Action Plan for the EPSRC/STFC Review of Nuclear Physics and Nuclear Engineering

Preface

This document will outline the recommendations in order of importance as prioritised by the international panel in September 2009. We will canvass opinion on parts that fall outside direct control of the Research Councils. We hope to give context to the statements made and to give clear thoughts of action where possible.

Context

This review was initiated in response to a recommendation from the 2008 RCUK Review of Physics, also known as the Wakeham Review. The Wakeham review recommended that ''*RCUK develop a review of the priorities in nuclear physics research to ensure they best match the needs of the UK.*' On the same timescale, a number of reviews and studies were carried out with reference to UK skills provision in nuclear engineering and related areas. Although these two areas have significant differences, there are synergies, particularly in relation to skills and training. Thus it was felt that a review of the Research Councils' support of these areas in the context of future economic impact was timely.

Action Plan Ref. No.	Report Recommendation	Relevant Stakeholders to Engage	Response and/or Proposed Actions
1	**R1*** It is vital that the Research Councils work closely with key departments of government – DECC, BIS, MoD, Home Office, FCO – all of whom should have an interest in the sustainability of the skill and capability base underpinning nuclear topics across the full spectrum of issues, for the furtherance of UK policy on the international stage and in the national interest for access to highly specialised advice. The panel **recommends** that Research Councils should be proactive in discussions with the key government departments.	Colleagues in Department for Business Innovation and Skills (BIS), Department for Energy and Climate Change (DECC), Ministry of Defence (MoD), the Home Office and the Foreign and Commonwealth Office (FCO)	EPSRC and STFC will organise a meeting of the named stakeholders, focusing on the relevant recommendations in the report and on taking the skills agenda forward. The Councils will propose the group meets on a six-monthly basis and will review these arrangements after 1 year.

* This reference number refers to the recommendation number given in the EPSRC/STFC Review of Nuclear Physics and Nuclear Engineering Report

2	**R2** The panel concluded that the UK's needs in terms of trained personnel and scope and volume of research and development activity are dependent on the Government's intentions for new nuclear build. It is therefore clear that a high-level national strategy for nuclear is required, with a roadmap which defines how our future nuclear capability is to be achieved. The House of Commons' Innovation, Universities and Skills Select Committee's recommendation for a master roadmap for nuclear energy owned by the Office of Nuclear Development is fully endorsed by the Panel. The panel **recommends** that the roadmap should consider the need for a balanced portfolio of research in nuclear engineering in the UK to serve the short-, medium-, and long-term needs of the country. **R3** The panel **recommends** that the Research Councils should engage with the roadmapping process and relevant stakeholders, including government departments, to determine their place in the overall strategy. A managed and coherent approach to the whole landscape of nuclear engineering, science and technology is required. The relevant Research Councils should ensure that their research and training portfolio meets the needs identified in the roadmap. **R4** The panel **recommends** that key strategic input for the Office of Nuclear Development roadmap should come from the National Nuclear Laboratory, in consultation with industry and policy makers.	Office of Nuclear Development	The Research Councils' Energy Programme will further this through their discussions with contacts at OND. In addition to direct discussions with the OND the Research Councils Energy programme will continue dialogue with the NNL, the NCE and also with other non-university stakeholders via the Letter of Arrangement (LoA) group. It is anticipated that the university sector would be engaged in this process, the research councils will ensure this occurs through normal mechanisms. STFC will contribute to this engagement through attendance at LoA meetings as appropriate. STFC will consider whether there is a need to change the criteria for prioritising nuclear physics research projects, or to focus allocations of quota studentships to target studentships to specific skills, to support these needs.

3	**R5** The panel noted that countries with large-scale nuclear power industries such as France and the US also have relatively large pure nuclear physics research programmes. Although the panel did not identify a causal connection between the two, it **recommends** that STFC examines whether operating support for nuclear physics research at a level significantly below international OECD norms is strategically justified.	STFC Science Board and Council	STFC has undertaken a prioritisation exercise of its entire programme. Science Board and Council considered this recommendation as part of that prioritisation. In particular, the Science Board considered the suggestion in the Review that any further reductions in nuclear physics support by STFC might leave its programme subcritical. The Science Board did not support this view, since the projects concerned are all international collaborations and work largely independently of each other. STFC is planning funding of approximately £30M over 5 years for the nuclear physics programme.
4	**R6** The panel noted with some concern the issue of funding for taught Masters courses in nuclear science and technology. An appropriate funding stream should be established for these courses by the Spring of 2010. The panel **recommends** that the Research Councils should work proactively with the research community to highlight the issue to relevant government departments and work towards a resolution. **R7** In addition to recommendation 6, the panel **recommends** that the nuclear physics and nuclear engineering communities, assisted by the Research Councils, should proactively engage with industry to seek out opportunities for further funding for taught Masters courses, particularly through provision of Continued Professional Development courses.	DBIS	The Research Councils will initiate discussions on this issue with colleagues in BIS, in the context of the Higher Education Framework and the review of postgraduate training.
5	**R8** The panel **recommends** that the Research Councils jointly and proactively engage with the nuclear physics community and other funding agencies to identify the challenges and opportunities in the areas of nuclear data,	Nuclear physics research community	Through the STFC Futures Programme and the Innovations Directorate, STFC will work with the nuclear physics community to identify opportunities of high visibility and impact.

	healthcare, nuclear forensics and homeland security where nuclear physics can play a key role, and capitalise on the need for technology solutions in these areas. It was recognised that blue-skies research and development spawns novel ideas and technologies, and that challenge-led research and development can bring these technologies closer to the marketplace.		
6	**R9** The panel felt that there is greater scope for the nuclear physics community to capitalise on application areas generally. The panel therefore **recommends** that the nuclear physics and nuclear engineering communities seek better research links in areas with potential for future economic impact. **R10** The panel commented on the need for a vibrant research base and a pool of trained UK nationals when considering the UK's future energy security. The panel **recommends** that the Research Councils work in concert to optimise the links between nuclear engineering, nuclear physics and industry.	Nuclear physics and nuclear engineering research communities, relevant industry representatives and learned societies	EPSRC and STFC will work with the relevant learned societies to broker the setting up of a special interest group in this area. Additionally, EPSRC will work with their Letter of Arrangement group to explore options for better community coordination.
7	**R11** There are a number of international initiatives underway, cutting across the breadth of the civil nuclear sector, in which the panel feels the UK is currently under-represented. The panel **recommends** that the UK reinvigorate its involvement in the Generation IV International Forum and other related international initiatives.	DECC	EPSRC and STFC will highlight the report and its recommendations to colleagues in DECC, who have ownership of UK involvement in the Generation IV International Forum

8	**R12** The panel considered two scenarios for the future of nuclear power in the UK and considered that it is very important for the UK to participate in generation IV reactor research. Thus, further to recommendation 11, the panel **recommends** that the Research Councils encourage research into generation IV technologies and related fuel cycle topics. **R13** The panel **recommends** that the Research Councils continue to support nuclear engineering research and training through a combination of managed and responsive mode funding. Additionally, responsive mode applications should be actively encouraged.	Nuclear physics and nuclear engineering research communities	The Research Councils' Energy Programme has recently issued a call aimed at developing consortia within the UK focussed around four research areas 1) Novel Separations Science and Processes for Spent Nuclear Fuel (Covers existing and future fuels) 2)Long term materials behaviour and chemistry 3) Fuels 4) Reactor Systems. All of these themes include aspects of generation IV technologies.
9	**R14** The panel **recommends** that the Research Councils explore all possible mechanisms for continuing and increased engagement with industry to maximise the leverage of their funds. Collaboration between universities, the National Nuclear Laboratory and key industrial partners is needed to optimise the impact and effectiveness of the UK's nuclear engineering programme.	Research Councils' Energy Programme Letter of Arrangement Group	EPSRC co-ordinates the Research Councils Energy programme and has two major routes to ensuring industrial engagement with Energy Programme activities 1) Sector teams – a dedicated resource focussed on developing and maintaining industrial engagement. 2) The Letter of Arrangement (LoA) group – a group of nuclear research funders that meet regularly to share strategy and identify joint activities. We will continue to use both these mechanisms to identify mechanisms to continue and increase engagement with industry. The National Nuclear Laboratory is a member of the LoA, EPSRC also have a Business Relationship Manager dedicated to them through the Energy Sector.
10	**R15** In order to facilitate recommendation 14, the	Research Councils'	The Letter of Arrangement Group originally

	panel **recommends** that the Research Councils' Energy Programme Letter of Arrangement group be expanded to include additional companies in the nuclear industry as appropriate.	Energy Programme	included representatives of the HSE, EPSRC, NDA, AWE, MoD, BE and NNL. We are in the process of expanding the group, at the last meeting we also invited representatives of Rolls Royce, EDF, AVEVA, Westinghouse, Horizon Nuclear Power, the Environment Agency and DECC. Other potential members have been identified.
11	**R16** Nuclear fission energy should be considered by government with the same status as other low-carbon technologies. The panel **recommends** that inclusion of nuclear fission energy in the remit of the ETI (Energy Technologies Institute) should be considered.	ETI	ETI's Research and Development Programme is governed by its membership. The Research Councils will make a copy of the Review report available to appropriate colleagues in the ETI Executive.
12	**R17** The panel **recommends** that the newly built laboratory of the National Nuclear Laboratory at Sellafield be fully commissioned and academic access ensured in order to allow the UK to take full advantage in reinvigorating its nuclear research and to be properly active in the field.	NNL	The Research Councils Energy Programme will initiate discussions with the National Nuclear Laboratory to understand how best to take this recommendation forward.
13	**R18** The panel noted that presently in the UK there are no civil research reactors for neutron research, medical radionuclide generation and for training the future generation of reactor engineers and physicists. The panel **recommends** that consideration be given as to whether the UK Government in partnership with the healthcare sector and wider nuclear industry should invest in provision of a research reactor for isotope production, materials and other research.	N/A	EPSRC and STFC will keep this recommendation under consideration.
14	**R19** The panel **recommends** that the Research Councils' portfolio be examined by a suitably qualified group on a biennial or triennial basis to		The Research Councils currently employ recognised evaluation mechanisms to review their entire research and training portfolios as part

	ensure adequate support of the correct initiatives to support a resurgent nuclear industry.		of their normal business. The Research Councils will review progress against this Action Plan itself in early 2011 and make amendments as necessary.