

## Appendix F

### Faulty Forecasting Procedures

The following comments were submitted in response to the draft US State Department U.S. Climate Action Report 2010. They are reproduced below from the following source:

<http://climatedepot.com/a/6451/Team-of-Scientists-Counter-US-Govt-Climate-Report-Global-warming-alarm-will-prove-false--Fears-based-on-faulty-forecasting-procedures>

**“Global Warming Alarm Based on Faulty Forecasting Procedures:  
Comments on the United States Department of State's  
U.S. Climate Action Report 2010. 5th ed.,**

May 4, 2010

#### Submitted by:

**J. Scott Armstrong** (Ph.D., MIT, 1968), a Professor at the Wharton School of Management, University of Pennsylvania, is the author of Long-range Forecasting, the creator of forecastingprinciples.com, and editor of Principles of Forecasting (Kluwer 2001), an evidence-based summary of knowledge on forecasting methods. He is a founder of the Journal of Forecasting, the International Journal of Forecasting, and the International Symposium on Forecasting, and he has spent 50 years doing research and consulting on forecasting. (Armstrong@wharton.upenn.edu)

**Kesten C. Green** of the International Graduate School of Business at the University of South Australia is a Director of the International Institute of Forecasters and is co-director with Scott Armstrong of the Forecasting Principles public service Internet site (ForPrin.com). He has been responsible for the development of two forecasting methods that provide forecasts that are substantially more accurate than commonly used methods. (Kesten.Green@unisa.edu.au)

**Willie Soon** is an astrophysicist and a geoscientist at the Solar, Stellar, and Planetary Sciences division of the Harvard-Smithsonian Center for Astrophysics. He is also the receiving editor in the area of solar and stellar physics for the journal New Astronomy. He has 20 years of active researching and publishing in the area of climate change and all views expressed are strictly his own. (vanlien@earthlink.net)

## Statement

Our research findings challenge the basic assumptions of the State Department's Fifth U.S. Climate Action Report (CAR 2010). The alarming forecasts of dangerous manmade global warming are not the product of proper scientific evidence-based forecasting methods. Furthermore, there have been no validation studies to support a belief that the forecasting procedures used were nevertheless appropriate for the situation. As a consequence, alarming forecasts of global warming are merely the opinions of some scientists and, for a situation as complicated and poorly understood as global climate, such opinions are unlikely to be as accurate as forecasts that global temperatures will remain much the same as they have been over recent years. Using proper forecasting procedures we predict that the global warming alarm will prove false and that government actions in response to the alarm will be shown to have been harmful.

Whether climate will change over the 21<sup>st</sup> Century, by how much, in what direction, to what effect, and what if anything people could and should do about any changes are all forecasting problems. Given that policy makers currently do not have access to scientific forecasts for any of these, the policies that have been proposed with the avowed purpose of reducing dangerous manmade global warming—such as are described in CAR 2010 Chapters 4, 5, 6, and 7—are likely to cause serious and unnecessary harm.

In this comment on CAR 2010, we summarize findings from our research on forecasting climate. Most of our findings have been published in the peer-reviewed literature and all have been presented at scientific meetings. They are easily accessible on the Internet and we provide links to them.

### **1. There are no scientific forecasts to support claims that there will be dangerous global warming over the 21<sup>st</sup> Century.**

#### a) Faulty selection of forecasting methods

Based on scientific research on forecasting, the most appropriate method for forecasting climate over the 21<sup>st</sup> Century would be a naïve no-trend extrapolation. Due to the substantial uncertainty about climate, it is not possible to forecast even the direction of change and one should not, therefore, forecast changes. As with many conclusions from scientific research on forecasting, this conclusion derives from a finding that is not intuitive: in complex situations with high uncertainty, one should use methods that are conservative and simple (Armstrong 1985; Armstrong 2001).

While much has been made of the climate models used to support forecasts of dangerous manmade global warming, these were used in effect only as tools to present forecasts. The actual forecasts were made by unaided judgment; that is, by judgment unaided by forecasting principles. A substantial body of research has shown that unaided judgment cannot provide useful forecasts in complex situations with high uncertainty (Armstrong 1980; Tetlock 2005), such as is the case with climate.

In other words, if one were to recruit the cleverest climate scientists in the world and give them access to all of the available facts about climate, and ensured that all facts were true and all data were valid and accurate, the experts could do no better at forecasting climate than people with only minimal expertise. And their forecasts would even be less accurate than those from a simple heuristic. This finding is astonishing to those who are not familiar with the eight decades of evidence in the peer-reviewed research literature, and nearly all who learn of it believe that while the finding might apply to others, it does not apply to them.

#### b) Errors in implementation of forecasting methods

The forecasting procedures described in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report violated 81% of the 89 principles relevant to climate forecasting. For example, the methods and data were neither fully disclosed nor were they easy for independent researcher to access, no reasonable alternative forecasting methods were assessed, and prediction intervals were not assessed objectively (see “Global warming: Forecasts by scientists versus scientific forecasts”).

Those who were responsible for making the forecasts had no training or experience in the proper use of scientific forecasting methods. Furthermore, we were unable to find any indication that they made an effort to look for evidence from scientific research on forecasting. It is perhaps not surprising then that their implementation of their forecasting method was inappropriate.

#### c) Failure in validation testing

The forecasting procedures used by global warming alarmists were not validated for the situation. To address this oversight, we conducted an ex ante forecasting simulation of the IPCC forecasts (from the organization's 1992 report) of a .03°C per year increase in global average temperature.

We used the period from 1850 through 2007, a period of industrialization and exponential growth in human emissions of carbon dioxide. In a head-to-head competition involving 10,750 forecasts, the forecast errors from the IPCC model were more than 7 times larger than the errors from a model more appropriate to the situation, the aforementioned naïve extrapolation. More importantly, the errors were 12.6 times larger for the long-term (91 to 100-year forecast horizons). (See “Validity of climate change forecasting for public policy decision making.”)

## **2. There are no scientific forecasts to support the actions advocated by global warming alarmists.**

a) Our findings apply not only to the alarming forecasts of dangerous manmade global warming, but also to the unsupported claims that various actions (e.g., “buying local,” carbon taxes, subsidies for alternative sources of energy) would be beneficial

To assess actions properly, one would need to forecast all the costs and benefits. For example, we examined the procedures used to support the claim that polar bears are in danger of extinction

and should therefore be listed as an endangered species. The claim was made in the face of evidence that the polar bear population has been growing in recent decades. (See “Polar bear population forecasts: A public-policy forecasting audit.”) As with the IPCC's climate forecasts, we found faulty forecasting procedures. Indeed, only 15% of relevant forecasting principles were properly applied. An example of a faulty procedure is the construction of 45-, 75-, and 100-year forecasts based on an analysis that used only 5 years (2001-2005) of calibration data on polar bears and ice.

We judged that the polar bear population forecasting process to have been affected by political biases. See also Dr. Armstrong's [testimony](#) on this issue to a U.S. Senate Committee in January 2008.

b) A failure to consider the costs and benefits of reasonable alternatives

For responsible and rational policy making, it is necessary to obtain forecasts for a set of alternative decisions. One alternative would be to take no action, and another would be to monitor the situation until there is scientific evidence on actions that would lead to beneficial outcomes. On this matter, basic economic rationality in the form of cost/benefit analysis aligns with basic science: reasonable alternative hypotheses must be tested in order to have a good chance of identifying the truth.

### **3. A political argument, the “precautionary principle,” has been used to block a scientific approach to forecasting climate and making decisions.**

The purpose of scientific forecasting is to reduce uncertainty in order to facilitate wise decisions. The so-called “precautionary principle” claims that uncertainty is a reason to make dramatic changes. It has the effect of marginalizing rational scientific study. Rejection of the rational scientific approach to decision making was mocked in George Orwell's 1984, in one of the three slogans displayed on the Ministry of Truth building, “Ignorance is strength.” (Our essay “Uncertainty, the precautionary principle, and climate change” describes the anti-scientific nature of the “precautionary principle.”)

In the case of global climate change over policy-relevant time scales, there is little uncertainty. Proper scientific forecasts provide extremely accurate forecasts. Climate varies, but our validation study showed that simply extrapolating last year's global mean temperature resulted in a mean absolute error of only 0.24°C for fifty-year ahead forecasts. It is difficult to imagine how policy makers would benefit if this error were reduced further, even to 0.0°C.

### **4. Using a new, but validated forecasting procedure known as structured analogies, we forecast that the global warming movement will be shown to have raised a false alarm and to have been responsible for precipitating decisions that caused long-term harm to most people.**

We are conducting an on-going study to examine earlier forecasts of manmade disasters such as the global cooling movement in the 1970s, and the environmental movement's campaign to ban DDT. We have been actively seeking such analogous situations, especially from the people

responsible for promulgating alarming forecasts of manmade global warming, to see if there have been any widely accepted forecasts of manmade disasters that proved to be accurate or where the forecasted disaster was successfully prevented by government actions.

In all, we have identified 72 analogous situations, and we judge 26 of them to be relevant. Based on an analysis of these 26 similar alarms with known outcomes, we found that none were based on forecasts derived from scientific forecasting procedures, and all were false alarms. Government actions were sought in 96% of the cases and, in the 92% of cases where government action was taken, the actions caused harm in 87%. (“Effects and outcomes of the global warming alarm: A forecasting project using the structured analogies method”).

We are providing full disclosure and inviting inputs at [publicpolicyforecasting.com](http://publicpolicyforecasting.com). A page of the site devoted to our Global Warming Analogies Project provides a list of the 26 analogies and links to descriptions of some of them. We also seek evidence that might lead us to revise our analyses. We will provide an update of the project at the 4th International Conference on Climate Change on May 18, 2010.

Based on our structured analogies study, we forecast that the global warming movement will be found to have been raising false alarms, and that the negative effects of the movement will continue to be felt for many years.

## **Conclusions**

Those who make alarming forecasts of dangerous manmade global warming have appealed to the “precautionary principle” in order to justify their calls for drastic actions. The latter appeal is made in response to uncertainty about how and why climate changes. We have shown that the alarming climate forecasts are not based on scientific procedures. Calls for drastic action are neither logical nor responsible.

Policy-makers should halt and reverse actions to try to change the climate. There is no scientific justification for making energy more expensive and reducing economic efficiency. If policymakers fail to reverse their anti-energy policies, we forecast that people will suffer further harm from unnecessarily expensive energy as well as from unintended consequences of climate change policies.

## **References**

Armstrong, J. S. (1978; 1985), *Long-Range Forecasting: From Crystal Ball to Computer*. New York: Wiley-Interscience, 1978; 2nd Edition, 1985.

Armstrong, J. S. (1980), “The Seer-Sucker Theory: The Value of Experts in Forecasting,” *Technology Review*, 83 (June/July), 18-24.

Armstrong, J. S., Green, K.C., & Soon, W. (2008), “Polar Bear Population Forecasts: A Public-Policy Forecasting Audit,” *Interfaces*, 38, No. 5, 382–405. [Includes commentary and response]

Green, K. C. & Armstrong, J. S. (2007), "Global Warming: Forecasts by Scientists versus Scientific Forecasts," *Energy and Environment*, 18, No. 7+8, 995-1019.

Green, K. C. & Armstrong J. S. (2010), "Effects of the global warming alarm: A forecasting project using the structured analogies method," Working Paper.

Green, K. C., Armstrong, J. S. & Soon W. (2009), "Validity of Climate Change Forecasting for Public Policy Decision Making," *International Journal of Forecasting*, 25, 826-832.

Tetlock, P. E. (2005), *Expert Political Judgment*. Princeton, NJ: Princeton University Press."