

## Royal Commission on Environmental Pollution Choice of Topics for 27<sup>th</sup> Report

Submission by the Royal Academy of Engineering to the  
Royal Commission on Environmental Pollution

December 2005

## **1. Introduction**

The Royal Academy of Engineering is pleased to respond to the Royal Commission on Environmental Pollution's consultation on the choice of topics for the Commission's 27th report.

The ideal subject for Royal Commission's next study would be one that was pertinent to current or future interests, primarily of the UK, where the Commission is likely to contribute original thinking and advice. Similarly, topics should be chosen for their medium to long term impact, certainly beyond the usual political or commercial timeframes of more usual studies. All of the potential topics identified in the Commission's letter of 30th September have these attributes and the Fellows of the Academy who were consulted endorsed them all on these grounds.

Given that ideal topics should have medium to long term impact, it is important that studies should involve a certain degree of horizon scanning for likely developments in both the environmental situation and the available technologies (both remedial and antagonistic to the environmental situation) over the period of relevance to the study. The use of scenarios is likely to be useful in this respect and has been used to good effect in previous Commission reports.

Another general issue that came to light was the suggestion that the Commission should continue to monitor and push for the implementation of its recommendations from previous reports and studies. Wherever possible, the Commission should take the opportunity to reiterate previous recommendations whenever there is relevance to the topic in hand.

None of the topics being considered present clear cut pictures as to the pros and cons of the technologies or substances involved. Whilst a study limited to environmental impacts would be of considerable worth, a risk analysis approach to the potential effects might, in some cases, add further value.

Detailed comments on the four proposed topics for the 27th Report and the three potential topics for special studies are contained in the following pages. The comments are organised into groupings for each topic, covering: the appropriateness of the topic; approaches and treatments of the subject; and other comments including other studies in the area.

## **2. Assessing the environmental impacts of novel materials and applications**

### **2.1. Appropriateness of the topic**

This was felt to be particularly relevant currently with the REACH (Registration, Evaluation and Authorisation of CHEMicals) legislation going through its final stages in the European Union. Whilst REACH will have major consequences for the ongoing use of many chemicals, it also has implications for the testing and acceptance of new chemicals and materials. Also, being such an all encompassing legislation, there is unlikely to be further regulatory legislation on chemicals for quite a considerable period.

Beyond the direct impact of REACH, there is growing concern about the testing and acceptance procedures for novel ultra fine powders and nanoparticles. This concern was expressed in the Royal Academy of Engineering and Royal Society report, *Nanoscience and Nanotechnologies: Opportunities and uncertainties*. Another related concern raised in the Royal Academy / Royal Society report concerned research into the release of free nanoparticles into the environment as a remedial action to clear up certain types of ground water pollution.

Whilst new chemicals and nanoparticles stand out as topical examples of novel materials which may have significant environmental impacts, the Commission should not restrict the study to these. For example there is widespread concern about the effects of small quantities of various chemicals on public health, which are sometimes connected with the rising incidence of asthma and other allergic disorders.

### **2.2. Approaches and treatment of the subject**

The proposed set of issues to be addressed within this topic is comprehensive and reflect the major concerns identified by the Royal Academy / Royal Society report in relation to nanomaterials.

In relation to waste issues, the Royal Academy / Royal Society report expressed concern over the possible release of nanoparticles from a fixed matrix through wear and tear and in the process of final disposal as well as end of life disposal itself. This particular aspect may warrant the Commission's attention and is applicable to other areas of novel materials as well as nanomaterials.

Due to the rapid rate of development of new and novel materials, such a study could be of most value if it were able to examine frameworks and processes for dealing with new materials rather than expending too much effort on trying to determine what advances are likely to occur in the future. Alternatively, if the Commission is keen to tackle specific materials and technologies, then there would be value in ensuring that the topic is revisited every five years or so to review previous recommendations and to examine the implications of new advances.

### **2.3. Other relevant studies**

The Commission has already identified that there have been a number of recent studies, mostly concerned with nanotechnologies, such as the Royal Academy /

Royal Society report, the OST response to it and the work currently being conducted within DEFRA. In addition, there are a number of other studies being conducted such as *Exposition Professionnelle aux Aérosol Ultrafins presents dans l'atmosphère des lieux de travail* (EXPAU) by the Institut National de Recherche et de Sécurité in France and *Safety and Risks of Nanotechnology: Overview of completed and ongoing activities* by TEMAS ag in Switzerland.

The Academy is not aware of any similar studies looking at novel materials and technologies in general or, as the Commission points out, rare earth metals in particular.

### **3. Implementation of environmental policies**

#### **3.1. Appropriateness of the topic**

Almost every national and international policy has an effect, deliberate or otherwise, on the environment and consequently business in the UK today faces a plethora of different legislative mechanisms designed to address environmental issues. The mixture of financial incentive, taxation disincentives, targets, buy-outs and trading mechanisms currently in place mean that such a study would be warmly welcomed by those with business interests.

In part due to the complexity and multitude of environmental legislation, the effective implementation of new policies is often compromised by the level of understanding and experience of regulatory or advisory bodies. The UK's "fridge mountain" arose out of fairly simple and ultimately avoidable misunderstandings of the relevant EU directive.

It is often the case that policies act antagonistically towards each other. For example, plans to dramatically increase the housing stock in the South-East will be antagonistic to many of the environmental aims of other policies. In such cases, some environmental damage has to be accepted as a price for progress but it is necessary that such damage is minimised. The Commission's interest in this area could help to further develop environmental risk assessments for new legislation.

The Academy therefore believes that the topic is highly appropriate for study by the Commission especially if examining the feasibility of simplifying the various delivery mechanisms were part of the brief. In this vein, the Academy has previously argued for a straightforward carbon tax on primary fuels instead of the current maze of separate energy efficiency, emission reduction, renewables promotion and emissions trading policies.

#### **3.2. Approaches and treatment of the subject**

The focus on the time taken to successfully implement environmental policies is important. As well as the time taken to bring legislation into force, the Committee might also look at the time required to build up sufficient legal precedents for the enforcement of the legislation to be consistent and fully understood by industry. This period can be reduced by clearer drafting and aiming for compatibility with existing legislation as well as simplicity. The Commission could make useful comments and recommendations on how best to keep the inevitable implementation time to a minimum.

A related issue that may warrant the Commission's attention is the effectiveness of "joined-up Government" in respect of environmental policy. Although there have been significant improvements over recent years, the current situation with, for example, responsibility for energy efficiency residing in a different department to energy production, further improvements could be made.

As with the development of novel materials and technologies, the rate of implementation of new environmental policies is increasing both in the UK and Europe, so it would be beneficial if the Commission's study could suggest a

framework for developing new policies and review progress on a rolling five year basis.

The Commission's emphasis on measures to influence small companies and individuals is welcome, although while delivery mechanisms remain focused on economic instruments, this seems to be an intractable problem.

### **3.3. Other relevant studies**

The main study that the Academy is aware of in this area is DEFRA's recent consultation on its own Evidence and Innovation Strategy which is to be welcomed.

## **4. Noise and light pollution**

### **4.1. Appropriateness of the topic**

The Commission correctly identifies the fact that noise and light pollution are both becoming more important in the public's perception. However, increasing levels of complaints may be as much due to increased awareness as actual increases in noise and light levels. Nevertheless, it might be argued in this case that public perceptions are at least as important as actual noise and light levels.

The relevant EC Directives on noise have been identified by the Commission and the imminent imposition of ambient noise levels means that such a study would be both timely and appropriate. While the UK Government's response to the Directives has been to encourage noise mapping, this does not provide a solution; merely a quantification of the problem (though possibly not its effects).

It appears that the effects of noise and light pollution can manifest themselves through psychological rather than physical health problems and are therefore less easily quantified or understood. Better understanding or better methods for quantifying noise and light nuisance would be valuable and such a study could usefully contribute to that debate.

Both noise and light pollution are predominantly urban problems in terms of where the majority of people are affected by them and where they are generated. There is, therefore, a danger of significant overlap with the Commission's current study on the Urban Environment and it seems that most of what can be learnt about urban noise and light pollution could be translated to the rural environment as well.

### **4.2. Joint topic or separate studies**

The natures of noise and light pollution are different enough to justify separate special studies for each topic. Additionally, the noise debate is at a much more mature stage, so it may become difficult to appear to give both equal treatment and status in a joint study.

As well as noise and light pollution, the Commission might also like to consider problems associated with vibration associated with traffic. While it is of lower impact as a nuisance to people, it can, over time, affect the stability of buildings.

### **4.3. Approaches and treatment of the subject**

Noise and light are different to most forms of pollution in that they are transient and localised. They do not accumulate, so once the source is removed or turned off, the pollution is gone immediately. The separation of people from the sources is not always feasible, significantly less so in the urban environment. Physical barriers can be effective in shielding from noise and light, but can be expensive to implement. While it is still so difficult to quantify the nuisance and detrimental health effects incurred, it is difficult to know how best to prioritise reduction or removal of sound and light sources. A study into the health effects (physical and psychological) incurred by those at risk might therefore be more useful than a study into the prevalence of noise and light pollution.

In considering noise pollution, there is the possibility of unforeseen results. For example, the mapping of noise as a determination of the problem could show air transport in a very favourable light against rail and road transport. This would be because its noise foot print is concentrated and probably affects fewer people as its land take is so much smaller.

#### **4.4. Other relevant studies**

The Commission has identified the main recent studies and reports into noise and light pollution and should also bear in mind possible overlap with their own study on the Urban Environment.



## **5. Nuclear energy: framing the environmental debate (special study)**

### **5.1. Appropriateness of the topic**

With the announcement of the Government's Energy Review on 19<sup>th</sup> December, this topic is very appropriate. It is strongly rumoured that while the 2004 Energy White Paper recommended that the nuclear option be kept open, the current review will assess nuclear power on a more practical basis.

A new civil nuclear programme would be very attractive in terms of reducing CO<sub>2</sub> emissions or at least maintaining the current level of nuclear electricity generation so that any growth in renewables makes a real contribution rather than reducing a deficit. However, this advantage must be balanced against nuclear waste issues.

Regardless of any decision on a new civil nuclear programme, there is a legacy of nuclear waste which must be dealt with. Unfortunately, the linking of a new civil nuclear programme with a final solution to the nuclear waste problem may have led to delays in dealing with the waste issue as a way of ultimately delaying a decision on new nuclear build. Ultimate disposal or proper long term storage of legacy waste must now be seen as a high priority.

Debate around all issues surrounding nuclear power has become very polarized and in some cases, views have become very dogmatic. This is, in part, due to a loss of trust in the industry and what might now be thought of as outdated public engagement techniques. Such a background will make restarting public engagement on a level footing problematic, but resolution of these issues is now becoming urgent and every effort should be made in this respect.

Addressing the environmental issues surrounding the nuclear fuel cycle could also be useful.

### **5.2. Approaches and treatment of the subject**

A study that concentrates on the environmental issues, both pros and cons, of nuclear power, divorced from any debate about cost or generation mix would be very useful at this stage. There are, however, a number of areas where cost and environmental difficulties might be worth incurring for a greater good such as reducing the potential for nuclear proliferation or terrorist access to nuclear materials. In this regard, the management of risk rather than its absolute avoidance should be given a high priority in the study.

An environmental assessment of the nuclear fuel cycle should consider fuel re-processing in a holistic manner. Regardless of discussion as to whether THORP should ever have been built, will ever break even or if the UK should accept foreign contracts for reprocessing, the non-proliferation advantages, including reducing plutonium stocks, of using the mixed oxide (MOX) fuel cycle should be considered.

### **5.3. Other relevant studies**

The Commission has identified some of key studies already in the public domain and it is certain that there will be a number more published in the near future. Most of these will concentrate on the economic case for new nuclear build and the Commission's proposed study framing the environmental debate, would be most welcome.

## **6. Water in the United Kingdom**

### **6.1. Appropriateness of the topic**

The proposed study on water in the UK gained broad support among the Academy's Fellows. Taking the long term view of UK water resources that the Commission would be able to do, massive demand increases can be seen, especially in the South-East, at a time when the climate change implications for precipitation in the region are uncertain.

Because of the timescales involved in the ramping-up of water demand through development, this topic is not urgent in the sense some of the other proposed topics are and the window of opportunity for making meaningful recommendations is somewhat longer. Nevertheless, the examination of such long-term issues is appropriate and the topic should not be dismissed because other topics are more urgent. The consideration of strategic, economic and social dimensions in the longer time scale will also be important.

This topic lends itself to an approach which places a high priority on sustainability and sustainable development. However, the study should recognise that absolute sustainability may not be achievable given current development requirements and, therefore, a risk management rather than risk avoidance approach may be appropriate.

### **6.2. Approaches and treatment of the subject**

In addition to the areas for consideration under this topic as laid out in the Commission's letter of 30<sup>th</sup> September, the Commission might also consider the development of new sources of water. While the consideration of efficiency, recycling, re-use and non-use should be high on the Commission's list of priorities, examination of alternative sources, such as desalination, should be examined in the context of how they might reduce stress on existing systems.

Although the topic of run-off has been addressed in other studies, including the Commission's previous studies, it may have significance in this study because of the developmental pressures within the South-East and effects that run-off may have in changing the patterns of replenishment of ground waters.

### **6.3. Other relevant studies**

The Academy is aware that there have been many studies in this area both in and out of the public arena. The Commission have identified the key studies publicly available including those surrounding the Water Framework Directive.

In addition to these, the Commission will be aware of the House of Lord's Science and Technology Select Committee's Inquiry into Water Management which is currently on-going.

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19/12/05