

RCUK REVIEW OF ENERGY

PUBLIC CALL FOR THE SUBMISSION OF EVIDENCE

Please complete and return this form to EnergyReview@rcuk.ac.uk by **12th February 2010**¹. You must limit your submission to no more than 8 pages in length and no smaller than font size 11. You should address your comments to the issues flagged in the **evidence framework**. The headline questions only appear in this form.

All responses will be published on the website as part of the publication of evidence received by the Panel unless you state that there is confidential content for the Panel only.

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Statement of interest (please indicate your reasons for making this submission - 200 words max.):

The Society of Biology is a single unified voice for biology: advising Government and influencing policy; advancing education and professional development; supporting our members, and engaging and encouraging public interest in the life sciences. The Society has been created by the unification of the Biosciences Federation and the Institute of Biology, and is building on the heritage and reputation of these two organisations to champion the study and development of biology, and provide expert guidance and opinion.

This response is made on behalf of our membership which is composed of individual biologists and over sixty learned societies representing an effective membership of over 80,000. A list of member organisations is available on our website at www.societyofbiology.org. The Society of Biology is a charity (Charity No. 277981), and is incorporated by Royal Charter.

The Society welcomes this review and wishes to highlight the important role for biological research outputs in meeting energy requirements and the societal and environmental challenges of energy generation and use.

A. To what extent is the UK Energy community addressing key technological/societal challenges through engaging in new research opportunities?

A key component of the capacity to rise to these challenges is, and will be, the maintenance of appropriate skills and basic competence. The stresses applied by a generation of reduced interest in the nuclear industry is becoming apparent, it is important that similar trends do not fully evolve in

¹ Unfortunately no late submissions can be accepted.

areas such as plant breeding and environmental and biodiversity monitoring, which are essential components of development and implementation strategies. Research Councils rightly seek to develop 'cutting edge' science but also have a crucial role in preserving and developing fundamental underpinning skills and those research activities where long-term activity and expertise are less compatible with short-term funding cycles.

The consequences of energy usage, because of its scale and global impact, require long-term monitoring and large-scale research on biological impact. Some of areas were little recognised a few years ago (including atmospheric chemistry, insect microfauna, and marine sediments) and now require field-based and lab-based experimentation and passive monitoring.

Applications under Round 3 to Crown Estates already require a huge volume of biodiversity assessments. Monitoring obligations will also need to be fulfilled. These tasks are complex and require trained specialists, i.e. a sustainable supply of well-trained graduates and post-graduates.

The biological research community is actively exploring a range of biofuel options; synthetic photosynthesis; energy generation from non-food crop and crop residue sources of biomass; carbon capture and storage² as well as life cycle analysis of the carbon, nitrogen and water footprint of technologies, and environmental impact assessment and prediction for energy generation and use (off-shore and on-shore wind, hydro and wave, new nuclear facilities etc)

The Energy Technology Institute investigates some but not all candidate renewable energy technologies, for example biological energy including marine biomass, biomass for aviation and bio-based material use in transport to reduce energy consumption. BBSRC's Sustainable BioEnergy Centre (BSBEC) which works in these areas has £27m over 5 years for strategic R&D. By comparison the US Department of Energy is funding three bioenergy centres at \$375m and BP is funding the Bio-Energy Institute (EBI) at Berkley with \$500m over 10 years. There is considerable government funding abroad (US, France, China for example) for biofuel demonstration activities but this is deemed a private sector activity in the UK.

B. To what extent is the Energy Programme bringing together disciplines to form a coherent Energy research community?

The concept of a coherent energy research community is vague.

Interdisciplinary research is eclectic by nature. It would be difficult to formulate an overarching framework for activities which draw heavily on creativity and unconventional thinking in bringing disparate activities together. Of the seven themes outlined as covering the remit for this review very few would span more than two of categories 1 to 6. Social, economic and policy

² See www.iop.org/activity/policy/Events/Seminars/file_30843.pdf

considerations (category 7) can have relevance across the board and we see environment and ecosystem considerations as explicitly required within this.

Many of the aspects of an Energy Programme require detailed, underpinning research, which should not be eclipsed by short-term target-focussed research calls. For example, photosynthesis underpins most energy sources (including ‘fossil’ fuels). A better understanding of the processes involves experimental research spanning physical/electronic, chemical, genetic, genomic and mathematical/systems areas. These can be very fundamental and long term, but are likely to lead to major and novel areas of exploitation, many unforeseen at the time of investigation or discovery of new principles.

Research council support of interdisciplinary research generally, and the development of cross-council activities are welcome. It is to be hoped that developments under the Research Excellence Framework (REF) will support interdisciplinary research.

The BSBEC and the Integrated Biorefineries Technologies Club (IBTI) have instigated many new multi-disciplinary efforts and SUPERGEN (Bioenergy) uses EPSRC funding to achieve wide coverage in academia and business and address deployment of R&D outputs.

C. What is the level of knowledge exchange between the research base and industry/policy makers that is of benefit to both sides?

Even within the Department for Environment, Food and Rural Affairs (Defra) there are a multiplicity of policy divisions covering, for example, water. There is a considerable challenge in terms knowledge sharing but the use of UK-level information management systems has the potential to support this to the benefit of activities such as NERC Knowledge Exchange and issues such as the Beauly to Denny power transmission scheme.

It has been commented that one consequence of full economic costing (FEC) is that the higher costs to business dissuade them from funding packages with the kind of broad research scope which is attractive to universities.

Closer collaboration between policy makers and active researchers would be welcome in helping to formulate more precise statements. In terms of industry, a greater presence of industry researchers at academic conferences and lectures would be welcomed along with a greater willingness to engage. The twin challenges of the need to respect confidentiality and the fear of criticism are seen as active here but could be overcome.

Civil servants and policy advisers should attend conferences to maintain and expand links with the academic research community. We would like to see encouragement of this, allowing high-level but straightforward engagement with the best researchers, as part of continuing professional development which would benefit policy advice. Departmental Chief Scientists should

actively support the process in their role as leaders for the profession. Some mechanisms to enable these activities exist through levy and other schemes³ and best practice in this area should be considered as a model for further initiatives.

Activities of the Technology Strategy Board (TSB) and Knowledge Transfer Networks (KTNs) are helping to establish better business-to-academia strategic contact, with KTNs in some cases acting as external liaisons between academia (often RCs) and industry. Different handling of intellectual property (IP) rights by different publicly-funded organisations will alter these relationships and the perceived incentives.

D. To what extent is the UK Energy research activity focussed to benefit the UK economy and global competitiveness?

In general a global focus is natural to the academic community which draws upon and contributes to international flows of information. Responding to national needs and issues may also have international or global applications. Investment in national capacity and skills will be important however to maintain an internationally competitive position in development and translation.

E. To what extent is the UK able to attract talented young scientists and engineers into Energy research? Is there evidence that they are being nurtured and supported at every stage of their career?

The UK is internationally regarded as a leading research and technology centre. This is evident in the high numbers of overseas students, post-doctoral researchers and staff who seek positions in the UK.

In collaborations with the US (for example) there is often an apparent disparity of funding, leaving the UK as a less than equal partner in terms of the work which can be carried out. In terms of staff mobility for training and collaboration abroad the Royal Society international travelling fellowships are welcome but make little contribution to lab fees. This means that UK scientists can travel and learn but have few resources.

Many UK Universities have seen large expansions in masters students from the UK, EU and overseas. Their needs, numbers, and employability show the high value seen of these courses, although there is some concern about costs (of courses and of subsistence) and visas in an international marketplace. The courses and their future development are best fostered by well-resourced laboratories with excellent energy research programmes.

ERA-NET schemes exploit good practice through framework agreements.

³ For example COWRIE and MALSF

There are many challenges that will be associated with rapidly industrialising nations (BRIC, etc) and research opportunities and challenges to minimise the increased carbon footprint and environmental impact this development will have on the global environment. Development and use of technologies designed to mitigate the impact of energy in all countries (e.g. CCS for coal) will provide international linkage opportunities to developing and developed economies.

F. To what extent are UK researchers engaged in "best with best" science-driven international interactions?

G. What is the impact on a global scale of the UK Energy research community both in terms of research quality and the profile of researchers?

International benchmarking of UK academic research is now the norm and increasingly evidence of international leadership is sought. UK research fares well generally in international comparisons and this is recognised abroad.

H. What evidence is there to support the existence of a creative and adventurous research base and portfolio?

It is apparent that there is a great deal to be discovered and developed in the biological sciences and this constantly draws creative and inquiring individuals to research. Foresight and horizon scanning schemes are useful in identifying themes and there is a need for an overview to tackle integration and environment issues.

The bottom-up research base in the UK for academic research provides scope for excellent creativity but provides challenges in terms of the kinds of strategic delivery which policy-makers may require. To support and capitalise on the research resource the mechanisms for translation and development need excellent facilitation.

Any other comments

A number of issues also warrant attention in terms of the funding structures and routes to exploitation of research.

The Society believes more must be done to foster understanding of the opportunities from the equity investment and venture capital markets including business angels. Case studies from the US and elsewhere could be used as part of an information provision strategy.

The TSB has made some impact in this area, but there is still a fundamental lack of appreciation of the importance and funding required by the community for UK science to reach market.

There is still work to be done in understanding the biology of energy production and use. Recent heightened needs for environmental monitoring have underlined the importance of long-term continuous data sets (of which the UK has several, for example SAHFOS,⁴ and MEDIN⁵). There is a tension between the commercial usefulness and public need for many such information bases. Their long-term need for support from public funds should to be recognised as their importance can be underestimated within normal funding cycle reviews.

The Society would like to acknowledge, in particular, input from Prof Pat Heslop-Harrison, President of the Society for Experimental Biology, Prof Paul Leonard FSB and Dr Tom Jenkins, BiosciencesKTN whose expertise we gratefully acknowledge.

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⁴ Sir Alister Hardy Foundation for Ocean Science, SAHFOS.

⁵ Marine Environment and Data Information network, MEDIN.