

The COAL AUTHORITY



INVESTOR IN PEOPLE

Email: kevinpickup@coal.gov.uk

BY EMAIL ONLY
energy@royalsoced.org.uk

The Royal Society of Edinburgh
22-26 George Street
Edinburgh

Our Ref: CA23/19/2/11/KMP
Your Ref:

15 July 2005

Dear Sir

Royal Society of Edinburgh Energy Issues for Scotland – Committee review

The Coal Authority (the Authority) is pleased to be able to contribute to the above review. As Scotland historically has been a major contributor to the UK energy scene with coal, oil, gas nuclear and now renewable with wind in particular, the Authority is keen to contribute to a debate on the future role for coal. The Authority is the Non Departmental Public Body with ownership of coal in Great Britain and statutory responsibility for licensing coal mining operations. The Authority has a duty to secure so far as is possible an economically viable coal mining industry and would wish to ensure that policies developed by the UK Government and devolved administrations support the future of the coal industry as part of a secure, diverse, sustainable, and balanced energy portfolio.

The UK coal industry produced some 27.7 million tonnes of coal in 2003 and a further 31.8 million tonnes were imported into the UK providing a total coal supply of 62.2¹ million tonnes, including the use of stocks. The electricity generation sector used some 53 million tonnes of coal in 2003 to produce 127.7 Terawatt hours or 36% of the

¹ (Statistics, DTI website: www.dti.gov.uk/energy/sepn/index.shtml)

electricity for the nation. Of the coal mined in the UK over 90% is used for electricity production and therefore the UK coal sector is an integral part of the UK's energy supply. Within Scotland in 2003 coal production of 6.87 million tonnes provided a quarter of the total UK mined coal, and an important 11% share of the total electricity supply.

Indigenously produced coal provides a welcome moderator against the impact of currently high oil and gas prices and has been able to compete against imported coal even when coal prices were low. Coal is not in decline in the UK. It has increased its share of electricity generated from 28% usage therefrom in 1999 to 36% in 2003 over a period when electricity demand itself increased by 5%. Coal is critical to the UK energy scene where it provides flexibility in generation. On occasions during peak electricity demand periods, 44% of electricity is generated from coal. Longannet and Cocksfield coal fired power stations are an integral and important part of the Scottish and UK diverse energy supply

The Authority recognises the impact of global warming. Coal, when converted into electricity, contributes more carbon dioxide into the atmosphere than other carbon based fuels. Nevertheless there are existing and future technologies which can and will reduce its impact, potentially to near zero. A National Audit report of February 2005 indicates that renewable energy is a relatively expensive way for Britain to cut emissions of greenhouse gases. It reports that there are cheaper alternatives to reduce environmentally damaging emissions. Studies show that investment in clean coal technology can deliver the Government's desired results through:

- Increased efficiency e.g. the installation of supercritical boilers to all coal fired electricity generation plant could achieve 50% of the Government's targets.
- Fitting emissions reduction technology e.g. fitting flue gas desulphurisation to all coal plant would extend the lives of the plant and meet the new LCPD and IPPC requirements.
- Investment in state of the art clean coal technology, notable coal gasification with IGCC.
- Developing carbon capture and storage technology to place the carbon dioxide underground in very long term, geologically secure, gas storage 'reservoirs' such as depleted (providing the opportunity for enhanced oil and gas recovery) or depleted oil and gas fields, saline aquifers and possibly unrecoverable coal seams.

The IEA describe global electricity demand as growing at 2.4% per year up to 2030 with coal satisfying 37% of this demand. The growth of the developing nations and their energy demands is much higher than this, particularly in China and India, and this growth will be largely based on coal fired electricity generation. The developed world and the UK in particular can help to make the use of this coal more efficient and reduce carbon emissions significantly on a global basis. The Prime Minister has indicated that the environment will be at the heart of Government policy. Scotland is no less committed. The UK therefore has an opportunity to lead by example in securing coal fired power generation using modern and efficient technologies to reduce carbon emissions. Implementing carbon capture and storage technologies will further reduce the effective

carbon output to near zero. These technologies can be exported for both UK and global benefits.

The UK and Scotland in particular has a significant history of oil and gas development in the North Sea fields. The experience and knowledge derived from the exploration and production activities is directly relevant to carbon dioxide capture, transport and storage. This is an opportunity for the UK to lead the world in developing carbon capture and storage technology.

The UK has an open, competitive and market led electricity generation and supply industry. The UK generators are multinational companies who have a diverse portfolio of generating plant based on different fuels and sources in different countries. Given a choice of where they can invest in new plant or upgrading technologies, they will choose those projects with the best returns and least risk. Investment in the UK at the moment is difficult for these companies as there are too many uncertainties in the market place, particularly with the, as yet undecided, hybrid plan for the Large Combustion Plant Directive and the lack of allocations under the E.U. Emissions Trading Scheme. Investment is more likely to be placed in other countries where a more positive and certain longer term regime provides a lower risk.

The coal fired power stations in the UK are ageing. Over half of the plant has opted out of the Large Combustion Plant Directive (LCPD) which means that they will cease to operate by 2014, if not earlier. The plant which is opted in will need major investment over the next 20 years if it is to continue to function. Cockerhills in particular is likely to close within the next five years and Longannet having opted out of the LCPD will close in its current form before 2014 leaving a significant gap in Scotland's generation capacity. There are a number of older nuclear power stations which are scheduled to close. The consequence of coal and nuclear station closure is that there will be a big gap in electricity generation for which no immediate solution is available. Renewable energy sources, whilst desirable, will not be able to fill this gap and whilst additional gas generation may fill some of the gap it will place an unhealthy and dominant reliance on gas for electricity generation. It is recognised that imported gas will provide 70% of energy supply for the UK by 2020. It is the Authority's view that such reliance will not provide the right balance for a secure and diverse energy supply. There is, therefore, an opportunity which will emerge over the next 10 years within Scotland and the UK to replace existing generation capacity with more modern and efficient coal fired supercritical (and possibly ultra supercritical) boilers, new coal based Integrated Gasification Combined Cycle plant and to these technologies can be easily added carbon capture and storage. These technologies will significantly reduce carbon dioxide emissions and can provide a platform for major exports of the technology.

It is critical that the Government, within a policy which is clear, certain and coherent, provide a stable and long term framework for power generation, which recognises and encourages carbon abatement but does not discriminate against coal. Scotland has a necessary part to play in providing this consistent framework. Coal, more than any other fuel, has the capacity to reduce both the UK and global carbon dioxide emissions

significantly over the next ten to fifteen years whilst still providing long term opportunities. The framework should provide legislative and regulatory stability and a financial and tax regime, which encourages research and development and major investment to upgrade old plant, build new plant and promote new technologies, which demonstrate carbon savings. Particular and immediate financial support should be given to demonstration plant to get new technologies off the ground. In this regard attention should be paid to the integrated gasification and combined cycle (IGCC) power station where coal can be the source fuel for clean and efficient electricity with near zero carbon emissions when carbon capture and storage are integrated with it. Coal can be an economic source for hydrogen and act as a bridge to a hydrogen economy until other technologies can produce hydrogen as cheaply.

The Authority recognises the significance of global warming and the necessity for carbon abatement. It would support a carbon abatement technology or sustainable energy obligation which encourages the development and implementation of clean coal technologies in a similar way to Government support for renewables to meet demanding renewable targets. It should not compete with renewables but should complement it as an equally important way of reducing carbon emissions.

Scotland is leading the UK in researching the potential of underground coal gasification through a study at Herriot Watt University. New technologies should be promoted and attention is drawn to the contribution coal mine methane and potentially coal bed methane could make to reducing emissions. In the USA and Germany these technologies are provided with incentives and the industries are developing rapidly in contrast to the UK.

The Coal Authority's response to the individual questions within your consultation are given in Appendix 1, only where the Authority believes it has relevant comment to make. Appendix 2 shows the Authority's responses to the DEFRA consultation on Climate Change for information. The Authority strongly hopes that the result of the consultation will recommend as part of a diverse and balanced energy supply the implementation of a new and positive strategy for real investment in new carbon efficient technologies with an emphasis on coal to bring immediate carbon savings.

Consultation Questions

How should Scotland provide for its energy needs over the next 5, 15, 30, 45 years, in the context of the likely UK, European and global energy environment?

The Authority is of the view that Scotland's energy supply should be considered an integral part of the UK supply and provided by a diverse, secure and sustainable approach which acknowledges the Government's desires for carbon abatement. As such it should meet the Government's policy of being secure diverse and competitive

Should Scotland aim to be self-sufficient in energy in general, and in electricity in particular, despite trends towards interdependence within Europe?

The ability for Scotland to be self sufficient in both energy production and electricity generation exists, however, commercial decisions on using indigenous resource and the operation of power stations rests with others. The significant port facilities which Scotland has would allow a dependence on imported coal should it be decided not to use indigenous production on commercial or environmental grounds.

What are the possible implications and consequences for Scotland, and the UK, of becoming increasingly reliant on imported oil and gas for their energy needs?

The implications of dependence on imports are clear when there is a global increase in energy demand especially by developing countries. Once dependency in imports is reached any reduction in supply will severely impact on national economy and security.

Energy Supply

What is the feasibility, availability, reliability, sustainability, efficiency, capacity and risks of the different energy generation technologies?

Coal fired power generation and especially clean coal technologies with CO₂ sequestration has the ability to meet energy demands in the medium term without reliance on imports.

What are the likely trends, and uncertainties, in the availability and cost of energy sources over the next 20/45 years?

Trends for energy use are continuity to rise, especially in developing countries like China and India. Uncertainties therefore exist in world coal supply being able to continue to meet demand.

What are the economic issues of capital investment in the supply and distribution of energy that need to be considered?

High reliance on imported energy will require further capital investment in ports and rail/road infrastructure. Capital investment in new clean coal fired generation would negate that requirement and provide greater security.

What are the key issues surrounding the development of Scotland's bulk electricity transmission and local distribution systems?

Energy Demand

What will the impact of energy availability and price be on the demand for energy by commerce and industry in Scotland?

What are the likely trends in the domestic demand for energy for space heating and other purposes? What would need to be done to achieve major savings? What are the investment costs?

What are the likely trends in the demand for energy for transportation in Scotland? What is the likely time-scale and scope for substituting other power sources for fossil fuels? What are the likely investment costs?

Environmental and Social Issues

What are the environmental concerns that need to be taken into account, in terms of the impact on ecological and other natural resources, as well as waste management and impacts on the landscape?

All coal produced in Scotland now derives from opencast working following the closure of Longannet Colliery in March 2002. Opencast working is seen by many as an environmentally destructive method of energy production, however, opencast working today is highly regulated and controlled. Operators have high standards of environmental awareness and control and long term restoration is now of a much higher standard than early post-war sites. Removal of shallow coal and workings can have a greatly beneficial effect on the future use of land for development and precludes unnecessary sterilization of valuable energy resource. Impacts on the landscape derived from opencast workings can be mitigated by sensitive site design and visual improvements before and during site working.

Can the objectives of environment improvement and economic growth both be met without a major increase in energy costs? What steps should be taken to enable an informed debate on the issue?

What are the social values and consequences of energy generation and distribution on employment opportunities, health, and energy affordability?

Yours faithfully,

K. M. Pickup
Director of Development

Coal Authority Responses to Questions in:

Defra consultation: Review of the UK Climate Change Programme, December 2004

The question and section numbers are the same as those in the consultation document.

THE VIABILITY OF A SCOTTISH GREENHOUSE GAS EMISSIONS REDUCTION TARGET

Q.1 What do you think are the main advantages and disadvantages of introducing a Scottish target?

A Scottish target provides a focus for the Scottish Parliament and the Executive to manage, monitor and review Scotland's movement towards the climate change targets. It provides credibility and an incentive for action. Without it, it will be difficult to know how successful Scotland has been. The obvious difficulty is that it must sit within a UK target. This is appropriate given that a significant proportion of electricity generated is sent to other parts of the UK. Close liaison and partnership is required with the UK Government.

Q.2 Given the associated complexities associated with introducing a Scottish greenhouse gas emissions reduction target (in particular the small number of energy generators in Scotland and the reserved nature of some of the key policy levers), should Scotland have its own target?

Yes but integrated within a UK framework.

Q.3 If yes to Q.2, what sort of target should it be (e.g., long-term target, year-on-year rolling target, sector target, non-carbon-specific targets, carbon dioxide tonnage reduction target in first Kyoto commitment period) and at what level should carbon specific targets be set?

It would be beneficial if it was in the same form as the rest of the UK and certainly in a form which was readily understood and complied with the Kyoto protocol

Q.4 If no to Q.2, is the Executive's current commitment to deliver an equitable contribution to UK climate change commitments sufficient?

N/A

Q.5 If the Executive were to measure its progress against a set of non-carbon-specific targets across a range of sectors, what targets would be most appropriate (please list existing targets as well as suggesting new ones)?

No comment

Q.6 Are there any alternatives to introducing a Scottish target that might prove more

effective in encouraging action to reduce emissions in Scotland - e.g., producing carbon accounts?

Parliamentary and Executive support for the development and implementation of clean coal technologies in Scotland may assist in their implementation. Such technology includes supercritical boilers (new or retrofit), ultra supercritical boilers, coal gasification with Integrated Gasification Combined Cycle plant and carbon dioxide capture and storage. Bearing in mind the age of the two coal fired power stations in Scotland, encouraging investment in the two plants could bring significant savings in emissions and extend the life of the plant with the continued benefit of employment and electricity export to the rest of the UK.

EU EMISSIONS TRADING SCHEME

Scope of the scheme

Q.7 Should the UK consider pressing the Commission to bring forward a proposal or consider applying to include other sectors and gases at a national level?

The following options could be considered:

- To lower the threshold for combustion installation below the current level of 20 MW?
- To include process₁ emissions from the chemicals, food and drink, aluminium and engineering and vehicles sectors?
- Could the scheme be expanded to cover any other sectors?
- Should emissions of greenhouse gases other than carbon dioxide be included?

The Authority considers that carbon dioxide and other greenhouse gas reductions should be across a broad front, prioritising those sectors with the largest or most easily enabled reductions. The electricity generation sector has been targeted correctly in the first phase of the EUETS. Time should be allowed to consider how successful this has been and whether there remain further economically viable potential reductions. However other sectors and particularly transport and business, should be included in the next round. The Authority also considers that other gases and in particular methane should be included in the next phase. The Coal Authority is involved with the DTI in setting up a scheme to promote the mitigation of methane escaping from coal workings. The acceptance of methane into the EUETS in 2008 will provide additional motivation to industry to tackle the problem of coal mine methane emissions. Any opportunity to encourage electricity from coal mine methane should be taken.

Determination of the cap for phase II

One of the key objectives of this review of the UK and Scottish Climate Change Programmes is to consider the level of emissions reductions we should expect to achieve through phase II of the EU ETS. A number of issues need to be considered:

- The UK Government and the Devolved Administrations currently intend that the overall number of allowances to be allocated for phase II should be consistent with the trading sector's contribution to achieving the UK goal to reduce carbon dioxide emissions by 20 per cent below 1990 levels by 2010.

Q.8 How should this contribution be determined?

Q.9 How should this contribution be distributed between the different sectors covered by the Scheme?

The power generation sector has taken the bulk of the emission reductions in the first phase. Greater priority should be accorded to the other sectors in Phase II.

Q.10 How should emissions projections be used in considering the level of the total allocation or allocations at sector level?

Projections are necessary in the UK just as they are globally. It is also the case that they will rarely be accurate. Nevertheless projections should be realistic and there should be full consultation and involvement with the relevant sector in their compilation. They should also be routinely reviewed and amended to meet changing circumstances

Q.11 Should a national limit be set on the extent to which credits generated through the Kyoto mechanisms (clean development mechanism and joint implementation) can be used by UK companies to meet their EU ETS targets and if so what limit would be appropriate?

No comment

Q.12 Are there any implications peculiar to Scotland for phase II?

No comment

ENERGY SECTOR

Q.13 What priority should be attached to demand side management (energy efficiency) compared with supply side (e.g. renewables) solutions?

Energy efficiency is high on the list of sustainability principles and must feature in both the electricity demand (use) and the supply (generation) sectors. There is no single solution to climate change and action must be taken across a broad range of activities.

Q.14 Do you support the proposal for developing a Scottish Energy Efficiency Strategy?

Yes

Q.15 Which sectors have the greatest potential to realise further energy efficiency savings?

The Authority has no doubt that there are further efficiency savings to be made in coal fired electricity generation. There is considerable scope for further carbon reductions through the implementation of new and more efficient coal technology. The Scottish coal fired plant can be considered elderly and old technology. The Large Combustion Plant Directive will require this plant to be retired by 2014 if flue gas desulphurisation (FGD) is not fitted. It is a regret that as yet no announcement on the fitting of FGD to

Longannet has been announced. Within the UK, it is anticipated that in the order of 12.8Gw of the 27.5Gw total coal plant, has or will be fitted with FGD by 2007. The rest, circa 14Gw, will cease to function by 2014 and combined with the withdrawal of certain elderly nuclear power plant will leave a large hole in the electricity supply. The Authority believes that renewable energy will not be sufficient to replace this capacity and whilst gas fired generation will certainly increase to cover the gap, it is not clear whether the amount of generation will be available or at what cost. The UK's (and Europe's) dependence on gas is forecast to rise to 70%² of electricity supply by 2020. The Authority considers this to be unhealthy considering that the UK is at the "end of the pipeline" for imported supplies from countries which could be considered to be higher risk than Europe. This casts doubt on the security of supply for such a dominant energy source. The Government's diverse approach is fully supported by the Authority. The increased development of renewables and alternative fuel sources is sensible but any policy for energy supply must include a significant proportion of coal. In order to achieve this and meet the carbon constraints requires the Government and devolved administrations to promote the development and implementation of new and more efficient coal technologies. Fiscal incentives are required to encourage investment in greater efficiency in power generation and allowances are needed to promote an enhanced programme for the research, development and most importantly demonstration of clean coal projects.

The retirement of coal plant in Scotland is an opportunity to introduce new more efficient coal fired technology. Such technology would make a significant impact in reducing the carbon dioxide emissions and go a long way to meeting the Government's targets. The simple retrofitting of supercritical boilers to existing coal plant could achieve up to 50% of the required carbon dioxide reductions. It is considered³ that between 2010 and 2020 the competitive advantage of gas will disappear and that advanced coal technologies may account for the bulk of incremental electricity demand. Incentives should be offered to develop and implement this technology both now with the retrofit of supercritical boilers and at the time coal plant is retiring with ultra supercritical boilers and Integrated Gasification CC plant. Scotland should promote some form of carbon abatement or sustainable energy obligation to drive forward the development of new coal technology.

During the period 2010 to 2020, new carbon capture and storage technologies will be developed to make a very substantial contribution to carbon abatement. Scotland is ideally placed to benefit from this technology with coal fired plant adjacent to the Firth of Forth for offshore storage of carbon dioxide. The development of this technology should be encouraged now. Scotland is already involved in underground coal gasification which provides significant potential for the future in the medium to long term to unlock the very large coal resource on land and under the North Sea. It should not be forgotten in the new technologies, particularly as it provides an easy capture path for carbon dioxide. If used in the North Sea then it also provides an easy storage path, providing the pipeline

²The Energy Review, Performance and Innovation Unit, Cabinet Office, February 2002

³ Strategy For Sustainable Power Generation From Fossil Fuels, PowerClean, CO2NET and CAME-GT, EC Thematic R & D Networks, 20 November 2004

network is not decommissioned too soon.

In relation to the key goals of fuel poverty, competitive markets and security of supply, coal has an essential role in each of them. Coal fired generation is currently cheaper than most forms of generation and helps to moderate electricity prices and reduce fuel poverty. Coal is traded in the UK and globally in a very active international coal market which when combined with the hedge of significant indigenous production provides very healthy competition. Finally there is no shortage of coal within the UK and internationally it is traded in high volumes from a variety of stable sources to provide security of supply. In relation to the three goals, coal can continue to make a significant contribution to electricity supply, given a supportive and stable economic, market and regulatory framework to provide a low risk environment for long term investment.

Q.16 Which sectors should be given particular emphasis?

As in Q15 above the clean coal technologies can have an enormous impact on reducing carbon dioxide emissions in the short term provided investment in retrofitting supercritical boilers is forthcoming.

Q.17 In which sectors could there be particular difficulties in realising additional energy efficiency savings? How might these difficulties be overcome?

It will be difficult to achieve further savings in the coal fired generation sector without significant investment in lower carbon technologies. A sustainable obligation, similar to the renewables obligation, would encourage clean coal technology and could work very effectively and rapidly.

Q.18 What additional specific energy efficiency initiatives and measures could the Scottish Executive introduce to support existing policies?

In relation to energy supply, Scotland is blessed with a diverse portfolio including a substantial renewable energy resource. However it is essential that any measures introduced do not distort the energy market. Coal must remain as a part of the diverse supply and the replacement of Cockerzie and Longannet with higher efficiency coal plant should be encouraged. The Authority would support a sustainable obligation which included clean coal technology.

Q.19 Should the Scottish Energy Efficiency strategy set specific targets for energy efficiency savings? What form should these take?

No comment.

Q.20 How could the existing arrangements be better co-ordinated within Scotland?

Certainty in legislation, regulation and fiscal policy can provide an environment in which investment is promoted. Combine this with some form of financial incentive(s) (carbon abatement / sustainable energy obligation) and the private sector will develop initiatives

to deliver carbon savings.

Q.21 What other new initiatives might be taken forward at the national, regional or local level?

See Q20.

PARAGRAPHS 76 – 126

The Authority is not in a position to comment in detail on the other sectors and climate change. Nevertheless it would reinforce the need for action to be taken across all sectors, identifying which activities cause substantial emissions and can provide the best opportunities for mitigation. Of particular concern are the business, transport and agriculture sectors which provided 35% of the greenhouse gas emissions in 2002 (the consultation's Table 1). Whilst increasing efficiency for vehicles is having an impact, it is not making the inroads into reduced carbon required when vehicle use seems to increase year on year. Alternative fuels may be a longer term solution and the future fuel which is relevant to coal and other fossil fuels is hydrogen.

Hydrogen can be used directly to provide combustion for engines or used in fuel cells for electric motive power. Both have zero carbon emissions. The concept of economically deriving hydrogen from water using 'renewable' electricity is a long way from fruition. The only source for hydrogen economically in the foreseeable future is fossil fuel. Coal is a credible source using the new gasification technologies. Both IGCC and Underground Coal Gasification can be controlled to produce hydrogen and therefore will provide an enormous and long term energy source for the future in the UK.

ANNEX E

RESPONDEE INFORMATION FORM

Name:

The Coal Authority

K M Pickup
Director of Development

Email. kevinpickup@coal.gov.uk

Consultation title:

1. Are you responding as: (please tick one box)

(b) **on behalf of** a group or organisation (go to 2c)

2c ON BEHALF OF GROUPS OR ORGANISATIONS:

Your name and address as respondees **will be** made available to the public (in the SE library and/or on SE website). Are you content for your response to be made available also?

Yes

SHARING RESPONSES/FUTURE ENGAGEMENT

3. We will share your response internally with other SE policy teams who may be addressing the issues you discuss. They may wish to contact you again in the future, but we require your permission to do so. Are you content for the Scottish Executive to contact you again in the future in relation to this consultation response?

Yes