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# **Clean coal in the UK and European electricity mix**

A report from the TUC's  
Clean Coal Task Group  
- a joint industry and trades union initiative

a TUC publication

## **Clean coal in the UK and European electricity mix**

### **Overview – why this Position Paper is needed**

There is a growing recognition by governments (and the EU) of the importance of clean coal-fired electricity generation, including carbon capture and storage (CCS) for meeting our security of supplies and climate change targets.

Clean coal with CCS is a vital part of the UK's generation mix, balancing renewables, baseload nuclear energy, clean coal and limiting dependence on gas. Recognition of the global importance of CCS for both coal and gas (see for example the Stern Review<sup>1</sup>) has led to UK government action on R+D, Demonstration, Regulation, and specification that newly consented power plant should be "capture-ready".

But the TUC's Clean Coal Task Group believes that progress on a clean coal strategy is not rapid enough to achieve either local (UK) or global policy goals on security of supplies or greenhouse gas reductions, and new, significant hurdles to clean coal electricity generation are developing.

The CCTG also fears that the UK government's Energy Markets Outlook predictions on security of supplies are over-optimistic and that the proposed new EU policies on auctioning of CO<sub>2</sub> Allowances will have further detrimental effects on both security of supplies and the cost of electricity – without having a significant impact on global CO<sub>2</sub> emissions.

The resulting uncertainties will delay investment and limit the potential growth of industry capacity and creation of quality jobs in clean power plant construction, CCS and coal mines as well as hindering subsequent exports.

Major workforce issues are involved, especially in the skills and training requirements to develop the low carbon energy supply, including clean coal, profiled in the Energy White Paper.

Across all energy sectors – nuclear, fossil fuels, renewables – there remains an urgent need to develop an evidence-based energy skills and training strategy. Given the concern now being shown across a number of Government departments (BERR, DEFRA, DIUS) over requirements for a low carbon and resource efficient economy, the Government should take steps urgently to coordinate these efforts into a meaningful strategy supported by social partner consultation.

## Introduction

The Government has followed its Energy White Paper 2007 with a range of regulatory and other initiatives designed to promote actions on energy efficiency, nuclear power, renewable energy and carbon capture and storage (CCS) for both coal and gas. More attention is also now being given to heat and transport.

This paper comments on the current position seen from the perspective of the trade union and industry partners on the CCTG, and makes recommendations on how the government's objectives can be best achieved.

### 1. Diverse secure clean affordable electricity

The TUC CCTG are supportive of government plans in so far as they set out to achieve secure, clean and affordable energy but we are concerned over the pace and scale of progress to ensure sufficient new power plants are built soon enough. We are concerned that the later that decisions are made compared to the 2015/16 cliff edge in generation capacity (due to closures of old plant) the greater the tendency to opt for gas fired generation. As well as impacting on security of supplies, delays in construction of new cleaner power plants (including both capture ready and plants with CCS) detract from UK claims to be setting a global example in reducing GHG emissions from fossil fuels.

### 2. Importance of clean coal

In the Energy White Paper 2006 the government recognised the importance of clean coal power plant and, in a move welcomed by the TUC, announced the setting up of the Coal Forum:

- *'The Government will convene a coal forum to bring together coal-fired generators, coal producers and suppliers, power plant suppliers, trade unions, small businesses and other parties in order to help them to find solutions to secure the long-term future of coal-fired power generation and UK coal production.*
- The forum will facilitate dialogue within the industry and work to ensure that we have the right framework, consistent with our energy policy goals, to secure the long-term contribution of coal-fired power generation and optimise the use of economical coal reserves in the UK.' **DTI Energy Review 2006**

We note that in recent government energy statements, for example in the debate on nuclear power in the House of Commons on 10 January 2008, Ministers emphasise the importance of clean coal in the future generation mix (UK, Europe and globally). Coal is necessary for security of supplies (>50% of our electricity was generated from coal in the last cold winter, 2006, when gas prices hiked). Coal is the lowest cost means for electricity generation and helps moderate the

price of electricity. Clean coal is, of course, necessary to reduce CO<sub>2</sub> emissions both within the UK and globally. Given the massive dependence of China, India, the US and European economies on coal fired power, the successful development of clean coal technology on a global scale is essential to limit global temperature increases to below 2 degrees centigrade. With respect to China alone, it is noted that coal production more than doubled from 2000 to 2006 and that by 2030 China will have six times as many coal fired power plants as the EU.

These points were well articulated by the Secretary of State John Hutton in a speech to the Adam Smith Institute on 10 March 2008. He said:

“As a country we have to accept the reality that, even in meeting our EU 2020 renewables target, fossil fuels will still play a major part for the next couple of decades at the very least. And there is nothing wrong with that – provided we are meeting our international obligations to reduce our carbon emissions.

For critics, there’s a belief that coal fired power stations undermine the UK’s leadership position on climate change. In fact the opposite is true. Developing economies need to be able to see by the actions that we are taking that it is possible to use indigenous energy reserves and decarbonise our economy.

Leadership isn’t about forcing people into making binary choices. Low carbon energy production or fossil fuels. Particularly when the primary goal – substantial emission reductions – can be achieved without having to make binary choices in the short term. We will need a mix. The world will use a mix of energy sources for the foreseeable future. Our leadership role is best promoted by the actions we take on capping emissions, carbon pricing and supporting the development of new CCS technology.

Fossil fuels will continue to play an important role in ensuring the flexibility of the electricity generation system. Electricity demand fluctuates continually, but the fluctuations can be very pronounced during winter, requiring rapid short-term increases in production. Neither wind nor nuclear can fulfil this role. We therefore will continue to need this back up from fossil fuels, with coal a key source of that flexibility, as we increase the proportion of renewable energy in our electricity mix.

Gas is cleaner than coal, but an over-reliance on gas would leave us more exposed to the international gas market as our own resources decline. In winter 05/06, with pressures in gas markets, it was coal fired generation that took up the slack, consistently generating about half of our electricity throughout the winter.

It was for these reasons that in our Energy White Paper last year we said that “coal fired generation makes an important contribution to the UK’s energy security and the flexibility of the UK’s energy system, while acknowledging that in order to have a long term future its environmental impact must be managed effectively.”

That's why we are taking a global lead on clean coal power generation.

Within 7 years one of the world's first commercial scale demonstrator plants will be up and running in the UK, generating electricity from coal with up to 90% less carbon emitted. Through our competition, the Government is intervening to help develop this breakthrough technology.

And we're already preparing for the technology's rapid deployment. Clauses are before Parliament now on the regulatory regime, and we are in discussions with our EU partners. And shortly we'll set out proposals for making carbon capture readiness a mandatory requirement for all future fossil fuel power stations.

The EU ETS places a firm cap on emissions from the power sector and I believe the energy industry is fast adapting to the emissions trading world. Any decision to invest in fossil fuel generation will be taken in full knowledge that it pays them to deliver low emissions."

#### **Future coal scenarios**

The Coal Forum considered three scenarios for new coal power plants to replace the 11 GW of coal and oil power plants which are to close by 2016 (see "Overview of the Work of the UK Coal Forum, November 2006-June 2007" - <http://www.berr.gov.uk/files/file41186.pdf>). These scenarios envisage Low (5GW), Medium (10GW) and High (15GW) amounts of clean coal plant being built by 2015, with the balance of the generation gap being filled by new gas plants. A typical power plant with two 800MW units would produce around 12000 GWh of electricity a year. If all of the plants are fitted with CCS by 2025, CO<sub>2</sub> emissions from UK power plant would be reduced by 40 % by then, or sooner with the right regulatory and financial framework.

The consequence of the Low coal scenario is an increase in dependence on gas for electricity generation to around 52% (58% if no new coal is built).

To maintain the present proportion of coal in the UK power generation mix would require the "Medium Coal Scenario", i.e. 10 GW of new clean coal operational by 2016. This would require 2 GW of projects (at least one new or replacement power station) to start each year (2008 to 2012) to be ready for 2016. It is not feasible for plants to be built faster due to the capacity of the industry in Europe.

In order to meet the emerging energy gap, construction of these plants (and in parallel around 10 GW of gas CCGTs) needs to start quickly and faster than CCS can be implemented on them all. Many must therefore be built "capture-ready", as is now being stipulated in Section 36 consents for gas fired power plants.

The present proportion of coal in the electricity generation mix can only be maintained if power companies start to build new clean coal power plants now.

### **Recommended Action**

*The government should decide which clean coal scenario (Low, Medium or High) would meet its objective for the Coal Forum and security of supplies, and issue a preliminary version of the National Planning Statement covering coal fired generation and CCS facilities.*

### **3. Clean coal technologies**

Clean coal power plants are 20% cleaner in CO<sub>2</sub> terms than existing coal-fired plants (up to 40% with biomass cofiring) and can be built capture-ready, i.e. designed for CCS to be added. The 20% reduction in emissions is a result of higher efficiency (up from an average of about 35% to 45/46%). They are very much cleaner than existing plants in terms of other emissions. Supercritical and Advanced supercritical technology is being used world wide, including China, India, Germany, Taiwan, South Korea, and Southern Africa. After a period of hiatus for orders, other than those placed in China and India, there is now a strong growth in ordering worldwide and queues are developing in the supply chain.

Advanced supercritical boiler technology has been specified for the Kingsnorth project and is under consideration for Scottish Power's clean coal project at Longannet and RWE's at Tilbury.

The alternative technology for clean coal, known as Integrated gasification combined Cycle (IGCC), has a similar efficiency and is suitable for CCS with a lower cost penalty than for post combustion capture. The technology offers the prospect of supplying hydrogen, of particular interest during off-peak periods for electricity demand. In the UK, four potential IGCC/precombustion capture projects are being developed, and were potential participants in the Government's CCS competition. There remains a need for this technology to be demonstrated as plans for IGCC/precombustion projects in the USA are stalled due to cost escalation or permitting difficulties.

### **4. Carbon dioxide capture and storage**

Carbon dioxide capture and storage (CCS) is vital for achievement of deep cuts in CO<sub>2</sub> emissions globally and to *limit the concentration* of CO<sub>2</sub> in the atmosphere.

In contrast, other approaches (energy efficiency, renewables, nuclear) to reducing annual emissions may only delay when emissions from fossil fuels reach the atmosphere. Similarly, switching to gas without CCS only delays the time when the coal will be burned and the timing of the resultant emissions and build-up of the CO<sub>2</sub> concentration in the atmosphere.

The technologies for CCS exist but they do need scale-up to full size

implementation. Government commitment to supporting a demonstration of CCS on pulverised coal is a very welcome first step, but more is needed, and faster!

CCTG supports the EU's plans for 10-12 CCS demonstration projects in Europe by 2015 and a similar number in the rest of the world if CCS is to be commercialised and rolled out on the scale necessary from 2020.<sup>1</sup> These demonstrations should cover coal and gas, a range of capture technologies and a range of storage locations. Because of the UK's location and well understood offshore geology, several of these projects should involve CO<sub>2</sub> storage in depleted gas fields on the UK Continental Shelf.

### **Recommended Action**

*The government should include in its revision of the Carbon Abatement strategy a vision for the progress and roll out of CCS first to 10-12 demonstrations and then to full commercialisation by 2020 on the scale necessary to meet its global CO<sub>2</sub> reduction targets*

The government, alongside its very welcome (and successful) development of regulation for CCS, should accelerate its efforts to find ways to incentivise more CCS projects - both post combustion and precombustion - for coal and gas. Initially, for the first tranche of CCS projects, the government should commit to recycling a large proportion of the anticipated revenues from auction of CO<sub>2</sub> allowances to provide a guarantee of the carbon allowance price by a contract for differences.

The BERR review of incentives for CCS should be accelerated and a commitment given as part of the planning of the auction process to recycle auction revenues to support a number of early CCS projects and infrastructure development, sufficient to meet the objectives of the updated CAT Strategy. Urgent consideration should also be given to a "CCS Obligation" and mandating capture readiness.

### **Recommended Action**

*Urgent consideration should also be given to a "CCS Obligation" - a mechanism whereby the additional cost of CCS would be spread over all electricity supplied, as occurs for renewable electricity, rather than falling on the Treasury.*

More effort should be invested to establish a vision for the nationwide CO<sub>2</sub> infrastructure that will need to develop. This should build on a number of local and regional studies, including the Yorkshire and Humberside study sponsored by

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<sup>1</sup> IEA advice to the G8 at Bali was that 22 coal (800 MW) and 20 gas (500 MW) power plants with CCS need to be installed each year from 2013 to 2030

Yorkshire Forward, the earlier study of the NW Region by IEA Greenhouse Gas programme, a new pre-study by ONE North East, a proposed study on the Firth of Forth led by the Scottish Executive, and work carried out jointly by EON and RWE relating to the Thames estuary.

### **Recommended Action**

*BERR should complement its work on the North Sea infrastructure with further urgent action to secure financial and other support for regional and national pipeline infrastructure.*

#### **A regional capture network: the Yorkshire Forward project**

Tackling climate change is a critical part of Yorkshire Forward's regional industrial policy. A crucial initiative is a project to capture, transport and store a large part of the 55 million tonnes of CO<sub>2</sub> emitted from the region's power stations and heavy industry. The project's key objectives are:

- Develop the evidence base (technical, economic and environmental) for the benefits of shared CCS infrastructure in Yorkshire and Humber;
- Develop an economic model for an open source CCS network in Yorkshire and Humberland;
- To use the assembled evidence to secure public and private investment for the development of a CCS network in Yorkshire and Humber.

The Regional Development Agency has created a CCS partnership comprising representatives from the region's power, oil, chemical and steel industries, and other bodies including the TUC and affiliates. The project aims to develop the evidence base for investment in a CCS transportation network whereby much of the region's CO<sub>2</sub> would be liquefied and piped under pressure for storage in depleted gas fields in the southern North Sea.

The scheme could capture up to 60 million tonnes of CO<sub>2</sub> (MtCO<sub>2</sub>) annually from the 13 heaviest CO<sub>2</sub> emitters alone, and up to 80 MtCO<sub>2</sub> if the infrastructure were extended to plants in neighbouring regions. The UK as a whole emitted 560 MtCO<sub>2</sub> in 2006.

Almost all the 13 heaviest emitters have a joint union-management recognition agreement (principally Unite/Amicus, Unite/T&G, Prospect, GMB, Community and Unison), with a combined workforce of around 4,300 directly-employed. A further 650-800 workers are employed on contracting services for Doosan Babcock, Areva, Siemens and ABB; for example, Centrica contract out all major maintenance to contractors.



The region's trade unions have warmly welcomed the project. Clearly, it takes forward TUC policy: a composite motion to Congress 2007 reiterated the TUC's support new clean coal technologies such as carbon capture and storage, allied to the exploitation of the nation's massive coal reserves in the best interests of security of supply.

The partnership is looking for support from the Government to help fund the pipeline – demonstration funding, a supportive regulatory framework and other initiatives notably the inclusion of CCS in the EU ETS.

The project clearly has significant industrial and employment consequences for affiliates in the region:

- As a capture network, it will provide a market-based means for industry to safely store CO<sub>2</sub> emissions, thereby helping to secure their long-term presence in the region.
- It is likely to attract energy and industrial investment to the region in a carbon-constrained world.
- It will offer industrial and skills opportunities in its design, construction and long-term management of the network.

The RDA will therefore be assessing the economic and employment benefits of the network in a report expected in mid 2008.

## 5. Use of Heat

Opponents of clean coal criticise even the much improved efficiency because such plants fail to use the waste heat. They point to Denmark (and Germany) where some plants are located much closer to conurbations than most UK power plants and the waste heat is used for district heating, leading to higher nominal efficiencies.

Of course, the same criticism applies to gas-fired power stations (CCGTs) and the Government has added conditions to recent Section 36 consents requiring these to be designed for Combined Heat and Power, and as well designed to be CO<sub>2</sub> capture-ready.

The current government consultation on heat emphasises the benefits that could be achieved through more use of waste heat in district heating schemes.

## **Recommended Action**

*The government should initiate studies with the industry to determine the opportunities, the gaps and hurdles limiting take-up of schemes to use heat from central power plants and to identify the necessary actions by government and other stakeholders.*

## **6. Support for industrial R&D and Demonstration**

Sustained Government support for research and development for clean coal in the UK is essential. There is no doubt that this technology suffered serious setbacks with the demise of the research capacity of the NCB, the CEGB and the closure of the Grimethorpe project<sup>2</sup>. During the 90s the government provided some support to industrial R+D through a series of coal related R+D programmes and latterly the BERR Technology Programme.

However, the Government has recently increased its support for R&D related to carbon abatement technologies. Indeed, UK companies are participating in the various programmes – the TSB Low Carbon Programme and the BERR Hydrogen Fuel Cells and Carbon Abatement Technologies Demonstration Programme (HFCCAT) - and, as a result, are in a leading position to supply advanced boilers and carbon dioxide capture and storage technologies.

Government schemes are now being reviewed with the introduction of the Energy Technology Institute (ETI) and the Environmental Transformation Fund (ETF). These changes should bring increased funding but in the meantime cause delay and uncertainty. Industry is looking for a long-term scheme of support for clean coal technologies against which it can plan its investments.

It remains very important to provide support to the Advanced R+D/Early demonstration phase, i.e. smaller scale than the full BERR Demonstration Competition but nonetheless at a larger scale than normally covered by research programmes. The HFCCAT scheme had begun to address this area but HFCCATs is now being subsumed under the Environmental Transformation Fund. Examples of projects that could be promoted are:

- Slip steam trials of novel scrubbing technologies on flue gases from UK coals
- 100MWe Oxyfuel demonstration of carbon capture
- New forms of Oxyfuel firing of coal, including IGSC
- 700 deg/ 50% efficient boiler turbine power plant
- PFBC with CCS

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<sup>2</sup> Pressurised Fluidised Bed Combustion (PFBC) as first demonstrated at pilot scale at Grimethorpe has recently emerged as central to a new Carbon capture technology developed in Norway by Sargas and being tested on a slipsteam from the Vartran PFBC power plant in Sweden.

## **Recommended Actions**

*The government's ten year commitment to the Energy Technology Institute should be matched by similar long term plans for the low carbon programme (TSB) and the Environmental Transformation Fund.*

*The government should give maximum weight to the potential economic benefits and employment prospects in UK companies in all its support schemes, including the CCS competition.*

## **7. The global importance of CCS**

A UN Special Report on CCS (2005) identified CSS as part of “a portfolio of measures that will be needed” to achieve the stabilisation of greenhouse gas emissions. It is a process that involves separating CO<sub>2</sub> from industry and energy-related sources, transport to a storage site and long-term storage away from the atmosphere. The UN study comments that most future energy scenarios project that the supply of primary energy will continue to be dominated by fossil fuels until at least mid-century. Furthermore, most scenarios for global energy use project a substantial increase of CO<sub>2</sub> emissions throughout the century in the absence of specific actions to mitigate climate change.

Around 60% of global CO<sub>2</sub> emissions from fossil fuels originate from a core of around 7,900 heavy emitting stationary sources globally – power stations and energy-intensive installations such as steel and aluminium works. These sites emit more than 100,000 tonnes of CO<sub>2</sub> a year, an aggregate total of 13.5 billion tonnes of CO<sub>2</sub> annually. Current capture systems for power plants are capable of capturing 85% to 95% of CO<sub>2</sub>.

The Government recognises the global deployment potential of the technology, notably for China, where rapid growth is fuelling a huge surge in CO<sub>2</sub> emissions, especially from its massive coal consumption for both energy and steel production, yet facing severe challenges on pollution, crop production and water supply. The one resource that is not apparently constrained is coal - China has the third largest recoverable coal reserves.

China is building on average one new coal station every four days, and built in 2006 as much new coal-fired power (92 Gigawatts) as the whole of the UK's electricity generating capacity (coal, gas, nuclear and renewables).

## **8. Example to rest of the world**

British companies have a strong track record in China and India. Originally they supplied sub-critical power plants to China (direct supply contracts) but since 2002 have also licensed Chinese companies with supercritical technology. The UK is

therefore in an excellent position to encourage the adoption of advanced supercritical, capture-ready and CCS technologies in these and other emerging markets. Alstom, Doosan Babcock and Shell are participating in the DEFRA/BERR Near Zero Emissions coal power plant for China project (NZE). Shell is licensing gasification technology to China for coal to liquids plants.

It is extremely important that the Government – in parallel with its other actions on energy - sets an example of specifying capture-ready best available technology for coal-fired power plant (as well as gas). It should demonstrate a commitment to clean coal and thereby set an example to China, India and others including Indonesia, Taiwan, Libya, South Africa, etc, that will otherwise continue to build new plants with CO<sub>2</sub> emissions potentially “locked-in”.

In this context the TUC CCTG are concerned that the proposed E.ON Kingsnorth project could be delayed if the government refers the matter to a public inquiry. We believe that building capture-ready clean coal now in parallel with urgent actions demonstrating a range of carbon capture and storage technologies is the most valuable immediate contribution the UK can make towards cutting CO<sub>2</sub> emissions from fossil fuels globally.

In the UK context, the work of the Coal Forum has demonstrated that fitting CCS to just the new coal and gas fired power plants expected to be built by 2016 could reduce carbon dioxide emissions from the UK power sector by 42% in 2025 compared to the present day, and much sooner if a CCS regulatory framework is introduced.

### **Recommended Action**

*The government should make clear, perhaps via the proposed National Planning Statement, that capture ready coal and gas fired power plants and CCS facilities are necessary.*

## **9. EU announcements on Energy and Climate Change**

The TUC CCTG welcomes the European Commission’s Energy and Climate Change package of 23 January 2008, particularly since these documents fully recognise the vital role for clean power generation from fossil fuels in the future global energy mix.

In the European Strategic Energy Technology Plan announced by the Commission on 22 November 2007, the commercial use of carbon capture and storage (including whole system efficiency) was defined as a key challenge to meet 2020 targets. The proposals of 23 January 2008 elaborate on some of the policies and actions that will be necessary to meet this challenge. We comment below on those most relevant to the TUC CCTG.

## **9.1 Supporting early demonstration of sustainable power from fossil fuels**

The vital need and potential for CCS is recognised. In the EU alone, reductions of CO<sub>2</sub> by CCS from the power sector could reach 194 Mt in 2030 and 800-850 Mt (20%) in 2050.

Widespread application of CCS on power plants can become commercially feasible in 10 to 14 years, incentivised by the Emission Trading Scheme, but this will not happen without catalysing the necessary preparation steps, including early single plant and regional demonstration projects. The Commission admits there is neither a natural market nor a short-term business benefit in use of CCS and the proposal presents an EU structure to stimulate demonstration of CCS power plants, including an *EU CCS Initiative* starting this year. The EU will support the creation of a network of demonstration projects and information exchange but has insufficient funds within its FP7 budget to support the projects themselves. It is therefore looking to industry to commit funding and seems to suggest that such a commitment could trigger complementary public funding.

The CCTG's view is that the programme of CCS Demonstrations needs to be stimulated by substantial EU funding as well as funding by national governments and the power industry. The source of such funds could be the revenues from auctioning of CO<sub>2</sub> allowances (EAUs), see below, which, being effectively a tax on the carbon dioxide emissions from fossil fuels, should be 'recycled' to help prove the technologies needed to minimise these. Longer term, other mechanisms will be needed to stimulate the wider global deployment of CCS.

The Commission is proposing that a percentage (at least 20%) of auction revenues should be used to reduce greenhouse gas emissions and to adapt to the impacts of climate change, including by CCS. We consider this linkage to be essential and believe it appropriate that a much larger proportion of the revenues should be spent promoting CCS.

### **Recommended Action**

*The government should set an example on recycling of auction revenues and press the EU to increase the proportion recycled to close to 100%.*

## **9.2 Geological storage of carbon dioxide**

The Commission has published a proposal for a Directive to regulate the geological storage of carbon dioxide.

The TUC CCTG welcomes this proposal. The development of a regulatory regime for secure long-term storage is an essential complement to the development of CO<sub>2</sub> capture technologies. The proposed regulatory process is very thorough and should secure public confidence that CCS is a safe and environmentally sound means of reducing CO<sub>2</sub> emissions.

### **9.3 EU greenhouse gas emission allowance trading system**

The Commission has published a proposal to amend Directive 2003/87/EC so as to improve and extend the EU ETS.

The proposal recognises Carbon Capture and Storage (CCS) and clarifies that CO<sub>2</sub> stored in a regulated site will be treated as not emitted –the TUC CCTG welcomes this clarification.

The proposal recommends a change to the system of allocation of CO<sub>2</sub> allowances to power plants. Whereas currently allowances are allocated free-of-charge in accordance with National Allocation Plans, the proposal is that from 2013, for power plants, these allowances should be sold by auction (except that electricity generators will be given free allowances for heat delivered to district heating or industrial installations).

The TUC CCTG note that auctioning will favour gas-fired generation (which requires only half the allowances of coal) with negative impacts on the EU's security-of-supply objectives and no long-term benefit once CCS is introduced.

#### **Recommended Action**

*The government should further analyse the risks to Security of supplies via a further dash for gas resulting from the auctioning plan.*

### **9.4 Renewable Energy targets**

The TUC welcomes the EU's bindable target that 20% of all *energy* should come from renewable sources by 2020, with a 10% target for the proportion of biofuels.

*All energy* includes electricity, heating and transport and this is seen as very demanding. The government's new initiative to promote offshore wind is a reaction to this target. The CCTG would point out that wind power needs backup by fossil power. Over the longer term, as the proportion of wind power increases, this may impact on the cost of electricity, first because wind power is currently more expensive, and secondly because the costs of fossil power electricity may increase as load factors for these plants are reduced.

### **Recommended Action**

*The CCTG asks the Coal Forum to readdress its scenarios for increased renewable generation and analyse the long-term cost of electricity.*

## **10. Energy Markets Outlook – Security of Supplies**

The CCTG welcomes the Government's Energy Markets Outlook (EMO) process and, in particular, the more open discussion of the inputs/outputs and analysis, and BERR's wish to make the annual report more valuable to government and industry.

Industry needs forecasts against which it can plan its business, including investment, recruitment, training and R&D. Different companies and different skills are required for the different kinds of power plant (nuclear, gas, coal, wind, etc.) and the mining industry has similar needs.

### **Recommended Action**

*The CCTG will disseminate its views of the EMO report amongst its members, to the Coal Forum, Ministers and Parliamentarians.*

The comments we have can be split into two groups, general and specific (Electricity Generation and Coal Production).

### **10.1 General**

The CCTG has closely examined the EMO forecasts and has a number of specific concerns, which it believes should be referred to both the Coal Forum and to BERR for further consideration.

The CCTG will prepare a more detailed note of concerns, but in principle the key issues are:

1 We consider that the overall conclusions on security of electricity supplies are somewhat optimistic, with insufficient recognition of concern around the growing dependence on gas for electricity generation. This is in contradiction with the government's wish to avoid this, as expressed in the 2007 Energy White Paper and the objectives of the Coal Forum.

2 We consider that in future EMO reports, the conclusions should include a clear reminder to the public and planners that unless new electricity generating capacity (of whatever type) is built to replace the plants which will close, then the capacity margin will decrease to the point where power cuts, brown-outs or enforced switch-offs may be unavoidable.

3 Estimates of future demand for electricity should in future take account of population and economic growth and increased electrification.

4 It would assist future forecasts if the EMO report included “known unknowns”, in order that policy makers can be warned of the potential impact of each of these measures on security of supplies. These include regulatory changes which could shut/restrict existing coal fired power plant:

- capture-ready (risk of over-regulation),
- short-term climate change targets (which could cause a switch from coal to new gas CCGTs),
- planning/consent hurdles,
- auctioning of CO<sub>2</sub> permits (which favours gas versus coal).

5 We have specific concerns over the capacity margin for different sources of electricity.

6 We believe that a National Policy Statement is needed urgently for capture-ready fossil fuel power plants (coal and gas) and for CCS infrastructure (pipelines and facilities). This could be published as a draft or as a “Statement of Need” as was requested by the Coal Forum prior to the publication of the 2006 Energy White Paper.

7 The EMO needs to develop a much more comprehensive understanding of the skills and training challenges of the Government’s energy strategy. We consider this in more detail below.

8 A future report should include a forward estimate of the average cost of electricity for the generation mix assumed in each Scenario.

9 The TUC is concerned at the accuracy of the coal production forecasts, which project UK coal production falling to very low levels by 2025. We consider this to be far too pessimistic.

10 Recent coal price increases have facilitated investment at deep mines that will underpin their medium term future. In addition, Hatfield Colliery has been reopened and will contribute some 2m tonnes per annum for many years. In the circumstances a reasonable expectation is that deep mine output will be capable of being sustained at least of 5m tonnes per annum for the medium term; it may be more.



11 We recognise the difficulty of projecting opencast output as this will be dependent on the receipt of ongoing planning approvals. It is not unreasonable to assume on ongoing output of 10m tonnes a year.

### **Recommended Actions**

*The CCTG should seek to discuss these concerns with the EMO team and contribute to the preparation of the next report.*

## **11. Skills and Capacity issues**

The conventional (fossil) power plant supply industry is already seeing capacity restraints on steam turbines, materials for pipework and turbine rotors. These arise due to burgeoning demand in China, India, South Africa and Germany. It will not be possible to build all the plants required in the UK in parallel in the last five years up to 2015.

There are also constraints on Engineering Construction resources, i.e. the skilled/semi-skilled workforce of mechanical construction workers (including welders, fitters, erectors, NDT operators, scaffolders, ladders). This workforce is presently employed on repair, maintenance and upgrades (Business as Usual) and this workload is estimated to continue at the present level. To meet current shortages, the contractors (including Alstom, Siemens, Doosan Babcock and AMEC) are finding it necessary to bring in personnel from Europe, mostly Poland. However, these sources are 'drying up' and it is feared that the power plant construction boom in Germany will absorb them.

### **11.1 Power generation**

The TUC welcomes the BERR review of energy skills, due to report to Ministers by June 2008. The 2007 Energy White Paper contained a commitment for the Sector Skills Councils to report on the skills situation across the energy sector. BERR is coordinating contributions from the SSCS, the TUC and other interested parties.

In July 2007, the Government also published World Class Skills: 'Implementing the Leitch Review, of Skills in England', which sets out the actions Government will take to raise the nation's skills base, increase social inclusion, build productivity, and increase economic competitiveness. This includes a commitment to putting the skills implications of the transition to a sustainable, low-carbon and resource efficient economy at the heart of that long-term drive to increase our nation's skills.

The skills challenge is formidable. Key issues across the energy sector are the ageing of the workforce, which will see increasing losses of skilled workers to

retirement in the 2010s, skills gaps, as the existing workers are faced with new procedures and technologies, and gender imbalance. New infrastructure investment to meet the energy supply challenges of the EWP, such as clean coal and CCS, nuclear power plant, a renewables programme linked to EU targets, and network replacement, also present demands for skills which cannot be met from the current workforce.

Power plant manufacturers foresee a major growth in their business and are seeking to recruit several hundred additional professional engineers and several thousand skilled engineering construction workers.

The growth arises from increased investment in R&D (including CO<sub>2</sub> capture), dramatic expansion of the prospects for 'new build' (coal and nuclear), and steady growth of repair, maintenance and upgrade work at power and petrochemical plants.

The companies expect a major change in their products for coal-fired and gas power plant – to higher efficiency units, capture-ready plant and carbon dioxide capture (new build and retrofits). They are reasonably well positioned due to their investment in R&D and support from the TSB.

However, both the trade union and industry representatives on the CCTG are concerned about a range of skills and capacity issues that need Government attention. The growth in the energy sector, in all companies, will create many new career opportunities and there is already evidence of a 'skills gap' among professional engineers (graduates and above) and engineering construction skills (apprentice level and semi-skilled).

The Government needs to coordinate and focus on two areas:

- (i) To make sure that enough graduates and postgraduates in science (physics, maths, chemistry) and engineering (mechanical, chemical, electrical) come through the University system to match future requirements.

The Universities themselves cannot produce "power plant design engineers" so in order to accelerate the progression of graduate recruits to Chartered level and specialist engineer, industry is seeking to create relevant postgraduate training. For example, via the Industrial and Power Association, a modular, MSc level post-graduate Power Plant Engineering course is being initiated at Strathclyde University. Power plant companies will use this course to upskill existing employees and to accelerate the training of graduate recruits.

We would like to see many more individuals with a science or engineering background taking such courses and would like to see

DIUS providing support grants/loans.

- (ii) To step up the support for apprentice and semi-skilled training in engineering craft skills. The CCTG anticipates large shortages. Its members are working with ECITB (Engineering and Construction Industry Training Board) to formulate plans/proposals to government, including plans that could provide good work opportunities for those who have failed to secure academic qualifications at school.

ECITB levies engineering construction companies as a proportion of turnover and recycles these levies as training grants. The turnover-based support has only just kept pace with the need for people as the R&M sector has grown. To cope with the new power station building programme and the adverse demographic profile of the workforce, the industry now needs a step-change upwards in the numbers being trained, beyond that which can be funded from a proportional levy. Proposals are being prepared by ECITB and discussions with the TUC are beginning.

## **11.2 Coal Mining**

Given the average age of the workforce in the mining industry, skill shortages are becoming critical. A competent workforce will be a major factor in the industry's survival. Young people will not be attracted into the mining industry with little to no prospect of a long term career and that is where the Government can help by giving a signal that for security of supply we require a deep-mined coal industry.

The training schedule which exists now in the mining industry requires new entrants to undergo a 20-day course before they are allowed underground and 20 days CPS (Close Personal Supervision) when they commence underground work. This would only allow them to assist trained mineworkers with outbye (away from coal face) tasks or patrol the belts. They are then reviewed monthly with regard to their competency.

For face/development training there is a one-week induction course, 60 days on the face training on all aspects of face work, chocks, loadergate end, tailgate end etc. Development training is a further 40 days, ideally 20 days in a bolted development and 20 days in a steel development, if available.

On the statutory training above it would take 12 months to train a person to face/development standards. On a practical basis it would be a further 3 to 5 years before they would have the practical experience to be a competent mineworker safe to carry out their duties.

## **Recommended actions**

*BERR should produce its energy skills review as soon as possible. But, given the concern across a number of Government departments (BERR< DEFRA< DIUS) over the need to develop the evidence base on the skills requirements for a low carbon and resource efficient economy, the TUC should seek a high level meeting with Government on the coordination and direction of these initiatives.*

*The TUC, appropriate trade unions and industrial groups, including the ECITB, and government should prepare a joint strategic plan for this specific sector.*

## **12. Summary of Recommended Actions**

*The government should decide which scenario for coal in the generation mix (Low, Medium or High) would meet its Energy White Paper objectives of secure, low carbon energy supplies, and its ambitions for the Coal Forum, and issue a preliminary version of the National Planning Statement covering coal fired generation and CCS facilities (Section 2).*

*The government should include in it's revision of the Carbon Abatement strategy a vision for the progress and roll out of CCS first to 10-12 demonstration projects (at single sites and for regional networks) and then to full commercialisation by 2020 on the scale necessary to meet its global CO<sub>2</sub> reduction targets (Section4).*

*The BERR review of incentives for CCS should be accelerated and a commitment given as part of the planning of the auction process to recycle auction revenues to support a number of early CCS projects and infrastructure development, sufficient to meet the objectives of the updated Carbon Abatement technology (CAT) Strategy.*

*Urgent consideration should also be given to a "CCS Obligation" and mandating capture readiness (Section 4).*

*BERR should complement its work on the North Sea infrastructure by a further study on how to achieve economically optimised regional and national pipeline infrastructures (Section 4).*

*The government should initiate studies with the industry to determine the opportunities, the gaps and hurdles limiting take-up of schemes to use heat from central power plants and to identify the necessary actions by government and other stakeholders (Section 5).*

*The government's ten-year commitment to Energy Technology Institute (ETI) should be matched by similar long-term plans for TSB and ETF (Section 6).*

*The government should give maximum weight to the potential economic benefits and employment prospects in UK companies in all its support schemes, including the CCS competition (Section 6).*

*The government should make clear, perhaps via the proposed National Planning Statement, that capture ready coal and gas fired power plants and CCS facilities are necessary and urgently needed (Section 7).*

*The government should set an example on recycling of auction revenues and press the EU to increase the proportion recycled to close to 100% (Section 8.1).*

*The government should further analyse the risks to Security of supplies via a further dash for gas resulting from the auctioning plan (Section 8.3).*

*The Coal Forum should readdress its scenarios for increased renewable generation and analyse the cost of electricity (Section 8.4).*

*The TUC CCTG will disseminate its views of the Energy Market Outlook (EMO) report amongst its members, to the Coal Forum, Ministers and Parliamentarians (Section 9).*

*BERR should produce its energy skills review as soon as possible. Given the concern across a number of Government departments (BERR, DEFRA, DIUS) over the need to develop the evidence base on the skills requirements for a low carbon and resource efficient economy, the TUC should seek a high level meeting with Government on the coordination and direction of these initiatives (Section 10).*

*The TUC, appropriate trade unions and industrial groups, including the ECITB, and government should prepare a joint strategic plan for this specific sector (Section 10).*

## **APPENDIX 1**

### **THE CLEAN COAL TASK GROUP**

The Clean Coal Task Group, a joint industry/unions/government advisory body, was initially formed as an initiative of the Trade Unions' Sustainable Development Advisory Committee, a joint TUC/DEFRA committee, with the following remit:

To identify an appropriate policy framework and supporting economic instruments and regulatory framework that would take forward the research, development and

promotion and initiation of clean coal burn and carbon capture and storage technologies.

*Following the creation of the Coal Forum, the TUC, Trades Union and industry members have continued to meet and provide input and advice to the TUC, the Coal Forum and where appropriate to other interested groups and bodies.*

The Clean Coal Task Group believes a diverse portfolio of power generation sources including renewables, nuclear, gas and clean coal, combined with demand reduction, is necessary to meet the government's objectives.

The group is focussed on:

- Developing a framework for the successful deployment of clean coal;
- Security of supplies and energy costs (and their consequences for fuel poverty and costs to industry) as well as emissions; and
- Employment opportunities in power generation, mining and equipment supply

### **Membership**

The current membership (March 2008) is:

- Dr Mike Farley (Chair), Director of Technology Policy Liaison, Doosan Babcock Energy
  - Chris McGlen (Secretary)
  - Nigel Yaxley, Coallmp (Association of UK Coal Importers)
  - David Brewer, Director General, Coalpro (Confederation of UK Coal Producers)
  - Phil Garner, Commercial Director, UK Coal.
  - Michael Gibbons, Director, Powerfuel Power Ltd.
  - Chris Kitchen, National Secretary, NUM.
  - Pat Carragher, General Secretary, BACM-TEAM.
  - Terry Fox, National President, NACODS
  - John Neal, Policy Officer, UNITE
  - Pamela Ross, GMB, Yorkshire Coal Staffs Branch
  - Dave Feickert, Coal industry consultant to TUC.
  - Adam Lent, Head of Economic & Social Affairs, TUC
  - Philip Pearson, Senior Policy Officer, TUC
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