

Keeping the lights on

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Having been introduced to 'nuclear' by images of protesting women scaling fences at Greenham Common, my early perception of the word and the negative connotations surrounding it played an influential part in my determination for many years that all things nuclear were bad, unreasoned as this may have been. Events at Chernobyl in 1986 did little to assuage concern but rather reinforced commonly held fears over issues of safety and the environmental impact of using nuclear technology; associations with armaments, the Cold War and 'nuclear winters' gave the nuclear industry a bad press for decades. And just when the nightmare scenarios were beginning to fade, the government decided to privatise the industry and scandals over massive subsidies followed. It's not surprising therefore that those in the industry have until recently kept a low profile.

Yet, the nuclear industry may currently be seeing a reversal of fortune and an opportunity for an image makeover. As issues of climate change, increasing carbon dioxide emissions and the world's growing need and greed for energy focus the attention of both national and international governing bodies, there has been a realisation that the virtually carbon neutral nuclear power option may need greater consideration.

After all, in the UK nuclear power has been making an important contribution to the electricity supply for several decades and, even if we don't wish to acknowledge it, we would certainly notice if, suddenly, our power supply fell by 20%. What gives the whole discussion a degree of urgency, quite apart from the onset of global warming, is that of the 12 nuclear power stations currently in operation in the UK, it is anticipated that by 2020 this will have dropped to just three sites producing only 7% of supply (Morgan, 2005). Given the lead time required for building new and/or upgrading existing nuclear power stations, and the fact that our experience of building such facilities is 20 years out of date, unless a decision to prolong our nuclear energy capacity is made imminently, we will have no means of changing that 2020 situation.

Many would be in favour of a decision to shut down all nuclear installations. One of the overwhelming concerns about nuclear power is that of the long-term storage of nuclear waste. Despite reassurances, we have no way of predicting exactly how the earth will respond. The waste may be buried deep but what if water tables change or there's an earthquake? There is particular disdain for the UK's nuclear reprocessing facilities – why should we be dealing with other countries' waste as well as our own? And what if, with climate change, sea levels rise and the nuclear installations themselves, usually located on the coast, become partially submerged? There is also the fear of the possible radio-active damage that may be incurred by any leaks from a nuclear power station and, further, there is the threat of a terrorist strike.

Scare-mongering aside, a fundamental issue for the industry is the security of supply of uranium. There seem to be mixed views on likely long-term availability but, if there is only sufficient uranium until 2055 (Meek, 2005), is it worth the huge investment that would be required to revitalise the UK industry? And how politically secure is the supply anyway? If other countries, such as China, are also developing nuclear power, what guarantee of supply does the UK have in a global market?

Nuclear's overwhelming advantage is that of its carbon neutral status. France managed to reduce its carbon emissions by 27% in a seven year period through a shift in dependency toward nuclear and hydro-power for electricity (Jean-Baptiste & Ducroux, 2003). Even James Lovelock, the so-called 'godfather of Green', sees developing nuclear power as the

only real way forward for the UK (RSA, 2004). Not because he is a great proponent of nuclear power but rather because he expects that the effects of carbon emissions and climate change will be so badly damaging that, really, we have no choice. Despite this, the industry does not appear to be recognised for its capability to cut carbon emissions in the way that the renewables industries are. While acknowledging the critical importance of safety, the nuclear industry also seems to suffer disproportionately from the perception of 'danger' associated with it, yet disasters in the oil industry, such as the Piper Alpha explosion or the Exxon Valdez oil spill which cost lives and caused extensive damage, did little to change long-term safety perceptions of that industry.

Oil as an alternative energy source – quite apart from its fundamental, inherent carbon polluting properties – is becoming an increasingly volatile and political market, as well as there being uncertainty over its price, long-term supply and access to that supply. The demand for oil from emerging markets together with the decrease in output from the North Sea makes the UK's position less predictable.

Similarly, decreasing supply and increasing demand for natural gas means that the UK is now a net importer of gas and our reliability on the vagaries of overseas suppliers makes us increasingly vulnerable, as demonstrated by recent events in the Ukraine, despite assurances. Natural gas is a relatively 'cleaner' energy source but still an 'emitter' and, given the government's commitment to a 60% reduction in carbon emissions by 2050 (DTI, 2003), there will need to be severe alterations to current practice if gas is going to continue as a national source of energy. A process has now been developed to 'strip off' the carbon dioxide from natural gas and operate a decarbonised electricity plant while injecting the carbon dioxide back into depleted oil and gas fields. At BP's Miller project near Peterhead carbon emissions have been reduced by 90% compared with a gas-fired power station and carbon-free electricity is being provided to 250,000 UK homes (Mark Akhurst, 2005). However, 'carbon storage' is a relatively new technology and there is little experience to indicate what effect this might have long-term. Furthermore, this is an extremely expensive process and off-shore storage will be even more so with concomitant dangers.

There are also opportunities in the new technologies that have been developed to utilise previously abandoned UK coal supplies for energy. Advanced coal combustion with water resulting in significantly reduced carbon emissions is being tested, but it will be some time before this has any large-scale output and, although this may be a more carbon efficient technology, it is still perpetuating a reliance on fossil fuels which, ultimately, will run out.

Much attention has been given to renewable energy in the UK and its potential for offering a carbon-free alternative. Indeed, the UK has committed to sourcing 10% of its energy supply from renewables by 2010 (DTI, 2004) and there has been growth in the development of small-scale wind (both onshore and offshore), wave, tidal, solar and biomass power generation, in addition to the established hydro schemes. The momentum for all of these is building but on a piecemeal basis, and if this target is to be achieved, it will require a step change in the level of activity and investment and some very clear 'joined-up' policy. While riding our oil-rich wave for the past 30 years, we have squandered the opportunity to develop these technologies which can provide often local and not necessarily complicated energy solutions. Hence, for most of these there remain issues over levels of efficiency, including problems of intermittency, connection to the grid, as well as economic viability.

The concept of renewable energy may be generally easier to sell to the public than other options but opinions change, for example, when NIMBYism kicks in and when there is realisation that extensive swathes of countryside will be dotted with turbines – and large numbers of wind farms *will* be required if wind power is to gain the significance expected of it. Further, the emphasis to date has been on the provision of electricity *per se* whereas if we look to our northern European neighbours we could learn a thing or two about the benefits of

district heating and CHP; heating accounts for approximately 30% of our energy demand and we have a growing supply of biomass, not least from forestry, that could help fuel this. So, for all the potential, it is difficult to see, at present levels of development, how renewables could somehow substitute for fossil fuels and/or nuclear in the near future.

In terms of carbon emissions, the greatest gains to be made are where we have so far failed conspicuously, i.e. in energy efficiency. The primary objective in the UK's energy policy must be to reduce the use of energy. It is also vital that a long-term strategy be planned. It is estimated that technically, efficiencies could reduce domestic electricity usage by 40% (Fred Dinning, 2005). If we achieved this the argument for needing to prolong our nuclear capability would be significantly weakened. But in the current consumer climate, without major incentives and a commitment to lifestyle change, such a target looks unattainable, certainly in the time-span available to make a difference.

Given the varying vulnerabilities of each of the UK's present energy sources and the surging global demand for energy, can we afford to rule out nuclear? It appears that the only realistic option is to pursue, develop and invest in a suite of energy sources – including nuclear power as one such source. This would mean extending the life of existing plants and, unless it could be shown that alternative energies together could within 25 years substitute for nuclear with minimal emissions, it may mean that new nuclear facilities will also be required – not a prospect to look forward to.

This, no doubt, will cause a public outcry, on moral, environmental and economic grounds, and will raise numerous concerns about the industry, including those mentioned earlier. Certainly there are those who feel we have no right to leave a nuclear legacy in the form of buried waste for future generations; there are also those who would strongly oppose the industry on the grounds of its association with nuclear weapons. The cost to the taxpayer for the investment required to develop the industry would be resented by many but until we, as individuals, realise the rate at which we use energy and what the real costs for this are, energy efficiency savings will not happen and emissions will not decrease.

Such a policy move would be politically extremely unpopular and this may prove to be a barrier, although the indications are that the present government is veering towards the nuclear option as the pressures to take action on climate change grow. There may now be just enough public awareness about the effects of global warming for people reluctantly to decide that nuclear is, perhaps, not all bad – and the outcry may not be as loud as that which will be heard if the lights go out.

[1808 words excluding references]

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