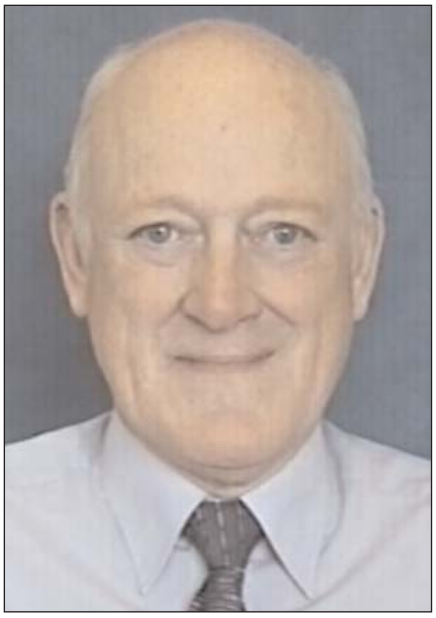
***OUR ENERGY FUTURES FOR SECURE AND SUSTAINABLE POWER: FROM CLEAN COAL TECHNOLOGY WITH CARBON CAPTURE AND STORAGE, MICROGENERATION, TIDAL, WIND AND NUCLEAR***

*MEETING OF THE THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE ON MONDAY 24TH APRIL 2006*

A sharp decline in the generation of North Sea Gas has resulted in the UK becoming a net importer of energy for the first time ever. This coincided with market failure that gave rise to unscheduled and sudden cost increases for domestic consumers of both gas and electricity and the possible threat of supply interruptions for imported gas. These events have prompted an urgent review of UK energy strategy for the longer term.

The ownership and control of effective, economic, secure and sustainable energy sources that are compatible with Climate Change are increasing in importance if we are to manage our economy in the future. Decision time is upon us therefore, unless we are prepared to accept whatever may be left at the end of the pipeline.

# Bringing Clean Coal Technology into the UK Generation Portfolio



*Dr J M Farley*
*Director of Technology Policy Liaison, Mitsui Babcock Energy Limited*

## Introduction

Mitsui Babcock has been a leader in development of power generation technologies since the company was formed in the UK in 1891 and it continues to lead particularly in advanced clean coal firing technology. The company believes that the UK should have a diverse, balanced fuel supply portfolio which will deliver secure supply at affordable prices with minimum $CO_2$ emissions. Carbon abatement from fossil fuel power generation should be the highest priority amongst all supply-side technologies with the objective stated in the DTI Strategy for Carbon Abatement Technologies for Fossil Fuels "To ensure the UK takes a leading role in the development and commercialisation of carbon abatement technologies that can make a significant and affordable reduction in $CO_2$ emissions from fossil fuel use".

Reduction of carbon emissions is required, but must be considered in conjunction with, crucially, maintaining security of supplies and reasonable, stable energy prices. This requires consideration of the alternative "fuels" (and their carbon footprint) and the timescales necessary for the building of power plants on a meaningful scale against the demand requirements in the generation system and the relevance of the measures on a global scale.

Carbon dioxide Capture and Storage (CCS) from fossil fuelled plants, coal and gas, has very great potential for the UK and even more importantly for the major coal using countries of the world like China, India, USA and Russia. A precursor to CCS is the introduction of carbon-abated clean coal technology. Such technology is available now and could be operational in 3 years as retrofit plants or in 4 years as new plants. Carbon-abated clean coal technology could thus be applied in time to contribute significantly to filling the UK energy gap of 2015.

## Carbon-abated Clean Coal Technologies

A major opportunity exists by adoption of carbon-abated clean coal technology which can reduce emissions whilst generating electricity at a competitive price. Adoption first of Track 1 and then Track 2 carbon-abated clean coal technologies as defined in the government's CAT strategy would reduce emissions progressively by

20% to 40% (Track 1, available now) and later 90% (carbon dioxide capture and storage). Track 1 CAT technologies (higher efficiency Advanced Supercritical Boiler/Turbine and Biomass cofiring as new build or retrofit or existing power plants) are the lowest cost reduced carbon supply-side technologies. Building capture-ready Advanced Supercritical coal-fired plant would set the right example to major users of coal worldwide, and kick-start early adoption of cleaner technology in countries such as China and India, which have a track record in using UK power plant technology and a huge and growing dependence on coal as an energy source.

Since coal and gas are both seen as major contributors long term, the Government needs to implement an array of policy measures to achieve reduction of carbon emissions by ensuring *investment* in the cleanest technologies for coal and for gas. These measures have to avoid driving more fuel switching from coal to gas since this would adversely impact security of supplies and expose customers (domestic and industry) even more to higher prices. Our views on various measures are given below.

## Government Policies on Clean Coal

At present, carbon trading is not driving more than minor incremental changes and has an inherent tendency to drive switching of electricity generation from existing (less than optimum) coal plant to existing less than optimum gas-fired CCGTs. It is not reliable enough (in terms of certainty of $CO_2$ price), nor long-term enough to allow bankable investment decisions. Presently it is just working to move cash from electricity consumers through the generators on to the holders of excess $CO_2$ Allocations, mostly outside the UK.

However, we believe the UK National Allocation Plan could be implemented in a way that would incentivise investment in the cleanest coal and cleanest gas technologies. This would require an adequate New Entrant reserve, separate BAT benchmarks (g/kWh) for $CO_2$ for coal and gas and a long-term commitment to the duration of the Allocations awarded.

It is very important that the rules for New Entrants and Retrofitted plants are set correctly for 2008-12 since these rules will influence investments for many years. If the wrong rules are set then these rules will run counter to the Government's security-of-supply objectives and any investment incentives introduced by the Government would then have to be more generous than otherwise necessary.

The Secretary of State should use his powers to require use of Best Available Technology[2] for all new fossil fuelled power plant or refurbished/retrofitted plant permitted from 2006 onwards and should require all plant (except GQCHP) to be designed to be "capture-ready"[3].

There is currently no Low Carbon Incentive for fossil fuels or nuclear comparable to the Renewables Obligation, and the incentive which exists (Carbon Trading), as stated above, incentivises fuel switching coal to gas rather than major investment. An incentive for low carbon sources would not need to be so generous as the Renewables Obligation, but would need to be carefully designed to avoid driving fuel switching to gas because of the low initial capital costs of gas-fired power plant, with consequences for security of supplies and high price risks.

Cofiring of biomass in place of coal in large power plants is the most efficient and cost-effective way of using this renewable fuel – 1.5 times more MWh and $CO_2$ reduction in an advanced supercritical power plant than in a dedicated small-scale biomass plant. Since it is now clear that large coal-fired plants will remain in the generation mix, more not less cofiring of biomass should be encouraged and, with a view to the longer-term growth of biomass energy crops in the UK, this should be strongly encouraged by appropriate changes to the Renewables Obligation.

## Advantages of Coal

Coal has a high energy density and the advantage that it can be stockpiled cheaply and safely, is sourced from politically and economically stable countries around the world, with 200 years proven reserves. Supplies of coal are much less likely to be disrupted than supplies of gas, which are especially vulnerable to terrorist or insurgent action directed at pipelines along the supply routes. 40% of the UK's coal needs are produced from indigenous sources, at prices which now match those of imported coal. Coal prices are much more stable than gas or oil and are predicted to remain so. Over the longer term, the relative abundance of global coal reserves, including significant UK reserves, compared with the relative paucity of gas reserves, including declining UK reserves, means that the price differential must move inexorably in favour of coal.

If the generation gap is filled by coal then the current healthy diversity of fuel mix for power generation would be maintained. Coal plants can be built in 3 years (retrofit) or 4 years (new build) from completion of permitting. Only plants ordered by 2011 will be operational by the end of 2015, and recognising world-wide industry capacity, a steady build programme with, say, 4 GW of project starts per year from 2007 to 2011 is needed.

[1] Details of these technologies are given in Mitsui Babcock document "Clean Coal Technology and the Energy Review", www.mitsuibabcock.com, and in DTI Best Practice Brochure, BPB010 – Jan 2006 – "Advanced Power Plant using high efficiency Boiler Turbine"

[2] For coal BAT would be capture-ready with an ELV for $CO_2$ of 750g/kWh and for gas BAT would be good quality CHP or capture-ready CCGT with an ELV of 350 g/kWh

[3] ie suitable for the later addition of Carbon-dioxide Capture

*OUR ENERGY FUTURES FOR SECURE AND SUSTAINABLE POWER*

# Local Sustainable Energy

*Adapted from a presentation by*
*Allan Jones MBE*
*Chief Development Officer, London Climate Change Agency*

Electricity is currently supplied nationwide by means of a grid system that commenced operations in 1926. This national grid is based on electricity sourced mainly from a few very large fossil fuel generators located near coal mines and major rivers, such as the Trent, which supply cooling water; offshore natural gas fields such as Morecambe Bay; and nuclear plant in remote coastal locations such as Sizewell, which are very wasteful of the total heat and electricity generated. The national grid system thereby loses as much as two thirds of the total energy produced, mainly as wasted heat generated at the power station, but also through the distribution system. The combustion of fossil fuels to generate $CO_2$ in industrialised economies is also one of the principal contributors to climate change. The fact that most of the total energy generated is also wasted is no longer acceptable as a component of a rational plan designed to economise on fossil fuel combustion and to combat climate change.

In 2004 I was invited to take up the challenge of replicating in London the work previously achieved by Woking Borough Council. The Council had previously received the Queens Award for Enterprise: *Sustainable Development 2001 in respect of Energy Services activities undertaken in the development of Local Sustainable Community Energy System* with the help of Danish investors who were familiar with the technology employed. The system is based on locally situated combined heat and power (CHP) co-generation units burning natural gas, leading to tri-generation with the addition of cooling and subsequently hydrogen production as fuel for transport. Summaries of the Energy, Environmental and Financial Savings and the Climate Change Strategy adopted by Woking from 1 April 1991 to 31 March 2004 are presented in Figs 1 and 2. A recent Greenpeace article *Decentralised UK Energy* also suggests that it would be cheaper and more sustainable than the nuclear option to convert every building in major cities into mini power stations, each providing as much energy as possible for their own use, and thereby gradually extending the Woking model more widely across the commercial sector and domestic housing stock.

The Mayor of London, Ken Livingstone, who is responsible for the Greater London Authority, Transport for London, Metropolitan Police, London Fire & Emergency Planning Authority and the London Development Agency, has very recently announced plans to generate renewable energy in London. This will be in the form of a decentralised system of local generation as an alternative to the centralised grid system designed to meet climate change objectives. The London Climate Change Agency, which is a component body of the London Development Agency, is the practical delivery agency implementing climate change projects in water, waste and transport. Energy will be delivered through an Energy Service Company (ESCO) in conjunction with EDF Energy. The Joint Venture Company Finance for this is split with a 20% Shareholding (19% Public Sector and 81% Private Sector Partner(s)) and with 80% Loan Finance.

The annual thermal efficiencies and grid losses for centralised power generation are presented in Fig 3 for comparison with Fig 4 showing the economic and environmental advantages which could be realised by the introduction of a highly decentralised energy plan for London in the first quarter of the 21st Century. An

**Summary of Energy, Environmental and Financial Savings 1 April 1991 to 31 March 2004**

| | | |
|---|---|---|
| Energy Consumption Savings | 244,408,155 kWh | 48.6% saving |
| Carbon Dioxide $CO_2$ Emission Savings | 142,013 Tonnes | 77.4% saving |
| Nitrogen Oxides $NO_x$ Emission Savings | 439.0 Tonnes | 76.6% saving |
| Sulphur Dioxide $SO_2$ Emission Savings | 1,480.84 Tonnes | 90.9% saving |
| Water Consumption Savings | 412,855,000 Litres | 43.8% saving |
| Savings in Energy and Water Budgets | £5,388,721 | 31.36% saving |

Notes:
1. The Council's target was to reduce energy consumption by 40% within 10 years from 1991/92 to 2000/01.
2. The above savings are for corporate property and housing stock, where the Council pays the energy and water bills, and exclude Council tenant and private sector savings achieved by the Housing Energy Efficiency and Sustainable Energy Programmes.

*Fig.1*

**Climate Change Strategy for Woking 1 April 1991 to 31 March 2004**

| | |
|---|---|
| Reduction of $CO_2$ Equivalent Emissions | 17.23% saving |
| Electrical and Thermal Energy from Sustainable Sources | 97.7% |

Notes:
1. Woking's Environmental Footprint - 1,060,000 tonnes of $CO_2$ equivalent emissions at 1990 levels.
2. Target to reduce $CO_2$ equivalent emissions by 80% from 1990 levels by 2090 RCEP target.
3. Council targets to purchase 100% of its own electrical and thermal energy from local sustainable sources and 20% of its own electrical energy from local renewable sources by 2010.

*Fig.2*

inter-comparison of prices for Grid Supply and Private Wire supply shows the economic, environmental and engineering advantages to be gained from the use of private wire in preference to electricity supply from the Grid. Electricity would be delivered though a new London Energy Internet, by means of a series of Island Generation, private wire based sub-units, powered by CHP, Fuel Cell and PhotoVoltaic units, with connection, technical and supply (standby and top up) agreements with the Grid.

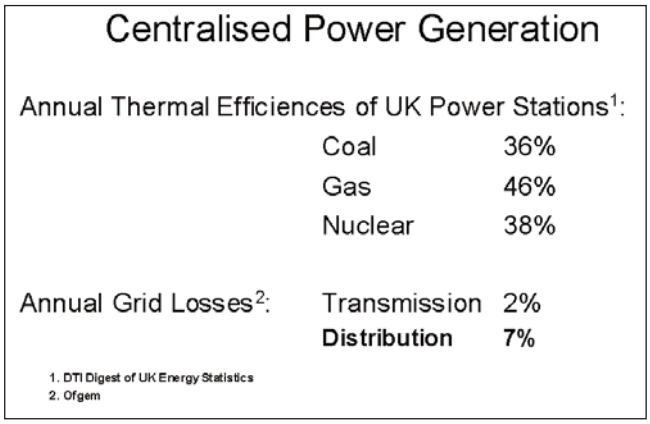



*Fig.3*

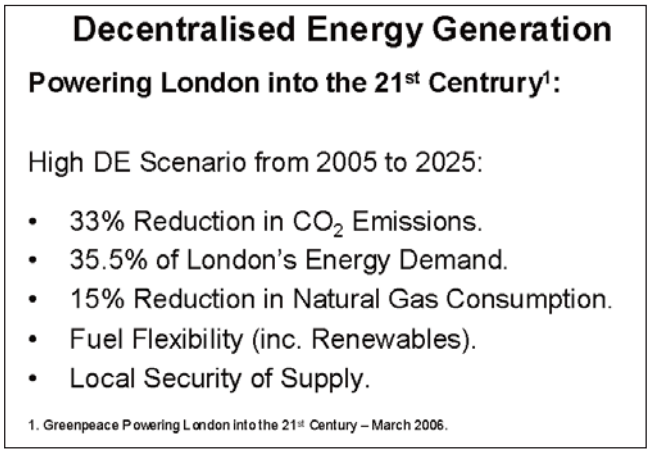



*Fig.4*

The Mayor's Energy Strategy for $CO_2$ and listing of Sustainable Energy Targets is summarised in Fig 5. The enormous potential for new renewable energy projects in London is summarised in Fig 6, and large scale renewable energy projects are listed in Fig.7. Hydrogen will be the energy carrier of the future, which will be manufactured locally from renewable sources (Fig 8). Fuel cells and the Hydrogen Economy derived from renewable fuels represent the only technology/fuel that can sustainably meet the UK's future electricity, thermal and transport energy needs. The current barriers to this are not technical but are regulatory and due to vested interests.

According to the London Development Agency's *Green Alchemy report – Turning Green to Gold*, "The potential sustainable energy market generated as a direct result of deploying the technologies set out in the Mayor's Energy Strategy could be worth around £3.35 billion by 2010 and employ between 5,000 and 7,500 people."

For further information see www.praseg.org.uk/downloads/2005/Allan%20Jones.pdf

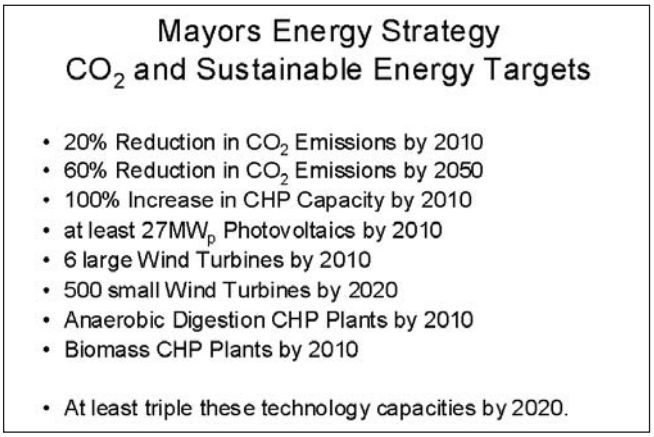



*Fig.5*


*Fig.6*

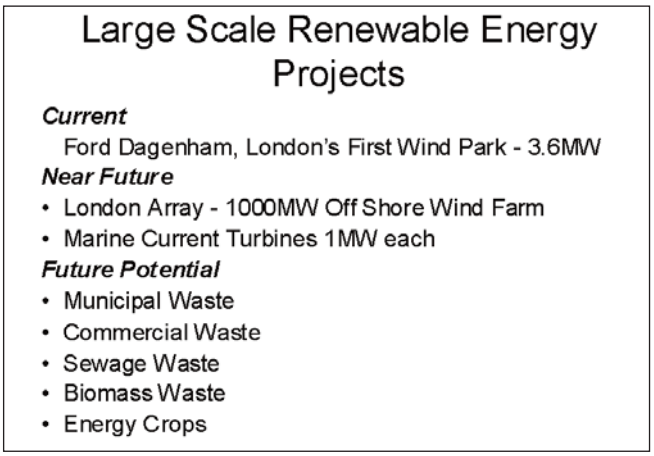



*Fig.7*

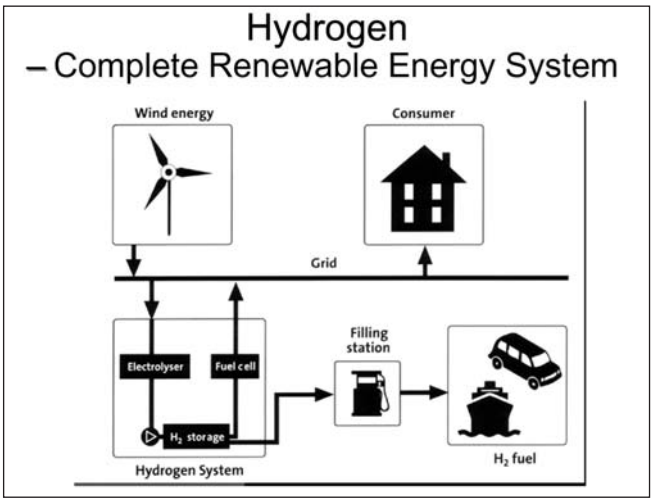



*Fig.8*

# Must Nuclear make a Contribution?

*Michael Connarty MP*
*Secretary, All Party Parliamentary Group on Nuclear Energy*

I set myself five key questions: Is nuclear power necessary, safe, sustainable, affordable and is its use avoidable? This note sets out the results of my research on these questions.

## Is Nuclear Power Generation Necessary?

**Table 1 UK Electricity generation over Time**

| | 1998 | 2005 | 2010 | 2020 |
|---|---|---|---|---|
| | % | % | % | % |
| Coal | 36 | 34 | 25 | 15 |
| Nuclear | 29 | 20 | 15 | 7 |
| Gas | 28 | 41 | 45 | 55 |
| Renewables | 1 | 2 | 10 | 20 |
| Oil | 2 | 1 | 1 | 1 |
| Hydro | 2 | 1 | 1 | 1 |
| Imports etc | 1 | 1 | 3 | 1 |

Source: Energy White paper. Department of Trade & Industry

Nuclear power provided 29% of the reliable 24/7 base-load electricity to the UK in 1998 and 20% in 2005 (Table 1). Under current plans, progressive reductions of nuclear power generation (see Fig 1) would be replaced by increases in gas imports and renewables. A survey of present progress leads me to doubt whether the realised increase in renewables will match nuclear's reliability in maintaining base-load electricity supply over the grid.

The shock of the interruption of the gas supply from Russia to the Ukraine in winter 2006, and the massive price rise in energy products underline their position as an important consideration in Geo-politics. Reactions to Gazprom's interest in British Gas caused a stir and underlined increased concerns about security of energy supply. In an open and free international market, the result is likely to be reflected in price rather than a threat to supply, leading to a reappraisal of domestic sources such as nuclear power.

According to Tony Blair "the single biggest long-term problem we face as a world is the issue of climate change. The evidence is now overwhelming."

The Government has targets for reduction in $CO_2$ by 20% by 2010, and a cut of 60% by 2050 from 1990 levels. The 2010 target will not be met not least because of the rise of 3.2 million tons of Carbon from electricity generation from 2000 to 2005. I suggest this is linked to the run-down of the non-$CO_2$ generating Magnox nuclear stations (see Fig 1).

Security of electricity supply without nuclear would therefore be subject to the following five factors:

1) Decline in domestic coal production and greater use and costs of imports;
2) Increasing reliance on imported gas, volatile in supply and price;
3) Increased use of $CO_2$-producing fuel cycles;
4) Greater reliance on alternative fuels and energy sources;
5) Substantial costs in developing renewable sources and carbon abatement processes.

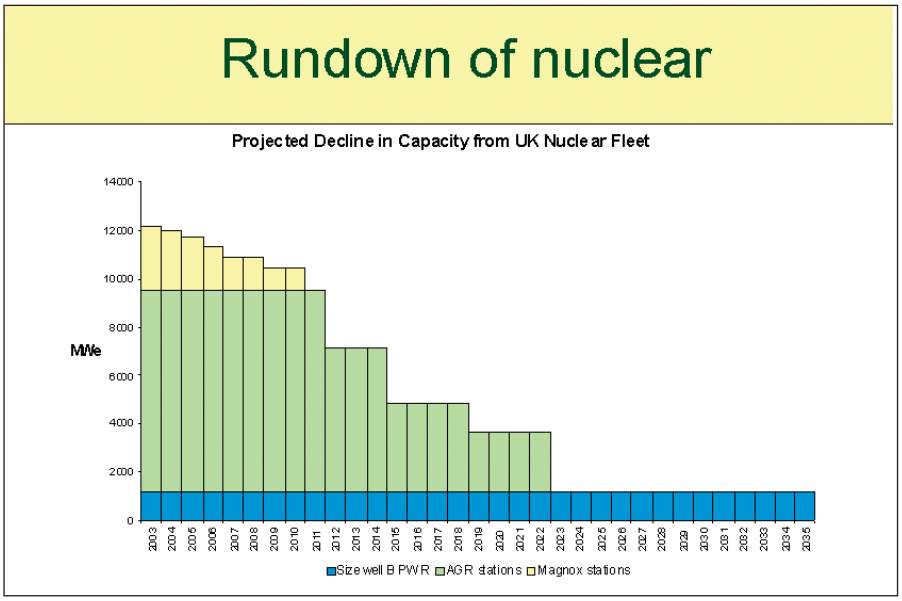



*Fig.1*

Nuclear is necessary if the UK is to maintain the diversity of supply choices to protect us from supply problems and the trend line for $CO_2$ production is to decrease over time.

## Is Nuclear safe?

Greenpeace founder, Professor James Lovelock concluded "Nuclear electricity is now a well-tried and soundly engineered practice that is both safe and economic; … even taking the Chernobyl disaster into account it is, according to a recent Swiss study, by far the safest of the Power industries." Extreme breaches of basic safety and design protocols at Chernobyl, discussed elsewhere in this issue, are unlikely to be replicated in a future setting, whereas the safety record of nuclear power generation is well known and easily verifiable.

The reality of spent nuclear rods giving off minimal amounts of radioactivity when only immersed in several metres of water, which I have personally verified, contradicts the "scary story" image of ticking time bombs of nuclear waste used as an image by the anti-nuclear power lobby. The issue of storage in the short, medium and long term is one for which a solution is long overdue, but has been exacerbated by indecision and inactivity on the part of UK Governments over the last forty years. It is not due to a lack of technical and scientific knowledge of how to store or dispose of waste nuclear materials in the UK. Geologists agree that Uranium ore deposits that are often more than two billion years old but which have no surface expression present an analogue for a safe high level nuclear waste repository. After forty years of inactivity, during which France, Finland and the USA have advanced their search for a solution, geological disposal is back on the list of possible options according to the UK Committee on Radioactive Waste Management (CoRWM). The Canadian study, led by a former UN Environmental Commissioner, Elizabeth Dowdeswell, suggests a way forward.

## Is Nuclear Sustainable?

Known supplies of uranium ore reserves will suffice for 50-60 years at the current rate of use. Any increase in demand will tend to raise the economic value of these reserves and also, more importantly, the current value of future exploration for new reserves that will be required beyond 50 years. Canada and Australia have been joined by Russia and Kazakhstan as major sources. Non-coal fossil fuels are not thought be sustainable for as long at the current rate of use. I agree with the Chemical Industries Association that such fuels should be reserved for their variable uses as chemicals and for new Hydrocarbon based products.

At present the energy output of one 8 gram pellet of uranium is the equivalent of 900$m^3$ gas=700litres of oil=4000kg of coal, yet first use reactors only release 10% of a pellet's energy. Reprocessing and future fast breeder technologies could release up to 90% of pellet energy. Thorium, abundant in India, is an additional alternative to uranium which can be enriched to operate in Canadian CANDU reactors without producing uranium. Nuclear is sustainable.

## Is It Affordable?

Just as scare stories are used about nuclear safety, so some exaggerated sums have been set against the capital costs of nuclear power generation. One recent statement from an MP's anti-nuclear group stated £1,000 per Megawatt produced, which is just absolutely unfounded. The latest estimates are that FULL capital and running costs including decommissioning of new generation nuclear power stations will fall between £20 and £30 per megawatt generated.

**The percentage of total cost are as follows:**

**Capital 17%**
**Financing 41%**
**Operations and Maintenance 25%**
**Fuel costs 13%**
**Spent Fuel Management 2%**
**Decommissioning 2%**

To complete the analysis of costs I researched the comparative non capital generation costs per kilowatt hour of electricity for each fuel type. Since this analysis gave no indication of the level of $CO_2$ output for electricity generated, I researched the $CO_2$ output for each fuel.

## Is Nuclear Avoidable?

From all the evidence I have found in my research I have to conclude that if Climate Change is to be tackled and the UK is to have the affordable, diverse and secure energy balance it requires for the coming century it must contain a

**Costs & $CO_2$ Output per kilowatt of Electricity for each fuel type**

| | Pence per kWhour | Grams $CO_2$ per kWhour |
|---|---|---|
| Wave | 22.5 | 8 |
| Tidal | 13.5 | 8 |
| Wind/offshore | 7.0 | 8 |
| Hydro | ? | 9 |
| Biomass | 6.5 | 17 |
| Geothermal | ? | 79 |
| Solar | ? | 133 |
| Wind/onshore | 5.2 | 8 |
| Gas/OCGT | 4.2 | 430 |
| Diesel | ? | 772 |
| Oil | ? | 818 |
| Coal/IGCC | 3.5 | 995 |
| Nuclear | 2.8 | 4 |
| Gas CCGT | 2.7 | 430 |
| Coal/CFBC | 2.4 | 955 |
| Coal/PF | 2.3 | 955 |

substantial nuclear power element. The public response to nuclear is changing as the survey of public opinion in November 2005 showed that 41% supported the building of new nuclear stations to replace the existing ones. Perhaps people are already responding to the scientific arguments which clearly demonstrate that we already have safe and secure $CO_2$-free nuclear power generation in abundance but will need to rely on new nuclear build on existing sites for base load electricity supply.

***In discussion the following points were made:***

A tidal energy bridge over the Severn Estuary with suspended vertical axis rotors would provide a cheaper, efficient and less environmentally damaging option than a barrage. Transmission of carbon dioxide derived from coal burning along pipelines following railway lines could be used to extend the life of the Brent oilfield. Competition in delivery times between carbon capture and storage (CCS) and clean coal technology (CCT) on the one hand and new nuclear build on the other favours the former mainly due to inaction subsequent to the Energy White Paper and a very long drawn out approvals procedure. New nuclear build is therefore no longer an option available to the Government to replace soon to be decommissioned nuclear stations that provide baseload electric power, whereas CCS and CCT are ready to go straight away. New nuclear build could be installed much more quickly on existing sites. Renewables are retail technologies suitable for small scale operation, they do not replace the need for large scale primary baseload energy. The imminent closure of currently operational nuclear, coal and oil-burning electrical generating plant will create an 18GW shortfall by 2015 for which the only possible replacement on the Government's current agenda is imported gas with all the potential risks to security of supply and cost that that entails.

# The Importance of Clean Coal Technology

*Anthony Darbyshire – Trustee, The Comino Foundation*

The Comino Foundation's vision is that people in Britain should live more fulfilled lives within a prosperous and responsible society.

In pursuit of this vision the trustees have identified that the security, continuity, cost and cleanliness of electricity generation is of fundamental importance.

Currently UK electricity is generated using a balanced mix of fuels but, in the absence of a Government energy policy, it is predicted that the closure of ageing plants and market forces will alter this balance significantly. The nuclear and coal components will be replaced, progressively, by gas. Energy conservation and production from renewable sources will be a positive factor but will not address the fundamental problem of maintaining a strategic balance between gas, coal and nuclear fuels.

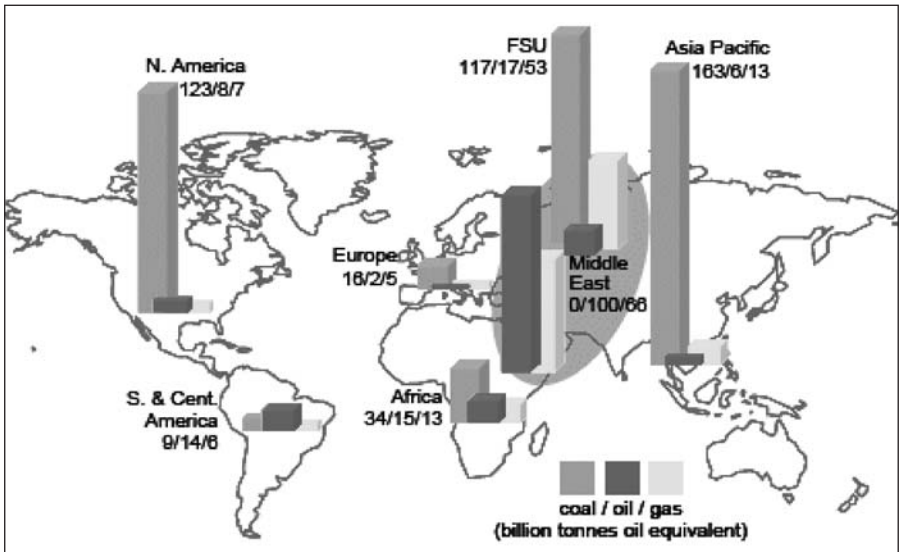
| Electricity generation by fuel type in the UK for 2003 | |
|---|---|
| Gas | 37% |
| Coal | 35% |
| Nuclear | 22% |
| Other | 3% |
| Oil | 1% |
| Hydro | 1% |
| Net Imports | 1% |

One possible scenario is that by 2020, 60% to 70% of UK electricity will be generated from gas with 80% being imported – a significant proportion from Russia. This would obviously be against the interests of the British people. To avoid this scenario the Government must establish a balanced energy policy for the 21st century.

The decision on whether to replace existing nuclear power plants is compounded by capital cost, safety, spent fuel disposal problems and a lead time for new stations of 15 years. The Government may be forced to support this option if it is not possible to maintain balanced energy generation using other means.

Having carefully reviewed this situation, Comino believe that the future, potential role of coal in generating electricity is not fully understood or recognised.

Coal is the most abundant fossil fuel in the world and in the UK. Security of supply and cost stability is better than that for gas. The key question to answer, however, is how $CO_2$ emissions from coal generation can be addressed to help curb global warming.




**Location of the world's fossil fuel reserves, showing the *"strategic ellipse"* where over 70% of the world's oil and gas reserves lie**

The technology to generate electricity from coal so that some, or all, of the carbon dioxide produced is eliminated, is well established.

Current technology to generate electricity with zero carbon emission requires that the $CO_2$ is captured and then stored underground, possibly to enhance the output of ageing oil fields. Existing coal power stations can also be modified to reduce carbon emissions in the medium term with upgrade to zero emission status at a later date.

Zero emission plant with full carbon capture and storage (CCS) is operational in the US and the US Government is supporting further development. Many of the coal fired stations that are now being built in China and India have relatively efficient carbon reduction and may be upgraded in the future to be emission free.

In the UK, however, no firm progress has been made to establish electricity generation from clean coal technology. Some existing plants are reducing carbon emissions by introducing biomass to their fuel mix but modifying old, existing plants to introduce carbon capture is not considered a viable economic option.

The clear strategic option is to ensure that a new generation of coal fired power stations with CCS is built, progressively, to replace those that currently exist. This will maintain, and could increase, the proportion of electricity generated by coal. Fuel supply will be secure and cost will be competitive.

To realise this option the Government will need to:

- establish an energy policy which includes clean coal electricity generation with CCS as a major component;
- make necessary legislation changes to ensure that CCS is possible, commercially;
- encourage, with appropriate 'pump prime' funding, the development of one, or more, full scale demonstration plants;

The proximity of the UK's depleting offshore oil fields offers the opportunity to enhance UK oil output whilst providing substantial $CO_2$ storage. In the UK there is also extensive technical knowledge and commercial interest from private sector organisations. The opportunity exists for the UK to become a world leader in CCS technology.

BP and partners are planning a demonstration project to test the viability of linking onshore gas conversion, power generation and offshore $CO_2$ storage in Scotland. In March 2005 Powerfuel plc announced plans and funding to re-open Hatfield colliery in South Yorkshire and build a 430MW clean coal generating plant with zero emissions technology on this site. This new company is jointly owned by the Russian coal giant, Kuzbassrazrezugol (KRU) and Richard Budge, who led the buyout of British Coal.

To maintain their vision, the Comino Foundation urge the Government to retain coal as a major fuel in their forthcoming statement on energy policy and ensure that a new fleet of clean coal power stations can be built.