

Our reference
KIHIEHM

Your reference
Direct line/e-mail

keith.hopcraft@nottingham.ac.uk

Mr. A. Brereton
Cabinet Office
70 Whitehall
London
SW1A 2AS

**School of Mathematical
Sciences**

University Park
Nottingham
NG7 2RD
Tel: +44 (0) 115 953844
Fax: +44 (0) 115 953837
<http://www.maths.nottingham.ac.uk>

10 September, 2001

Dear Mr. Brereton

I write in response to your call for submissions to the 2001 PIU Project on Energy Policy.

1. The use of energy defines the modern western societies. Energy consumption underpins the structure and modus operandi of these societies, providing the only means to sustain economic activity and promote growth, and from which all the trappings of civilisation and culture obtain. It is a primary duty of Government to guarantee the production and delivery of energy in the short to medium term and to ensure that the continuity of supply is maintained in the longer term, when new technologies will become the principal providers. It is important that the Government maintains a balanced portfolio of energy production means. Such a strategy enables it to respond flexibly to short term political initiatives and economic fluctuations, such as for example, the Kyoto protocols or instability in the oil producing areas of the world. Diversification also maintains national expertise in different energy production technologies whose importance will wax and wane with longer timescale economic evolution of the global economy.
2. Electricity is the principal energy requirement in both the medium and long term. Whilst it is presently economical to burn carbon fuels to meet this demand, such a strategy is not economically sustainable and there is currently political activity that is sensitive to the environmental impact of this option. It is inevitable that alternative future energy sources will be required. Electricity production by thermonuclear fusion of hydrogen isotopes into helium has been a topic of international research for over fifty years and a world-wide scientific consensus for the form that a commercial fusion reactor would adopt using the magnetic confinement option has now emerged.
3. The principal fuel source for thermonuclear fusion is deuterium and this is abundant in seawater. The secondary component, tritium is bred from the fusion reactor itself. Thus supply of the raw material for the process is essentially limitless and its extraction has an acceptable environmental impact by modern standards. The waste product of the fusion process does not require lengthy storage in geologically stable environments such as is required of the waste of nuclear fission reactions.



THE QUEEN'S
ANNIVERSARY PRIZES

2000

4. Responsibility for research into thermonuclear fusion in the UK is carried out principally by UKAEA Fusion, Euratom, and through Research Council facilities available at the Rutherford and Appleton Laboratory. These institutions are international centres of excellence into fusion research and development. These centres also foster the maintenance, development and transference of expertise through contacts with universities, where the next generation of engineers and scientists are being trained.
5. Fusion research in the UK has an international reputation for excellence and the UK is presently the location of the world's largest experimental facility for the magnetic confinement option. It is important that the UK continues to play a prominent role in the 'next step' development, which will necessarily be an international venture.
6. Fusion research has global scope and impact and there has been an unusual and sustained level of international co-operation between workers since the subject was declassified in 1958. This activity continued uninterrupted throughout the entire cold-war period and persists to this day.

The UK must remain a stakeholder in the thermonuclear fusion option for future electricity supply. Adopting this strategy in the medium term ensures that the UK remains internationally competitive in the area, maintains continuity and levels of expertise, and is placed to take advantage of exploitation and export of the technology. In the long term it guarantees for the nation the provision and continuity of a future energy source that can be supplied economically and with acceptable impact on the environment.

Yours sincerely

Dr K I Hopcraft
Division of Theoretical Mechanics
University of Nottingham
Nottingham
NG7 2RD

keith.hopcraft@nottingham.ac.uk