Department of Energy & Climate Change

Department of Energy & Climate Change
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Our ref: **13/0776**

10 July 2013

Re: Request for Information

Thank you for your letter dated 3 May 2013, regarding previous correspondence with the Department of Energy & Climate Change (DECC) and your request for the following information:

1) DECC projections for the future UK and Cornwall carbon emissions with the associated predicted climate forecast for the UK and Cornwall?

2) The estimated rainfall, mean air temperatures, mean water temperatures, sunshine hours and long term weather forecasts, in particular extremes of weather that are often associated with CO2 and climate change. I would like these forecasts for the next ten years for Cornwall.

3) The methodology, models and your calculations that you are employing to derive these predictions.

4) An explanation to me how exactly CO2 affects the UK climate in the scientific terms you have assumed and if necessary the physics behind this.

We have considered your request in accordance with the Environmental Information Regulations 2004 (EIRs), as the information you have sought disclosure of does, in our view, fall within the definition of "environmental information" as stated in the EIRs.

DECC has the following obligations under the EIRs:
- to confirm whether the Department holds the information requested, and
- to provide that information (subject to any exceptions which may apply).

1) *DECC projections for the future UK and Cornwall carbon emissions with the associated predicted climate forecast for the UK and Cornwall?*

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DECC publishes projections of UK greenhouse gas emissions on an annual basis. The latest projections, for the period up to 2030, can be found at: https://www.gov.uk/government/publications/2012-energy-and-emissions-projections.
The report also describes the methodology used to derive the projections.

DECC does not have emissions projections for Cornwall. Statistics on recent carbon dioxide emissions at Local Authority level are, however, available at: https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/sub-national-greenhouse-gas-emissions-statistics.

The UK climate forecast is derived from the UK climate projections (UKCP09)[1] published in 2009 by the Department for Environment Food & Rural Affairs (Defra). The UKCP09 climate projections, which start in 2010 and end in 2099, are divided into 30-year time periods, as shown in Annex 1. Thirty years is the minimum time interval for which meaningful climate projections can be made using climate models; the climate projections are thus averages over these 30-year periods. All climate data given in UKCP09 are relative to the 1961-90 average, unless otherwise stated.

The UKCP09 projections are based on three scenarios (High, Medium and Low) for global carbon dioxide emissions. They correspond to the Intergovernmental Panel on Climate Change's (IPCC) Special Report Emissions Scenario (SRES)[2] scenarios A1FI, A1B and B1 respectively, as shown in Annex 2. As global emissions are currently tracking the high end of the IPCC emissions scenarios[3], the Medium to High emissions scenarios in the UKCP09 projections are probably the most relevant to consider, though over the next 30 years there is actually little difference between these two emissions scenarios.

Projections up to the end of the century (split into 30-year periods) for a wide range of climate variables for each of the three emissions scenarios are available at: http://ukclimateprojections.defra.gov.uk/21731.

The UKCP09 projections do not, however, provide a climate forecast specifically for the Cornwall area.

2) *The estimated rainfall, mean air temperatures, mean water temperatures, sunshine hours and long term weather forecasts, in particular extremes of weather that are often associated with CO2 and climate change. I would like these forecasts for the next ten years for Cornwall.*

As noted above, the main UKCP09 projections do not provide climate information specifically for Cornwall. Also, they use 30 years as a minimum time period, because natural climate variability may quite large over a 10-year

[1] http://ukclimateprojections.defra.gov.uk/
[2] http://www.ipcc.ch/ipccreports/sres/emission/index.htm
[3] http://www.theccc.org.uk/publication/building-a-low-carbon-economy-the-uks-contribution-to-tackling-climate-change-2/ - in the document 'setting a 2050 target'.

interval and could mask any underlying changes that may be caused by rising concentrations of atmospheric carbon dioxide and other greenhouse gases.

The UKCP09 projections geographically closest to Cornwall are for the 'South West England' region, which incorporates Cornwall but also includes Devon, Dorset and Somerset.

A summary of projections for changes in summer and winter temperature and rainfall for the South West region for the next 30 years, under a High emissions scenario, are available at: http://ukclimateprojections.defra.gov.uk/22305.

It may, however, be possible for registered UKCP09 users to reduce the South West geographical region down to Cornwall only by using the 'customised version' of the UKCP09 outputs, based on the 25km gridded data. Also, use of the 'weather generator' tool may be necessary to produce information on projected weather extremes for the Cornwall area. The UKCP09 website provides further guidance on registration and use of these facilities.

Information on projections for coastal water temperatures is provided at: http://www.mccip.org.uk/uk-marine-projections.aspx.

3) *The methodology, models and your calculations that you are employing to derive these predictions.*

A detailed description of the methods used to generate the UKCP09 climate projections can be found in the reports listed at: http://ukclimateprojections.defra.gov.uk/22544**.**

4) *An explanation to me how exactly CO2 affects the UK climate in the scientific terms you have assumed and if necessary the physics behind this.*

The mechanism by which CO2 warms the climate is the so-called 'Greenhouse Effect', as illustrated in Annex 3. A more detailed description of the physics governing the 'Greenhouse Effect', together with information on the effects of rising CO2 and other greenhouse gases, is available on the Government Office for Science website at: http://www.bis.gov.uk/go-science/climatescience/greenhouse-effect.

For the UK's maritime climate, the warming effect of rising carbon dioxide levels will likely increase the risk of weather extremes, leading to more flooding events and more intense heatwaves. The UK is also expected to be at increasing risk of flooding due to increasing coastal erosion and storm surges from rising sea levels, caused by thermal expansion of the oceans and melting of ice caps and glaciers.

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Studies have shown, for example, that the risks of the extreme heatwave of August 2003 (which also affected Western Europe) and the record floods in England in the autumn of 2000 were increased by the build-up of greenhouse gases in the atmosphere.

Some references to publications on these UK extreme weather events and on projected UK effects of climate change are given in Annex 4.

Appeal Procedure

If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Under Regulation 11(2) of the EIRs a request for an internal review should be submitted no later than 40 working days after the date of this letter and should be addressed to the **Information Rights Unit (*DECC Shared Service*)** (foi@decc.gsi.gov.uk), Department for Business, Innovation & Skills, 1 Victoria Street, London SW1H 0ET.

Please remember to quote the reference number above in any future communications.

If you do request an internal review and are not content with its outcome, you have the right to apply directly to the Information Commissioner for a decision. The Information Commissioner can be contacted at:
Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF.

Yours sincerely

Climate Science Observation and International Team
Science and Innovation Group

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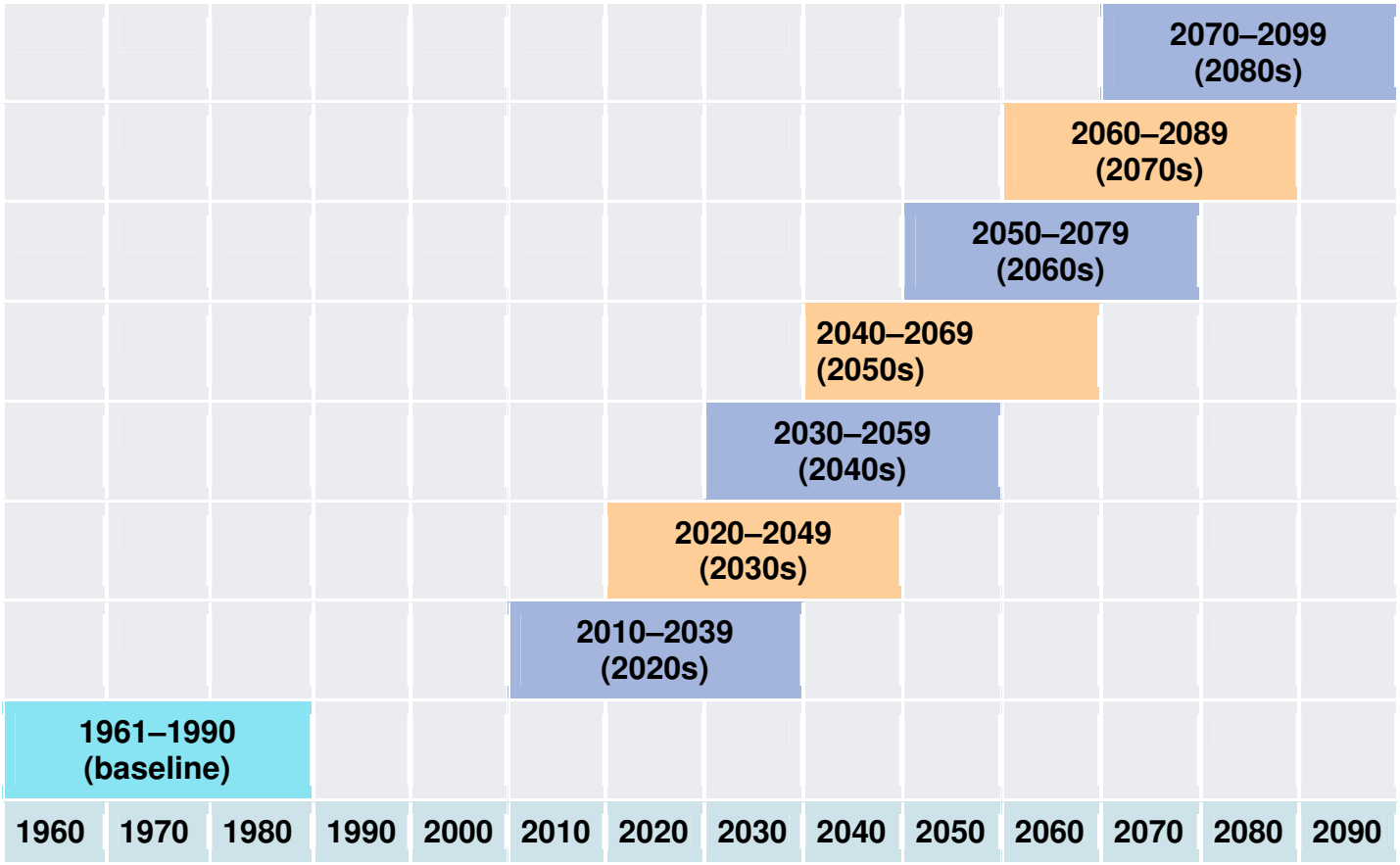
ANNEX 1

UKCP09 Projections - Time periods

The seven 30-year future time periods over which projections are averaged, relative to the baseline period.



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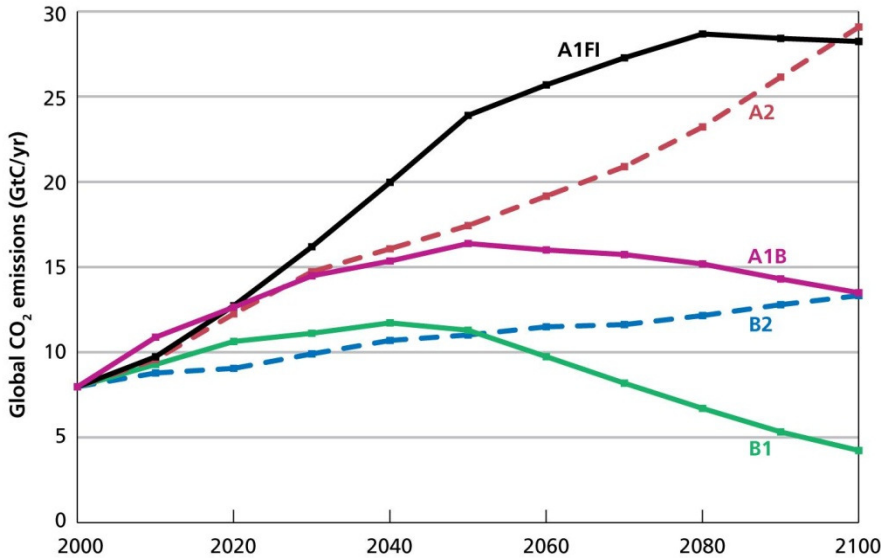
ANNEX 2

The (A1F1, A1B and B1) Emissions Scenarios used in UKCP09

UK CLIMATE PROJECTIONS



Note:

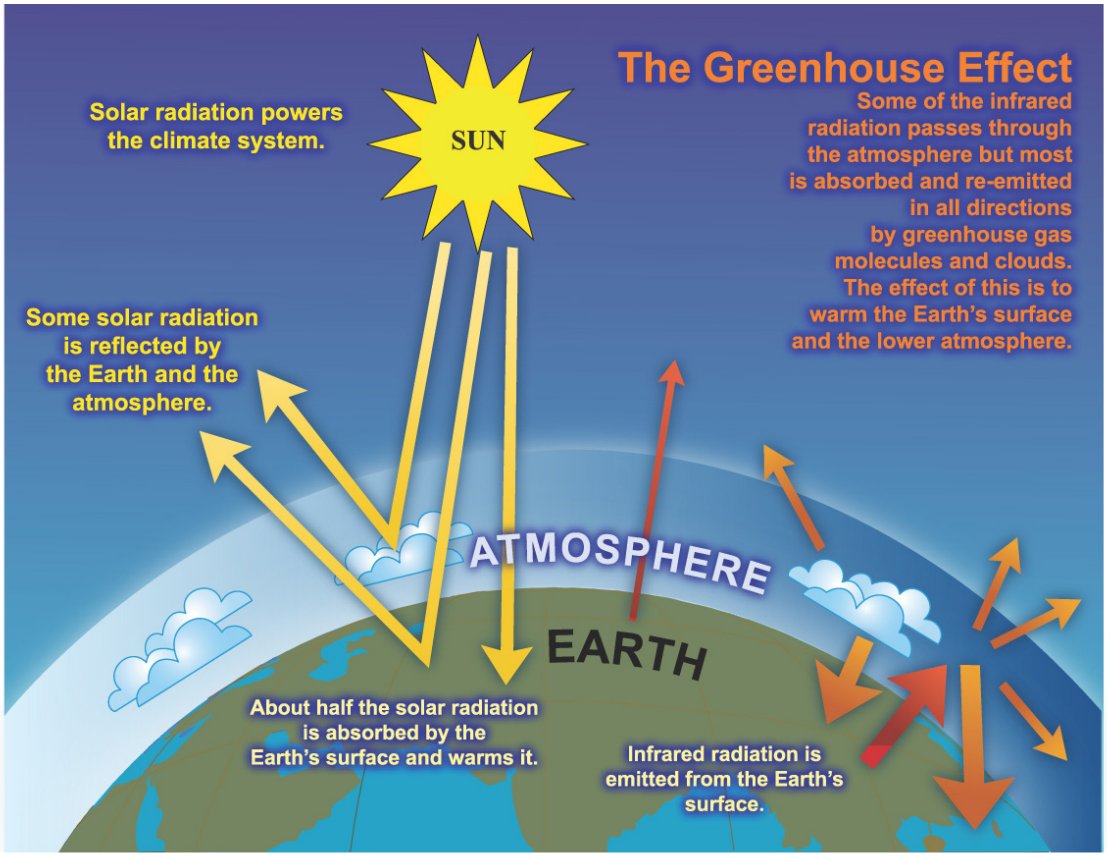
A description of these emissions scenarios can be found in the IPCC document: http://www.ipcc.ch/ipccreports/sres/emission/index.htm

The High, Medium and Low UKCP09 scenarios correspond to the IPCC A1F1, A1B and B1 scenarios.

The A2 and B2 scenarios are not used in UKCP09.

ANNEX 3

The 'Greenhouse Effect' (Source: IPCC 2007)



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Annex 4

References on UK extreme weather events and projected UK effects of climate change

Stott et al, 2004, Human contribution to the European heatwave of 2003, Nature 432 p610.
http://www.nature.com/nature/journal/v432/n7017/abs/nature03089.html

Pall et al, 2011, Anthropogenic greenhouse gas contribution to flood risk in England & Wales in autumn of 2000, Nature 470 p382
http://www.nature.com/nature/journal/v470/n7334/full/nature09762.html

J Lowe & J M Gregory, 2005, The effects of climate change on storm surges around the UK, Phil Trans of Royal Society A, vol. 363 no. 1831
http://rsta.royalsocietypublishing.org/content/363/1831/1313.long

Defra, 2012, The Climate Change Risk Assessment.
http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=15747
This report gives a detailed discussion of how climate change is projected to affect the UK, across different sectors.