

A Cloudy Energy Future

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"For now we see through a glass darkly....." 1 Corinthians 13.1

In 1982 Nigel Lawson, then Secretary of State for Energy, gave a celebrated speech in Cambridge where he stated "energy is a traded good.....the job of government is to remove distortions in the market place". He went on to add gratuitously "searching for an autonomous energy policy is like hunting the snark". Ever since then UK energy policy has relied on a liberalised, competitive energy market "which will ensure diverse and sustainable supplies at competitive prices". There have been successes and failures, the price of electricity has been driven downwards by draconian regulation until it is much as it was in real terms thirty years ago, but R and D in energy has been a major casualty and the "dash for gas" is steadily eroding diversity of supply.

Global Warming

Abandoning control of energy policy to the market place has raised a number of problems. The last decade has seen the weather machine becoming steadily destabilised due to global warming and, in particular, increased emissions of carbon dioxide from burning fossil fuels. Unfortunately the market values the environment at zero and will throw into it whatever it can get away with unless stopped by legislation or encouraged not to by the use of fiscal incentives. This involves substantial intervention rather than the removal of "distortions in the market place" called for by Nigel Lawson.

White Paper

The long awaited White Paper, purporting to provide an energy strategy which will lead us through the next 50 years to a low, or even zero, carbon economy, leaves much to be desired. It is both timid and reckless. Reckless, in that the very large role suggested for renewable energy - as much as 20 per cent of electricity by 2020 - although laudable, may not be achieved. Real engineering analysis and cost of this possibility has yet to be assessed. Timid in its approach to nuclear power, which is left in limbo with the tiny hint of encouragement that if new build becomes economic its future will be reassessed (in fact only a modest increase in the price of natural gas would achieve this). Timid also in its approach to implementing a carbon tax and to the problem of transport. When it comes to security of energy supply it is reckless in its complacency over relying on rapidly increasing imports of natural gas from politically unstable parts of the world.

The strategy outlined in the White Paper, together with the recent hint from the Energy Minister that nuclear plant will probably be replaced by gas-fired power stations, means that even meeting our Kyoto commitments will be difficult, the reduction in carbon dioxide emissions by 20 per cent promised for 2010 most unlikely and any move to a low or zero carbon economy impossible. The Government's stated priorities for UK energy strategy are protecting the environment and security of supply; it is difficult to see how the proposals in the White Paper will achieve either of these goals.

Renewable Electricity

Ten per cent of electricity is to come from renewable sources by 2010 and around twenty per cent by 2020. The current figure is 2.8 per cent, most of which comes from large-scale hydro or burning waste such as landfill gas. It is expected that the increase will be largely provided by wind, both on and off shore, and biomass; there are no large scale hydro sites remaining.

Engineering analysis of this proposition seems to have been minimal; indeed, any attempts at "energy arithmetic" seem not to have been attempted. For example, if all the wind farms currently operating in the world were to be put on the South Downs, assuming planning permission could be obtained they would generate only *15 per cent of UK electricity*! To produce 20 per cent of UK electricity, largely from wind, would require twenty, 2MW machines to be installed every week between now and 2020, most of them offshore (The Danes are just completing the Horns Rev offshore field 11km out into the North Sea, using the latest technology they have succeeded in installing one machine every two days). The floating cranes necessary to install at a rate of 60 machines per week offshore (there is a very restricted window of opportunity for North Sea work, so working is only possible for a third of the year) will have to be built, the undersea cabling also presents a problem. No doubt a huge capital investment programme to provide the necessary offshore infra-structure can be mounted, but it is problematical that the private sector will pay unless substantial price guarantees are made.

The other problem with wind is its fickle nature; on average, the necessary wind strength to generate electricity is only available for one third of the time. It is unreliable and back up to keep the lights on when an anticyclone is sitting over the UK is necessary and should be factored into any economic analysis. Accommodating any intermittent electricity source into the grid distribution system presents considerable problems. Denmark, famous for espousing the cause of wind power and with around 15 per cent of wind electricity on its distribution grid, has just removed subsidies for three proposed 150MW offshore wind farms, effectively cancelling them, as any more wind power will cause serious destabilisation of their grid. The new electricity trading arrangements (NETA) also perversely disadvantage wind.

As to biomass as a major source of electricity, a little arithmetic shows that the whole of Kent would have to be turned over to coppiced willow to replace half the output of Dungeness B nuclear power station on the Kent coast.

Wind and biomass will undoubtedly play an important part in supplying renewable power in the future but it is irresponsible to project a role for them, which is unrealistically high. 20 per cent renewable electricity by 2020 is a very high-risk strategy.

Nuclear Power

The White Paper is remarkably downbeat about nuclear power despite its excellent record in providing the safest substantial contribution to energy supply that Britain has ever known. And that is without putting carbon dioxide into the atmosphere. If the current stations are de-commissioned as they come to the end of their life, without rebuilding, we will have to replace 20 per

cent of our electrical capacity by 2020, just about what renewables will do if we meet the extremely ambitious projected targets. Then there are the coal stations to replace, another 30 per cent of polluting capacity. If we rebuild the nuclear stations we might just have a chance of reducing carbon dioxide emissions with the help of renewables but otherwise we will just replace nuclear with renewables and mark time. Currently, carbon dioxide emission levels are rising after a decade of reduction; they are not continuing to fall, as some ministers boast. This is the result of burning more coal for electricity generation as gas prices have more than doubled in the last two years and the older nuclear stations are coming off line. Cleaner coal technology with carbon dioxide capture could help but this technology has still to be developed.

The collapse in profitability of power generation, caused the risk of receivership for our nuclear arm, British Energy, prompted by the very low wholesale price of electricity, and is a salutary warning. It is perhaps worth reminding ourselves of Adam Smith's remarks in "A Wealth of Nations" where he points out that although "natural liberty" provides the ideal fulcrum there are many exceptions, injuries to society which can arise from free enterprise and which the state must control.

Carbon Tax

A report published by the Royal Society on 18th November concludes that a transparent fiscal instrument, in effect a carbon tax, is the way to control carbon emissions. But nuclear would need, logically, to be exempt; the present absurd situation is that the climate change levy is applied to nuclear and large scale hydro, the two biggest providers of carbon dioxide free energy.

Security of Supply

The availability of cheap natural gas from the North Sea has caused generators to switch from coal to natural gas for electricity generation over the last decade; this had the added advantage of reducing carbon dioxide emissions. It has also had the effect of making us more and more dependent on natural gas, just as North Sea supplies are beginning to decline. Using DTI's own figures, we will be importing 90 per cent of our gas requirements from Russia, the Middle East and Norway by 2020. Our electricity supply, if gas continues to supplant coal and also replaces nuclear, will be 80 per cent dependent on imported gas; a figure recently reiterated by the Energy Minister when seeking gas contracts in Algeria, not a noticeably stable regime. It seems unlikely that we will build new coal-fired stations unless the gas price goes through the roof; the old stations all come to the end of their lives in the next 10 to 20 years. The Government is quite sanguine about this; after all, we are a trading nation and will shop for gas around the world. There is the cost of the five new gas inter-connectors to the continent to consider of course but presumably the private sector will fund this if the price is right.

The prospect of interruption of our electricity supply by religious extremists, war or price disruption is almost too horrendous to contemplate. Energy, and particularly electricity, is the lifeblood of our civilisation; as communications

and computers, tube trains, lifts and lights fail as a result of actions outside our control we quickly spiral down into chaos. At least we can rely on coal and nuclear, provided we don't let them fade away.

A recent study by the Russian Academy of Sciences concludes that post 2050 Russia cannot rely on its dwindling oil and gas resources (the very gas that the UK is hoping to buy) and they must pursue their nuclear building programme including developing the fast reactor.

Transport

Transport, both road and air puts almost as much carbon dioxide into the atmosphere as the electricity supply industry. The Government is enthusiastic about hydrogen taking over as the fuel for road transport. Fuel cells "burning" hydrogen are at an early demonstration stage. But where is the hydrogen to come from? Currently hydrogen is produced by reforming natural gas or naphtha, which puts yet more carbon dioxide into the atmosphere. Only electrolysis of water using renewable or nuclear electricity will provide hydrogen without carbon dioxide as a by-product. The additional electricity required to move to a hydrogen transport economy would require a doubling of the electricity supply system. To do this we need to start planning new nuclear power stations now.

Research and Development

A major casualty of the unfettered market has been research and development. The world renowned research carried out by the old CEGB and the Gas Council in the 1970s and 80s has been abandoned by the privatised energy companies as not being their responsibility. Government has stimulated research in renewables but a comprehensive energy supply research programme needs to be put in place, steered by professionals, rather setting up a plethora of committees with briefs like "sustainability" scattered between DTI, DEFRA, Transport et al.

Some urgent topics include: carbon sequestration, electricity/energy storage, hydrogen for transport, restructuring the grid system to accommodate embedded generation and the financial and stability implications, the new gas supply infrastructure to provide for importing large quantities of gas, fiscal instruments for moving the energy economy to a low carbon future, electricity and energy trading arrangements which will not frustrate environmental and security aspirations.

Some of these topics are being addressed by a variety of committees but co-ordination is poor, communication often non-existent. The environmental Audit Committee identified twenty three different grant giving bodies; much of the work is wasted and merely consists of unread reports.

Conclusion

If the UK is to move to a low carbon economy there are difficult decisions to be made now. Rigorous engineering analysis must be quickly applied to the suggestions in the White paper to find out if they are realistically possible. What is already clear, by applying a little arithmetic, is that "Clean Energy" is

what is required and that means all the renewable and nuclear energy we can muster. It is important that we try to get people to use energy more efficiently but this has proved very difficult in the past and changing social attitudes, getting them out of their cars for example, is well nigh impossible. So we need to solve the problem using new, and some old, technology. This will require investment and free market policies will not deliver the long term strategies required. We must move into a "post-market" era.

The White Paper could be an opportunity to chart UK energy policy through the next 50 years but it will need some modification and statesmanship rather than politicking to achieve this end.