RESPONSE TO "TOWARDS CARBON CAPTURE AND STORAGE" FROM THE GRANTHAM INSTITUTE FOR CLIMATE CHANGE, IMPERIAL COLLEGE LONDON

The following represents the views of Professor Sir Brian Hoskins, the Director and Dr Simon Buckle, the Climate Policy Director of the Grantham Institute for Climate Change, Imperial College London, to aspects of the Consultation Document, "Towards Carbon Capture and Storage". It has been informed by discussions with a range of colleagues at Imperial College.

Question 1: We would welcome views on what more the Government might do to promote the development and deployment of CCS technologies in the UK, EU and globally.

Response: The Government should approach the CCS issue in the context of its enormous potential contribution globally to limiting climate change due to enhanced greenhouse gases. This crucial point should not be lost sight of in the wealth of necessary detail that has to be discussed.

The Kyoto methodology for quantifying the relative importance of different greenhouse gases is very useful, but it should be recalled that the 100 year period used by it for evaluating the integral global warming potential is arbitrary. A significant fraction of the carbon dioxide added to the atmosphere in this century will still be elevating atmospheric carbon dioxide levels in thousands of year's time, whereas the other important types of greenhouse gas emissions will cease their direct impact over a few decades.

Therefore, for the long-term the focus must be on limiting the cumulative carbon dioxide emissions this century and this is the ultimate metric for success.

Stabilisation scenarios assessed by the IPCC AR4 (Working Group III, Chapter 3) suggest that to keep the likely range of global mean temperature increase to between 1.4-3.6 º C relative to their pre-industrial level implies that the cumulative carbon dioxide emissions between 2000-2100 must not exceed around 1100 $GtCO_2$ globally (range 800-1500 $GtCO_2$).

Higher stabilisation targets would of course allow higher levels of cumulative carbon but would also entail greater degrees of risk. For example, for a likely range of temperature increase of between 2.2-6.1 º C, the compatible level of cumulative carbon emissions would increase to around 3000 $GtCO_2$ (range 2270-3920).

The size of the carbon pie to be divided globally is finite and the timescale in which to make the necessary transformation of global energy systems and take effective action on deforestation is tight, although there remain significant uncertainties around the precise magnitude and timing. To put this into context, 1100 $GtCO_2$ is equivalent to around 30 years of anthropogenic CO_2 emissions (emissions from fossil fuel and deforestation etc) at 2004 levels, whereas 3000 $GtCO_2$ is over 80 years of the same level of emissions.

In terms of UK policy, it is also important to note that the rate of CO2 emissions from a number of large, rapidly developing countries is likely to continue to increase for some years to come, especially in the absence of CCS technology, further tightening mitigation requirements in other regions.

In such circumstances, investment in the development and early demonstration of CCS technology is an important insurance policy against future climate risks.

By stressing this background in all fora, the Government can create the context for the promotion of the development and application of CCS in the UK, EU and globally.

Question 15: What might be the impact of the potential costs of CCR for 100% biomass power plants and so the implications for their future build? Should the Government explore excluding 100% Biomass schemes from the proposed Article 32?

Response: The levels of carbon dioxide are currently rising faster than the highest IPCC scenario. Whatever international action is agreed to reduce future greenhouse gas emissions, it seems very likely that the atmospheric levels that will be achieved by 2030 will imply levels of climate change that will prove

extremely difficult for adaptation. Further the level of carbon dioxide will lead to acidification of the oceans that will have serious implications for oceanic biota. Geo-engineering attempts to compensate the changing climate will have unknown detailed climate impacts and side-effects and not deal with the ocean acidification problem. Attempts to fertilise the ocean, even if viable, would have unknown implications for the ecosystems there. In contrast, biomass with CCS could offer the prospect of reducing atmospheric carbon dioxide without such major Earth system problems.