The Royal Academy of Engineering

The Department for International Development's Research Strategy 2008-2013

Response from the Royal Academy of Engineering to the Department for International Development

September 2007

The Department for International Development's Research Strategy 2008-2013 Consultation: Response from The Royal Academy of Engineering

1. How can DFID build on its work on sustainable agriculture and develop its work on economic opportunities and growth?

The Academy does not possess wide expertise in the area of agriculture. However, we would like to draw attention to the need to give greater consideration to the implications of the growing interest in energy plantations in Africa and Asia for the sustainability of agriculture and the livelihoods of the poor in these regions. In addition, we note that engineering and infrastructure are key enablers of wealth creation and DFID's work on economic growth should not be confined to research on agriculture and economic studies.

2. How can DFID improve research on "killer diseases" and healthcare and develop its work on building the capabilities of individuals and families for a better life?

The Academy believes that there would be merit in adopting a stronger focus on primary healthcare than has been the case to date and, in particular, on public health engineering interventions e.g. to improve drainage and sanitation to limit the spread of disease. Unfortunately, the relatively low status and profile of public health engineering compared with biotechnology and molecular/cellular biomedical science means that this area of research has not tended to attract the attention it deserves, both in the UK and in many developing countries.

DFID's commitment to developing public-private partnerships to focus research efforts on diseases which primarily affect the developing world and where the main market for products will comprise poor people is essential. We also note that engineers have roles to play in developing new drugs and vaccines and, importantly, in designing and implementing systems for delivering them to poor people. It is increasingly recognised, in the UK at least, that engineering principles and practice can make a valuable contribution towards strengthening health systems but to date engineers and engineering have been under-represented in research in this area.

3. How can DFID improve research into good governance, including social and policy design areas?

The Academy urges DFID to undertake more work at the interface between social policy and technology. Engineers have much to contribute towards research on governance and social and policy design, particularly on topics relating to infrastructure and service delivery, water, natural resource management and sustainable energy. In many instances, only by closer dialogue between social scientists and engineers will problems be framed appropriately and optimal solutions be developed to address the most pressing social and governance challenges in developing countries.

4. How can DFID improve research into the impact of climate change on poverty and environmental change more broadly?

The Academy endorses the need for an active programme of research in this area. For example, research is clearly needed to improve understanding of the likely impact of climate change on infrastructure in developing countries. Moreover, research addressing infrastructure design is essential to increase the resilience and sustainability of critical infrastructure (e.g. through incorporating sacrificial elements

designed to fail first in order to defend the main parts of a bridge or road). This research needs to encompass a wide range of possible climate-related phenomena, including increased number and severity of extreme weather events, changes in patterns of rainfall, desertification and sea-level rise.

The Academy also calls for a greater emphasis on research aimed at improving monitoring of existing conditions in developing countries. This in turn will enable better modelling of likely climate changes in these regions. Sensors are now significantly cheaper, more robust and more sophisticated than was previously the case and these developments have been accompanied by increases in computing capability. This provides an opportunity to acquire more comprehensive and accurate data on climate and improve predictions to inform policy making and planning.

The third key recommendation we would make in regard to climate change research is to strengthen the focus on sustainable energy. We have already made reference to the need to augment research addressing the sustainability of biofuels but there are likely to be significant opportunities for developing countries in carbon sequestration services, e.g. in the form of maintenance of natural habitats and creation of replacement habitats, which can be traded as carbon credits. In addition, geothermal energy could represent a very fruitful avenue of research, with the potential to provide developing countries with a significant low-carbon energy source.

Finally, the Academy notes the importance of ensuring that environmental change studies are not restricted to the most obvious environmental phenomena. For example, in various developing countries (most notably India), there has been insufficient attention paid to the depletion of groundwater resources, which are too often being exploited in highly unsustainable ways.

5. In addition to climate change, what are the emerging global trends that DFID research needs to address?

A number of important global trends are identified in the consultation paper, including urbanisation. Other trends which the Academy considers worthy of note include the impending depletion of a wide range of primary natural resources, including metal stocks and groundwater (see response to question 4); the opportunities presented by the availability of more powerful and cheaper computers and related high tech equipment; and the growing disparities in personal wealth within populations in developing countries.

6. How can DFID improve the way research responds to user demand?

There are real challenges associated with effecting change at the level of the poorest communities. In many cases, technologies to address a particular problem are known and available, but achieving sustainable uptake or adoption of such technology by the poorest communities remains elusive. Research focussed on solutions rooted in local tradition and practices may increase the chances of success. However, it is also essential that research addresses the ability of donors and their in-country partners to deliver services at a scale and quality that is acceptable to and desirable by the local population.

It is equally important that user demand is identified in terms of the impact that the users seek rather than the outcome. For example, for a community seeking improved access to water as an outcome, the desired impact might be an increase in food security. Focussing on the impact would be likely to reduce bias in need identification and encourage a more holistic (and sustainable) approach. A further consideration in

this regard is that ‘users’ need to be defined appropriately. If a restricted group of users is engaged with, responding to the demand they identify can lead to unintended negative impacts on others. Involving a range of in-country professionals as well as the users themselves can also help to ensure that user demand is seen in its full context.

7. How can DFID best support cutting-edge science that benefits poor people?

The term ‘cutting-edge’ is subjective and will have different meanings in different situations. Nevertheless, research scientists and engineers in countries such as the UK would benefit from greater knowledge of what are perceived to be the most urgent (and potentially tractable) problems being faced by developing countries. Using the analogy of ‘translational research’ in biomedical science, through which scientific discoveries are developed into practical applications, there is much scope for the ‘translation’ of cutting-edge scientific and engineering knowledge from the international research community into practical solutions to address developing world problems. The key barriers to this at present are a lack of awareness amongst researchers of the potential for their research to be applied in this manner, and the lack of incentives for them to pursue this kind of work, which tends not to result in publications in high impact journals or be adequately recognised by the Research Assessment Exercise.

8. How can DFID be more systematic in helping developing countries to increase their research capacity?

At present, it is not clear how DFID is supporting capacity building in science and engineering in a significant way, notwithstanding funding for research consortia involving developing country scientists and small amounts of in-country activity etc. This is regrettable because building science and engineering capacity in the developing world is fundamental to enabling these countries to take ownership of their own needs and the development of solutions to address them. Research will never be truly locally owned if research and technical capacity in that country/community is weak.

DFID needs to take a much more holistic view of building research capability. Building specific niches of research capacity through funding research consortia is not sustainable if there is a chronic lack of trained engineers and scientists in the country as a whole. The Academy believes that DFID needs to do more to support the development of these professions, as well as increasing funding for capacity building of higher education in the developing world. We would also suggest that DFID should consider developing early-stage training programmes for young people from developing countries, supported by UK institutions which have particular expertise and experience in hands-on engineering, with an obligation for the geographical focus of their work and much of their on-site data collection to occur in their home countries. The fellowships could require students to return to their home country after completion of their studies to mitigate ‘brain drain’ concerns.

The Academy also notes that DFID’s latest White Paper correctly identifies climate change as the most serious long term threat to development and the Millennium Development Goals. Engineering capacity is critical if developing countries are to have any chance of adopting a more sustainable development path or adapting their infrastructure to increase its resilience to the impacts of climate change.

In addition, DFID must adopt a more multidisciplinary approach in building research capacity since it is only by bringing together professionals from different disciplines that the challenges faced by developing countries will be tackled effectively.

9. Communicating research: How can DFID make sure people in developing countries can access and use research?

The Academy recognises that DFID has already undertaken a number of useful actions towards this end. We do not wish to make any detailed comments on this topic although we would emphasise the need for the approach taken to be sensitive to the cultural context. For example, in some countries the researchers who are most visible are not necessarily the ones who are actually the most active. Approaches to communicating research need to ensure that access is provided to those who most need it.

10. How should DFID position its research in the future?

As discussed above, the Academy believes that DFID should move away from a predominant focus on social, economic and political issues to embrace technology and engineering more fully in its research. This research needs to be positioned alongside capacity building efforts, without which the potential benefits of research will not be realised. Further comments on this are provided in answers to questions 4, 6 and 8.

11. To what extent should DFID take a more regional approach to some research questions?

There is definitely scope for DFID to adopt a regional approach more frequently when addressing research questions, particularly when developing countries have organised themselves in regional communities. However, it is worth noting that in some cases a regional approach could mean operating within a part of a country rather than across a group of countries, for example in India where there is significant variation in culture, environment and socio-economic factors between different regions of the country.

12. How should DFID work with other funders of international development research?

While the Academy recognises that collaboration and coordination between donors is essential to maximise value for money and the effectiveness of the collective research effort, we would also caution against too much convergence of research activity. Donors must be willing to support a range of different types of research and preserving some distinctiveness in the programmes offered by donors can help to maintain diversity in the funding streams available. In addition, consolidating donor support so that it is increasingly aimed at large research consortia reduces the opportunity for smaller research groups to obtain funding for more tightly focussed and smaller-scale research projects. This is not a desirable situation since the latter type of research can be highly effective and large research consortia are often not accessible for researchers in countries or disciplines where capacity is weak.

13. Other comments

Founded in 1976, The Royal Academy of Engineering promotes the engineering and technological welfare of the country. Our fellowship - comprising the UK's most eminent engineers - provides the leadership and expertise for our activities, which

focus on the relationships between engineering, technology, and the quality of life. As a national academy, we provide independent and impartial advice to Government; work to secure the next generation of engineers; and provide a voice for Britain's engineering community.

The Academy is taking a growing interest in poverty reduction and our current President, Lord Browne, has identified it as one of his four priorities for his five year term of office. This reflects the fact the sustainable reduction of poverty in the developing world cannot be achieved without the appropriate application of engineering. Engineering and technology have, for example, clear and essential roles to play in the development of, and provision of access to, new medical interventions, safe drinking water and sanitation facilities, and sustainable energy generation technologies. Engineering is also a key enabler of wealth creation, both underpinning the innovation process and being necessary for building the infrastructure (physical and virtual) required for enterprises, supply chains and markets to function. Furthermore, application of the engineering method of problem solving will be crucial for the development of practical tools to mitigate and adapt to rapid climate change, which is now perceived to be one of the greatest threats to poverty reduction and economic development worldwide.

The Academy is undertaking a range of activities relating to engineering capacity building, poverty reduction and sustainable development. For example, in 2006, the internationally renowned expert on the application of science and technology to sustainable development, Calestous Juma FRS HonFREng, Professor of the Practice of International Development at Harvard University, delivered the Academy's flagship Hinton Lecture on the topic of 'Redesigning African Economies: the Role of Engineering in International Development'. This highly acclaimed lecture has informed the development of the Academy's engineering capacity building partnership with the Africa Engineers Forum. The Academy is also extremely active in the area of energy and climate change and Dr R K Pachauri, Chairman of the Intergovernmental Panel on Climate Change will be delivering the Academy's International Lecture on 3 October 2007 on the theme of 'Global Climate Change: the Role of Science and Technology in Mitigation and Adaptation'. Should you require further information on any of these activities, please do not hesitate to contact us.

Submitted by:
Mr Philip Greenish CBE
Chief Executive
The Royal Academy of Engineering
24 September 2007

Prepared by:
Dr Hayaatun Sillem
International Manager
Royal Academy of Engineering