

DINNER/DISCUSSION SUMMARY

The impact of climate change on Scotland

Held at The Royal Society of Edinburgh on 29th October, 2009

The Foundation is grateful for the support for this meeting from
The Institute of Physics, The Chartered Insurance Institute and
The Royal Society of Edinburgh

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

Speakers: **Professor Geoffrey Boulton OBE FRS FRSE**
General Secretary of The Royal Society of Edinburgh and a member of the Prime Minister's
Council for Science and Technology
Professor John Mitchell OBE FRS
Director of Climate Science, the Met Office
Dr Andrew Dlugolecki
Tyndall Centre University of East Anglia and Chartered Insurance Institute

PROFESSOR BOULTON summarized the present position. We have the evidence, we have a consensus on scientific interpretation, we have the investment, we know (Stern) that mitigation now rather than later is cheaper. But, we have not sorted out the politics and started to adapt behaviour to minimize risks. We cannot do this without public support. If we fail, we will be risking the consequences of catastrophic climate changes. The problem is that these consequences will not be felt at first in polluting countries, such as Scotland. The objectives of the RSE inquiry are to map out the ground between where we are now and where we need to get to in order to achieve the targeted Greenhouse Gas (GHG) reductions; and understand how to engage the public so as to enable politicians to make the right choices. Change is happening now - see the studies of water flow in the Ganges and the effects on agriculture. Kyoto failed to reduce atmospheric CO₂; Copenhagen needs to do much better. But will it?

Surveys show only 33% of the public are concerned about climate change, and only 18% alarmist. The issue is lower in priority than other seeming threats. A problem for public understanding is that climate change science is complex - not simple cause and effect with self evident outcomes. We cannot fully explain the relationship between and the extent of natural and anthropogenic variations in the atmosphere. The public think that computational modelling which underlies projections is only a technical tool thought up for the occasion; they do not understand the universal use of modelling to project likely consequences. A mitigation strategy must seek to meet emission targets, minimize costs, and maximize energy security. The policies which would enable us to meet these aims should include economic incentives, freedom to use all technical means, and full transmission to the public of the need to stop the misuse of resources. But we must be positive about the future, not simply fearful and negative.

PROFESSOR MITCHELL outlined the science behind the IPCC and other projections of emissions and their consequences. We know the growth of CO₂ concentration in the atmosphere; we know the effect it produces on temperature; and we have evidence that these effects match that which would be produced from modelling. But there is still uncertainty about the scale, interaction, and effects of natural and anthropogenic variation, particularly in relation to short term but chaotic incidents (such as El Niño). But we can move from uncertainty to probability as we now have a wide range of projections from modelling, and can weigh the

differences between them. We can show probabilities and measure changes based on existing evidence. We can now indicate that by 2050 temperature changes could rise by up to 4 degrees, with increasing sea levels and surges. We know more about regional effects, but it must be emphasized that the probabilistic approach is based on scientific interpretation of known factors. New factors will become known, which would involve fresh interpretation. It is important that we do not claim certainty. Science can never be certain; it is based only on what we know now - and we can, and should always be open to learning more and changing views

DR DLUGOLECKI looked at climate change from the business perspective. He identified three elements. First, impact. Edinburgh could become as warm as Bordeaux; crop growing periods could become longer; pleasures such as golfing could cease, because of restrictions on water, fertilizers and land use. The evidence was showing that exceptional events - violent storms, heat waves - would be likely to become more frequent, with increasing costs both for prevention and insurance. Businesses were not prepared for these impacts, and many, particularly SMEs were not prepared or able to put in the effort - actions were seen as too expensive, and too low a priority. Even FTSE 100 companies had far to go. Second, customers' needs and behaviour will change - what would they want, how would it be procured, what would they be prepared to pay; how could increased costs be met - by savings or developing new products? It would be no use complaining that poor performance was due to the weather.

Third, carbon reduction will become essential. To meet targets we need to cut emissions from the business as usual scenario by half. There will be new and demanding regulations, and the market price of carbon will rise. There will also be the possibility of litigation - note the UKFI/RBS case. Different sectors will be affected differentially, but new methods of working will be needed everywhere. Public opinion will demand change, but it should be seen as an opportunity to minimize risk and exploit opportunities.

Major concerns in the following discussion were, if Kyoto had failed signally to deliver the necessary reductions in Green House Gases (GHGs) whether Copenhagen would be likely to do any more successful; and, if it failed to do so, had we reached a "tipping point" from which unavoidable catastrophic consequences would follow. Speakers suggested there were reasons for optimism: Copenhagen

had been preceded by a much more structured discussion of the problems and study of the IPCC projections: countries were going to Copenhagen with a broad intent to reduce emissions, but without specific prescriptions which would stand in the way of compromise and consensus. Moreover the follow up to the conference would be structured around diplomatic and scientific discussions which would encourage consensus based policies to emerge. The US presence and commitment was an enormous advantage. But the nationalistic pressures to protect industries; the passion in developing countries to grow their economies to replicate the lifestyle of the West; the imperfect understanding of how any national target could be offset by exporting manufactures (and emissions) to other countries, meant that agreements would be very difficult to achieve.

It was impossible to be categorical about a "tipping point". We must always bear in mind, as Professor Mitchell had stressed, that new material can always come to light and science can never claim certainty. We cannot fully quantify all the effects of changing temperatures in the models, so as in the IPCC report, we have to operate with probabilities rather than point models - which is difficult for the public to understand.

There is not likely to be one "tipping point" which will have global effects, there is more likely to be a number of points at which certain events will inevitably occur. Some of these may already have - e.g. the melting of the Greenland ice sheet and the reduction in the flow of the Ganges.

Speakers also raised the failure to bridge the gap between emission objectives and public understanding of the issues - the focus of the RSE inquiry. Why was it that we did not have a mature discussion based on probabilities and risks? After all, assessing risk and probabilities was part of our daily lives - as when we crossed the road ahead of the traffic. Businesses could not survive or thrive unless they were continually assessing risk and making decisions by incurring costs or developing new products with no certainty about the results. Perhaps it was due partly to failure to understand complex science and scientific methods; partly because of the long term and seemingly abstract nature of the issues (it was one thing to worry about jumping across the road in front of a lorry; another thing to concern oneself about flooding in Bangladesh in 2030, if CO2 emissions from Scotland were not curtailed); partly because people did not understand the function of models in predicting the future when the circumstances which generated time series had changed. Models could tell us what could happen, but not assert it would happen at specific times and places. Understanding could be improved if discussion centred - as is generally the case with business decisions - on the upside and downside of options; together with an appreciation that we must have contingency planning to deal with extreme events in particular circumstances and areas - the sort of analysis done in the Lloyd's of London Insurance market.

Speakers agreed that it was vital to get children to understand the issues in climate change and discuss the actions needed to meet objectives. The Inquiry certainly proposed to involve schools. Children could not only pressure parents but could themselves imagine how things might be done differently, and how actions might improve life, not threaten it. But we need to be careful about how they are taught and the basis of their understanding. We must not attempt to tell teachers how to teach, but they must be able to appreciate the scientific method, the analytical tools that are used and the importance of exploring unexpected relationships

Speakers raised a number of suggestions about how CO2 concentrations could be reduced - more forestry, a higher market price for carbon, traffic restrictions. There was particular concern about agriculture - 20% of carbon emissions came from agriculture. What would be the impact of increased flooding on agriculture and drainage systems?

How will landscape adapt? Could the change from existing crops to new ones be made quickly enough? What would the effect be on the landscape generally? In short, there was a concern that the effect of climate change on the national infrastructure, and how its unfortunate effects could be ameliorated, had not been adequately considered.

The role of the media was also raised. How much time should be spent attempting to educate them and rebutting the inevitable publicity generated by sceptics? Was the BBC, with its remit of fair coverage, too lenient with sceptics? Sceptics must be answered, but politely. Rancour and exaggeration would backfire, and result in loss of confidence in arguments.

A speaker said that the fundamental issue was that we were not communicating a dream, a dream for the future based not only on science, but also on ethical priorities. The world is no longer (if it ever was) a static universe; it was changing rapidly and fundamentally with dire effects on many people. Such a vision would have the environment at its centre, and use it to restructure the economy so as to restrain the consumerist lifestyle, alleviate poverty and regulate resource exploitation.

Sir Geoffrey Chipperfield KCB

The speaker presentations can be found on the Foundation website at www.foundation.org.uk .

Useful web links:

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www.cii.co.uk

CRed
www.cred-uk.org

Department for Environment and Rural Affairs
www.defra.gov.uk

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

The Institute of Physics
www.iop.org

The Met Office
www.metoffice.gov.uk

Natural Environment Research Council
www.nerc.ac.uk

The Royal Society of Edinburgh
www.rse.org.uk

Scottish Climate Change Impacts Partnership
www.sccip.org.uk

Scottish Government
www.scotland.gov.uk/Topics/Environment

Tyndall Centre, UEA
www.tyndall.ac.uk

UK Climate Impact Assessment
www.ukcip.org.uk

[The workshop report follows this page.]

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WORKSHOP SUMMARY

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Chair: **The Rt Hon the Lord Jenkin of Roding FRSE**
President, The Foundation for Science and Technology

Speakers: **Professor David Sugden FRSE**
University of Edinburgh and Chair, The Royal Society of Edinburgh Inquiry on 'Facing up to climate change'

Dr Andrew Dlugolecki
Tyndall Centre University of East Anglia and Chartered Insurance Institute

PROFESSOR SUGDEN said that the inquiry would focus on the gap between what must be done and what people were prepared to accept. The size of the gap and the scale of change needed were not understood. Barriers hindering change would be explored. Engagement with people would be crucial in order to understand how they responded to targets, and there would be regional and other meetings. He expected the inquiry's recommendations to stress the positive aspects of this new industrial revolution and its ability to improve life.

DR DLUGOLECKI stressed the implications for business of climate change. Businesses gave little sign of recognizing that big changes were imminent. They needed to consider the impact of extreme events (such as floods) occurring often, but irregularly; the changing behaviour and priorities of customers; and the effect of rises in the price of carbon, which would affect fuel and other costs; and extensive regulation. The Carbon Disclosure Project showed that while the FTSE 100 companies were better prepared than others, progress was far too slow.

The following points were made in discussion:-

- The public was in denial about the reality of climate change and how it could affect their lives. They might understand it as an abstract concept which might, e.g. cause flooding in Bangladesh, but could not conceive that it might impact on their own lives in Scotland by, e.g. higher prices and immigration.
- Children were an effective means of increasing knowledge and understanding of climate change, if they were taught properly. But, although the Curriculum for Excellence had much in it about climate change, teachers were not equipped to teach it effectively and, in particular, refute sceptical arguments. They needed support and further training.
- Scientists should beware of making dogmatic statements. Science was not about certainty. Children must understand the reasons and evidence behind the conviction that climate change was happening and understand the limits of that knowledge and how new discoveries might change forecasts about the future. They must not parrot dogma.
- The media needed to be educated to avoid misreporting and misrepresentation (e.g. the Times reported that Lord

Stern was suggesting that we should stop eating meat. He had not said this). The Meacher/Cook seminar in the early 2000s had been effective - was this a way forward? But while dialogue with the Press was crucial, scientists were slow to recognize that journalists had their own agenda and always wanted a startling story. Perhaps a focus on a particular issue might help - note how Norwegian propaganda on acid rain got attention and changed public opinion.

- Business managers, as well as others, needed training. At present they used scenarios about climate change as communication tools, and not for planning. We needed to know how they made decisions amidst uncertainty. It is their decisions that should be driving change - not scientists.
- The task was to translate science into social understanding - to effect a transformation in behaviour patterns and aspirations.
- How much time should we spend in confronting sceptics? We need effective websites and authorities briefing of journalists, to avoid both "equal hearing" for rogue scientists and the mainstream, and hysterical threats of doom. We should stress differing regional aspects, and deliberately phased responses.
- But don't sideline sceptics? Treat arguments about uncertainty and the limits of existing knowledge seriously, and use them in teaching. Stress the possible effects on individuals, and don't just quote Intergovernmental Panel on Climate Change (IPCC) figures.
- Politicians will always be constrained by the need to seek votes. They will generally do what they think the voters want. But they can be persuaded to lead and take unpopular decisions if it is in the interests of the nation. Scientific institutions and other independent (i.e. unelected and undemocratic) bodies have a big role to play in orchestrating this persuasion
- Local authorities want to understand and act on the adaptations needed in their areas. But they need clear messages and able to provide local media with good stories based on evidence.

- The UK and Scottish governments have enacted legislation, but what is now needed is a “coalition of the willing” - including business and institutions - to carry forward implementation. Social scientists must work on methods of changing social behaviour.
- We have been using fear as the emotion to drive change. This will not, in the long term, work. We need to stress the benefits for employment and a better life style in the future. The future should be a dream, not a nightmare (c.f. Martin Luther King).
- Business needs regulation to create level playing fields and to avoid companies claiming false “green” credentials.
- Bottom up pressures from local groups and communities is also valuable (see CRed in East Anglia) in changing behaviour and increasing understanding.
- We cannot isolate the behavioural changes needed to deal with climate change from the wider issues of a consumer led society, based on macroeconomic models which do not recognize resource issues.
- The market price of carbon must rise from present levels, and governments understand the differential cost that will affect different sectors. They will need to plan to alleviate the effects on the most affected.
- The British Council has much expertise in communicating ideas and concepts. Their experience might be useful in seeking how to inform people and awaken their interests.

Sir Geoffrey Chipperfield KCB

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