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FUELLING THE FUTURE: Security, Stability, Development

Global Energy Mix

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Energy problems are back at the top of the world's agenda. There is a combination of factors. They include rising oil and gas prices and the prospect of diminishing fossil fuel resources; rising atmospheric pollution, caused not only by oil and gas emissions but also by burning of domestic fuels; climate change with evident effects on global warming; and increasing concern about security of supply, thereby underlining the vulnerability of all industrial countries. Yet these factors are accompanied by continuing growth in world population, and rising energy demand.

The issues are bedevilled by the artificiality of current energy prices. There is, in my view, a paramount need to assess true costs of the different forms of energy generation, including the many externalities involved. We have to reckon with a multiplicity of subsidies, some of them perverse (witness the extraordinary energy bill passed recently by the US House of Representatives). There is a general failure to take account of the public interest in assuring secure sources of supply. Even if market forces applied in this case, it is obvious that by themselves they are not enough.

Hence the renewal of interest in the so called nuclear option. We sometimes forget that it is nuclear energy which makes the universe as well as the world go round, and that the sun itself is a continuous hydrogen bomb explosion. Life itself depends upon it. Yet now we have, particularly in the old industrial countries, an ageing nuclear industry run by an ageing population of scientists and engineers, with a poor public reputation. Even so 7.5% of the world's commercially sold primary energy, and 23% of such energy in Britain, come from nuclear sources. At present 439 reactors are operating in some 30 countries.

Let us look briefly at the arguments against further development of nuclear energy. The costs (in particular capital costs) are considered too high. We have not established acceptable means of disposing of radio active wastes, especially high level wastes. The process of decommissioning former nuclear stations is so far unsatisfactory. There are safety concerns manifest in such accidents as Three Mile Island and Chernobyl. There are risks of proliferation of nuclear materials for military or terrorist purposes. In the very long run there will be a shortage of uranium. The civil nuclear industry has a poor record for transparency, and telling the truth, especially about accidents. Many other technologies for energy generation, in particular renewables, look more promising. Altogether it is not surprising that there should be continuing public hostility, encouraged by certain NGOs and other special interest groups, towards any revival of nuclear power.

Now the arguments in favour. The environmental record of the industry in terms of air pollution and carbon emissions is greatly superior to any other form of energy. The same can be said of its safety record in relation to other energy sources. The number of

victims from accidents has often been greatly exaggerated. Disposal of wastes, and decommissioning of old reactors do not present insuperable problems, and depend substantially on how much effort and investment is put into them. The experience gained over almost half a century has identified the principal technical, engineering and other problems, none of which is beyond resolution. This has led to work on new technologies, at different stages of development, which would eliminate or minimize such problems as misuse of nuclear materials for military or terrorist purposes, and generally cope with the issues of waste disposal.

Among such new technologies are pebble-bed reactors (under development in China and South Africa), ADS (Accelerator-Driven Subcritical) reactors (research in Italy), HTGR (High Temperature Gas-cooled) reactors (research at MIT in the United States), and fusion through the ITER (International Thermonuclear Energy) reactors (under consideration for France or Japan). Fusion on a very small scale is also under research elsewhere, and even if the results recorded in Nature of 28 April 2005 do not at present have energy implications, who knows where the technology will lead?

For those in old industrial countries, who were the pioneers in nuclear energy, the development of nuclear technology elsewhere, in particular in China, India, Iran and possibly Brazil must be a source of concern. The Chinese are already building a large pebble-bed reactor and they have thirty other nuclear reactors on order. Given the dangers as well as the opportunities for development of nuclear technology, can the old industrial countries afford to leave the initiative to others?

Finally the need for alternatives to fossil fuel energy is becoming more evident every day. To take Britain alone, there is little prospect of the Government meeting its energy targets between now and the middle of the century without renewed recourse to nuclear energy. The solution of existing problems mentioned above will also be of value in developing new technologies. The public debate is now being renewed, and the British Government has taken care not to rule out the nuclear option.

I think the priorities in the debate should be broadly as follows. We need

- An analysis of true costs of all existing forms of energy, with an accurate and up to date comparison of costs, including externalities and capital v running costs.
- Long term methods to dispose of nuclear waste, in particular high-level waste. These should include not only burial but also transmutation and partitioning. One idea would be to establish a rich prize (as with longitude in the 18th century) for whatever individuals or teams could establish safe methods of disposal of waste.
- Clear recognition of the public interest in securing long term and reliable sources of energy, and substantial investment from both government and private sector sources for this purpose. This should include use of fiscal instruments, measures to encourage innovation, and recruitment and training of scientists and engineers in the relevant disciplines.

- A public education campaign, drawing on my experience in chairing a Chatham House study, later published in April 2002, by Peter Beck and Malcolm Grimston under the title of Double or Quits ? The Global Future of Civil Nuclear Energy.

The debate is now open. It is vital that it should be conducted in rational terms.

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