

Science and Technology

Mr Freeman
Royal Commission on Environmental Pollution
Room 108
55 Whitehall
London
SW1A 2EY

10th October 2008

Dear Sir,

The Royal Society of Chemistry's response to the Royal Commission on Environmental Pollution "Study on adapting the UK to climate change"

The RSC welcomes the opportunity to submit formal written evidence to the study on adapting the UK to climate change.

The RSC is the UK Professional Body for chemical scientists and an international Learned Society for advancing the chemical sciences. Supported by a network of over 44,000 members worldwide and an internationally acclaimed publishing business, our activities span education and training, conferences and science policy, and the promotion of the chemical sciences to the public.

This document represents the views of the RSC. The RSC's Royal Charter obliges it to serve the public interest by acting in an independent advisory capacity, and we would therefore be very happy for this submission to be put into the public domain.

The document has been written from the perspective of the Royal Society of Chemistry.

If you would like further information or need anything in this document clarified, please do not hesitate to contact me.

Yours sincerely,

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Adaptation – General Questions

Range of climate change

Q2) *There are several important factors when discussing climate change, which the RCEP needs to understand for this study:*

- a) *Over what time period should climate change be considered for the RCEP study – 2020, 2050, 2100, or some other time period?*

Carbon dioxide persists in the atmosphere for around 100 years, so even if levels of CO₂ emitted are dramatically reduced in the coming decades, atmospheric concentrations of CO₂ will take a long time to respond. This means that the greenhouse gases already emitted since pre-industrialised times have already committed us to global warming for at least the next century, with the possibility of stabilising temperatures taking decades longer only if action is taken now. The RCEP study should therefore consider the effects of climate change over the period from the present day to 2100 or longer, as any adaptation and mitigation of climate change will need occur over at least this time frame.

- b) *What are the magnitude, rate and kinds of climate change impacts in the UK that the RCEP study should be considering?*

RCEP should take into consideration as many factors indicative of climate change as it is possible to measure. Only this way can accurate models of our Earth system be produced and tested. Given the uncertainties surrounding current climate change models, for a study into adaptation and mitigation, it would be prudent to also make evaluations which consider the likelihood of more rapid and dramatic changes than predicted by current models.

Awareness of adaptation to climate change

Q3) *The Royal Commission is interested in understanding the general level of awareness about adapting to climate change. How would you describe:*

- a) *The level of awareness that either you or your organisation has about the need to adapt to climate change?*

As a learned and professional scientific society we are very aware of the need to adapt to climate change. We believe the chemical sciences have a huge role to play in enabling society to first of all mitigate climate change and also adapt. The chemical sciences already plays a vital role in measuring and monitoring key climate change indicators, such as CO₂ and temperature, which is essential to enable accurate climate change models. The chemical sciences will help to provide the solutions to enable us to mitigate climate change, such as by developing low carbon energy sources and carbon capture and storage technologies. Finally the chemical sciences will be essential in providing new innovative solutions to help society adapt to climate change, for example by providing new low energy technologies for producing drinking water, new fertilisers to allow us to grow enough food and new medicines to treat people and animals as disease vectors change.

- b) *Your awareness of what could or should be done to enable the natural environment to adapt to climate change;*

We are aware that the natural environment will change because of climate change and that it is essential that we have the correct tools to monitor this and base any intervention measures on sound scientific evidence.

- c) *Your awareness of any actions (by the government or others) already planned or underway, to adapt the natural environment to climate change.*

We are aware of several measures planned including:

- NERC sponsored programme “Living with environmental change”
- Adapting to climate change programme coordinated by Defra
- Adaptation measures in the climate change bill currently passing through UK parliament
- Water Framework Directive (WFD) introduced by the EC and translated into UK law in 2003

The relationship between adaptation and mitigation

Q4) The UK is committed to significant actions to mitigate climate change – what should be the relationship between adaptation and mitigation actions for climate change?

Both the mitigation and adaptation to climate change will be essential for the future; we must maximise our mitigation strategies in the UK and globally then plan our adaptation strategies around these.

Climate change in the broader context

Q5) Climate change is not the only major change that will take place over the coming years, or the only issue of importance for the environment, and yet it is being used as a justification for many decisions and actions.

a) In broad terms, what are the important non-climate changes (e.g. social, economic, demographic, technological, cultural or other) that will interact with climate change to facilitate or inhibit adaptation? (It may be useful to cross reference your answer with your response to question 2a).

- 1) Increase in human population and/or migration of populations due to war or economic situations will hinder adaption to climate change by putting a strain on existing fresh water and food supplies, and by continuing the expansion of urban areas in to natural habitats.
- 2) Industrialisation of developing countries (eg India, China, Africa and South America) will increase the dependence on fossil fuels and increase the urbanisation of these communities, which could hinder adaptation to climate change.
- 3) Continued change of land use from natural habitats to those suitable for agriculture and grazing.

b) When considering wider environmental priorities, what environmental goals may suffer if a stronger climate change adaptation agenda is introduced? How can the priority of adapting to climate change be increased as part of the sustainable development agenda without detracting from other important issues?

Since resources are limited, a stronger adaptation programme may lead to a reduced programme of mitigation e.g. resources used by the Environment Agency for increased coastal flood defence may reduce their efforts to educate the public about utilisation of sustainable transport. More importantly the concentration of legislative and regulatory activity on climate change adaptation (and indeed mitigation) may lead to a significant reduction in the focus on other environmental areas. Protection of the soil environment in order to enable food production to continue in a sustainable manner is also important.

The Natural Environment

Throughout these questions, where the term ‘natural environment’ is used, answers should refer to the three exemplars (biodiversity, nature conservation and protected areas; sea-level and coastal zones; freshwater).

Resilience of the natural environment

Q6) When planning what adaptive actions should be taken in order to increase the resilience of the natural environment in the UK, the RCEP is interested to know:

a) What form will this resilience take?

We need to enable the environment to become as resilient as possible by, for example, reinstating natural habitats as much as possible, transplanting the essential elements of biodiverse systems further north if necessary, and creating effective links between areas of biodiversity so that species can migrate.

b) How resilient to climate change does the UK want the natural environment to be? How resilient does it need to be to continue providing the services upon which society depends?

The natural environment needs to be resilient enough to continue to support the levels and diversity of life that we have at present and for future generations.

Natural responses and thresholds

Q7) The natural environment will respond to climate change in the absence of any human interventions. When considering the adaptation of the natural environment, when might a “do nothing” option be appropriate, whereby natural systems are left to respond without intervention?

Every case of intervention will have to be assessed individually, with the likely potential outcomes of a “do-nothing” strategy analysed. In some cases it is likely that a “do-nothing” scenario could be potentially disastrous, for example, climate change is likely to decrease fresh water availability, which all life on earth relies.

Q8) In the natural world, there will be thresholds of response to climate change, which are defined by the IPCC as “the point where stress on an exposed system or activity, if exceeded, results in a non-linear response in that system or activity”¹.

a) Should thresholds of response to climate change be identified for the natural environment and, if so, how should this be done and by whom?

We believe that thresholds of natural systems should be identified by people who have the academic credibility in the field of predicting non-linear responses to climate change, such as those working on the NERC sponsored “Rapid climate change programme”.

Institutional arrangements for environmental conservation

Q9) How will adaptation of the natural environment interact with (either negatively or positively) adaptation responses in the major land uses (such as agriculture, water resource management, energy production, forestry, urban development, infrastructure) and what institutional arrangements, if any, are needed to facilitate changes in land use to support adaptation to climate change?

As the climate changes in different regions, this will affect the type of plant and life forms that that land can sustain. This will obviously affect industries such as agriculture and forestry and changes will have to be made to adapt to the new conditions ie different types of food crops grown that are drought resistant or require less water.

In order to protect our natural environment it is important to strike a balance between land for required agriculture and land for natural environments. Changes in funding to ameliorate the financial attraction of changing land use to arable systems in favour environmentally positive interventions will aid this protection.

¹ Taken from IPCC WGII AR4 Section 2.3.1

Opportunities presented by the changing natural environment

Q12) Whilst much of the debate is focussed on how humans can help protect the natural environment as it responds to climate change, how can the changes to the natural environment be used to help UK society adapt to climate change?

This is intimately associated with what those changes might be – but sea-level rises and flooding that are dealt with by natural solutions such as salt marshes, robust investment in the identification of appropriate species for planting in parks and for the development of new ‘natural’ zones would be proactive, and foresight on how the new climate regime will encourage new habitats to develop needs investment.

European, national and regional approaches

Q17) What is the appropriate level (e.g. European, UK, regional, local) at which decisions should be made for climate change adaptation?

Decisions for climate change adaptation will need to be made at all levels but it is imperative that there is a strong National and European lead.

Q20) As other countries in Europe experience climate change, they also will experience changes in the natural environment. What indirect impacts might this have on the natural environment of the UK?

It is likely that the UK will be affected by:

- Increased population migration within and from outside of the EU
- Food/ freshwater shortages
- Fluctuating financial markets and economies
- More frequent “emergency situations” ie floods
- Increased water trading
- Increased disease transmission

Indirectly this could impact the natural environment by requiring more reliance on UK only based resources such as food and water.