

Mrs Nina Commeau
Directorate - General for Energy &
Transport
European Commission
200, rue de la Loi
B-1049 Brussels
Belgium

Thursday, 29 November, 2001

Dear Mrs Commeau

Towards a European strategy for the security of energy supply

The Institute of Physics is a leading international professional body and learned society, with over 32,000 members, which promotes the advancement and dissemination of physics and its applications.

The Institute embraces member-based professional subject groups in areas including Environmental Physics, Combustion Physics, Nuclear Physics and Energy Management. Members are involved in many areas related to energy issues, including R&D of low emission energy technologies, understanding of the climate through climate modelling, and in environmental pollution monitoring. The Institute is well placed, therefore, to comment on technical issues pertaining to the security and supply of energy. Issues such as energy markets, however, lie beyond its remit.

The Institute has been actively involved in the debate of energy and environmental issues and has submitted its views to several governmental and parliamentary consultations. A list of the Institute's previous contributions to the energy and environment is given on the Institute's website at <http://physics.iop.org/Policy/public.html>.

The Institute welcomes the Green Paper, which it believes highlights most of the threats and opportunities the Member States of the European Union (EU) are likely to face in the short to medium future with regards to the security and supply of energy.

The Institute recognises the fundamental importance of secure energy supplies to maintain the social and economic structure in Europe. It therefore:

- believes that stability and security is best assured by maintaining a mixed energy economy, drawing on all energy sources as appropriate to meet energy and environmental needs;
- supports the importance of environmental and sustainability issues, as evinced by the Kyoto declaration and targets, and concludes that meeting those targets must be a prime, although difficult, objective;
- believes that science and technology will be key drivers in future energy policy, and thus that increased research and development into all forms of energy generation, efficiency end use, and the science and technology underlying them, will be needed if we are to achieve these objectives;
- supports the concept that a common policy needs to be adopted in order for the Member States to be able to supply energy from indigenous sources without the risk to supply that could arise from factors outside of the EU;
- urges that all energy sources be addressed for their contribution to our energy needs on an equal basis – in particular we are concerned at the trend away from nuclear power, despite its comparative benefits in respect of climatic effects; and
- believes that many of the issues relating to energy are reliant upon an assured supply of high quality science graduates and the public's acceptance of the need for environmentally sustainable policies.

The Institute's comments on some of the most pertinent questions raised for debate in the Green Paper are given in the attached annex.

I hope these points will be of help. If you need any further information on the points raised, or generally on the Institute's views on energy and environmental issues, please do not hesitate to contact me.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Peter Cooper', written in a cursive style.

Peter Cooper
Director, Science

Response to the Green Paper, Towards a European strategy for the security of energy supply

1.	<p>Can the European Union accept an increase in its dependence on external energy sources without compromising its security of supply and European competitiveness? For which sources of energy would it be appropriate, if this were the case, to foresee a framework policy for imports? In this context, is it appropriate to favour an economic approach: energy cost; or geopolitical approach: risk of disruption?</p> <p>The Institute of Physics shares the general concern that an increasing dependence on external energy sources leaves the EU in a vulnerable position with regard to security of electricity supply. It has been suggested that many EU nations will move increasingly to importing energy resources, in particular, natural gas from nations outside the EU. A reliance on natural gas as a major energy source leaves EU nations vulnerable to severe disruption of supply in case of adverse political or economic decisions elsewhere. Therefore, the Institute supports the concept that a common policy needs to be adopted in order for the EU to be able to optimise supply energy from indigenous sources to minimise the consequences of supply problems outside the EU. A framework policy for importing natural gas and oil seems to be most appropriate, but the Institute is not in favour of economic approaches alone. The Institute would favour technological advancements to be a driver for this policy.</p>
5.	<p>Should more reserves be stockpiled - as already done for oil - and should other energy sources be included, such as gas or coal? Should the Community take on a greater role in stock management and, if so, what should the objectives and modalities be? Does the risk of physical disruption to energy supplies justify more onerous measures for access to resources?</p> <p>The Institute is of the view that larger reserves of all fossil fuels, including coal (as clean coal technologies are in the process of being developed) need to be stockpiled as fossil fuel sources are finite and will be the main source of electricity for many years to come. Other sources that need consideration are renewables and hydrogen for fuel cells. If renewables are to be seriously considered as the primary source of electricity supply in the foreseeable future, then the <u>issue of storage needs to be urgently addressed</u>. At present renewables suffer from a number of barriers to innovation, including difficulties in supplying electricity in all weather scenarios and the storage of electrical energy during short days and long nights, and long-term seasonal storage problems.</p>

<p>7.</p>	<p>The development of some renewable energy sources calls for major efforts in terms of research and technological development, investment aid and operational aid. Should co-financing of this aid include a contribution from sectors which received substantial initial development aid and which are now highly profitable (gas, oil, nuclear)?</p> <p>The Institute is of the view that renewable energy technologies will play a vital role in supplying carbon-free electricity in the medium-term future, and will eventually significantly reduce the requirement for fossil fuel consumption by EU nations and the rest of the world. Renewable energy technologies are an essential part of the future energy mix but need an increase in research and innovation in the relevant R&D sectors, in order for the UK and the EU to be in a position to respond to the challenges of the medium to long-term future.</p> <p>Most of the R&D expenditure needs to be aimed at removing the barriers to innovation, currently affecting most renewable technologies. These include disadvantages with respect to base-load capacity and the inflexibility of their supply and high capital costs in comparison to fossil fuel technologies.</p> <p>The Institute is of the view that all low CO₂ producing technologies, not just renewables, require further R&D from both public and private sources. R&D is essential and physics and physicists have much to offer.</p>
<p>8.</p>	<p>Seeing that nuclear energy is one of the elements in the debate on tackling climate change and energy autonomy, how can the Community find a solution to the problem of nuclear waste, reinforcing nuclear safety and developing research into reactors of the future, in particular fusion technology?</p> <p>The Institute is concerned to note that the Green Paper states that most EU nations would be in favour relinquishing the nuclear sector of supply energy. The Green Paper also highlights that at present 15% of energy demand is covered by nuclear, and this could be as little as 6% by 2030. The energy mix for the future, under all scenarios, must inevitably include some nuclear power generation. The decommissioning of existing nuclear power plants, unless countered by the development of new reactors, will result in nuclear power electricity generation declining over the next decade as highlighted in the Green Paper. This may lead to a greater dependence on fossil fuels to supply energy, as it is at present impossible to envisage renewables meeting the increased demands for energy, owing to the continuing need for research and development, and difficulties in supplying energy during long winter nights.</p> <p>It is imperative, therefore, for nuclear power to have a significant role in a future energy mix, that progress is made on the issue of the safe disposal of nuclear waste. Within current time-scales nuclear waste has been managed satisfactorily but a decision on a long-term repository is necessary as part of the solution. However, a final strategy for the safe storage of waste does not need to be identified for a decision to allow new nuclear power plants to be built, to be</p>

	<p>made. Progress is being made in other countries and the lack of progress, particularly in the UK, needs to be addressed. The development of reactor designs with greater intrinsic safety properties should be encouraged, particularly in light of recent incidents in former USSR nations. Recently in the UK the nuclear waste issue has received renewed consideration by parliament, government and third parties, which the Institute welcomes.</p> <p>The Institute acknowledges that the issue of nuclear waste is a complex problem, the solution to which will involve the input of engineers and physical and social scientists. There is a need for dialogue at national and international level between science, engineering and policy makers and all concerned publics in order to establish a policy that meets all of the public's legitimate concerns. The European physics community is in a strong position to contribute to diverse approaches to the problem, while simultaneously allowing important momentum towards deep geological repositories to be maintained.</p> <p>Regarding the development of nuclear reactors, funding and support for R&D needs to continue as support for nuclear fission and fusion R&D is under threat in various EU nations. In particular, fusion in Europe allows for global leadership and time-scales that match climate change. The physics of fusion has been demonstrated and now engineering challenges lie ahead. Fusion has much to contribute and there needs to be a political will on a shorter time-scale than previously considered.</p>
9.	<p>Which policies should permit the European Union to fulfil its obligations under the Kyoto Protocol? What measures could be taken in order to exploit fully potential energy savings, which would help to reduce both our external dependence and CO₂ emissions?</p> <p>The objective of meeting climate change targets is fundamental, as the issue of stopping the growth (and preferably lowering) of atmospheric CO₂ levels and other greenhouse gases is one of great importance, and possibly the one key factor in reducing the ever increasing threat of global warming.</p> <p>The Institute is of the view that nuclear power has a major role to play in lowering CO₂ emissions, as it can meet base-load electricity demands and is a low CO₂ emitter. If the EU in light of the recent ratification of the Kyoto Protocol wishes to overcome the problem that most EU nations are poorly prepared to meet their respective emissions targets, then they need to seriously consider the commissioning of further nuclear power plants, rather than the decommissioning.</p>
10.	<p>Can an ambitious programme to promote biofuels and other substitute fuels, including hydrogen, geared to 20% of total fuel consumption by 2020, continue to be implemented via national initiatives, or are co-ordinated decisions required on taxation, distribution and prospects for agricultural production?</p> <p>The Institute is of the view that hydrogen has a vital role to play as a fuel in the</p>

	<p>present and in the foreseeable future. However, further R&D, particularly on the issues of storing hydrogen, is required at a national and European level.</p>
<p>13.</p>	<p>How can we develop more collaborative visions and integrate the long-term dimension into deliberations and actions undertaken by public authorities and other involved parties in order to evolve a sustainable system of energy supply. How are we to prepare the energy options for the future?</p> <p>The answer to most questions regarding energy options for the future lies with increased support and funding for R&D. In the UK, in particular, the expenditure on energy research was in steady decline during the 1990's, but has recently picked up as a result of a number of government subsidies awarded to a few renewable technologies. However, all low carbon emitting technologies, including nuclear, need to be supported if the future problems facing the EU highlighted in the Green Paper regarding energy supply are to be avoided.</p>
<p>14.</p>	<p>Any other questions or proposals:</p> <p>In order to tackle the scientific and technological challenges presented by future energy scenarios, the EU will need to recruit more new graduates to energy and environmental disciplines. This will require offering better employment opportunities for graduates working in energy and environment sectors. These sectors are growing, but have few career role models as compared with other disciplines. The sector must recognise more fully the need for career development and must initiate attractive training programmes to attract the best graduates.</p> <p>The public's understanding of the key issues, especially those related to science and technology will have to be enhanced. It is essential that education and information is provided in a co-ordinated way, starting in primary schools and continuing through to the adult population. But informing the public is only a part of the solution – the public has a voice and its views and concerns have to be taken into account.</p>