

Towards a European strategy for the security of energy supply

This response has been prepared by Sir Eric Ash CBE FEng FRS, Chair of the Royal Society's Energy Policy Advisory Group, in consultation with other members of the group. Sir Eric is also Treasurer and Vice-President of the Royal Society¹.

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| 1. | <p><i>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?</i></p> <p>Both an economic and a geopolitical approach will be required. The risk of reliance on imports depends on the number of suppliers who can be regarded as likely to be "uncoupled" –separated by geography and history. For example, reliance on coal coming from Russia and the USA (which are geographically and historically separated) is more acceptable than gas from Russia and Romania. The economic/geopolitical issue does not lend itself to any simplistic answers – especially if one looks at a 50-year time horizon.</p> |
| 2. | <p><i>Does not Europe's increasingly integrated internal market, where decisions taken in one country have an impact on the others, call for a consistent and co-ordinated policy at Community level?</i></p> <p>The European Union already has a co-ordinated policy on climate change and, once the Kyoto Protocol is ratified, it is committed to reducing its annual emissions of carbon dioxide by 8% by from 1990 levels by 2008-2012. We believe that, consequently, there is a need for a co-ordinated policy at the EU level on certain aspects of economic policy – specifically energy taxation. As we outline below, we believe that a carbon tax – harmonised across Europe – is the most effective way to proceed.</p> <p>The Green Paper states that its long-term strategy for energy supply security must be geared to ensuring, for the well-being of its citizens and the proper functioning of the economy, the uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial), while respecting environmental concerns and looking towards sustainable development.</p> <p>Our particular interest is in "respecting environmental concerns". In this context the words in question two have a particular resonance. It refers to decisions taken in one country and their impact on the others. We believe the question is referring to the particular issue of national policy decisions. However, consideration of environmental concerns must start from the recognition that economic actions (by consumers or producers) in one country can affect the lives of those in others, by their effect on air</p> |

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| | <p>and water quality and, potentially most serious, on the climate. Global problems require global solutions. While these are being developed, there is a clear case for action at the Community level.</p> <p>The integration of the market for goods and services and the proposed integration of markets for energy raise problems that are more familiar. The objective is the most efficient allocation of scarce resources between activities and countries. European law already seeks to ban national actions that interfere with free competition by, for example, protecting or subsidising domestic producers. An integrated market for energy does not raise new problems though it does raise particularly complex versions of old problems. The well-recognised problem in relation to environmental concerns is that economic activities can impose costs on others that are not borne by producers or consumers (the problem of "externalities"). These problems can be dealt with by some combination of regulation and taxes. We warmly endorse the conclusions in the Green Paper that: "In an increasingly open market, taxation is still the most flexible and effective instrument for encouraging operators to change their behaviour."</p> <p>In our report <i>Nuclear energy-the future climate</i> we particularly supported the role of carbon taxes, rather than general taxes on energy, as the most efficient form of taxation for meeting environmental objectives. It follows that we agree that the whole issue of energy taxation should be re-examined taking account of energy and environmental objectives. As far as competitiveness is concerned we believe that there is often a misunderstanding about the very purpose of energy taxation. If there is a desire to discourage energy consumption in general or the production of CO₂ in particular, one way of doing so is to increase the relative cost of energy-consuming and CO₂-producing activities. If the result is investment in energy-saving technology that is fine, but we must also accept that one result can and should be a relative decline in the demand for energy intensive goods and services. A loss of competitiveness is precisely what is needed. We fully understand the concerns of those who lose competitiveness to producers in other countries that are not imposing the same taxes. Hence the need for international action where the problem is international. Security of energy supplies is a problem for the European Union and requires solution at that level.</p> <p>[Reference: Royal Society and The Royal Academy of Engineering (1999) <i>Nuclear energy – the future climate</i>. Available from http://www.royalsoc.ac.uk/policy.]</p> |
| <p>3.</p> | <p><i>Are tax and state aid policies in the energy sector an obstacle to competitiveness in the European Union or not? Given the failure of attempts to harmonise indirect taxation, should not the whole issue of energy taxation be re-examined taking account of energy and environmental objectives?</i></p> <p>As outlined in detail above (please see our response to question 2), we agree that the issue of energy taxation should be re-examined taking account of energy and environmental objectives. We believe that a carbon tax, harmonised at the European level, is the most effective way to proceed if the aim is to reduce emissions of CO₂ and thus tackle the causes of climate change.</p> |

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| 4. | <p><i>In the framework of an ongoing dialogue with producer countries, what should supply and investment promotion agreements contain? Given the importance of a partnership with Russia in particular, how can stable quantities, prices and investments be guaranteed?</i></p> <p>This is outside our expertise.</p> |
| 5. | <p><i>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?</i></p> <p>This is outside our expertise.</p> |
| 6. | <p><i>How can we develop and ensure better operation of energy transport networks in the European Union and neighbouring countries so as to enable the internal market to function properly and guarantee security of supply?</i></p> <p>Energy storage is the specific technological issue that bears on the distribution of energy. There are some old and some new technologies that need to be evaluated, and which can have an important influence on the need for and economics of energy distribution.</p> <p>It is not clear how much randomly intermittent sources of power such as from wind, wave or solar sources can be tolerated by an electricity supply system. According to the International Energy Agency as the contributions of these sources approaches 12% of power supplied and electricity not being capable of storage, policy makers need to start thinking about creating an energy buffer. At a 20% level it is contended that a buffer is absolutely necessary. Such a buffer can be supplied by pumped storage schemes in principle if enough storage capacity is installed. One possible option is the use of hydrogen (perhaps from electrolysis) providing the buffer and energy storage needed. This is an important area for research and development but we believe that a detailed economic analysis of the role of hydrogen is an essential first step. In this context the development of fuel cells is a complementary activity to the development of renewable energy sources.</p> <p>There is thus a technical limit to the development of renewable energy sources if they are geared entirely to the production of electricity. The production of hydrogen, on the other hand, leads to a different energy vector for electricity generation and transport, among other uses, with the significant benefits of security of supply and, most importantly, the reduction of carbon dioxide emissions. We identify this as a priority area for development.</p> <p>We believe that energy transport networks will be enhanced in response to appropriate economic instruments – notably a carbon tax.</p> |
| 7. | <p><i>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</i></p> |

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| | <p><i>initial development aid and which are now highly profitable (gas, oil, nuclear)?</i></p> <p>Sufficient levels of funding of research and development are crucial in ensuring sustained growth of renewable energy technology, with the correct balance depending on the technology in question. Wind turbines, for example, no longer require core research funding but do require investment in development to reduce manufacturing, production and installation costs. We have previously recommended that investment in this area be increased. The revenue from any carbon tax could provide an appropriate source of revenue to fund this increase.</p> |
| 8. | <p><i>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?</i></p> <p>As noted in the Green paper, nuclear power accounts for approximately 35% of the total electricity consumed in the EU. Projections based on the energy policies being pursued by the Member States suggest that this figure will fall to 9% by 2025 [Reference: Dilemma Study: Study of the contribution of nuclear power to the reduction of carbon dioxide emissions from electricity generation. Final report for Directorate General XVII of the Commission of the European Communities, July 1999]. To prevent an associated rise in CO₂ emissions, this capacity must be replaced by other non-emitting sources or electricity demand must be reduced. In the UK, at least, electricity demand is still rising. We recognise that important issues of the long-term management of nuclear waste have to be addressed but if the main priority of the EU and member states is to reduce emissions of greenhouse gases then we believe that the nuclear option should be kept open until it can be demonstrated that the renewables industry has developed to the extent that it can replace this carbon-free source of power. We also believe that any concerns relating to the financial viability of nuclear power could be addressed by a carbon tax.</p> <p>To win public confidence for nuclear power, particularly new build, national governments must express confidence in the ability of the industry to erect safe installations and to deal with the waste problem. With respect to new build, the nuclear industry in the UK is based on 1960s technology. New incremental and radical ideas for new build will require additional research and development. With respect to the waste issue, the key need is to identify a safe system for waste disposal – one that, with careful, detailed and transparent explanation will be acceptable to the public. There is a near-total consensus by scientists and engineers that disposal of nuclear waste in deep depositories is technologically sound. There are however other technological alternatives for dealing with waste – and these do need to be seriously considered. The Community needs to recognise this as a political problem. The UK has just launched a six-year programme of consultation and research on the future of radioactive waste. The first stage is primarily focused on determining the most appropriate way to consult the public. We would advise the European Union to seek best practice from member states regarding the issue of public dialogue over radioactive waste.</p> |
| 9. | <p><i>Which policies should permit the European Union to fulfil its obligations under the Kyoto</i></p> |

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| | <p><i>Protocol? What measures could be taken in order to exploit fully potential energy savings that would help to reduce both our external dependence and CO₂ emissions?</i></p> <p>The ratification of the Kyoto Protocol will be a small but essential first step towards stabilising atmospheric concentrations of greenhouse gases, but much more substantial reductions will be necessary by the middle of the century. We must consider exploiting all possible approaches, including using less energy, using technologies based on renewable sources, finding ways to prevent CO₂ from reaching the atmosphere and the nuclear option. It is not appropriate to dismiss an energy source on the grounds that it could supply 'only' a small percentage of the need. The chance of realising the potential of these various approaches would be much enhanced by the imposition of a carbon tax.</p> |
| 10. | <p><i>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?</i></p> <p>As we have outlined in our response to previous questions, we believe that a co-ordinated decision on taxation, namely the introduction of a harmonised carbon tax across the EU, is the main way in which the implementation of such a programme can be achieved. However, as we illustrate with reference to the example of biofuels below, national schemes and other EU policies (such as the Common Agricultural Policy) can also play a role.</p> <p>We have considered the issue of biofuels in our recent report on the role of land carbon sinks in mitigating global climate change. The planting of biofuel crops such as perennial grasses (e.g. <i>Miscanthus</i>) or short rotation coppice of willow can temporarily increase the amount of carbon stored in the soil of new forests and can produce a more permanent reduction in greenhouse gas emissions by replacing fossil fuels in power stations. We therefore welcome the new schemes to promote the planting of biofuel crops that have recently been introduced by the UK government as part of their plan to promote renewable energy sources. As with any agri-environment scheme we recommend that they be rigorously assessed to determine their full environmental impact. In our report we recommend that, in the light of the proposed reform of the Common Agricultural Policy, consideration be given to strategies that encourage the carbon mitigation potential of agricultural land throughout the EU. [Reference: Royal Society (2001) The role of land carbon sinks in mitigating global climate change. Ref 10/01. Available at http://www.royalsoc.ac.uk/policy].</p> |
| 11. | <p><i>Should energy saving in buildings (40% of energy consumption), whether public or private, new or under renovation, be promoted through incentives such as tax breaks, or are regulatory measures required along the lines of those adopted for major industrial installations?</i></p> <p>We believe that a carbon tax is the appropriate incentive for achieving a portion of the available savings.</p> |

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| <p>12.</p> | <p><i>Energy saving in the transport sector (32% of energy consumption) depends on redressing the growing imbalance between road and rail. Is this imbalance inevitable, or could corrective action be taken, however unpopular, notably to encourage lower use of cars in urban areas? How can the aims of opening up the sector to competition, investment in infrastructure to remove bottlenecks and intermodality be reconciled?</i></p> <p>We do not regard this imbalance as inevitable but it is important to recognise that it is very difficult to persuade people to reduce car use. The use of electric cars (where the electricity is generated from a non-CO₂ emitting source) and incorporating fuel cells in vehicles is an alternative way forward. We feel that the issue of air travel should also be addressed. The recent increase in air travel, has meant an increase in emissions from this source and we feel that this is an issue requiring attention.</p> <p>Again we would regard an appropriate economic instrument (such as a carbon tax or congestion charges in cities, as proposed for London) as the first step in reaching for a more appropriate balance in the transport sector.</p> |
| <p>13.</p> | <p><i>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?</i></p> <p>Dialogue with all interested parties is crucial and we see the wide consultation on the Green paper as an important first step in this process. Given the important role of the science and technology community - in providing an analysis of the problems (e.g. evidence for climate change), quantifying future trends (e.g. through interdisciplinary scenario modelling) and providing innovative solutions (new energy technologies) - they must play a key role in any such dialogue. At a European level, we would recommend that the Commission seek advice from independent scientific bodies such as the recently established European Academies' Science Advisory Council of which the Royal Society is a founding member. Clearly there is the need to take a global perspective with respect to developing a sustainable energy policy. At the international level, scientific advice can be sought from independent scientific bodies such as the InterAcademy Panel who held a conference on sustainability in May 2000. The Royal Society's contribution to this conference (Towards sustainable consumption: A European perspective) looks at some of the challenges of attempting to reduce energy consumption.</p> <p>[References: Transition to Sustainability in the 21st Century: The Contribution of Science and Technology. A Statement of the World's Scientific Academies (2000). Available at http://interacademies.net/intracad/tokyo2000.nsf</p> <p>Heap, B & Kent, J (eds) 2000. Towards sustainable consumption: A European perspective. London: The Royal Society. ISBN 0 85403 537 0. Available at http://www.royalsoc.ac.uk/policy/sustainreport.htm.]</p> |

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| 14. | <p><i>Any other questions or proposals:</i></p> <p>We believe that there are two key issues missing from this document. The first is the need to take a global perspective on this issue. The threat of global climate change is arguably the first truly global problem that the world has had to face. It must lead to new ways of international collaboration in countering this threat.</p> <p>Secondly the European Commission must recognise the key role that science and technology can play in meeting the challenges of providing a sustainable energy supply. As outlined above, the science and technology community can provide an analysis of the problems (e.g. evidence for climate change), a quantification of future trends (e.g. through interdisciplinary scenario modelling) and innovative solutions (new energy technologies). The priorities for research include the development of energy vectors such as hydrogen and methods for large-scale carbon sequestration.</p> <p>Sufficient levels of funding of research and development are crucial and much of the necessary research and development must be done in collaboration with other countries. It is not feasible for the UK to work in isolation in areas such as the development of designs of new nuclear power stations or large-scale carbon sequestration. We have previously advocated the establishment of an international body funded by contributions from individual nations. We do not envisage the establishment of a new research institution, rather an international fund for energy research and development where industry and academia could obtain funding to carry out a co-ordinated research programme.</p> <p>We would recommend that the European Commission, European Parliament and Council of Ministers seek independent scientific advice on these issues. We would be happy to facilitate this at the European and International levels through our membership of both the European Academies' Science Advisory Council and the InterAcademy Panel.</p> |
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¹ The Royal Society

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