

The Third Annual Fuellers' Energy Lecture

Energy Policy The struggle between Myth & Fact



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Master of the Worshipful Company of Fuellers, Distinguished Guests.

Thank you for doing me the honour of inviting me to give this lecture this evening. You certainly know how to torture your lecturers. This could not be a more awkward time for me because we are all in limbo this evening.

We await the fourth review of energy policy in five years to see whether fact – reality – has triumphed over myth. Rumour has it we should know next week with the publication of the Government's new Energy White Paper.

My guess is that this will show that energy policy is still dominated by the myths emanating from environmental concerns, though with stronger hints of a dawning of reality. Whether it will prove to be a false dawn will depend on Gordon Brown, our likely next Prime Minister.

In short, the struggle set out in the title of this lecture remains unresolved and may still do so when May is out.

So what I want to do this evening is to set out my view of a rational energy policy in the circumstances of the early 21st Century and to separate myth from fact so that we are better able to identify what is in the nation's interest.

My judgements are informed by my service in the Department of Energy from 1974-79, latterly as head of its first energy conservation division which also took in policy responsibility for such things as renewable sources of energy and CHP – combined heat and power.

They are reinforced by two other things:

First, my experience of top level environmental discussion across the world in the 1980s.

Second, my study of the energy scene required by my secretaryship over the past nine years of 'Supporters of Nuclear Energy,' a small group of some 325 individuals who do what they say they do – support nuclear power.

This, you may feel, is a novel approach bearing in mind the activities of Greenpeace (what peace?) and Friends of the Earth (friends, when they would decorate every hilltop with industrial power stations the height of Big Ben?).

My concept of a rational energy policy can be simply stated: it is to seek to provide the nation with a secure supply of energy that enables us to compete in the world.

To this end, in the early years of the 21stC, we must add the desirability of providing such secure energy supplies in the cleanest, low-carbon, way possible, consistent with our need to remain commercially competitive.

I add this environmental rider not because I believe passionately that man is responsible for global warming. I do not share the modern Western passion for self-flagellation over everything from slavery to the decline of the lesser black-backed twine-toed godwit. In fact, I am a fully paid up sceptic on the matter of man-made climate

change since, on the admission of the more humble meteorologists, we know so little of what makes our climate.

It has never yet been adequately explained to me why we switched with almost the speed of light from global cooling to global warming in the 1980s when scientists must have known in their frigid phase that carbon dioxide wraps the globe in a duvet.

Nor has any scientist in the dozens of presentations I have seen on the subject since Margaret Thatcher gave the issue lift-off in the late 1980s changed the familiar graphs which show us inexorably en route in the long run climatic cycle to another ice age.

But the absence of proof of the reality or myth of man-made global warming is neither here nor there in terms of energy policy. It is a possibility that we cannot prudently ignore and that we should seek to mitigate if we can without damaging our economy's ability to compete.

So, my purpose – and the standard by which I judge other people's efforts – is to secure the nation's energy supplies at the lowest cost and with the lowest carbon output consistent with a viable economy.

We have never had such an energy policy. We – and that goes for most of the Western, indeed, developed world – still do not have one in spite of all the global discussion of the issue over the last 20 years. Nor can we be certain we are about to get one in the UK, even though the Government seems to have advanced towards reality more than any other political party with its statement last year that nuclear power has a significant part to play in achieving our energy goals.

Hugging huskies, misplacing a wind turbine on your roof and changing your logo from a torch to a green oak does not encourage me to think that the Conservatives are closer to reality, though their Backbenches are awash with realists.

The Liberal Democrats also have their realists, but their recent preoccupation with bovine flatulence as a cause of global warming suggests their sail has not yet caught the winds of reality, if you see what I mean.

None of this is calculated to secure a rational energy policy with the continuity that investors require.

So, energy realism in our body politic is elusive and struggles, where it exists, against a tide of myth.

Broadly speaking the realists – as I would describe them – argue that if the national interest is to be served then we need an energy policy that:

- secures a portfolio of controllable energy sources that includes nuclear power;
- minimises the use of finite fossil fuels, especially oil and gas;
- otherwise seeks to reduce the carbon content of our emissions;
- promotes economy in the use of energy
- safeguards our competitiveness as a nation.

Broadly speaking, the myth-makers' energy policy would comprise:

- a combination of renewables and energy conservation, with presumably gas as the swing supplier
- a shift away from a national grid to localised electricity generation and distribution networks
- a withdrawal from nuclear power
- an implicit belief that such an energy policy would ensure security of economic supply or – and this is never openly pursued - that we must drastically change our lifestyle, though to what extent is never discussed any more than is the cost of their whole approach in terms of economics, comfort and convenience.

I shall concentrate on the myths before I turn to what I would regard as a realistic energy policy for the circumstances in which we live.

The leading myth-makers are Sir Jonathon Porritt's Sustainable Development Commission, the Greens and the Celtic fringe, as it is described – Scotland, Wales and the Republic of Ireland which statutorily bans nuclear power while importing some nuclear electricity via a grid link. In Scotland a third of the electricity produced is generated by uranium.

The Sustainable Development Commission probably carries most weight since it advises the Government at a cost of £3m a year, employing up to around 40 staff.

In a report on nuclear power just over a year ago it said that “the data on UK renewable sources suggests that the total practical resource is at least 87 per cent of current electricity production”. It argued it was therefore “reasonable to state that it is theoretically possible to supply all of the UK's electricity from renewable sources in the long term, especially when combined with energy efficiency”.

This led it to claim that there was “widespread agreement among respected analysts that a viable energy future is possible for the UK without new nuclear power”.

This was news to us in SONE, as it was to the House of Commons' Science and Technology Committee, which concluded that renewable power without nuclear was not a viable or secure option. So, we naturally inquired how these sweeping claims add up. We have been able to tap into work done by serious engineers. They have come up with a myth. I will take you through the argument.

The Sustainable Development Commission based its conclusion on a report by the Tyndall Centre for Climate Change Research that the total practical renewable resource represents 334TWh – i.e. 87 per cent of total annual UK electricity generation of 382TWh.

But one of the problems with renewables is that they are very dilute sources of energy. Whereas a nuclear plant required to generate 1000MW occupies a mere ten soccer pitches, wind power would require the whole of Dartmoor – and then would only produce the electricity when the wind was blowing at optimum speed.

This means that the actual output of renewable sources of energy is significantly less than their rated capacity – between a quarter and a third for wind power. This load factor, as it is called, is roughly two thirds for municipal solid waste and energy crops

and typically around a third for the rest – hydro-electricity, wave, tidal stream, tidal barrage and photo-voltaic cells.

So what does that mean? Quite simply it means a helluva a lot of renewables generating plant. In fact, our engineers have worked out that we would need renewables plant with a total rating of 111,000MW to supply 87 per cent of UK electricity. That is virtually twice the amount we need from conventional coal, oil gas and nuclear plant to keep the nation fully supplied on the coldest winter's day.

And that is using average load factors. Under high pressure, there could be some freezing, windless days and nights when the sea is calm and renewables would produce almost zero electricity no matter how much renewable plant was constructed.

This massive investment in renewables may well be what the doctor ordered for the renewables industry but it most certainly is not what the consumer can afford. It would pretty well guarantee the nation's bankruptcy.

You should not be unduly worried. Leave aside the cost, it won't happen because it cannot happen. This takes us into the renewables myth.

First, renewables are not readily available. Large hydro-electric power (which is not, incidentally, classed as a renewable by Government for the purposes of subsidy) is pretty well fully developed.

Wave and tidal stream are a long way from commercial application. France is unlikely to repeat its Rance tidal barrage and we have no barrage projects in sight. Photo-voltaics are marginal at this stage.

Energy crops are so demanding of land because their energy potential is so dilute that to fuel just one 1000MW power station with biomass (which used to be called wood) would need a forest the size of North Wales; a rapeseed field the size of the Highlands of Scotland; or 800m chickens with regular digestions on a farm a third the size of Dartmoor to give us the bio-gas.

We need 60 1000MW power stations to keep us in the manner to which we have become accustomed in winter.

Let's just have a look at the implications of Drax coal-fired power station's plans to green itself by producing 10% of its output through co-firing with rapeseed and elephant grass, which would convert my native Yorkshire into a jungle. It is estimated this would require 3-5 per cent of the UK's cropped land.

It follows that if Drax, the source of eight per cent of our electricity, were to be wholly fired by crops, it would require 40 per cent of our arable land.

I do not believe this nation would choose to starve by giving up vast areas of prime growing land needed to provide us with supposedly clean renewable energy. Already we have evidence of Mexicans complaining about the price of their tortillas and Americans about the price of beef, pork and chicken because of the switch of corn production into ethanol for vehicles.

So, in practice, when we talk about electricity supply from renewables, we are talking for the foreseeable future substantially about wind power, whether onshore or offshore.

It therefore stretches credulity to suggest that renewables are the answer to our prayers when wind, after 15 years' development – and 15 years' opposition to its development - still generates less than one per cent of our power. Renewables in total, including large-scale hydro, still account for only about four per cent.

Another limitation of some renewables is that they are uncontrollable. The wind does not blow, the tides do not flow and the sun does not shine when we want them to do. They do not necessarily produce power when we most want it and they often produce it when we don't need it. For example, maximum solar power comes in summer when demand is low.

One of the consequences is that Denmark, with a relatively large wind power sector, dumps 80 per cent of its wind power at give-away prices on to the European grid. We do not have access to this grid, assuming we were inclined to be as ruinously generous – indeed as daft - as Danes in subsidising mainland European consumers. Incidentally, for all their wind power, Danish per capita CO₂ emissions are twice those in pro-nuclear France.

This is not to say that this sceptred isle is entirely sane. Take Scotland, for example. It has about 9500MW of conventional capacity and some 6000MW of demand so it is able regularly to export about 2,200MW down south where the bulk of consumers are – the limit of the cross-border capacity.

Yet in its quest to become “the renewables capital of the world” Scotland has some 14,270MW of wind power operating, under construction, awaiting approval, planned or proposed. Of course, at best only about 5000MW – a third – would be generated if all this were built because of wind's load factor. Even so, that is still double the export capacity, and currently there is no means of getting it to market, let alone dumping it on mainland Europe.

I assume that because of one of the renewable myths – that wind power is good – we Sassenachs will be expected to fund new grids on top of the exorbitant cost of the wind power itself to bring it to the bulk of consumers.

There is no consolation for us in the form of uncontrollable renewables making a massive contribution to the reduction of carbon emissions. Another consequence of their unpredictability is that conventional power stations have to be kept wastefully running to chip in as and when renewables fail. That makes uncontrollable renewables rather dirty.

And let there be no illusion about the consequences for the management of the National Grid of surges or steep falls in electricity supply since electricity cannot be stored in bulk. If renewables, and notably wind, waves and solar, were developed on any substantial scale, they could cause the system to collapse.

We know that as between winter and summer UK demand can vary by 37000MW in any one year – that is, by the equivalent of 37 average sized power stations. This variation was recorded in 2005 when it fell to 23000MW over the 24 hours of July 17

and rose to a maximum of 60000MW on November 28. Within that, we also know that wind power at least can rise and fall precipitously.

And we know that a blackout across six countries in Europe affecting 15m consumers last November 4 has been partly blamed by the authorities on a tripping of wind power of around 6,200MW and that wind power hampered recovery.

For all these reasons I have to ask whether the Sustainable Development Commission knows what it is talking about. It is not just talking dangerous theoretical nonsense. It is perpetuating myths which undermine a realistic approach to energy policy.

If we are to have a realistic energy policy we have to recognise that no amount of uncontrollable renewables will close a single coal, oil, gas or nuclear power station.

Theoretically, the amount of conventional plant that can be rendered redundant by wind is the square root of the rated capacity of the wind power installed. So, if we had 16000MW of wind we could theoretically dispense with 4000MW of conventional capacity. But we may soon need 64000MW to keep the UK going. In that event, we could theoretically dispense with only 8000MW. The law of diminishing returns.

But how on earth can we afford to keep 56000MW – 64,000 minus 8,000 - of conventional capacity going, all the time clocking up its costs, to accommodate wind when it stops blowing? These are the economics of the mad house.

But it is worse than that. We could not even afford to dispense with the 8,000MW offered theoretically by the law of diminishing returns. This is because all studies have shown that the conventional power station capacity available to the National Grid will always exceed peak demand, regardless of the wind capacity installed.

I think I have shown you the severe limitations of uncontrollable renewable sources of energy and of the Sustainable Energy Commission as advisers to the Government.

It means that the £32bn expected to be lavished on wind power over 25 years is profligacy of the highest order – as some Parliamentary Select Committees have complained. It demonstrates beyond peradventure that we have more brass than sense when for that money we could have 16 clean, controllable, economic nuclear power stations with a 60-year generating life.

But, you may reasonably say, the Sustainable Development Commission included in its equation energy efficiency. I have not shown that renewables in concert with energy conservation are incapable of covering 87 per cent of our electricity. Indeed, I have not. But I will.

Over the coming years, scientists, engineers and technologists will be doing what they have done since the invention of the first steam engine – they will be improving the efficiency with which machines, processes, systems, buildings and vehicles use energy in its various forms. Like other developed nations, we are pretty consistently becoming a more energy efficient society.

Since 1970, for example, GDP has doubled but energy consumption has risen by only 12%. The improvement continues. Over the last 10 years GDP has grown by 21%

but energy consumption by only 2 per cent.

These are impressive figures repeated in other developed countries, though we have to bear in mind the flight from manufacturing. Yet the fact remains that demand for energy overall has grown and for electricity has been growing pretty relentlessly in the UK by 1 to 1.5% a year for 40 years. Our increasing reliance on electricity, and the sensitivity of the systems which use it, emphasises the need for reliable power which, as I have shown, some renewables, and not least wind, cannot deliver.

As rising demand shows, not all of the savings that our technicians are achieving by squeezing so much more useful energy out of the energy applied result in reductions in energy use. Their genius finds other ways of using energy and also saves cash that consumers use to buy energy-consuming machinery and appliances. This is the well-known rebound phenomenon at work that limits reductions in energy use arising from improved efficiency.

There is another way to reduce energy consumption. That is simply by every one of us using less in our daily lives – by economy as distinct from greater efficiency. As one who spent five years trying to persuade the UK to “Save It”, I know the theoretical potential is immense.

I also know that the economies are immensely difficult to achieve – and virtually impossible to sustain - without the pressure of excruciating and probably politically prohibitive increases in energy prices, especially if any democratic country applied them unilaterally.

This does not mean that we should not seek to moderate energy demand. We are very wasteful – as the current preoccupation with excessive packaging shows - and there are many ways in which we could be more economical. But we do not live in an economical society; we live in a profligate, throw-away society.

What we need is a change – or at least an adjustment - in lifestyle, expectations and behaviour. This is very difficult to engineer but it does not mean that we should not try. At present, such effort as is being made is diffuse and incoherent. We need a new, focused and high profile assault on wastefulness but we should not expect large returns on our capital.

There are five other myths I need to confront before I turn to advocate a realistic energy policy. They are represented by the terms micro-generation, CHP, the hydrogen economy, carbon capture and sequestration and hope springs eternal – that is, the belief in the existence somewhere of some magical new clean source of energy that will rapidly solve all our problems. I shall seek briefly to put each in perspective.

One of the objectives of the Sustainable Development Commission, Greens and politicians who ought occasionally to talk to engineers is eventually to replace the National Grid with more local or distributed networks. This is partly to encourage the development of renewables and household generation of power and partly to reduce losses of power in transmission. The credibility of the latter aim is somewhat reduced by their advocacy of the transmission of wind power generated in the North West of Scotland to the overcrowded South East of England, but that is by the way. In any case, they exaggerate grid losses.

One suspects there is more ideology than expertise behind this determination to reverse the route that all advanced nations have taken in creating National Grids.

We began the movement out of localised power networks with an inquiry in 1925, followed by the Electricity Act of 1926, and it was substantially completed before World War II. I am told this brought such economies of scale that within three years spare generating plant had been reduced from 85 to 15%. The capital saving amounted to 75% of the cost of building the grid and generating costs fell by virtually 25 per cent.

We need to ask whether advocates of micro-generation wish to bankrupt Britain and to put the lights out, given the horrendous problems of balancing flows on and off the localised networks relying on intermittent sources of supply.

Then there is CHP. It would be a valuable saving if we could make use of the 60 per cent of the heat raised - and wasted - in conventional power stations. You will not find Supporters of Nuclear Energy dismissing CHP which seems to make sense for new developments. The problem has always been how economically to transport the heat into existing houses and properties. I am aware of experiments to produce a viable scheme but I know of no demonstrably economic method. Otherwise it would have been taken up. We therefore need to keep this potential contribution in perspective. We also need to recognise that domestic CHP systems now being advocated would, if not fired by wood chips, raise our dependence on imported gas.

There are some engineers who say that the hydrogen economy has no past, no present and no future. This seems a little sweeping since it could find a niche market in transport propulsion.

But hydrogen comes at a price. It takes more energy to separate hydrogen from water or by chemically reforming gas than you get out of the hydrogen produced. So the hydrogen economy is no answer to energy shortage. It also follows that hydrogen will always be more expensive than the energy it replaces. It lies in the future, if it has one.

Working through the myths, I come to carbon capture and sequestration. Here there is no question that this is feasible. Injecting carbon dioxide into oil and gas fields to yield more output is a familiar technique, though using it to produce more carbon to burn is not exactly in the spirit of carbon capture and sequestration. The objective is to lock up the carbon in the strata. It perhaps explains why the oil industry is reportedly enthusiastic about carbon capture and storage.

The current idea is to capture the CO₂ from existing coal and presumably gas-fired power stations – scores of them – and sequester it in the strata under the North Sea. It is a grand idea in every sense of the word. But we do not yet know whether it is feasible on this national, let alone European, scale, whether the CO₂ would in fact remain locked up for centuries to come or what it would cost. Early estimates suggest it could increase the price of electricity by anything 50 to 100%.

Only last week I advised a Liberal Democrat MP with boundless enthusiasm for CCS, as it is called, that he would be out on his ear at the next election if he told his constituents he was advocating doubling the price of their power.

They would think he was certifiable if he also admitted, as he must, that CCS would have no effect on CO₂ emissions from wider industry or the domestic and transport sectors.

The moral of this tale is that we are some way from knowing whether we could rely on carbon capture and sequestration to give a new lease of life to coal and precisely what it could cost. We certainly cannot rely on it.

As for hope springs eternal - some unspecified new clean and economic source of energy emerging over the horizon like the 5th Cavalry - I have to ask one simple question: Is it likely when scientists have been searching for this Holy Grail for decades? The last presentation I had on the nearest approach to this dream – nuclear fusion – is that it would be commercially available in 2048.

I must say I nearly fell off my chair over the precision of the date. The prophet promptly hinted that he did not want to be held to it because, he said, it depended on politicians over the next 41 years never delaying a decision over its funding and development. For the foreseeable future we'd better stick with fission as the bird in hand.

To summarise: I hope that I have shown you that we cannot rely on renewables, energy conservation, micro-generation, CHP, hydrogen, carbon capture and sequestration or some stunning discovery to see us through – not even in combination.

The limitations of these power sources – whether in terms of reliability, economics, land use, carbon reduction, yet-to-be proven feasibility or just plain risk – show we have to look elsewhere, at least for the medium-term, if we are to secure Britain's supplies of energy at affordable cost and at the same time reduce carbon output.

So how might we do it? Let us first recognise that it is going to be immensely difficult and that the more we delay the more difficult it becomes.

Current energy policy is failing on all fronts. It is not giving us reasonable security of supply at prices we can afford to compete in the world. It is not reducing carbon emissions. They are higher now than when Mr Blair took office.

We need a new policy – and quick – because we stand to lose roughly one third of our electricity generating capacity over the next 15-20 years because of the closure of ageing coal and nuclear power stations.

North Sea oil and gas are well past their peak and declining a little faster than was expected. We are net energy importers for the first time in our history. At the same time common sense tells us that we would be criminally irresponsible to rely heavily on imported gas, given the known attitudes of Mr Putin and militant Islam. To do him credit, Mr Blair has blanched at the thought of relying on imported gas for up to 80 or even 90 per cent of our energy requirements. Yet that is what we are moving towards on his shortly-to-be ended watch.

It may be that the Russians and the Islamic states will prove more reliable suppliers than we might fear. But we have no idea what the cost of their gas will be, except that it is likely to be high, given the insatiable demands for energy of China, India and other developing states.

We are apparently devoid of ideas as to how actually to clean up our act since CO₂ emissions are rising. A carbon tax would make sense provided every nation acted in consort. But that is crying for the moon.

The early experience of carbon trading and offsetting suggests it is doing far more to earn our contempt and line the pockets of pious entrepreneurs than reduce carbon. Kyoto is a sad joke, given that at best only two European nations seem likely to meet their obligations and the candidates for biggest polluters – China and India – are excluded.

Carbon reduction is all target setting, pious talk and precious little action apart from sharp practice.

Indeed, I would characterise energy policy-making so far as a combination of flying on a wing and a prayer and the Micawber principle in a desperate attempt to avoid the obvious.

The energy policy Britain needs has to be made of sterner stuff than this if it is to serve the people.

Next week's White Paper will be an abject failure unless it conveys a sense of urgency. Even with our warmer winters, we are sometimes scraping the barrel on cold days for electricity generating capacity. It has been a close run thing on several occasions since the onset of this century. We do not have a robust energy base to our economy and our electricity supply is fragile in extremes of weather.

It will get worse rather than better because of the decline of the North Sea hydrocarbons province, the shortage of gas storage (about which industrialists were complaining last week), and the steady closure of coal and nuclear power stations. Renewables will remain marginal, though some such as energy from waste and heat pumps may well become more important.

Frankly, we are up against it because of procrastination, which seems to come naturally to politicians who present themselves as purposive. I do not expect the White Paper to confess all this. But if it does not exhibit a sense of urgency, it will not be worth the paper it is written on.

The Government may well be inhibited in making the development of nuclear power central to its policy of securing supplies at affordable cost and reducing carbon emissions because of the court judgement on consultation won by the Greens. But unless – while consulting on details - it positively recognises the need for nuclear power, as the United Nations Fourth report on climate change tentatively and timidly did last week, it will lack credibility.

Given that any new nuclear power station might not be on line for 10 years, it will have to acknowledge that some new gas-fired stations will be necessary as an interim measure to make ends meet. This will make us more vulnerable to international pressures and cause us to emit more carbon – but that is procrastination exacting its price.

The Government should pursue research into carbon capture and sequestration. It should certainly put more power and beef behind a national co-ordinated and high profile effort to promote economy and the elimination of waste in the use of energy.

It should bring far greater financial rigour to the business of subsidising renewables and carbon trading where immense amounts of money are being wasted and our industry is being made less competitive.

I can hear the critics stirring already. Ah yes, they say, but you are at odds with the passion of the day: reliance on the market. To which I reply: tough.

Reliance on the market to solve our energy problems carries about as much conviction with thinking man as does a politician resigning on the grounds that he wishes to spend more time with his family.

The Government has never hesitated to subvert the market and massively subsidise renewables, for example, beyond any reasonable assessment of their potential. Relying on the market has become shorthand for avoiding the issue. And the issue starkly is security of energy supply at affordable cost.

I do not know why we have a Government if it is not to secure the energy required to keep this nation in business and its people in reasonable comfort and prosperity. If so, it has to take decisions on what the nation needs to do to achieve that – and what it needs to do to secure a market response.

I do not expect the Government to allocate shares of the energy market to various fuels. I do not hope – still less want - it to subsidise nuclear power. Nuclear does not need subsidy. It is the cheapest source of electricity, given the volatility of the gas market and the massive contribution of coal to carbon emissions.

But what I do expect the Government to have done – or to provide evidence of doing – is

- facilitating the pre-licensing of reactors
- clarifying the planning regime
- identifying sites for nuclear power stations
- setting the framework for longer-term access to the electricity market (bearing in mind the awful consequence of Ofgem's short-term quest a few years ago for cheap electricity for coal, oil, gas and nuclear generation, resulting in the "rescue" of British Energy)
- recognising the need for long-term stability in the regulatory framework
- showing a determination to find and develop a site for the disposal of the relatively small amounts of longer term nuclear waste accumulated over 50 years from both military and civil reactors.

In a spirit of helpfulness – having set out a multi-lateral approach to cleaner energy security at affordable cost – I would finally offer our politicians ten quick reasons why we should have a sizeable nuclear power industry in Britain for the foreseeable future.

1. Nuclear is safe, not a single death from a radiation accident in 50 years of electricity generation in Britain. Beat that.

2. Nuclear has proved over half a century that it is reliable and economic – the cheapest generating option, taking account of environmental costs and the likely movement of fossil fuel prices, given the development of China, India, other parts of Asia, Russia and Latin America.
3. Nuclear is the only source of electricity to provide for its environmental consequences in its current price – a provision of about 4 per cent for decommissioning and waste management. You've already paid for it.
4. Nuclear, while undoubtedly having heavy initial capital costs, has low and predictable running costs, unlike fossil fuels.
5. Nuclear has no foreseeable shortage of fuel and the means vastly to extend the efficiency with which it uses uranium through reprocessing and the fast reactor.
6. Nuclear has neither decommissioning nor waste management problems, apart from getting politicians to designate a site as a repository for its longer-term irradiated wastes.
7. Nuclear minimises the use of finite fossil fuels, which is exactly what we should be doing, and could longer-term clean up the domestic and transport sectors through all-electric homes and electric vehicles.
8. Nuclear contributes to greater security of electricity supply at competitive cost, which, along with carbon reduction, is again what we require.
9. Nuclear discharges a moral obligation on the developed nations to maximise their use of high technology, especially when it is clean and economic, to allow the developing nations more room for development.
10. Whatever we do, or don't do, we won't stop the rest of the world from looking after their interests since they have got the message. Currently, there are plans to raise the number of nuclear reactors globally by 60 per cent – 250 are under construction, planned or proposed to add to the existing 435, which produce 16-17% of the world's electricity.

The leading nuclear developers are China (68 new reactors), Russia (32), India (26), South Africa (25) and USA (24). Leave aside France (2) and Finland (1), Western Europe (as distinct from the former Soviet satellites) is stuck in the mud of neanderthal, so-called Green prejudice.

We cannot afford to luxuriate in these myths. It is time we got real and faced facts.

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