

Scientific forecasts of global temperatures negate need for policy

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1. My submission relates particularly to the following clause in the Terms of Reference:
Identify the central/benchmark projections which are being used as the motivation for international agreements to combat climate change; and consider the uncertainties and risks surrounding these projections.
2. I am a scientist who does research on forecasting. I have published in international peer-reviewed journals on the subject of forecasting, including climate forecasting. I have been invited to present findings from research on forecasting at conferences and forums around the world. I have conducted an audit of polar bear population forecasting for the State of Alaska¹. I recently prepared analysis of the U.S. Environmental Protection Agency's Advanced Notice of Proposed Rulemaking for Greenhouse Gases at the request of Senator James Inhofe². I have advised, *inter alia*, officials at the U.S. Department of Homeland Security, the CIA, and the Department of Defense at the Pentagon on forecasting matters.
3. A year ago, I presented submissions on the Climate Change Bill. My submission was based on the conclusions from a peer-reviewed journal article³ describing my audit of the methods used by the Intergovernmental Panel on Climate Change (IPCC) to make forecasts about global temperatures over the 21st Century. My co-author and I concluded that the procedures used in making the IPCC's forecasts of dangerous manmade global warming violated proper forecasting practice⁴ to such an extent that the forecasts had no credibility and hence should not be used by policy makers.
4. Since my submission in 2008, I have been assessing how proper scientific procedures—ones that have been shown by empirical research to provide the most accurate forecasts for the situation—can best be used to forecast global mean temperatures during the 21st Century.

¹ Armstrong, Green, and Soon 2008

² Armstrong and Green 2008

³ Green and Armstrong 2007

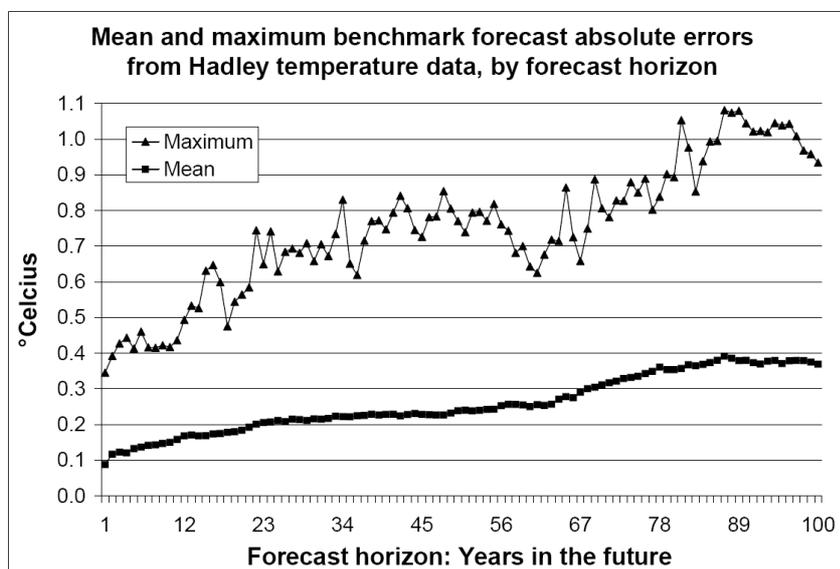
⁴ See Armstrong's (2001) forecasting principles, which were derived from 70 years of findings from research on forecasting, and <http://forecastingprinciples.com>.

5. As a first step, it is important to determine whether it would be possible to derive forecasts that would affect decisions. In the case of global mean temperatures, decision makers would need to see valid and reliable forecasts that temperatures over the 21st Century were going to be substantively different to temperatures over the last few decades in order to contemplate taking action of some kind.

6. My colleagues and I looked at temperature data over long periods of time, as is appropriate when contemplating making long term forecasts. We found that the data show long-term variations, variability around trends, and that trends were unstable over all time periods. In other words, trends appear to be up about as often as they were down, and there are no obvious patterns that persist over the period of the data. In this situation, a “no-change” forecasting model is an appropriate benchmark method to test whether useful forecasts might be possible and against which to test any proposed forecasting method.

7. Our no-change model was that, for each of the next 100 years, the global average temperature would be the same as in the starting year. We were able to test this model using estimates from the Hadley Centre of the U.K. Met Office of global average temperature from 1850 to 2007. We did this by taking the 1850 Hadley figure as our forecast for the years 1851 to 1950, then the 1851 figure as our forecast for the years 1852 to 1951, and so on ending with the 2006 figure as a forecast of global average temperature for 2007. We found that these no-change forecasts were remarkably accurate. For example, our forecasts for 20 years in the future were, on average only 0.18°C more or less than the Hadley estimate for the year. Forecasts for 50 years into the future were on average only 0.24°C different from the relevant Hadley figure (see Exhibit 1). The accuracy of our benchmark forecasts is such that it is doubtful that even perfect forecasts would provide useful information for policymakers concerned about changes in climate.

EXHIBIT 1



8. While there is no room for useful improvement on the no-change benchmark forecasts, we demonstrated the use of the benchmark method to test the validity of the IPCC's central "projection" that global average temperatures will increase at a rate of 0.03°C per year. The IPCC is a UN body that advises governments on climate change matters. It has been given enormous resources to this end, and the IPCC projections appear to carry great weight among government decision makers. The projection of 0.03°C per year was published by the IPCC in 1992, and so we were able to compare the accuracy of that projection with the accuracy of the no-change benchmark forecasts over the 17 years.
9. We found there was little difference in the accuracy of the IPCC projected temperatures and the simple no-change benchmark forecasts over the period. This is remarkable given the enormous difference in the cost of the two sets of forecasts. Of course, 17 years is too short a period to provide a proper test of the accuracy of long-term forecasts. This fact presents a major problem for the credibility of the IPCC's speculative projections because without proper validation of the IPCC's forecasting procedures there is no reason to believe the forecasts.
10. The IPCC's projection of dangerous global warming is based on the theory that human emissions of CO_2 and other "greenhouse gases" cause temperatures near the Earth's surface to increase dangerously above what they would otherwise be. In order to demonstrate the use of the no-change benchmark over a longer period, we asked "What if scientists in 1850 had used their knowledge of the greenhouse effect and the consequences of rapid industrialisation on CO_2 emissions to project that global average temperatures would grow at 0.03°C per year?" To answer this question we applied the IPCC projection of 0.03°C per year to the period from 1851 to 1975 when, analogously to the IPCC's central warming projections for the 21st Century, human emissions of CO_2 were increasing exponentially.
11. When we compared the warming projections with the benchmark forecasts for the 1851 to 1975 period, we found that the errors from the warming projections were more than seven times greater than those from the no-change benchmark. Moreover, the relative errors from the warming projections got bigger (worse) for forecasts of the more distant future.
12. Speculation is not sufficient for proper forecasting. The belief that "things have changed" and the future cannot be judged by the past is common, but invalid. A high-profile example of the bankruptcy of this belief was the 1980 bet between Julian Simon and Paul Ehrlich on the 1990 price of resources. Ehrlich espoused the Malthusian view that the human population's demands had, or soon would, outstrip the resources of the Earth. Simon's position was that real resource prices had fallen over human history and that there were good reasons why this was so; the

fundamental reason being human ingenuity. It was therefore a mistake, Simon argued, to extrapolate recent price increases. Ehrlich was confident of success and dictated the terms of the bet: a ten-year period and the five commodity metals copper, chromium, nickel, tin, and tungsten. The metals were selected with the help of energy and resource experts John Harte and John P. Holdren⁵. All five resources fell in price over the ten-year period, and Simon won the bet⁶.

13. Our demonstration and the Simon-Ehrlich bet illustrate the dangers of accepting forecasts from unproven methods⁷.
14. It is not just the forecasting method that is doubtful. There is evidence that the Hadley data overstates any warming that has occurred. The Hadley data is an average of adjusted thermometer readings from around the world. The temperature readings can be influenced by factors such as the “urban heat island effect” whereby developments such as new buildings and the laying of pavement increase the local temperature. Analysis by Ross McKittrick and Pat Michaels⁸ suggests that as much as half of the presumed global warming between 1980 and 2002 is in fact measurement error, rather than genuine warming. This finding suggests that our no-change benchmark forecasts were more accurate and the warming projection even less accurate than was indicated by the analysis I described above.
15. Even if there were proper forecasts of large changes in global temperature, public policy decision makers would still need accurate forecasts of local temperature changes, the effects of the temperature changes, and of the effects of proposed alternative policies in order to make good policy decisions.
16. It is not good enough in situations of uncertainty to invoke the so-called precautionary principle. The precautionary principle is an emotional appeal used to frighten politicians and voters into supporting actions that are not justified by good evidence⁹. While the lobbyists’ scary scenarios can be compelling, they are but a small selection of the large universe of similarly compelling stories about possible futures that creative people could come up with given the motivation. It would be irresponsible to base public policy on scary stories rather than scientific forecasts.
17. Sometimes is it better to ignore the clamour for action, and bravely do nothing. This is one of those times.

⁵ Nominated as U.S. President Obama’s science advisor

⁶ Tierney 1990

⁷ The findings I have described are reported in an article I have written with my colleagues Scott Armstrong and Willie Soon (2009) that will be published in the peer-reviewed journal of the International Institute of Forecasters, the *International Journal of Forecasting*, later this year.

⁸ McKittrick and Michaels 2007

⁹ Green and Armstrong 2008

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References

- Armstrong, J. S. (2001). *Principles of Forecasting: A Handbook for Researchers and Practitioners*. Kluwer Academic Publishers.
- Armstrong, J. S. and Green, K. C. (2009). EPA and greenhouse gases. An analysis of the U.S. Environmental Protection Agency's Advanced Notice of Proposed Rulemaking for Greenhouse Gases, prepared at the request of Senator James M. Inhofe. Available from <http://publicpolicyforecasting.com>
- Armstrong, J. S., Green, K. C. and Soon, W. (2008). Polar Bear Population Forecasts: A Public-Policy Forecasting Audit. *Interfaces*, 38 (5), 382-405. Available from <http://publicpolicyforecasting.com>
- Green, K. C. and Armstrong, J. S. (2008). Uncertainty, the precautionary principle, and climate change. Essay, 9 August. Available from <http://publicpolicyforecasting.com>
- Green, K. C., Armstrong, J. S., and Soon, W. (2009). Validity of climate change forecasting for public policy decision making. *International Journal of Forecasting* (forthcoming). Draft version available from <http://publicpolicyforecasting.com>
- Green, K. C. and Armstrong, J. S. (2007). Global warming: forecasts by scientists versus scientific forecasts. *Energy and Environment*, 18, 997-1021. Available from <http://publicpolicyforecasting.com>
- IPCC (1992). *Climate Change 1992: The Supplementary Report to the IPCC Scientific Assessment*. Edited by J.T. Houghton, B.A. Callander, and S.K. Varney. Cambridge University Press: Cambridge, United Kingdom.
- McKittrick, R., & Michaels, P. J. (2007). [Quantifying the influence of anthropogenic surface processes and inhomogeneities on gridded global climate data](#). *Journal of Geophysical Research*, 112, doi:10.1029/2007JD008465.
- Tierney, J. (1990). Betting the planet. *New York Times*, December 2.