

DEBATE SUMMARY

What is the right level of response to anthropogenic induced climate change?

Held at The Royal Society on 16th June, 2014

Chair: **The Earl of Selborne GBE FRS**
Chairman, The Foundation for Science and Technology

Speakers: **Sir Mark Walport FRS FMedSci**
Government Chief Scientific Adviser
David Davies MP
MP for Monmouth
Professor Jim Skea CBE
Imperial College London and Committee on Climate Change
The Rt Hon Peter Lilley MP
MP for Hitchin and Harpenden

THE EARL OF SELBORNE opened the debate by explaining that the Foundation welcomed the opportunity to provide a neutral platform for both sides of the climate change debate to come together. He hoped that the debate would help to identify common ground.

SIR MARK WALPORT said that it was clear that climate change was happening; the question was 'what should be our response?' The physics was accepted; the changing concentration of greenhouse gases (GHGs) was leading to warming of the atmosphere. We know levels of carbon dioxide are higher than ever before and that global emissions are rising. 36 gigatonnes of carbon dioxide were emitted in 2013. The latest report of the Intergovernmental Panel on Climate Change (IPCC)¹ report discusses the decline in Arctic ice extent and thickness, the rise in sea levels and indications that there is an increasing likelihood of extreme weather patterns and temperatures, such as intense rainstorms and periods of excess temperatures.

We can respond to climate change through mitigation, adaptation or enduring suffering. In all probability we will need all three. We can mitigate through reducing GHG emissions, and physical works; we can adapt - but there are limits of resources available, security issues, and human will, and we can change lifestyles. We cannot accurately predict regional effects of global warming, but are sure that most effects will be

negative. Limiting the rise in atmospheric temperature is vital - if the temperature range were an increase from 2 °C to 5 °C it could, at the upper end of the range, lead to the extinction of many species. Above 2 °C it was possible that "tipping points" such as the melting of the Greenland ice sheet, could occur over a very long period. So we must try to limit global GHG emissions to keep temperature rises below 2 °C. Many countries are legislating in an effort to do this, but international agreement is important. As a contribution to meeting the global 2 °C target the UK has set a target of reducing GHG emissions by 80% by 2050 compared to 1990 levels.

We need an urgent debate between scientists and politicians about how to do this at affordable cost, while maintaining sustainability and security. There is no magic single bullet - we need greater energy efficiency, reduction of emissions from all carbon fuels wherever used - in transport or industry or domestically - and development of low carbon supply options and increased research and innovation in mitigation and adaptation to climate change.

We cannot wait and see; this generation must choose what to do now to safeguard the planet for future generations.

DAVID DAVIES said that he knew no one who denied the fact that climate was changing, because of the presence of carbon dioxide in the atmosphere. The activities of mankind and society lead to carbon dioxide emissions

¹ www.ipcc.ch

but it does not follow that the observed increase in atmospheric temperatures in the last 250 years comes from human activity.

There is great variability in global temperature arising from natural causes, as the effect of ice ages throughout history makes clear. Even within historical memory we know that there were warmer and colder periods (the little ice age of the 17th century) and it may be that we are moving from a colder period to a warmer one simply through natural variation. So how can we be sure that the observed 0.8 °C global temperature rise over the last 150 years comes from anthropogenic sources?

There is no clear correlation between temperature rises and carbon dioxide emissions. There was no correlation in the early 20th century and since 1997 there has been no global temperature rising trend. There are many other causes which can effect temperature changes, such as volcanic emissions. We need to be able to distinguish increases in temperature due to human activity from changes from natural causes. This we cannot do; so to base policies on the need to reduce emission from human activities is unsound.

The precautionary principle is often evoked - we must do something in case disaster might otherwise happen. But this ignores the possibility that disasters can happen in other areas - pandemic disease or financial meltdown for example. What response should be made to these or other possible disasters? By pursuing policies which raise energy costs, the government is driving manufacturing abroad, where manufacturing facilities will continue to emit just as much carbon dioxide.

The UK is being expected to pay the equivalent of an insurance premium for risks which other countries are also responsible for. He did not accept that the increase in emissions from developing countries will be disastrous for them because these countries will become much wealthier and will be able to spend their increased wealth on coping with climate change.

He welcomed the debate because he doubted whether scientists were as open as they should be about the data they held and their models. Environmental groups should be challenged for pursuing contradictory agendas - wanting to limit carbon emissions, yet opposing nuclear new build and the development of shale gas. Gas could

displace coal in power generation reducing carbon emissions.

PROFESSOR SKEA said he sat on Working Group III of the Inter-governmental Panel on Climate Change (IPCC). The principal concern of Working Group III was to address the options to mitigate climate change. A key concern was how to respond to the upward trend of the change in temperature rise in the 20th century.

More than 190 countries have signed up to agreements to the UN goal of keeping global temperature increases below 2 °C. This meant according to the IPCC report reducing global emissions by 40% to 70% by 2050 compared to 2010 levels. This could only be done by a massive increase in low carbon energy production through developing nuclear power, renewables or deploying cost effective carbon capture and storage (CCS) systems, and promoting energy efficiency, particularly in transport.

This meant a change in investment priorities, away from fossil fuels towards other energy options. We do not have sufficient information about costs to judge between expenditure on mitigation and adaptation, but overall, if the 2 °C target is to be reached, we will need to forego 1% to 4% of consumption by 2030. But these estimates do not take into account the reduced impacts and benefits from better air quality and greater energy security.

Climate change is a global problem; dealing with it is a common responsibility. The UK is not alone - consider the actions taken in the US and China. Of course economic development is good - but it brings unwelcome side effects which need government action. The policy response should be based on scientific evidence. He cited the early resistance to the passing of the Public Health Acts after the cholera epidemics in the 19th century and the Clean Air Act of the 1950s which eventually gained wide acceptance.

Climate change is one of the biggest global challenges. The UK is right in its response.

PETER LILLEY said that he did not doubt the science of climate change, but he was concerned about the refusal of those committed to the environmental cause to engage in debate about the economic consequences of proposals. He was particularly concerned about the effects premature decarbonisation would have on the poor and in developing countries. He had

voted against the Climate Change Act because he had read the cost benefit analysis provided when the Bill was debated in the House. The analysis showed that the potential cost was twice the benefit from global warming. No one wanted to discuss the cost; they simply wished to demonstrate moral superiority. He particularly doubted the way that models had been used to forecast the future path of global average temperatures. He showed a chart of 50 model plots of global temperature versus time. Only two models in his diagram correlated with historical data. But all 50 were cited as evidence. In short, we do not know the path of future long-term temperature trends. Asked if the current pause is temporary or long-term, a scientist's reply was that they would only know in 50 years what were the long term trends.

The poor in developing countries were vulnerable because they were poor, not because they suffered from the weather. If their energy costs rise - because of renewables- they will consume less energy and remain poorer than they would otherwise be. They would be less healthy as a result. Lord Stern in his report to HM Treasury in advocated spending now, so that our descendants would have to spend less in the future. But this meant in practice, sacrificing the poor - the great multitude - in Africa and Asia.

We do not know what the effects of a 4 °C rise will be - whether it will mean the extinction of the human race, or great inconvenience. Society can adapt to a great deal of change; and knowledge of how to respond increases continually. Global warming has benefits; it will reduce temperature variability between the poles and tropics; which might be a benefit. Our policies should be to focus on promoting energy efficiency, innovative energy storage and developing shale gas and drop expensive uncertain technologies such as biofuels, wind and solar generation. Above all we should link any increases in carbon tax to actual increases in global temperatures.

DISCUSSION - In the following discussion central to the argument was the certainty of scientists that the impact of global warming would be disastrous and were convinced that the changes were in part a result of anthropogenic activity emitting carbon dioxide and other greenhouse gases and the failure of governments to take global action. Co-ordinated action by many countries was necessary.

Unfortunately, statements such as 'global temperatures are like to increase by 2 °C or 4 °C by 2100' meant nothing to the public but rises in fuel costs were obvious to everyone. If there was not a global commitment to reduce emissions, then much more effort needed to be devoted to making heard Sir Mark's plea that we would all be affected and need to take action.

A speaker asked how he would know if \$10 trillion was spent over ten years on emission reduction was worthwhile; how could we measure success? The response that 'many things would not have happened which otherwise might have' was unlikely to convince the public.

The public saw that energy prices were increasing because of government policies, but that also our carbon footprint was increasing. So why spend money on carbon reduction, which is not succeeding, while there are more pressing areas of health and poverty?

Public opinion was volatile and affected by local and economic factors; there was widespread fear of the risks of nuclear power, but strong support locally for nuclear plants which created employment opportunities. Wind power was seen as a good source of power except when the wind farm operators sought approval for their plans, and without any understanding that they required alternative supply options when the wind was not blowing. Shale gas was publicly opposed (vociferously by environmental groups who supported policies to reduce carbon emissions). But there was evidence that shale gas developments could reduce emissions through fuel substitution provided fugitive methane emissions could be controlled and the well casing properly designed.

There was no need for subsidies on renewables; but it was argued that renewables would always be more expensive than carbon fuel such as coal and oil, without a significant technological advance.

Speakers also discussed the use of models and the difficulty of estimating long-term trends from time series that had large short-term inter-annual variability. Undoubtedly there were multi-year periods when temperatures rose at different rates from other periods, and effects such as sea level rises and reductions in sea ice extent did not follow consistently from year to year. But it was fallacious to base policies on single observations, or use empirical models which

were fitted to historical data. The IPCC report had been based on a great number of observations over many different areas over time and its conclusions were based on a meta-study of long-term trends and forecast models.

While it was, perhaps, fair to criticize scientists for not being able to predict how long the current pause in temperature rise would continue, and say that we would only know if it was temporary or not in 50 years, the criticism did not take account of the many other observations and findings that had been made about temperature changes and, importantly, their speed and relationship to emissions. While it was important to understand the strong consensus that existed amongst scientists on climate change, there were still scientific challenges to be settled about future rates of global temperature rise and other changes. The statistical methods used needed to be transparent and robust.

Summing up the discussion, the opening speakers agreed that transparency about data and modelling methods used for scientific advice was crucial.

They also accepted that there was not a conspiracy of scientists, and that much more effort was needed to communicate an understanding of the issues to the public. The regional effects of warming were not clear, and economic effects on developing countries were a concern, which could stand in the way of global agreements. It was also agreed that innovation to mitigate and adapt was key.

But there was disagreement about by how much global temperature will rise, and how much is due to anthropogenic activity, and whether subsidized renewable power generation, which inevitably increased electricity prices, was appropriate for the UK.

There was a strong disagreement between those who considered we must act now and should not wait, and those who thought that we should only adapt and take action when we knew that temperature rises were taking place. The latter thought that the UK target of reducing GHG emissions by 80% from 1990 levels by 2050 was premature.

Sir Geoffrey Chipperfield KCB

Open the summary with Adobe Reader outside the browser and click on the URL to go to the sites below.

Academy of Medical Sciences
www.acmedsci.ac.uk

Arts and Humanities Research Council
www.ahrc.ac.uk

Biotechnology and Biological Sciences Research Council
www.bbsrc.ac.uk

Committee on Climate Change
www.theccc.org.uk

David Davies MP for Monmouth
www.david-daviesmp.co.uk

Department of Energy & Climate Change – Estimated impacts of energy and climate change policies on energy prices and bills, March 2013
[www.gov.uk/government/uploads/system/uploads/attachment_data/file/172923/130326 -
_Price_and_Bill_Impacts_Report_Final.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/172923/130326_-_Price_and_Bill_Impacts_Report_Final.pdf)

Economic and Social Research Council
www.esrc.ac.uk

Engineering and Physical Sciences Research Council
www.epsrc.ac.uk

The Foundation for Science and Technology
www.foundation.org.uk

Government Office for Science
www.bis.gov.uk/go-science

Grantham Research Institute on Climate Change and the Environment
www.lse.ac.uk/GranthamInstitute

Greenpeace
www.greenpeace.org.uk

Grantham Institute, Imperial College London
<http://www3.imperial.ac.uk/grantham>

Intergovernmental Panel on Climate Change
www.ipcc.ch

Rt Hon Peter Lilley MP for Hitchin and Harpenden
www.peterlilley.co.uk

Medical Research Council
www.mrc.ac.uk

Natural Environment Research Council
www.nerc.ac.uk

POSTNOTE – Risks from climate feedbacks
www.parliament.uk/briefing-papers/POST-PN-454/risks-from-climate-feedbacks

POSTNOTE – Arctic changes
www.parliament.uk/business/publications/research/briefing-papers/POST-PN-334/arctic-changes-june-2009

Research Councils UK
www.rcuk.ac.uk

Royal Academy of Engineering
www.raeng.org.uk

The Global Warming Policy Foundation
www.thegwvf.org

The Royal Society/US National Academy of Sciences Report on Climate Change: Evidence & Causes
<https://royalsociety.org/policy/projects/climate-evidence-causes/>

Science & Technology Facilities Council
www.stfc.ac.uk

Time for change? Climate Science Reconsidered
www.ucl.ac.uk/public-policy/Policy_Commissions/Communication-climate-science/Communication-climate-science-report/TIME_FOR_CHANGE_Final_Proof.pdf

Technology Strategy Board
www.innovateuk.org

WWF Report on Plugging The Gap
http://assets.wwf.org.uk/downloads/wwf_plugging_the_gap.pdf

The Foundation for Science and Technology
A Company Limited by Guarantee,
Registered in England No: 1327814,
Registered Charity No: 274727