SUBMISSION FROM THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION (RCEP)

Introduction
Over the past 11 years, RCEP has dealt with climate change issues in a number of its reports. The subject of the 18th report in 1994 and the follow up 20th report in 1997 was Transport and the Environment. One of the big drivers for restricting the growth in transport, particularly road transport, was the potential impact of the associated carbon dioxide emissions on climate. The 22nd Report in 2000 centrally addressed the climate change issue and the implications for UK Energy policy. Since that time two relevant shorter studies have been performed and reported on, the topics being the large-scale impact of aviation, and biomass as a future renewable energy source. The energy, aviation and biomass studies will be described further in this statement.

Energy – the Changing Climate (RCEP, 2000)
In this report RCEP considered the scientific evidence that emissions of greenhouse gases associated with human activity were perturbing the climate system, and that if they were not curbed they were likely to cause climate change that would have serious implications for humans and for the natural world. It concluded that this evidence was so persuasive that policy for the energy sector, a large contributor of carbon dioxide emissions, must take this into account.

By considering the best available evidence, RCEP decided that if the impacts of climate change were to be kept at a level that could be tolerated, the world carbon dioxide emissions in 2050 could certainly not be greater than those in 1990. It was also considered that the only hope of international agreement was to apportion the allowed amount equally among all the citizens of the world, the so-called contract and converge. The developed countries emissions would have to contract, allowing the developing countries to expand and all would converge at the same level. For the UK this would mean a 60% reduction in its carbon dioxide emissions. It was proposed by RCEP that this should be a target for the UK. The UK Government later accepted this as an objective for the UK and proposed that it should become accepted also at a European level.

RCEP discussed the ways such a reduction might be achieved. It found that there is no single solution. However first consideration must be given to being more miserly with the energy we use. This has major implications for manufacturing industry, commercial and public services, households and transport. Progress could be assisted by economic instruments or a carbon tax as part of a package of measures.

RCEP considered the alternatives to fossil fuels as sources of energy. On the large-scale these comprise nuclear, hydroelectric and tidal barrages. On smaller scales there are wind, wave and solar. Involving carbon, but in an almost neutral way, there is the combustion of urban, agricultural and forestry
wastes and of energy crops. There is also the possibility of capturing carbon dioxide before emission at power stations, liquefying it and sequestering it underground.

RCEP was dismayed to find that in real terms Government support for energy related R&D had dropped by a factor of about 8 between 1987 and 1998, with no compensating increase from the private sector, and that renewables had had relatively little attention.

RCEP looked at possible ways the proposed 60% reduction in emissions by 2050 could be obtained with known technology. It was clear that transportation is the sector for which carbon free alternatives are least apparent and the proposed carbon dioxide reductions if applied equally would be most difficult. Four scenarios were produced for energy production, each meeting the 60% reduction target. In each a large proportion of the allowed carbon dioxide emissions were given to transport because of the lack of alternatives. Two of them had base load power stations that could be nuclear or fossil fuel with carbon capture and sequestration, and two of them did not. They all had a mix of renewables, the amount of which depended strongly on the postulated reduction in energy usage.

A 60% reduction in UK carbon dioxide emissions by 2050 is possible. However if this possibility is to be realistic, significant actions and changes are required now and in the next decade.

**The Environmental Effects of Civil Aircraft in Flight (RCEP, 2002)**
This report was a response to the discussion on airport expansion and new runways stimulated by the Government. The discussion was focussing on local pollution, noise and land-take issues, and RCEP wished to highlight that the large-scale environmental impact of aviation and its continued expansion was also important. In particular the contribution of aviation to climate change was discussed in the report. This contribution is associated not just with carbon dioxide from the fuel burn. Nitrogen oxide emissions are also important. The most uncertain but possibly very important effects are associated with the production of contrails and the tendency to increase cirrus clouds. The total impact of aviation on climate was estimated by RCEP to be probably about 3 times that due to the carbon dioxide emissions alone.

Based on the scientific evidence and current projections of aviation activity, it was estimated that by 2050 some 6-10% of the human impact on climate could come from aviation. For the UK if any calculated climate impact included aviation arriving or leaving its airports the proportion due to aviation could be much larger than this.

Technological advances should be taken advantage of wherever possible. However there is no complete technological fix that could be put into practice in the next 20 years. It is clear that unlimited expansions of aviation will mean even more necessity to cut greenhouse gas emissions in other sectors if climate change is to be limited. Because of the fuel burn, short haul flights were found to be particularly damaging per passenger kilometre.
Biomass as renewable energy resource (RCEP, 2004)
One of the carbon-neutral energy sources discussed in the 22\textsuperscript{nd} report was the combustion of biomass. This was returned to in this shorter study as there seemed to have been little progress and it was felt that the advantages and needs of this approach needed further analysis and profile. Biomass combustion has the advantage over other sources of renewable energy of being controllable and of producing heat. This low-grade heat can be used directly, whilst electricity production should be viewed as a more minor product. The technology is proven and biomass energy production is well established in several countries around the world.

Sufficient biomass is already available to initiate the sector in the UK, in the form of forestry products and by-products, straw and municipal arisings. However the longer-term requires the growth of energy crops such as coppice willow and by 2050 a significant change in agricultural land-use.

Government support measures for biomass energy and the long-term need for energy crops have been unsatisfactory. It has also focussed too much on electricity generation rather than energy production.