannot even be certain whether the global human signal is one of warming or cooling. Though it is true that many scientists anticipate that human warming is the more likely, no strong evidence exists that any such warming would be dangerous.

The gentle global warming that probably occurred in the late 20th century falls within previous natural rates and magnitudes of warming and cooling, and is prima facie quite unalarming, especially when consideration is given to the likelihood that the historic ground temperature records used to delineate the warming are warm-biased by the urban heat island and other effects. Once corrected for non-greenhouse climate agents such as El Niños and volcanic eruptions, the radiosonde (since 1958) and satellite (since 1979) records show little if any recent warming and certainly none of untoward magnitude.

Atmospheric carbon dioxide is indeed a greenhouse gas, but the empirical evidence shows that the warming effect of its increase at the rates of modern industrial emission and accumulation is minor, given an assumed pre-industrial level of about 280 ppm and noting the established logarithmic relationship between gas concentration increases and warming. As one such empirical test, it can be noted too that no global increase in temperature has now occurred since 1998 despite an increase in carbon dioxide concentration over the same 8 years of about 15 ppm (4%).

Putative human influence aside, it is certain that natural climate change will continue, sometimes driven by unforced internal variations in the climate system and at other times forced by factors that we do not yet understand. The appropriate public policy response is, first, to monitor climate accurately in an ongoing way; and, second, to respond and adapt to any changes - both warmings and the likely more damaging coolings—in the same way that we cope with other natural events such as droughts, cyclones, earthquakes and volcanic eruptions.

Neither the Stern Review itself, nor the additional papers that our critique has stimulated, address the above cautious and widely held assessment of the

situation. Instead, straw-man arguments are erected and attacked, detail is endlessly obfuscated and IPCC orthodoxy is relentlessly repeated.

In dealing with the certainties and uncertainties of climate change, the key issue is prudence. The main certainty is that natural climate change will continue, and that some of its likely manifestations—sea-level rise and coastal change in particular locations, for example—will be expensive to adapt to. But adapt we must and will. Moreover reducing vulnerability to today's climate-sensitive problems will also help the world cope with future challenges from climate change whether that is due to natural variability, anthropogenic greenhouse gas emissions or other human causes.[41] The most prudent way of ensuring that happens is to build wealth into the world economy and to be receptive to new technologies. This will not be achieved by irrational restructuring of the world's energy economy in pursuit of the chimera of "stopping" an alleged dangerous human-caused climate change that, in reality, can neither be demonstrated nor measured at this time.'[42]

41 M. Indur and Goklany, *A Climate Policy for the Short and Medium Term: Stabilization or Adaptation?*, Energy & Environment 16, pp. 667-680, 2005.

42 R. Carter, et al., *Response to comments on Part 1 The Science of the Dual Critique of the Stern Review,* World Economics in press.