

# IMPLEMENTATION OF THE REVISED EC LARGE COMBUSTION PLANTS DIRECTIVE

*Consultation response submitted to the Department for the Environment, Food and Rural Affairs by the Confederation of UK Coal Producers*

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## Summary

- One third of the nation's electricity is generated from coal, half of which is mined in the UK by members of the Confederation of UK Coal Producers (COALPRO).
- Coal mining in the UK is a £900 million industry, directly and indirectly employing over 20,000 people. It is a modern industry which competes against strong international competition to supply coal to UK power stations.
- Coal brings valuable security benefits to the UK's energy supply, an increasingly important consideration as the UK moves towards an over-dependence on foreign natural gas.
- Sulphur dioxide (SO<sub>2</sub>) emissions are a particular concern with coal use – a noxious gas associated with "acid rain". Flue gas desulphurisation is already fitted to some coal-fired power stations in the UK and captures around 90% of SO<sub>2</sub> emissions; since the 1970s, total UK emissions have fallen by 80%.
- The UK's SO<sub>2</sub> emission target under the EC National Emission Ceilings Directive is 585 kt per annum by 2010, a 50% reduction from today which COALPRO believes is tough but achievable.
- The bulk of this reduction will be made at existing coal-fired power stations where sulphur emissions are expected to fall by over 500 kt, largely through implementation from 2008 of the revised EC Large Combustion Plants Directive (LCPD).
- The UK government has a choice in how it implements the LCPD: the emission limit value (ELV) approach would set SO<sub>2</sub> concentration limits for individual power station flues, whereas the national emission reduction plan (NERP) approach would set an aggregate SO<sub>2</sub> limit for existing large combustion plants taken together.
- The government's provisional decision is to implement a NERP. Unfortunately, the LCPD is poorly drafted such that the flexibility of a NERP, that government believed it had secured when it agreed to the directive, is missing.
- Persisting with a NERP implementation of the LCPD would drive power station owners to import low-sulphur coal, much of it from South Africa, Russia and Colombia, rather than use higher-sulphur, British-mined coal.
- This would reduce demand for indigenous coal to one half or less of what could be produced in 2008-10, threatening at least 15,000 British mining and related jobs with an initial cost to the economy of around £700 million per year – social and economic costs that have not been considered by DEFRA.
- In this detailed response to the government's consultation on implementing the LCPD, COALPRO finds many flaws in the arguments presented by DEFRA and its consultants. There are legal obstacles to be overcome before a NERP could be implemented, and there is no evidence to show that SO<sub>2</sub> emission allowance trading under a NERP would be successful.
- We believe that the ELV approach is the viable way forward and would not unnecessarily discriminate against the UK coal industry. ELVs will be required in any case under the Integrated Pollution Prevention and Control Directive and entail no cost to the Treasury.
- Our conclusion is that the Ministers' provisional decision to opt for a NERP is wrong and must be changed when the impact on the UK coal industry is included in the Regulatory Impact Assessment.

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## 1 Introduction

### *Confederation of UK Coal Producers*

- 1.1 The Confederation of UK Coal Producers (COALPRO) welcomes the opportunity to respond to this important consultation<sup>1</sup> on how the UK government intends to implement the revised EC Large Combustion Plants Directive (2001/80/EC).
- 1.2 COALPRO represents the interests of nine coal mining companies in the UK who collectively mine over 27 million tonnes (Mt) of coal annually and directly employ over 9,000 people.

### *Coal in the UK*

- 1.3 In 2002, the UK consumed 59 Mt of coal<sup>2</sup>. Whilst industrial and domestic use of coal has declined somewhat over recent years, the generation of electricity at coal-fired power stations remains significant. 119 terawatt hours (TWh) or 32% of the UK's electricity is generated from coal (*c.f.* 39% globally<sup>3</sup>), consuming 46 Mt in 2002<sup>2</sup>, well over half of which was sourced locally.
- 1.4 Deep mine production in 2002 totalled 16.4 Mt with a further 13.6 Mt from surface mines and recovery operations<sup>2</sup>. The balance of 29 Mt to meet demand was imported into the UK from many countries, principally South Africa, Russia, Colombia and Australia.
- 1.5 UK coal producers successfully compete against imported coal from nations where labour rates are a fraction of those in the UK. Such price competitiveness is unique within the EU and has been achieved through the application of new mining technologies, capital investment in automated mining equipment and improved working practices. The industry plans to improve productivity still further through the introduction of flexible working hours that would allow greater utilisation of expensive mining equipment. This, together with forecasts of a strong demand for steam coal for power generation, suggest that the UK coal industry is competitively well-placed for many years to come.

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<sup>1</sup> *Consultation paper on the implementation of the revised Large Combustion Plants Directive*, Department for the Environment, Food and Rural Affairs / Department of the Environment (in Northern Ireland) / Welsh Assembly Government, June 2003.

<sup>2</sup> *Digest of UK Energy Statistics 2003*, Department of Trade and Industry, London: The Stationery Office, 2003.

<sup>3</sup> *Key World Energy Statistics from the IEA*, 2002 edition, Paris: International Energy Agency.

- 1.6 The government has recognised that investment in a viable coal mining industry should be encouraged with the same incentives as available to other industries. To this end, in March 2003 the Energy Minister announced a £60 million Coal Investment Aid scheme designed to extend the life of the country's coal reserves and safeguard British mining jobs.
- 1.7 **COALPRO forecasts that by 2008-10, the UK coal mining industry will be producing around 25 Mt per annum of which 23 Mt (with an average sulphur content of 1.72%) will be supplied to electricity generators – providing that this market is not foreclosed by government action.**

#### *Coal's environmental performance*

- 1.8 Coal has many attractions: it is a low-cost energy source; it is widely distributed around the world; it is safe and easy to transport; it can be safely stocked in large quantities; and, unlike oil and gas, has reserves to meet demand for several centuries.
- 1.9 Tempering the above attractions, is coal's environmental performance. Emissions of sulphur dioxide, oxides of nitrogen and dust from the combustion of coal must be controlled to acceptable levels and, more recently, emissions of carbon dioxide have become a serious concern as the threat of global warming and climate change is better understood.
- 1.10 There will continue to be a tension between those who work to supply the country's energy needs, whatever the primary source, and those who seek a better environment. Providing a sensible and open debate takes place on these issues, we can be sure of a balanced outcome.
- 1.11 **COALPRO aims to ensure that coal's contribution to the UK economy and energy security is properly recognised and to ensure that environmental legislation does not unnecessarily discriminate against coal, particularly indigenously produced coal.**

#### *Revised Large Combustion Plants Directive*

- 1.12 The revised EC Large Combustion Plants Directive (LCPD) places limits on the emissions of sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>) and particulates (dust) from the combustion of coal, oil and natural gas. NO<sub>x</sub> and dust emissions are largely determined by the manner in which fossil fuels are used, the fuels' composition or quality having a lesser influence. However, in the case of SO<sub>2</sub>, emissions are in direct

proportion to the sulphur content of the fuels. **Legislation that limits SO<sub>2</sub> emissions has a direct impact on the demand for coal and the LCPD itself threatens the displacement of relatively high-sulphur UK coal (~2% sulphur) with imported, low-sulphur coal (<1% sulphur).**

- 1.13 **The LCPD is the most significant piece of legislation ever to be applied at coal-fired power stations in the UK. It will have a profound impact on how these stations operate in the future. COALPRO seeks to ensure that in implementing this directive, the UK government does not unintentionally place local coal producers in a hopeless commercial position. If the provisional decision made by Ministers is followed, then there is a real risk that the UK coal industry will be decimated. The purpose of this consultation response is to avoid such an outcome.**

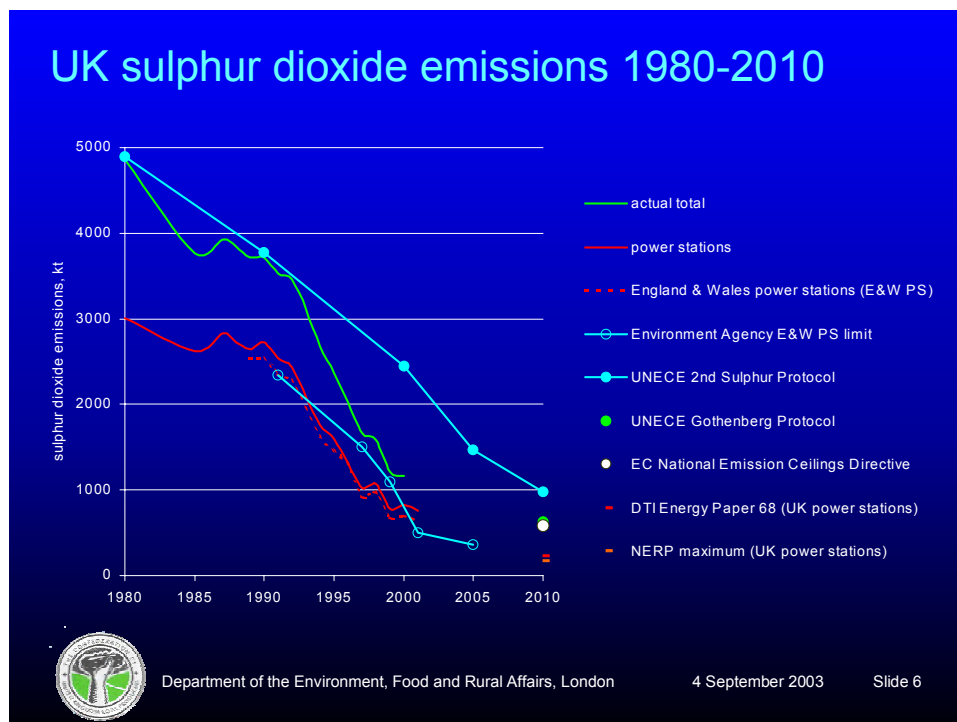
#### *COALPRO's consultation response*

- 1.14 This paper outlines the environmental impact of SO<sub>2</sub> to set the context for the international legislation that now exists to control emissions. In Section 5, the options for implementing the LCPD are presented followed, in Section 6, by an assessment of how these relate to another European directive on pollution control. Section 7 examines how demand for indigenous coal might vary under different LCPD implementation scenarios. Government has expressed a preference to address environmental issues by using market mechanisms, rather than applying prescriptive rules; the relevance of sulphur trading as a market mechanism to implement the LCPD is explored in Section 8. Sections 9, 10 and 11 examine the economic, environmental and legal cases for COALPRO's preferred implementation approach. COALPRO's responses to the specific questions raised by DEFRA in its consultation paper are provided in Section 12, and comments on LCPD interpretation issues and the draft Regulatory Impact Assessment (RIA) can be found in Sections 13 and 14. Before making some concluding remarks in Section 16, COALPRO summarises its past lobbying position on the LCPD which has consistently warned of the risk to the UK coal industry.

## **2 Sulphur dioxide in perspective**

- 2.1 All coal contains sulphur, principally in the form of pyrites and organically-bound sulphur. These turn to sulphur dioxide (SO<sub>2</sub>) when coal is burnt, a noxious gas that can aggravate breathing difficulties and cause damage to buildings and vegetation where it has dissolved in water droplets to form "*acid rain*".

- 2.2 Emissions of SO<sub>2</sub> come from both anthropogenic and natural sources. Indeed, “*Mount Etna is the largest source of SO<sub>2</sub> in Europe, emitting more of the dangerous SO<sub>2</sub> gas than all coal power plants and vehicles taken together.*”<sup>4</sup> – giving added impetus to the managed reduction of man-made emissions.
- 2.3 It is an unfortunate fact that some of the highest levels of atmospheric SO<sub>2</sub> in the UK are found in central London, not from coal-fired power stations but from traffic pollution. Implementation of the London Air Quality Strategy will hopefully improve this local air quality problem which is damaging public health.
- 2.4 Today, SO<sub>2</sub> emissions are a fraction of those seen in the past when smokeless fuels and abatement technologies were not used. For example, in the 1950s, UK SO<sub>2</sub> emissions are estimated to have been over 7 Mt, some seven times the quantity now emitted. Since 1980, UK SO<sub>2</sub> emissions have fallen 76% from almost 5 Mt to around 1 Mt<sup>5</sup> – principally due to the reduced and cleaner use of coal – as shown in Figure 1.



**Figure 1 – UK sulphur dioxide (SO<sub>2</sub>) emissions 1980-2010**

- 2.5 International strategies to reduce acidification demand further reductions – around 50% by 2010 in the case of the UK. The bulk of the UK’s reduction will be made at existing coal-fired power stations where sulphur emissions are expected to fall by over

<sup>4</sup> European Space Agency press release, 19 November 2002.

<sup>5</sup> *Digest of UK Environmental Statistics*, Department for the Environment, Food and Rural Affairs, October 2002.

500 thousand tonnes (kt), largely through implementation from 2008 of the revised LCPD.

2.6 Whilst some sulphur is retained in the ash when coal is burnt (5-10%), most is emitted to atmosphere unless captured using flue gas desulphurisation (FGD). Table 1 summarises which UK power stations already have FGD fitted or under construction, along with those where owners have expressed an interest in retrofitting FGD. In most cases, the FGD plants remove (or will remove) 85-90% of the SO<sub>2</sub> that would otherwise have escaped to atmosphere. All use the well-proven, “*wet scrubber*” process (except Fifoots Point with its dry limestone injection), reacting a slurry of crushed limestone with the SO<sub>2</sub> to produce gypsum, a useful by-product that finds a ready market amongst plasterboard manufacturers. Some of the proposed new FGD will use “*sea-water scrubbing*”. In the future, higher-sulphur UK coals will only find a market at power stations fitted with FGD – the logical result of more stringent environmental legislation.

**Table 1 – Summary of UK coal-fired power station FGD status**

station	capacity	potential FGD capacity in 2008	owner	FGD status
Drax	4.0 GW	4.0 GW	AES	operational
Ratcliffe	2.0 GW	2.0 GW	Powergen	operational
Fifoots Point	(0.4 GW)*	(0.4 GW)*	AES	has FGD but in administration
West Burton	2.0 GW	2.0 GW	EdF	commissioning
Eggborough	2.0 GW	1.0 GW	British Energy	under construction
Cottam	2.0 GW	1.0 GW	EdF	under construction
Longannet	2.4 GW	1.2 GW	Scottish Power	call for tender published in OJ
Ferrybridge	2.0 GW	1.0 GW	AEP	S36 consent granted
Fiddlers Ferry	2.0 GW	0.5 GW	AEP	applied to DTI for S36 consent
Rugeley	1.0 GW	1.0 GW	International Power	applied to DTI for S36 consent
Aberthaw	1.5 GW	1.5 GW	Innogy	applied to DTI for S36 consent
Didcot	2.0 GW	-	Innogy	
Cockenzie	1.2 GW	-	Scottish Power	
Ironbridge	1.0 GW	-	Powergen	
Kilroot	0.5 GW	-	AES	
Kingsnorth	1.5 GW	-	Powergen	
Tilbury	1.0 GW	-	Innogy	
	28.1 GW	15.2 GW		

\* plant in administration, so not included in totals

**2.7 COALPRO recognises the need to reduce emissions of environmental pollutants to achieve defined objectives. We wish to see more power stations fitted with FGD and a pollution control regime that meets these defined objectives whilst allowing the continued use of indigenous coal for electricity generation.**

### 3 International sulphur control

3.1 The United Nations Economic Commission for Europe's (UNECE) Convention on Long Range Transboundary Air Pollution, adopted in 1979, was the first legally binding instrument to “endeavour to limit” air pollution. In 1987, the Helsinki Protocol (signed by the “30% Club”, which did not include the UK who subsequently became known as “the dirty man of Europe”<sup>6</sup>) set a 30% reduction in SO<sub>2</sub> emissions by 1993, based on a 1980 baseline. The Second Sulphur Protocol was signed in 1994, setting new targets – a SO<sub>2</sub> reduction of 80% to 980 kt by 2010 for the UK. Finally, in 1999, the Gothenburg Protocol (*a.k.a.* Multi-pollutant, Multi-effect Protocol) was signed and places an annual limit of 625 kt on SO<sub>2</sub> emissions from the UK by 2010. The growing use of natural gas for power generation in the UK has resulted in far lower sulphur emissions than anticipated, as illustrated in Figure 1.

### 4 European legislation

#### *National Emission Ceilings Directive*

- 4.1 The UNECE protocols are perhaps of academic interest, since more recent EC directives introduce tougher controls on SO<sub>2</sub>. For example, the National Emission Ceilings Directive (NECD) (2001/81/EC) means that the UK must restrict its annual SO<sub>2</sub> emissions to 585 kt by 2010, an 88% reduction from 1980 levels as shown in Figure 1.
- 4.2 The European Commission states that the monetary benefit of complying with the NECD (€17 to €32 billion per year) more than compensates for the estimated cost of €7.5 billion per year<sup>7</sup>. The analysis underpinning this statement was carried out for the Commission by the International Institute for Applied Systems Analysis (IIASA) in Austria and AEA Technology in the UK.
- 4.3 The coal industry has disputed the Commission's cost-benefit analysis<sup>8</sup>. Firstly, IIASA's analysis assumes roughly half of the UK's domestic coal production can be displaced by low-sulphur imported coal to meet the UK's NECD ceiling at no cost – the Commission failed to consider the cost of closing the bulk of the remaining deep-mined

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<sup>6</sup> Rose, C., *The Dirty Man of Europe: the great British pollution scandal*, London: Simon and Shuster, 1990.

<sup>7</sup> *Commission proposes national emission ceilings for certain atmospheric pollutants and ambient air quality targets values for ozone*, EC press release IP/99/381, Brussels, 9 June 1999.

<sup>8</sup> *Consultation on the National Emission Ceilings Directive*, submission by RJB Mining PLC to the Department of the Environment, Transport and the Regions, 25 February 2000.

coal industry in the UK. Secondly, AEA Technology repeated the analysis with different, though still perfectly reasonable assumptions to arrive at total benefits that are *smaller* than the costs and concludes that the Commission's analysis does not prove "*beyond all reasonable doubt*" that the benefits exceed the costs<sup>9</sup>.

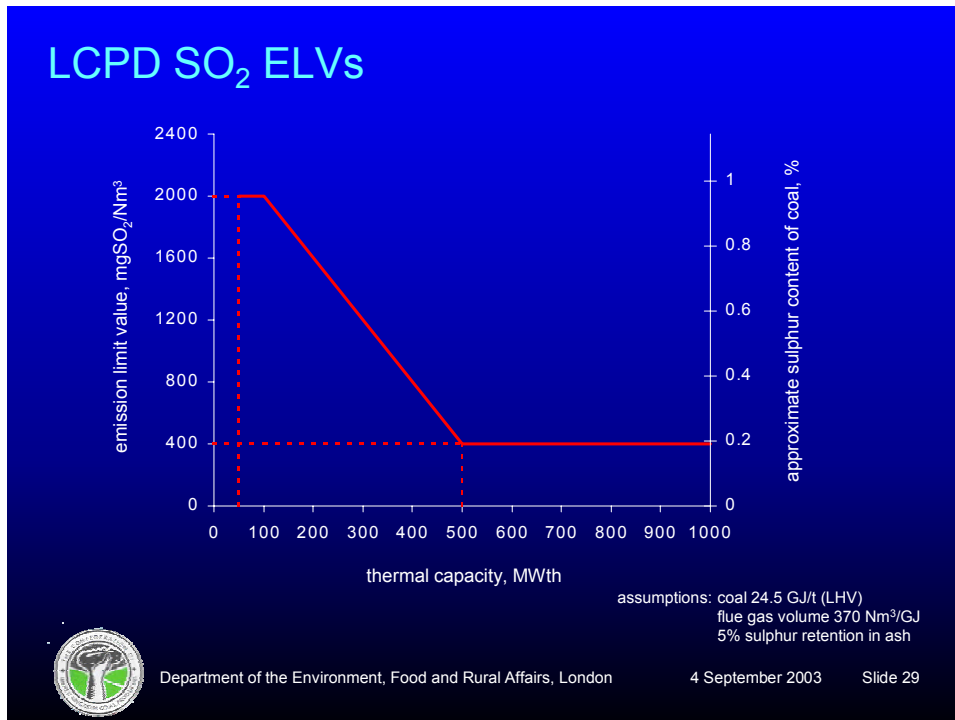
- 4.4 Notwithstanding the failings of the cost-benefit analysis, COALPRO does believe that the right approach has been taken to tackle acidification. It is an international problem demanding a co-ordinated, international response. The UK's 585 kt target is a figure, calculated using IIASA's RAINS model, that reduces acidification across Europe with each of the 15 EU member states making an equitable effort. The same model shows that by making SO<sub>2</sub> reduction across all UNECE countries, the UK's target would be the higher 625 kt figure adopted in the Gothenburg Protocol.
- 4.5 Any attempt to over-achieve the requirements of the NECD, perhaps by a stringent implementation of the LCPD, would result in a marginal environmental improvement at a sub-optimal cost since other EU member states would not be obliged to follow suit.
- 4.6 **COALPRO believes that the 585 kt SO<sub>2</sub> target under the NECD is extremely tough but achievable. It demands a further 70-80% reduction in emissions from coal-fired power stations – another 500 kt of SO<sub>2</sub> from a sector that has already reduced its SO<sub>2</sub> emissions by 75% since 1980. This can be achieved without destroying the indigenous coal industry, but only if government carefully manages this significant reduction to avoid a headlong rush towards imported, low-sulphur coal** (see also Section 10).

#### *Large Combustion Plants Directive*

- 4.7 The most important directive in relation to coal use is the revised LCPD which, for the first time, introduces emission limit values (ELVs) for existing coal-fired plants >50 MWth from January 2008 (see Figure 2), excluding cement kilns and coke ovens. The original LCPD (88/609/EEC) applied only to new plants, so had little impact in the UK where no new, coal-fired power stations have been built since the sixth unit at Drax power station was commissioned in 1986. The following sections consider how the government might implement the revised directive in a manner which does not unintentionally discriminate against producers of indigenous coal.

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<sup>9</sup> *Economic evaluation of proposals for emission ceilings for atmospheric pollutants – an analysis of the scenarios from IIASA's seventh interim report*, Interim report for DG XI of the European Commission, AEA Technology, January 1999.



**Figure 2 – Sulphur dioxide (SO<sub>2</sub>) emission limit values (ELVs) to be applied to existing plants from 1 January 2008 (showing approximate sulphur content of coal to achieve ELVs in plants with no SO<sub>2</sub> abatement) n.b. the thermal capacity of a typical 500 MWe unit at a coal-fired power station is >1,400 MWth**

### *Integrated Pollution Prevention and Control Directive*

4.8 The Integrated Pollution Prevention and Control (IPPC) Directive<sup>10</sup> covers existing large combustion plants from March 2006 and demands that best available techniques (BAT) are applied to the prevention and control of all emissions to air, water and land. In the case of power stations, The Environment Agency (and the Scottish Environment Protection Agency) will implement this directive; the Agency's initial thinking is considered in more detail in Section 6.

## **5 LCPD implementation**

5.1 In the case of *existing* pre-1987 large combustion plants (LCPs), the UK Government must inform the European Commission by 27 November 2003 whether it intends to adopt:

### *An ELV approach*

5.2 Prescribed emission limit values (ELVs) for the concentration of sulphur dioxide (SO<sub>2</sub>) in flue gases as shown in Figure 2, which must be met at each individual power station flue during normal operation, usually through fitting flue gas desulphurisation (FGD).

<sup>10</sup> Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control, Official Journal L 257, 10/10/1996 p.26-40.

By way of derogation, existing plants >400 MWth may emit 800 mg/Nm<sup>3</sup> (rather than the 400 mg/Nm<sup>3</sup> applied to purely coal-fired power stations), if they operate for less than 2,000 hours per year (23% load factor) before 31 December 2015 and less than 1,500 hours (17%) from then on.

or

*A NERP approach*

- 5.3 A national emission reduction plan (NERP) based on a national SO<sub>2</sub> bubble, which all existing coal-fired power stations (and other LCPs) taken together must not exceed. The annual bubble is equal to the average quantity of SO<sub>2</sub> that would have been emitted if ELVs had applied over a five year baseline period (1996-2000).
- 5.4 An operator may unilaterally “*opt out*” from the LCPD under the “*limited life derogation*”. Operators of the UK’s oldest coal-fired power stations may find this commercially attractive. At the end of the 20,000 hour derogation, these stations could only continue operating if upgraded to meet new plant standards.
- 5.5 DEFRA’s consultation paper poses the question of whether the UK should adopt the ELV or NERP approach to implementing the LCPD for *existing* plants and asks if there are any additional issues to be considered beyond those covered in the paper.
- 5.6 **COALPRO believes strongly that the “*provisional decision*” based on Ministers’ “*preliminary view of the way forward*” to adopt the NERP approach is wrong. Whilst we agree with DEFRA that the “*issues are finely balanced*” for many stakeholders, this is not the case for the UK coal industry which would face grave difficulty under a NERP.**
- 5.7 **The considered view of COALPRO members is that only the ELV approach will provide a viable market for UK coal. The following sections present our assessment of the implementation options, quantify the impact of a NERP on the coal industry and conclusively demonstrate why the ELV approach is in the UK’s best interest.**

## 6 IPPC implementation

6.1 The Environment Agency has published its initial thinking on how it will treat coal-fired power stations under the IPPC Directive<sup>11</sup>:

- **FGD required on all units** regardless of whether government elects for ELVs or a NERP. The Agency recognises that at some power stations where FGD is under construction, plans might not have included for FGD on all units. In these cases, the Agency would require equivalent performance (through the use of low-sulphur coal).
- **Under the ELV approach, the Agency proposes a bubble limit reflecting “*the availability of competitively priced international coal with low sulphur content*”** on the assumption that power stations with FGD would operate at a high load factors.
- **Under the NERP approach the Agency intends to impose concentration limits** (*i.e.* ELVs).
- **Continued use of “A” and “B” mass limits** for SO<sub>2</sub> emissions from power stations will be required, and extended to cover NO<sub>x</sub>, regardless of whether government elects for ELVs or a NERP. “A” limits may be revised downward to protect local air quality, depending upon the outcome of a review under the EC Habitats Directive. However, **the Agency considers that the national SO<sub>2</sub> limit under a NERP is “stringent”** and does not therefore envisage seeking to set more stringent “B” mass limits.
- In the case of *opted-out* plants, FGD is not BAT, so use of low-sulphur coal would be expected. The Agency is concerned that regulation under **IPPC should not commercially disadvantage owners of FGD plants**; in particular, that no commercial advantage should result to those who elect to *opt-out*. Hence, the Agency expects to impose a “B” mass limit covering all *opted-out* plants that reflects load factor restrictions, in addition to “A” mass limits and concentration limits (*i.e.* ELVs) to protect the local environment.

6.2 From the above, it is clear that regulation under both the ELV and NERP approaches could be very similar based on the Environment Agency’s preliminary view of what BAT means under the IPPC Directive.

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<sup>11</sup> *Preliminary assessment of BAT for the coal- and oil-fired power stations*, Environment Agency, April 2003.

6.3 COALPRO notes that the Agency's thinking on how it might implement the IPPC Directive remains fluid. However, it is most disturbing that the Environment Agency's current proposal that FGD power stations should use low-sulphur imported coal would eliminate the market for the UK's higher-sulphur coals and is therefore totally unacceptable to COALPRO members.

## 7 Implementation scenarios and the impact on indigenous coal demand

7.1 Three scenarios under a NERP are considered: one using DTI forecasts<sup>12</sup> and closely matching DEFRA's assumptions but with only limited sulphur trading *between* sectors (*i.e.* not *within* sectors); a low coal-burn scenario with sulphur trading; and, a high coal-burn scenario, again with sulphur trading. Whilst scenarios are helpful in understanding how complex systems might evolve, they provide limited insight into the range of possible outcomes and are heavily dependent upon the assumptions made. To address this failing, a further analysis is presented which makes fewer assumptions and shows the broad range of possible outcomes following implementation of the LCPD under a NERP or ELV approach. By understanding this final analysis, the discriminatory impact of a NERP upon the UK coal industry becomes much clearer.

### *Assumptions used to develop scenarios*

7.2 Before developing the scenarios, some assumptions must be made about how owners of the 28.1 GW of existing coal-fired power stations (see Table 1) will operate them once the LCPD is implemented: run with or without FGD, *opt-out*, or close. An argument used by DEFRA in support of a NERP is that reducing pollutant emissions at coal-fired power stations is more economic than at the *smaller* large combustion plants found elsewhere in the industrial sector which would therefore become net purchasers of emission allowances from the generation sector. Some assumption must be made about this likely demand for SO<sub>2</sub> allowances. From these assumptions, an estimate of the potential market size for UK coal can be made.

### *Demand for emission allowances*

7.3 Table 2a summarises the SO<sub>2</sub> allocations that would be made under a NERP. It is important to note the dominant contribution of coal-fired power stations to the total SO<sub>2</sub> emissions from large combustion plants: 89% in 2001. Under a NERP, this is expected to fall to less than 67% of the total. In fact, the *whole* of the required SO<sub>2</sub> reduction,

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<sup>12</sup> *Energy projections for the UK*, Energy Paper 68; Department of Trade and Industry; London; December 2000.

**Table 2a – Sectorial breakdown of actual SO<sub>2</sub> emissions in 2001 from large combustion plants and NERP allocations**

sector	2001 actual	NERP SO <sub>2</sub> allocation		
	tonnes	tonnes	%age of 2001	change from 2001
ESI <sup>1</sup> (coal)	742,843 t	170,711 t	23%	-572,132 t
ESI <sup>1</sup> (oil)	13,197 t	3,062 t	23%	-10,135 t
petroleum refining	26,472 t	50,211 t	190%	+23,739 t
iron & steel	2,935 t	9,368 t	319%	+6,433 t
aluminium	29,242 t	9,346 t	32%	-19,896 t
sugar refining	721 t	1,924 t	267%	+1,203 t
others	15,050 t	11,219 t	75%	-3,831 t
total	830,460 t	255,841 t	31%	-574,619 t
			non-ESI	+7,648 t
			non-ESI (coal)	-2,487 t

<sup>1</sup> Electricity Supply Industry

source: ENTEC analysis presented as Annex C to DEFRA consultation paper.

**Table 2b – Sectorial breakdown of actual NO<sub>x</sub> emissions in 2001 from large combustion plants and NERP allocations**

sector	2001 actual	NERP NO <sub>x</sub> allocation (2008-2015)		
	tonnes	tonnes	%age of 2001	change from 2001
ESI (coal)	310,192 t	221,272 t	71%	-88,920 t
ESI (oil)	12,248 t	6,565 t	54%	-5,683 t
petroleum refining	17,364 t	18,762 t	108%	+1,398 t
iron & steel	1,171 t	3,511 t	300%	+2,340 t
aluminium	7,696 t	6,357 t	83%	-1,339 t
sugar refining	693 t	1,176 t	170%	+483 t
others	16,414 t	11,982 t	73%	-4,432 t
total	365,778 t	269,625 t	74%	-96,153 t
			non-ESI	-1,550 t
			non-ESI (coal)	-7,233 t

source: ENTEC analysis presented as Annex C to DEFRA consultation paper.

**Table 2c – Sectorial breakdown of actual dust emissions in 2001 from large combustion plants and NERP allocations**

sector	2001 actual	NERP dust allocation		
	tonnes	tonnes	%age of 2001	change from 2001
ESI (coal)	21,900 t	20,863 t	95%	-1,037 t
ESI (oil)	535 t	397 t	74%	-138 t
petroleum refining	1,610 t	1,321 t	82%	-289 t
iron & steel	2,420 t	207 t	9%	-2,213 t
aluminium	637 t	1,059 t	166%	+422 t
sugar refining	244 t	94 t	39%	-150 t
others	1,155 t	760 t	66%	-395 t
total	28,501 t	24,701 t	87%	-3,800 t
			non-ESI	-2,625 t
			non-ESI (coal)	-2,763 t

source: ENTEC analysis presented as Annex C to DEFRA consultation paper.

and more, is expected to be made at power stations (including one dedicated to aluminium smelting), whilst emissions from other sectors could *increase* given their generous NERP allocations. So rather than being net *purchasers* of SO<sub>2</sub> allowances, the non-ESI sectors would likely be net *sellers* – thus undermining one of the arguments in

favour of a NERP. Nevertheless, the **NERP allocations suggest that the coal-fired ESI sector could be a net seller of 2,487 tonnes of SO<sub>2</sub>, a figure which is used in the three scenarios.**

7.4 Table 2b and c show NERP allocations by sector for NO<sub>x</sub> and dust emissions. DEFRA assumes that the main buyers of emission allowances would be operators outside the ESI sector, and includes examples in the iron and steel sector (Corus), aluminium smelting (Alcan) and sugar refining (British Sugar) (paras. 4.25-4.28 of the consultation paper). COALPRO finds it disturbing that, within the space of four paragraphs, the flimsiest of cases is made for a NERP using “*rough estimates*” that gloss over environmental issues, mislead and end up by simply being wrong.

- The iron and steel sector would be over-allocated SO<sub>2</sub> allowances by 6,433 t (not 5,000 t) and have a NO<sub>x</sub> allowance surplus of 2,340 t under a NERP, when compared with their most recently reported emissions. These over-allocations of 300% or more are not due to investment in pollution control, but to the unfortunate demise of the UK iron and steel industry – emissions in 2001 reduced because of reduced production. DEFRA notes that the iron and steel sector may be buyers for about 2,000 t of dust emission allowances (2,213 t in Table 2b), failing to mention that this is because the actual emissions at a single site are no less than 37× greater than allocated allowances – emissions so far above the LCPD’s ELVs that they must be of environmental concern (see also para. 11.4 below).
- DEFRA states that the “other industry” sector, comprising 56 plants, would need to buy 20,000 t of SO<sub>2</sub> emission allowances without mentioning that this is what might be required by three *large* plants on a single site within the aluminium sector. The *smaller* large combustion plants, making up the majority of the “other industry” sector, would receive over-allocations, whilst just nine other *large* plants would receive under-allocations. **In fact, the *smaller* plants meet their ELVs and the *larger* plants exceed them, such that an ELV approach would force abatement measures to be taken at the largest plants where costs are lowest – achieving exactly what a NERP sets out to do, but without the risk that large industrial plants do nothing to abate pollution.**
- In an attempt to put these figures into context, DEFRA compares emissions from other sectors with those from power stations. This is a meaningless comparison – it is

hardly surprising that a sector which provides one third of the nation's electricity from almost 50 Mt of coal emits more pollution than, say, a brewery using coal. DEFRA suggests that, "If it [the power station] changed its load factor, or changed the sulphur level in its coal, the emissions would alter in proportion." **COALPRO does not disagree, but wonders where the electricity would then come from and why DEFRA has not considered the impact on the UK coal industry of its suggestion to burn low-sulphur, imported coal.**

- Finally, COALPRO sees no reason why crude oil refiners would enter the market for SO<sub>2</sub> allowances given that they would be allocated twice what they require – an over-allocation of some 23,739 t.

**7.5 COALPRO remains unconvinced by DEFRA's justification for a NERP. It seems that a NERP would allow a small number of large industrial sites to exceed their ELVs, substantially so in some cases, at the expense of reduced coal-fired electricity generation using imported coal and at odds with the principal purpose of the LCPD.**

#### *Coal-fired power station operating strategies*

##### *FGD power stations*

7.6 DEFRA anticipates coal-fired power stations with a capacity of 12.2 GW will be fitted with FGD under a NERP. However, it is not at all clear that the proposed FGD at Rugeley and Longannet power stations will proceed under a NERP. COALPRO believes that it could range from 10.0 GW under a NERP to over 15 GW under ELVs depending upon the demand for coal-fired generation. What is certain is that, under IPPC, burning higher-sulphur indigenous coal will be allowed only at power stations with FGD (see Section 6); with little further constraint under the ELV approach or severely constrained by SO<sub>2</sub> allocations under a NERP.

##### *non-FGD power stations*

7.7 The IPPC Directive means that from 2006, no UK coal will be burnt at non-FGD power stations; in practice, this is largely the case today (except at those power stations where FGD is under construction and therefore benefit from a relaxation of the SO<sub>2</sub> emission limits imposed by the Environment Agency<sup>13</sup> – a temporary relaxation designed to

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<sup>13</sup> *Controls on emissions from coal- and oil-fired power stations - the Agency's decision following its 1999 public consultation on its proposed controls*, The Environment Agency, 17 December 1999.

encourage new FGD). The level of generation from non-FGD stations will depend on their SO<sub>2</sub> allocations under a NERP and on the sulphur content of the coal they consume. Table 3 illustrates the range of generation from the 12.2 GW of non-FGD plant assumed later in Scenario A. An SO<sub>2</sub> allocation of 69,008 tonnes is assumed, this being the allowance calculated by DEFRA for these power stations (71,476 tonnes) less the amount needed by other sectors (2,468 tonnes – should be corrected to the 2,487 tonnes from Table 2a). The amount of electricity that can be generated, and coal consumed, then depends solely on the sulphur content of the coal used, assumed to be 0.6% to 1.0% which is representative of internationally-traded, low-sulphur coals.

**Table 3 – Generation and coal-burn at non-FGD power stations under a NERP**

sulphur in coal	mgSO <sub>2</sub> /Nm <sup>3</sup>	gSO <sub>2</sub> /kWh	TWh/yr	Mt/yr
0.6%	1,258	4.79	14.4	6.0
0.8%	1,677	6.38	10.8	4.5
1.0%	2,096	7.98	8.6	3.6

assumptions: 24.5 GJ/t (LHV), 370 Nm<sup>3</sup>/GJ, 5%S in ash, 35% efficiency (LHV).

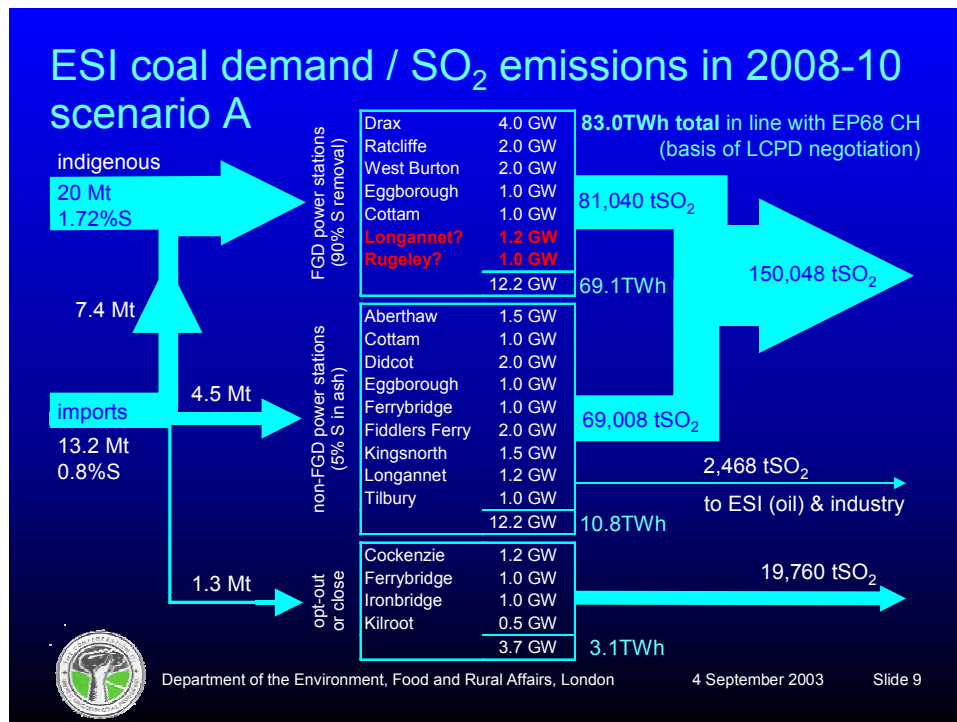
*Opted-out or closed power stations*

7.8 The remaining 3.7 GW of plants in Scenario A making up the 28.1 GW total are assumed to *opt-out* from the LCPD or close. At a 29% load factor (the 20,000 hour *opt-out* spread over the maximum 8-year *opt-out* period) these stations could generate 9.3 TWh/yr. However, the Environment Agency states that it will not allow these plants to operate with a commercial advantage, and in any case, some will close, so we estimate a generation of just 3.1 TWh/yr.

*Scenario A – based on DTI Energy Paper 68*

7.9 The central-high (CH) case in DTI Energy Paper 68 (EP68) was used by the UK government when negotiating the LCPD and the NECD<sup>14</sup>. It is therefore a useful starting point for any analysis of the impact of the LCPD on the UK coal industry. However, we note that the DTI is currently revising its forecasts for coal-fired power generation upwards, such that a high coal-burn scenario might be more realistic (see Scenario C – para. 7.19 *et seq*).

<sup>14</sup> Proposal for a directive of the European Parliament and of the Council on National Emission Ceilings for certain atmospheric pollutants: *A Regulatory and Environmental Impact Assessment on the Council's Common Position*, Department of the Environment, Transport and the Regions, 25 January 2001.



**Figure 3 – Scenario A based on the Central High case in DTI Energy Paper 68**  
 assumptions: coal 24.5 GJ/t (LHV); flue gas volume 370 Nm<sup>3</sup>/GJ;  
 35% / 37% efficiency (LHV) at non-FGD / FGD power stations

- 7.10 Figure 3 illustrates Scenario A with coal, on the left, being fed into a number of power stations grouped as: FGD, non-FGD or *opt-out/close*. On the right, SO<sub>2</sub> emissions are shown assuming that these reach what is allowed under a NERP from the FGD and non-FGD power stations. A small quantity of SO<sub>2</sub> allowances is traded across to other sectors to make up for an anticipated shortfall. However this quantity is small and has little impact on the analysis. Further emissions of SO<sub>2</sub> come from *opted-out* plants; these are outside of the scope of a NERP but are unlikely to rise much above the figure shown, given the Environment Agency's stated view on IPPC implementation (see Section 6).
- 7.11 The electricity generated from non-FGD stations lies at the centre of the range given above in Table 3, whilst the *opted-out* plants generate 3.1 TWh/yr, as explained above in para. 7.8. To reach the 83 TWh/yr forecast in EP68 would then require 69.1 TWh/yr from FGD stations.
- 7.12 Coal demand is calculated from the electricity generated using the assumptions on calorific value and power station efficiencies shown in Figure 3. The split between indigenous coal (1.72% sulphur) and imported coal (0.8% sulphur) is calculated so as to be consistent with the SO<sub>2</sub> emissions shown on the right (*i.e.* those allowed under a NERP).

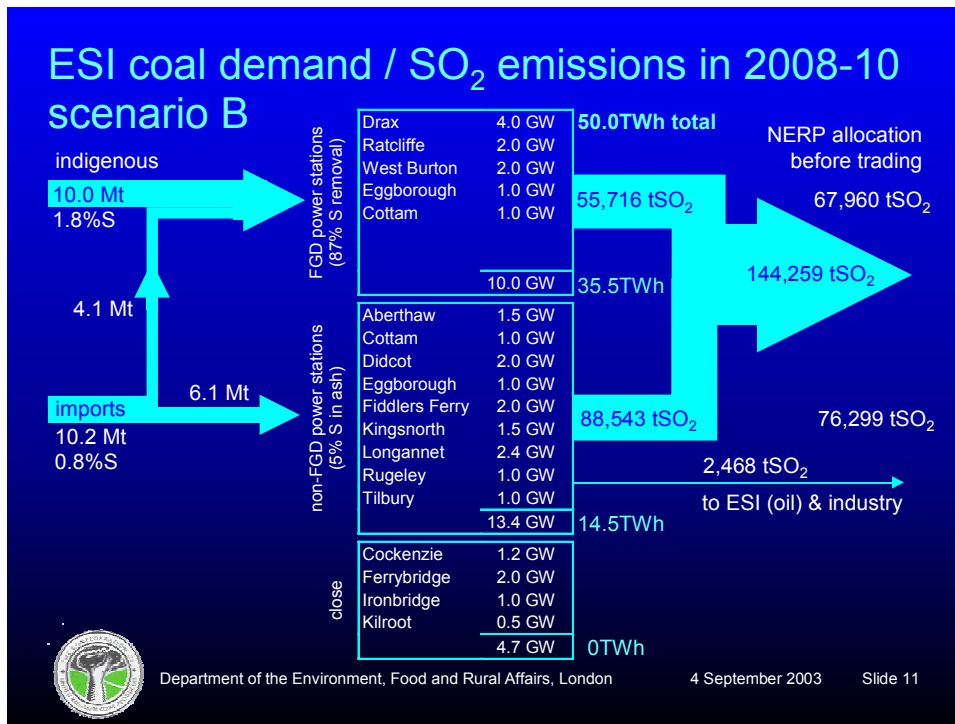
7.13 Whilst the annual 20 Mt demand for indigenous coal is not far off the UK's 23 Mt annual production potential for electricity generation in 2008-10, some serious problems can be identified from studying Scenario A. Firstly, to achieve sales of 20 Mt requires that UK coal producers win a 73% market share at a small number of FGD power stations. This would seem unlikely in a free market, unless coal buyers were directed to contract with local producers. Secondly, each owner of a FGD power station would expect to win an above average market share; owners would not compromise this by contracting to purchase higher-sulphur UK coal and so constrain their future level of generation. Thirdly, although the 65% load factor at FGD power stations is realistic, at non-FGD power stations it is just 10% – far lower than is commercially viable. It is extremely difficult to imagine how this would be resolved. Closing or *opting-out* non-FGD power stations is no solution since their SO<sub>2</sub> allowances would disappear, leaving the position of those that remain in the NERP largely unchanged. Ultra-low sulphur, imported coal would allow higher load factors at the non-FGD stations, up to a maximum of 40% with a few exceptional 0.2% sulphur coals. This would have a detrimental impact on the demand for electricity from power stations with FGD and so reduce the market size for UK coal still further. The non-FGD power stations could fit FGD, but this would reduce the overall load factor at FGD power stations down from 65%, perhaps to a level that would make investment in FGD unattractive.

7.14 **In conclusion, Scenario A attempts to mirror the Central-High projection in DTI Energy Paper 68 and DEFRA's own assumptions, but is implausible in practice. Moreover, the market for indigenous coal is constrained by SO<sub>2</sub> allocations to a size below COALPRO's forecast production capacity and is concentrated at too few power stations (*i.e.* UK coal producers would face an oligopsony), failings which do not improve as scenario adjustments are considered.** The government has suggested that SO<sub>2</sub> emission allowance trading could improve matters and this is considered in Scenarios B and C which examine low and high coal-fired generation scenarios respectively.

#### *Scenario B – low coal-fired generation*

7.15 Scenario B was presented to DEFRA in COALPRO's LCPD position paper dated March 2003 to voice our concern that a NERP approach to LCPD implementation could result in a demand for indigenous coal of just 10 Mt/yr with coal-fired generation falling to 50 TWh/yr (see Appendix IV). No power stations *opt out*, instead they close

(including all of Ferrybridge). Only the FGD operating or under construction today runs, totalling 10 GW. In this scenario, sulphur trading occurs between the FGD and non-FGD power station groups. However, allowances move away from FGD power stations to non-FGD stations, not via buying and selling in a market, but by redistribution of allowances within the power station portfolios of individual companies (e.g. Powergen, EDF and International Power assuming it secures an interest in Drax).



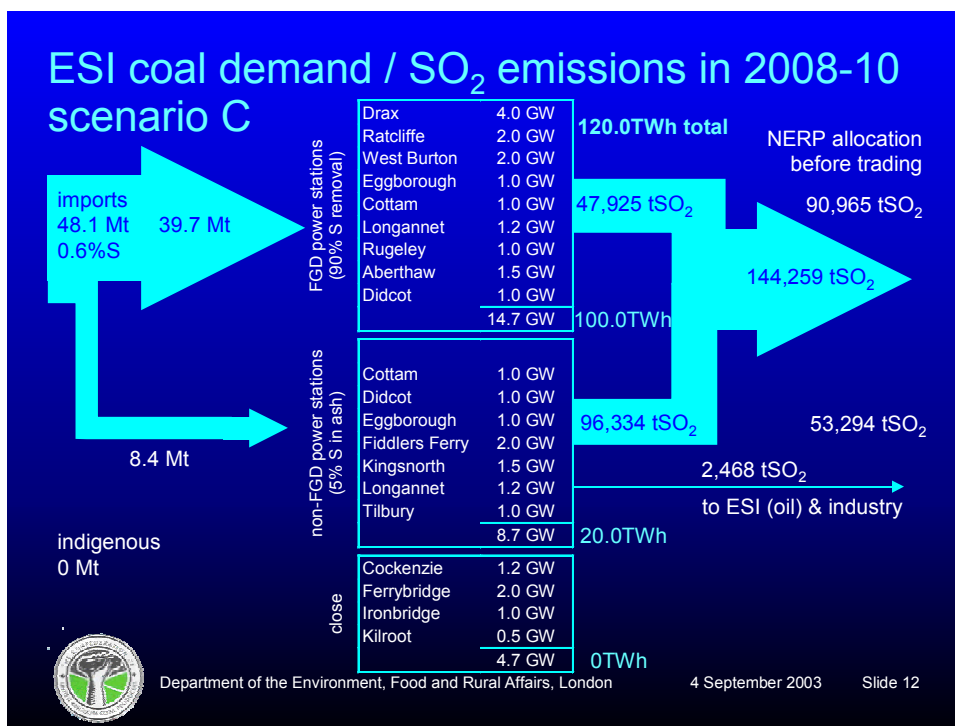
**Figure 4 – Low coal-burn Scenario B**

- 7.16 The rationale for this movement of allowances is that it is only the FGD power stations that are in a position to sell or transfer SO<sub>2</sub> allowances, either by using low-sulphur imported coal in place of higher-sulphur UK coal or by running at a lower load factor. Furthermore, it is the non-FGD power stations which desperately need more SO<sub>2</sub> allowances to enable operation at commercially viable load factors.
- 7.17 Under Scenario B, FGD power stations run at a reasonable 41% load factor and non-FGD at 12%. As in Scenario A, the latter is unlikely to be commercially viable; station closure does not improve the situation (SO<sub>2</sub> allowances are lost) and the use of ultra-low sulphur coal would simply take away market share from FGD stations.
- 7.18 **In conclusion, under a low coal-burn scenario, a NERP again drives operators of coal-fired power stations away from indigenous coal, not to maximise profits from power generation *per se*, but to maximise profits from an arbitrary distribution and finite supply of SO<sub>2</sub> allowances.** As indicated in para. 4.11 of the consultation

paper, such an arbitrary allocation raises State Aid issues with some power station owners faring better than others for no logical or fair reason.

**Scenario C – high coal-fired generation**

7.19 Some might consider that the maximum market size open to UK coal producers in Scenarios A and B (10-20 Mt) is the natural outcome of a declining demand for coal-fired electricity generation. Conversely, if coal-fired generation remained at today’s levels out into the future, perhaps because of high gas prices, then demand for UK coal would presumably remain buoyant. Perversely, this is not the case as the high coal-burn Scenario C demonstrates.



**Figure 5 – High coal-burn Scenario C**

7.20 Coal-fired generation in Scenario C rises to 120 TWh, compared with 115 TWh from major power producers in 2002<sup>2</sup>. As in Scenario B, no power stations *opt out*, but some of the oldest close as companies attempt to raise load factors at their remaining stations. Many more power stations have FGD retrofitted, although only on half the units at Eggborough, Cottam, Longannet and Didcot. The companies owning these stations are assumed to minimise their investment in FGD by redistributing SO<sub>2</sub> emission allocations under a NERP such that non-FGD power stations (or units) can operate at commercially viable load factors.

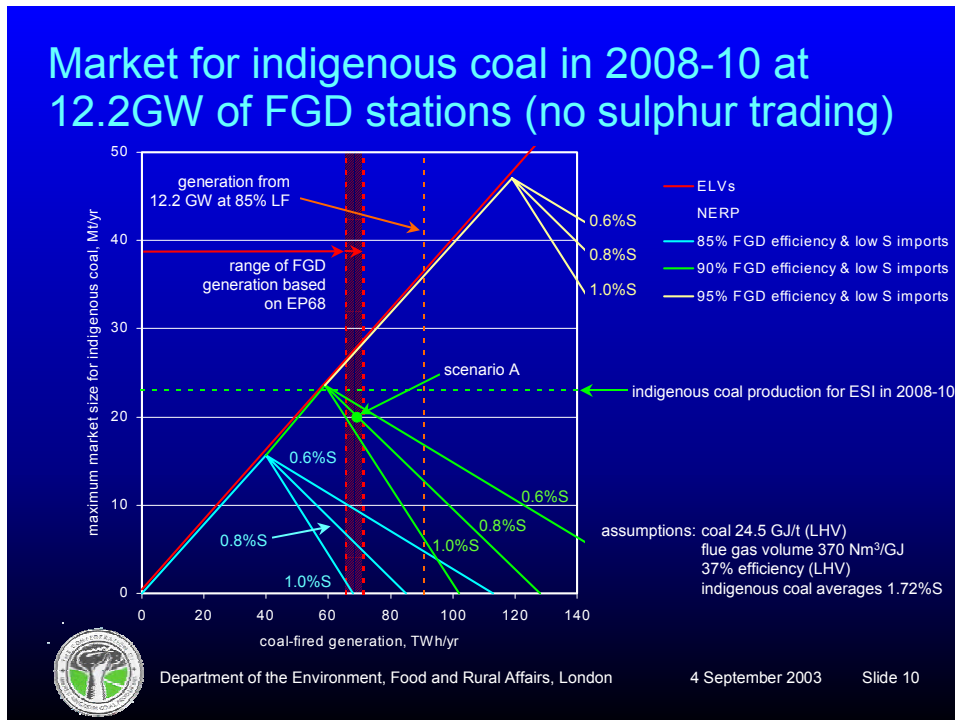
7.21 Only imported coal is consumed with an average sulphur content of 0.6% – there is no demand for indigenous coal. This allows FGD stations/units to run at an average load

factor of 78% and yet still be able to release a large surplus of SO<sub>2</sub> allowances which are transferred across to the non-FGD group. The non-FGD stations/units can then run at a load factor of 26% – ideal for supply during periods of peak demand.

- 7.22 Of the three scenarios examined, Scenario C is the most consistent in that all coal-fired power stations operate at plausible load factors within the constraints of a NERP. The higher level of coal-fired generation assumed is also consistent with what most generators believe will be the case in 2008-10. It is also what COALPRO believes will be the case given that the UK will then be more dependent on supplies of expensive imported gas rather than the self sufficiency we enjoy today. In its consultation paper, DEFRA considers that, *“A UK coal burn of 120 terawatt hours in 2010 is plausible, although likely to be on the high side.”* and similarly, in the RIA, *“By 2010, a coal burn of 120 terrawatt hours is not impossible, but a lower burn is more likely.”*
- 7.23 **In conclusion, Scenario C presents the coal industry’s worst fear – a high level of coal-fired electricity generation under a NERP but with no demand for indigenous coal. Explaining this perverse outcome to the employees and shareholders in coal mining companies would not be easy and COALPRO struggles to understand why any government would wish to pursue a course of action which so blatantly discriminates against an important local industry.**

#### *Market for indigenous coal 2008-10*

- 7.24 The above scenarios illustrate a limited number of outcomes, only one of which looks plausible. In this section, a more general analysis is presented to show that the detrimental impact on demand for UK coal is an inherent characteristic of a NERP. As explained above in Section 6, the IPPC Directive will mean that higher-sulphur indigenous coal will only be allowed to be burnt at power stations or units fitted with FGD. Figure 6 illustrates the maximum market size available to UK coal producers at these FGD power stations.



**Figure 6 – Market for indigenous coal in 2008-10 at 12.2 GW of FGD power stations (no sulphur trading)**

- 7.25 Under the ELV approach, the market size increases with demand for coal-fired generation, as one would intuitively expect (red line in Figure 6). Power stations with FGD simply achieve the 400 mg/Nm<sup>3</sup> ELV for SO<sub>2</sub> and the requirements of the LCPD are met.
- 7.26 Under the NERP approach, the picture is much more complex. The SO<sub>2</sub> allocations determine how much SO<sub>2</sub> may be emitted and hence the maximum amount of sulphur in the coal consumed. The exact relationship between these depends on the removal efficiency of FGD plant. In the UK, this has typically been 85%-90%. New plants, now being constructed, will hopefully achieve 90% removal over the course of a year, with design point efficiencies somewhat above this (90%-93%) when the plant is in stable operation at full load (*i.e.* excluding start-up and shut-down). It is possible to achieve higher removal efficiencies at FGD plants, for example by installing and running additional limestone slurry pumps or by using performance-enhancing additives. At existing power stations, the additional capital and operational costs are often not justified for the marginal reduction in emissions, a fact recognised in the LCPD which sets a 400 mg/Nm<sup>3</sup> ELV for existing plants (equivalent to a sulphur removal efficiency of 90% when using coal with a sulphur content of 1.7%-1.8% – *i.e.* the future average for UK coal).

- 7.27 **It is therefore reasonable to assume that, for the foreseeable future, power stations fitted with FGD in the UK will achieve an annual average sulphur removal rate of no more than 90%.** This is what DEFRA assumes in the annex to the Regulatory Impact Assessment presented as Annex B to the consultation paper (Table A5), although COALPRO notes that even this is substantially above the removal efficiency of 75%-80% assumed by government two years ago when the UK's Environment Minister agreed to the European Council's common position on the NECD<sup>14</sup>. In keeping with the aim here of avoiding assumptions which might colour our conclusions, Figure 6 illustrates results for 85%, 90% and 95% sulphur removal efficiencies (the blue, green and yellow sets of lines respectively).
- 7.28 Under a NERP, the market size for indigenous coal rises with projected demand for coal-fired electricity, as under the ELV approach, until a point is reached where SO<sub>2</sub> emissions equal the allowances made under a NERP. This point occurs sooner when the average FGD removal efficiency is low – the three breakpoints shown in Figure 6 are for 85%, 90% and 95%. If generators anticipate supplying any more electricity to meet demand, they must either purchase additional SO<sub>2</sub> emission allowances or use coals with a lower sulphur content. Here, it is assumed that there will be no allowances available for owners of FGD stations to purchase, such that they must reduce the average sulphur content of the coal they purchase. Hence, at projected electricity generation levels above the breakpoints, the maximum market size for indigenous coal declines. The rate of decline depends upon the sulphur content of the imported supplies of coal. The decline in market size is greatest where the sulphur content of imported coal is 1% or more.
- 7.29 Scenario A is shown as a point on Figure 6. The maximum market size for indigenous coal is 20 Mt, 73% of the total market size of 27.4 Mt and somewhat less than the 23 Mt annual production anticipated by COALPRO.
- 7.30 **What Figure 6 clearly shows, is that the market size available to UK coal producers under a NERP declines towards zero as generation rises to the 120 TWh/yr many in industry expect. Even if generation is less, individual players would have an optimistic view of the market share they might achieve and would not risk this by contracting ahead to take higher-sulphur UK coal.**

7.31 **It is likely that, under a NERP, UK producers would only be able to sell coal on the spot market towards the end of an SO<sub>2</sub> emission allowance trading year when generators were certain that enough SO<sub>2</sub> allowances remained to cover their generation over the last few weeks or months of the year.** This behaviour is already seen to a limited degree today (e.g. at Rugeley power station), although it is currently manageable because it represents only a small proportion of total sales to the ESI.

## **8 SO<sub>2</sub> emission trading within the context of the LCPD**

8.1 It is possible that DEFRA and DTI believe that a SO<sub>2</sub> emission trading scheme under a NERP would bring cost savings and provide generators with enough flexibility to take UK coal – the coal and electricity industries disagree. **DEFRA has not presented any analysis or modelling work to show how a sulphur trading system could operate without penalising indigenous coal.** Perhaps this is because, *“It is the nature of the trading approach that the precise measures cannot be identified in the abstract with any certainty, and cannot be attributed to particular plants.”* (DEFRA consultation paper para. 3.22). Nevertheless, DEFRA does present a summary of what measures could be taken in an annex to the RIA and in the draft NERP (Section 4.3.2 of Annex C to the consultation paper). The possible measures are: FGD, low-sulphur imported coal and reduced load factors. Indeed, DEFRA anticipates that by 2010 the market penetration of low-sulphur imported coal will have risen to 50% at coal-fired power stations whose output will have fallen to 84 TWh/yr. **These assumptions alone implicitly mean a market of just 17 Mt for UK coal producers.**

8.2 In this section, we attempt our own analysis and conclude that sulphur trading under a NERP puts an option value on emission allowances far in excess of the environmental impact cost of SO<sub>2</sub> emissions or the cost of their abatement. There would be an unwillingness by power station owners to give up this valuable option which, in any case, would have a very volatile price.

### *Environmental cost of SO<sub>2</sub> emissions*

8.3 When the European Commission (EC) presented its proposals for a revised LCPD and NECD to the European Parliament and Council of Ministers, it included a cost-benefit analysis showing an annual €17-32 billion benefit from reduced air pollution following implementation of the directives<sup>9</sup>. The greatest benefits are associated with reduced NO<sub>x</sub> pollution; the benefits of reduced SO<sub>2</sub> pollution might total €3.6-7.2 billion/year across the EU15. Much of the data used in calculating these benefits came from the EC

ExternE project which puts a valuation on mortality related to air pollution, amongst other ecosystem and health benefits<sup>15</sup>.

- 8.4 The most recent presentation of data from the ExternE project, prepared for the EC by NETCEN in the UK, is the Benefits Table (BeTa) database of the marginal external costs of air pollution in Europe<sup>16</sup>. In rural areas of the UK, the external cost of emitting SO<sub>2</sub> is estimated to be €4,500/tSO<sub>2</sub> in year 2000 prices (£2,740/tSO<sub>2</sub>). Since health benefits dominate this figure, the value attached to a statistical life is a significant assumption. The EC's preferred estimate is €1 million per life and this is used in BeTa. Unfortunately, there is considerable disagreement about monetising health benefits and reduced mortality rates. In view of this, DEFRA takes a more cautious approach in its consultation paper by quantifying, in the case of SO<sub>2</sub> emissions, building damage alone at £520/tSO<sub>2</sub>.

#### *Abatement cost of SO<sub>2</sub> at existing FGD plants under ELV approach*

- 8.5 Burning coal with a higher sulphur content puts a greater load on FGD plant and increases operating costs as more limestone, water and electricity are consumed. COALPRO estimates that the marginal abatement cost at existing plants is around £37/tSO<sub>2</sub>. This was confirmed following a poll of COALPRO members who report that recent contracts price excess sulphur in coal, above the contract specification, at 0-3 p/GJ per %S (0 to £36.75/tSO<sub>2</sub>). This is half the cost reported by others<sup>17</sup>, a discrepancy that COALPRO believes comes from ignoring the credit from gypsum sales.
- 8.6 To abate each tonne of sulphur at an FGD plant requires 3.125 tonnes of limestone but produces 5.375 tonnes of gypsum, a valuable by-product. Assuming limestone costs £10/t and gypsum can be sold for at least £20/t (actual revenue depends on quality) means that a net income of £38/tSO<sub>2</sub> can be earned when operating an FGD plant – offsetting, to an extent, the other operating costs.

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<sup>15</sup> *Extension of the accounting framework - final report*, P. Mayerhofer, W. Krewitt and R. Friedrich, Externalities of Energy (ExternE) core project, EC JOULE III contract no. JOS3-CT95-002, Institute of Energy Economics and Rational Use of Energy, Stuttgart, December 1997.

<sup>16</sup> *BeTa Benefits Table database: estimates of marginal external costs of air pollution in Europe*, created for the DG Environment of the European Commission by netcen, version E1.02a, October 2002.

<sup>17</sup> A review of SO<sub>2</sub> control options and costs, A. Moores, Joint Environmental Programme (JEP), ENV/EEA/92/2003, Innogy, March 2003.

### *Abatement cost of SO<sub>2</sub> at new FGD plants under ELV approach*

8.7 At non-FGD power stations, where FGD plant is not a sunk cost, an owner must decide whether to retrofit new FGD to abate SO<sub>2</sub> emissions. Table 4 shows the assumptions made to arrive at an abatement cost of £401/tSO<sub>2</sub>. Note that the marginal abatement cost (variable O&M cost) is twice that calculated in 8.5 above, since no credit is given for gypsum sales.

**Table 4 – Cost of new FGD**

	£/kW/yr	p/kWh	£/tSO <sub>2</sub>
capital charge	6.28	0.105	161
fixed O&M cost	6.50	0.108	167
variable O&M cost	2.84	0.047	73
<b>total cost</b>	<b>15.62</b>	<b>0.260</b>	<b>401</b>

source: capex and O&M costs taken from JEP report (see footnote 17)

assumptions:	capex	£72/kW
	discount rate	6% over 20 years
	coal	24.5 GJ/t (LHV) 1.8%S
	efficiency	37% (LHV)
	load factor	68.5% (6,000 hrs/yr)
	FGD sulphur removal	90%
	gypsum credit	nil

### *Value of avoided SO<sub>2</sub> emissions under a NERP*

8.8 It is extremely difficult to put a value on avoided SO<sub>2</sub> emissions under a NERP. Extensive analysis and modelling work would give some insight, but the potential for gaming means that the range of outcomes is huge.

8.9 Here, we begin with the assumption that a coal-fired power station costs 1.7 p/kWh to run and the wholesale market price for electricity is 2.2 p/kWh giving an operating margin of 0.5 p/kWh. At an FGD station, emitting 1.5 gSO<sub>2</sub>/kWh (~400 mg/Nm<sup>3</sup>), this margin puts a value of £3,300/tSO<sub>2</sub> on SO<sub>2</sub> emission allowances that allow an operator to generate electricity. At a non-FGD station, burning 0.8% sulphur imported coal, the value drops to £830/tSO<sub>2</sub>. It is important to note that these values would only be reached towards the end a trading year as it became clear that there were insufficient allowances. If there was a surplus of allowances, they would become worthless since there can be no banking. Perhaps some clever academic, with an understanding of how the Black-Scholes option pricing formula works in such a situation, could estimate the value of a SO<sub>2</sub> emission allowance during the course of the trading year to give the UK coal industry some idea of the cost impact on sales. Until then, COALPRO believes little trading would take place and that the impact on the UK coal industry would be disproportionate.

### *Cost of avoided SO<sub>2</sub> emissions under a NERP*

8.10 SO<sub>2</sub> emission allowances under a NERP will be in short supply; the analysis in Section 7 confirms that a demand for allowances will exist, particularly from non-FGD power station, under all scenarios. The construction of more FGD plant would free-up allowances, at the cost estimated above. In practice, allowances can also be freed-up by switching to low-sulphur coal, rather than higher-sulphur UK coal, at FGD power stations. The cost of making this fuel switch might be minimal, if coal import price volatility is ignored, or up to £370/tSO<sub>2</sub>, assuming a 3 p/GJ per %S price premium for low-sulphur coal and 90% sulphur removal by FGD plant – yet it creates an allowance which might have a significantly higher value (or no value).

### *Why sulphur trading under a NERP is so bad for the UK coal industry*

8.11 Table 5 summarises the costs of SO<sub>2</sub> abatement under ELVs and a NERP, alongside the potential value of SO<sub>2</sub> emission allowances under a NERP and environmental benefits. With ELVs, producers of UK coal must offer a discount, based on sulphur content, to remain competitive with low-sulphur imports. The required discount, of between nil and 3 p/GJ per %S would disadvantage the industry, but is the logical result of meeting the UK's environmental obligations. What is illogical, is the artificially high value placed on SO<sub>2</sub> emission allowances under a NERP. This value in no way reflects the environmental cost of emitting SO<sub>2</sub> nor the cost of its abatement. It reflects the value of electricity that could be generated by the holder of the allowance. Given the potentially very high value of a SO<sub>2</sub> emission allowance, it is most unlikely that they will be traded between companies. Their value as an option is likely to be very volatile and will not be precisely known until the last unit of electricity has been generated on the last day of the annual trading period. **No company would wish to leave itself unable to generate having sold allowances to a competitor who is then able to take market share.** Indeed, the history of power station divestments (both private sales and those forced by the regulator or government) is littered with examples of divesting companies retaining SO<sub>2</sub> emission “B” limits, simply to restrict the ability of new owners to compete effectively and so prevent them gaining market share. COALPRO would expect little trading activity, but can imagine internal transfers within portfolios of large combustion plants owned by a single company who aims to maximise profit.

**Table 5 – Summary of costs and benefits of reducing SO<sub>2</sub> emissions**  
with applicability under ELV and NERP approaches

	£/tSO <sub>2</sub>	ELV	NERP
cost of switching to low-sulphur coal at non-FGD plant	0-37 <sup>1</sup>	?	y
cost of switching to low-sulphur coal at FGD plant	0-370 <sup>1</sup>	?	y
marginal abatement cost at existing and new FGD plant	37 <sup>2</sup>	y	y
full abatement cost at new FGD plant	400	y	?
potential value of SO <sub>2</sub> emission allowances (non-FGD plants)	830	n	y
potential value of SO <sub>2</sub> emission allowances (FGD plants)	3,300	n	y
environmental impact benefit (DEFRA)	520		
environmental impact benefit (EC)	2,740		

<sup>1</sup> Depends on “sulphur premium” reflected in coal price.

<sup>2</sup> This is the marginal cost at around 90% removal efficiency. It does not hold true at higher removal efficiencies when the cost would rise significantly with additional capital and operating costs.

### *Would a NERP encourage FGD?*

8.12 It is COALPRO’s view that the ELV approach provides more certainty to LCPD implementation that would allow owners of non-FGD power station to invest in FGD without exposing themselves to the unquantified market risks associated with the proposed sulphur trading scheme. Should they wish to operate at a low load factor without FGD, then the low load factor derogation (800 mg/Nm<sup>3</sup> ELV) would allow this, without removing their option to retrofit FGD at a later date (*i.e.* a more flexible option than simply *opting-out* of the LCPD).

8.13 The cost of reducing SO<sub>2</sub> emissions by switching to low-sulphur imported coal at existing FGD power stations (0 to £370/tSO<sub>2</sub>) is lower than the full cost of retrofitting FGD at a non-FGD station (£400/tSO<sub>2</sub>). Moreover, with no capital investment required, and no long-term risk, COALPRO believes that this would be the preferred route to reducing SO<sub>2</sub> emissions under a NERP, particularly with owners who have a portfolio including FGD and non-FGD stations. **A NERP would not therefore encourage the FGD that is needed if the UK coal industry is to survive.**

### *Number of NERP allowances will be lower than calculated by DEFRA*

8.14 The coal industry and the electricity industry believe that the SO<sub>2</sub> allocations under a NERP would be tight; even the Environment Agency believes that the total SO<sub>2</sub> allocation “*appears stringent*”<sup>11</sup>. The UK is obliged to meet the LCPD NERP limit; there can be no banking or borrowing of allowance between the annual assessment periods. DEFRA suggests borrowing might be allowed when accompanied by a fine (para. 4.30 of the consultation paper), but the LCPD makes no provision for this. Hence, with SO<sub>2</sub> emissions trading, a certain proportion of allowances, perhaps 10%, would have to be withheld by government to provide a safety margin in case plant

emissions exceed allocations. **The tight allocations would become tighter, making the bleak analysis presented in Section 7 overly optimistic.** Excess emissions are not a distant prospect when one considers the irresponsible manner in which supposedly reputable energy companies have behaved recently. The ability to trade with impunity in liberalised energy markets allowed companies, such as Enron and TXU to establish positions which, in the end, damaged reputable businesses – including members of COALPRO. Only by withholding a large margin of emission allowances could DEFRA guarantee with reasonable certainty that the UK would meet the LCPD's requirements under a NERP (see also para. 13.3 below).

## 9 The economic case for ELV approach

### *Economic impact of a NERP*

- 9.1 Under a NERP, electricity generators would be driven towards low-sulphur imported coal rather than British-mined coal, which contains higher levels of sulphur. This would have a serious impact on the British mining industry – demand for higher-sulphur indigenous coal could fall to zero, resulting in the closure of all deep mines in England and forcing some surface mining companies out of business. COALPRO estimates 15,000 British mining and related jobs could be lost over the next five years. This section presents COALPRO's assessment of the cost of mine closures, which would be substantial, and yet DEFRA has not taken these costs into account.
- 9.2 The Coal Authority reports that 9,115 men (including contractors) were employed at coal mines in the UK for the three month period ending June 2003<sup>18</sup>; a number of others are employed at non-production sites, such as head offices. COALPRO estimates that, following the closure of the Selby complex in 2004, more than 5,750 direct jobs would be at risk under a NERP, mainly at mines producing higher-sulphur coal. There would of course be a wider impact of losing these direct jobs at collieries which must be taken into account. Research undertaken at the time of the 1993 Coal Review<sup>19</sup> provides some useful guidance in which the most widely accepted estimates of indirect job losses suggest a ratio of 1.04 indirect jobs with suppliers for each direct colliery job,

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<sup>18</sup> *Production and manpower returns for 3 month period ending June 2003*, COrAcLe - county summary report, The Coal Authority, Mansfield, 29 July 2003.

<sup>19</sup> *British Energy Policy and the Market for Coal*, first report of session 1992-93, HC 237, House of Commons Trade and Industry Select Committee, London: HMSO, 1993.

and a further 0.51 indirect jobs in the wider economy per direct job through the multiplier effect. Using these ratios suggests that a total of 15,000 jobs could be lost.

- 9.3 A more recent employment impact study carried out by Leeds Metropolitan University<sup>20</sup> suggests that 4,000 jobs could be at risk with the closure of the Selby Complex which employs 2,071 (including contractors). Whilst this suggests a lower overall multiplier (1.93 rather than 2.55), the University reports that further work is needed to refine this figure which comes from Yorkshire Forward's Econometric Impact Model rather than a specific study of job losses in the mining engineering sector (which may be greater).
- 9.4 The economic cost of so many job losses would be very significant. Coal production today adds approximately £900 million to the UK's GDP. Before 2008, 15 Mt of higher-sulphur coal production would be at risk under a NERP, mainly from deep mines but including some surface mines. An annual contribution of over £400 million to GDP would be lost if low-sulphur imported coal displaced this production and would adversely affect the UK's balance of payments by the same amount.
- 9.5 To lose this contribution to GDP would be damaging enough, particularly amongst those communities where there is little alternative employment to coal mining; worse still, the impact would rise over time unless there was direct intervention by government to offset the effects. The total economic impact, including indirect impacts on supply chain sectors to the mining industry could run initially to £700 million per year, based on similar analysis in *The Selby Coalfield Impact Study*<sup>20</sup>. Sectors that would be particularly affected include electrical and equipment supply, wholesaling, retailing, hotels/catering, construction, banking and business services. **If the government was successful in reducing this impact down to zero over the course of five years – a hugely optimistic assumption given past experience of coalfield regeneration – then the net present value of this economic impact might be limited to £1,900 million (6% discount rate), but it could be substantially greater.**

#### *Cost comparison of ELV and NERP approaches*

- 9.6 DEFRA attaches considerable weight to the cost analysis undertaken by ENTEC, basing its preference for a NERP over ELVs on an apparent £250 million cost saving – £50 million at power stations and £200 million elsewhere in industry. COALPRO

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<sup>20</sup> *The Selby Coalfield Impact Study*; Professor John Shutt, Roger Henderson, Felix Kumi-Ampofo, Dr Denise Thursfield; Leeds Metropolitan University; Leeds: European Regional Business and Economic Development Unit, July 2002.

suspects that the bulk of this £200 million additional cost to achieve the LCPD's ELVs would be incurred at just two sites. **It seems that the cost savings attributed to a NERP come from avoiding investment in pollution control equipment that will, in all likelihood, be required anyway under the IPPC Directive as the definition of BAT evolves.**

- 9.7 DEFRA admits, in para. 5.9 of the consultation paper, that the £250 million cost saving would only be delivered if emission trading succeeds in minimising costs. COALPRO has not spoken to any stakeholder who expects to be in a position to sell emission allowances in any meaningful quantity, so can only conclude that DEFRA's view of an ideal market working to minimise costs simply would not occur.
- 9.8 Of the £650 million cost to the electricity industry, 75%-80% of this will, according to DEFRA, be incurred to comply with more stringent NO<sub>x</sub> standards post-2016 (para. 5.8 of the consultation paper). COALPRO does not believe that these costs, even when discounted to today's value, should be used to make a decision between ELVs and a NERP. Firstly, as it is more widely adopted, the cost of SCR will become cheaper over the next decade in the same way that FGD capital costs have halved over the last decade<sup>21</sup>. Secondly, when the LCPD is reviewed, as scheduled at the end of 2004 (or in any subsequent reviews), it seems highly probable that the European Commission will view SCR as a desirable pollution control technology and will not entertain any Member States who seek to avoid its eventual adoption. Thirdly, in COALPRO's view, SCR will be required under the IPPC Directive by 2016 – it is almost inconceivable that it would not be given that it is already commonplace in many other developed countries such as Japan, Germany and some US states. Fourthly, it is illogical for government to attach so much importance to a cost that might or might not be incurred in 12 years' time – a higher discount rate (than 6%) should be applied because this is not a cost that can be attributed with certainty to implementation of the LCPD. Finally, why should the government wish to avoid this cost? The purpose of the LCPD is to encourage the use of pollution control equipment. In conclusion, COALPRO believes that the costs to the electricity industry reported by DEFRA should be reduced by c.£500 million to £150 million.

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<sup>21</sup> *Retrofit FGD system price trends and influence factors*, W. L. Boward and A. M. S. Brinkmann, in: Proceedings of the 60th American Power Conference, 14-16 Apr 1998, Chicago IL, USA, Antonia E. McBride and Robert W. Porter (eds.), Illinois Institute of Technology, pp.326-330.

9.9 The electricity industry presented a cost analysis showing that the ELV option would cost £300 million less than a NERP – a result DEFRA dismisses. To add support to its own analysis, in the face of a contradictory analysis by industry, DEFRA introduces a third analysis commissioned from OXERA by the Environment Agency. This suggests a NERP would be £400 million cheaper and is included in Table 6 which reproduces the headline predictions from the three analyses presented by DEFRA.

**Table 6 – Costs of implementing the LCPD**

scenario	cost of ELV approach	cost of NERP approach	prediction
ENTEC base case	£900 m	£650 m	NERP lowest cost option
JEP “most likely”	£2,000 m	£2,300 m	ELVs lowest cost option
OXERA	£600 m	£200 m	NERP lowest cost option

source: reproduced from DEFRA consultation paper para. 5.16

9.10 As explained above, COALPRO believes the £500 million cost of SCR before 2016 should not be included in the ELV versus NERP decision making analysis. This would reduce ENTEC’s cost estimates to those shown in Table 7. Also in the table, are the correct cost figures from the OXERA report – a correction that is explained in detail below. We have then added a conservative estimate of the net present value of the economic impact of a NERP on the coal industry and wider economy to each NERP cost figure – **conclusively demonstrating that the ELV approach is the lowest cost option.**

**Table 7 – Costs of implementing the LCPD – as revised by COALPRO**

scenario	cost of ELV approach	cost of NERP approach	prediction
ENTEC base case	£400 m	£150 m + £1,900 m = £2,050 m	ELVs lowest cost option
JEP “most likely”	£2,000 m	£2,300 m + £1,900 m = £4,200 m	ELVs lowest cost option
OXERA	£69 m	£90 m + £1,900 m = £1,990 m	ELVs lowest cost option

### *Assessment of JEP and OXERA cost analyses*

9.11 COALPRO has studied the electricity industry’s analysis carried out by the Joint Environmental Programme (JEP) and largely agrees with it. However, we recognise that the higher coal-burn forecast that underpins the analysis does not accord with government’s own projections. This is a subject COALPRO will pursue separately with DTI, but whether coal-burn is low, medium or high, a NERP has a devastating impact on the UK coal industry.

9.12 With regard to OXERA's analysis, COALPRO believes the headline figures presented by DEFRA are disingenuous. The figures include abatement costs, but are predominantly the "loss of profit" suffered by power station owners compared to a baseline scenario that bizarrely assumes the LCPD is not implemented. COALPRO has never before seen the loss of imaginary profits by commercial companies being taken into account by a government department as a cost to be avoided in its decision making. Shareholders would be heartened. COALPRO has extracted the relevant abatement cost figures from Table 5.3 of OXERA's report and inserted them into Table 7.

9.13 COALPRO wishes to make the following observations on OXERA's work:

- It uses a linear programming model where a behavioural model would be more appropriate to account for the fact that the decisions made by individual companies create a commercial dynamic that does not necessarily result in least-cost outcomes.
- We agree with OXERA (and JEP) that only costs to 2015 should be considered (*i.e.* no SCR costs).
- It ignores the low load factor (<23%) derogation for SO<sub>2</sub> which allows plants to emit 800 mg/Nm<sup>3</sup> under the ELV approach.
- It incorrectly states that over-fire air (OFA) cannot achieve the 500 mg/Nm<sup>3</sup> NO<sub>x</sub> ELV. For most coals, OFA does achieve this requirement and boosted-OFA covers other coals for very little additional cost (except very low volatile anthracitic coals which are used only at one UK power station and are the subject of a special derogation). Gas re-burn is therefore not required.
- It assumes 0.6% sulphur coal is "available at no premium to the buyer" which is not always the case today, and hardly likely to be the case in the future if all non-FGD power stations in the UK are required to purchase low-sulphur, imported coal.
- **In the scenarios used by DEFRA, it assumes FGD stations burn 1% sulphur coal, *i.e.* it assumes no market for UK coal "because, under any National Plan scenario, low-cost measures to deliver sulphur abatement, such as the use of low-sulphur coal, are expected to be adopted."** (p.12 of OXERA report).
- It is not clear when results are for England and Wales alone and when they are for the UK as a whole.

9.14 In its report for the Environment Agency, OXERA predicts 78-93 TWh of coal-fired generation in 2010, yet in a report published by OXERA three weeks earlier, using the same UK wholesale electricity market model, OXERA reports 100 TWh of coal-fired generation out to 2015. It is therefore difficult for COALPRO to decide which of OXERA's many forecasts should be used by government in its analyses.

### ***Strategic considerations***

9.15 The DTI's £60m Coal Investment Aid scheme is designed to extend the life of the country's coal reserves and safeguard British mining jobs – a NERP compromises this investment of taxpayers' money.

9.16 Finally, there is a strategic value to the nation of maintaining the option to generate 120 TWh or more of electricity from coal, if needed. Under a NERP, this would require achieving average flue gas SO<sub>2</sub> concentrations *below* the limits stipulated in the LCPD (*i.e.* below the 400 mg/Nm<sup>3</sup> ELV for existing power stations) at a greater cost than under the ELV approach. DEFRA acknowledges that more stringent abatement techniques would be needed if more coal were to be burned in the future than over the 1996-2000 baseline (para. 3.18 of the consultation paper). However, it has not assessed whether a NERP would actually encourage this unnecessary investment nor whether consumers would end up paying for higher-cost electricity from gas-fired CCGT power stations (or simply go short). Valuing options is a complex subject, but the cost of any future shortfall in electricity supply, perhaps because of gas supply shortages or nuclear decommissioning, would be substantial and should be factored into DEFRA's cost-benefit analysis.

### ***Administration costs***

9.17 There would be the cost of administering any emission trading scheme which would have to be borne by either government or industry. If the time and effort that has gone into presenting the general principles and an initial assessment of a NERP is any indication of future cost, then it could be substantial.

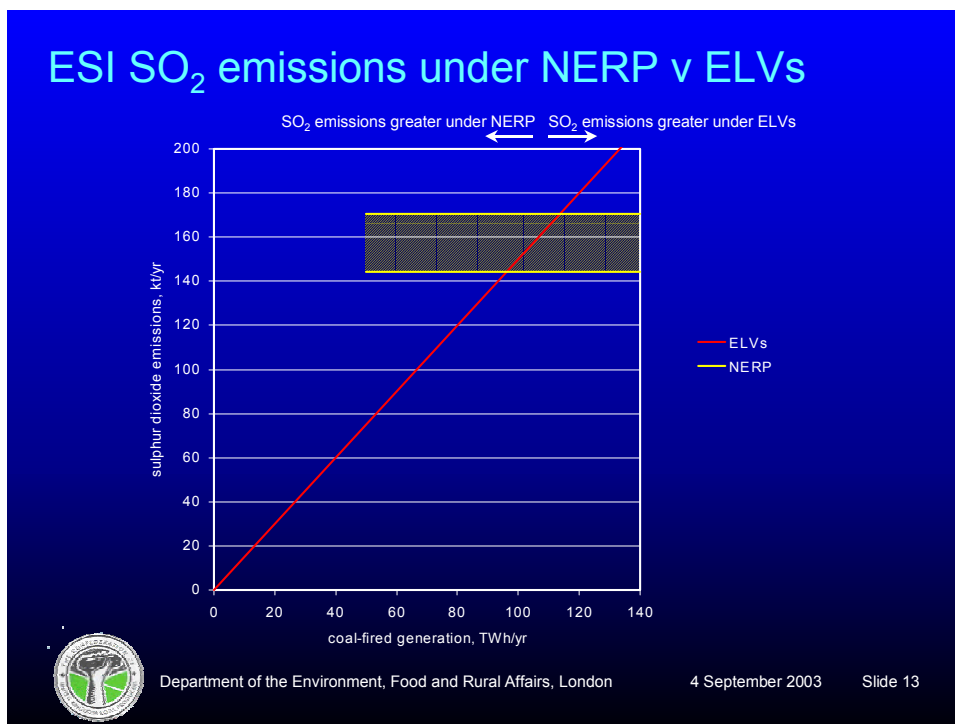
### ***Infrastructure costs***

9.18 The movement of coal to power stations makes good use of the national rail system, often short journeys from nearby mines. However, like other rail movements, it suffers from capacity bottlenecks such as found on the heavily utilised East Coast Mainline (ECML). Over half of England and Wales's coal-burn is at power stations close to the ECML; imported coal for these power stations is brought from Hunterston and

Immingham. **COALPRO does not believe that DEFRA has considered the capital investment that would be required in the railway infrastructure to accommodate the substantial increases in longer-distance imported coal flows between ports and power stations under a NERP.**

## 10 The environmental case for ELV approach

10.1 Figure 7 shows how total SO<sub>2</sub> emissions from coal-fired generation would vary under NERP and ELV approaches (excluding *opted-out* power stations which are likely to emit similar quantities under either approach). The SO<sub>2</sub> allocations under a NERP could be as much as 171 kt, but in practice, some power stations will *opt out* or close such that they could be 144 kt or less – the range shown. With ELVs, SO<sub>2</sub> emissions rise and fall with generation output. Above the cross-over at 96-114 TWh/yr, ELVs result in higher SO<sub>2</sub> emissions; below this, a NERP results in higher emissions. So, under the government’s own projections in DTI Energy Paper 68 of 83 TWh/yr coal-fired generation in 2010, ELVs would mean lower SO<sub>2</sub> emissions and a better environmental outcome.



**Figure 7 – ESI SO<sub>2</sub> emissions under NERP and ELV implementations of LCPD**

10.2 Despite the above, COALPRO recognises that the environmental benefits of both the ELV and NERP approaches are very similar – each results in emissions from coal-fired generation falling by around 500 kt. However, DEFRA has stated that when

interpreting the LCPD it would do so in a way which led to the best environmental outcome (based on the LCPD's recitals which refer to the long-term aim of reducing SO<sub>2</sub> depositions and concentrations below critical loads and levels – but not to zero). It is therefore surprising that, when taking the most important LCPD implementation decision, DEFRA has provisionally decided to opt for the less environmentally-friendly NERP option.

- 10.3 SO<sub>2</sub> emissions from coal-fired power stations under either a NERP or ELVs would be far below what is required to achieve the UK's 585 kt ceiling stipulated in the National Emission Ceilings Directive. The government negotiated this figure on the basis of the CH case in DTI Energy Paper 68 in which 237 kt of SO<sub>2</sub> is assumed to be emitted from coal-fired power stations. Even under the very highest predictions made by industry for future levels of coal-fired generation (140 TWh/yr), an ELV approach would allow our international obligations to be met and result in no more than 210 kt of SO<sub>2</sub> being emitted from *opted-in* units. This would leave a margin of 27 kt to cover any additional SO<sub>2</sub> emissions from *opted-out* units which would not be obliged to meet an ELV under the LCPD – allowing over 5 TWh from these plants if they burn imported coal with an average sulphur content of 0.6%.
- 10.4 In its consultation paper, DEFRA states that a NERP is “*compatible with future obligations on reducing the production of greenhouse gases*” (para. 2.6). **However, even under a NERP, coal-fired generation could remain well above 100 TWh/yr. In fact, choosing a NERP over ELVs will have no impact on carbon dioxide (CO<sub>2</sub>) emissions; it simply means CO<sub>2</sub> comes from the burning of imported coal rather than locally-produced coal.**
- 10.5 DEFRA sees low-sulphur, imported coal as a cheap solution to reducing the UK's SO<sub>2</sub> emissions. However, at no point in the consultation paper does it consider the environmental impact of mining low-sulphur coal in other countries, and shipping it halfway around the world. Some of the lowest sulphur coal is found in Indonesia from opencast mines created following the destruction of vast tracts of rain forest. For example, PT Adaro sells coal from the Tutupan area of South Kalimantan (Borneo) under its “envirocoal” brand, a name that reflects its low sulphur (0.16%) and ash content (1.0%) – but not its high moisture content (25%). Its mining agreement covers an area the size of Greater London with a coal resource approaching two billion tonnes. **Only a full life cycle analysis would reveal whether DEFRA's approach to SO<sub>2</sub>**

control, which would encourage coal buyers to search out coals such as “envirocoal”, is better or worse for the environment. COALPRO believes it would be worse.

## 11 The legal case for ELV approach

11.1 **If the UK government went ahead with a NERP, it would have questionable value because application of the ELVs it seeks to avoid would still be required legally under the IPPC Directive<sup>10</sup>:**

*“In the absence of Community ELVs defined pursuant to this Directive, the relevant ELVs contained in the Directives referred to in Annex II and in other Community legislation shall be applied as minimum ELVs pursuant to this Directive for the installations listed in Annex I.”* (IPPC Article 18, para. 2)

11.2 Needless to say, Annex I of the IPPC Directive includes power stations and Annex II includes the LCPD. The IPPC Directive does not cover the situation of existing plants operating under a NERP to avoid the LCPD’s ELV requirements. Indeed, Article 4(6) of the LCPD introduces the NERP and states that this must be implemented “*without prejudice to [the IPPC Directive]*”. This would seem to be impossible without amendment to the IPPC Directive.

11.3 **COALPRO believes that trading SO<sub>2</sub>, NO<sub>x</sub> and dust emissions would not be legal given the BAT requirement under the IPPC.** For example, an operator of two sister coal-fired power stations might decide to fit FGD at one, but not the other, to optimise the use of his SO<sub>2</sub> emission allocation. However, in building the FGD plant, he explicitly demonstrates what BAT is for this type of installation and would therefore be obliged to fit FGD at both power stations (unless he can demonstrate that the geographical location or local environmental conditions are such that it is not required). He would not be able to claim BAT has been achieved on aggregate across the two sites because IPPC applies to each site independently, taking into consideration which abatement techniques are economically and technically viable within the electricity generation industry as a whole.

11.4 In addition, COALPRO does not believe trading dust emissions is environmentally acceptable given their local impact. DEFRA acknowledged this at the first Industry Forum meeting<sup>22</sup>:

*“Trading would not be extended to cover dust emissions. Given the local health and environmental impacts of dust, trading would not be a feasible option. The ELVs would be applied for dust.”*

Since then, DEFRA’s view must have changed because dust trading is now proposed (para. 4.1 of consultation paper).

11.5 Article 26 of the EC Emission Trading Scheme (ETS) Directive<sup>23</sup> amends the IPPC Directive to remove the need for ELVs in the case of greenhouse gases:

*“Where emissions of a greenhouse gas from an installation are specified in Annex I to [the ETS Directive], the permit shall not include an ELV for direct emissions of that gas unless it is necessary to ensure that no significant local pollution is caused.”*

and to remove the energy efficiency requirement in the case of carbon dioxide:

*“Member States may choose not to impose requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site.”*

11.6 In drafting the ETS Directive, the European Commission has clearly decided that an amendment to the IPPC Directive is required before the trading of greenhouse gases (including carbon dioxide) can take place, thus allowing some operators to exceed ELVs (or energy efficiency standards)

11.7 **COALPRO believes that this sets a precedent such that an amendment to the IPPC Directive would be required before implementing a NERP under the LCPD.**

## **12 Specific responses to DEFRA’s consultation paper**

12.1 In the following paragraphs, COALPRO responds to the questions posed by DEFRA in its consultation paper. In most cases, COALPRO’s responses are provided by cross-references to other sections of this document.

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<sup>22</sup> Minutes of first LCPD Industry Forum Meeting held at Eland House, Bressenden Place, London SW1E 5DU on 21 March 2003, DEFRA.

<sup>23</sup> Directive 2003/.../EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading with the Community and amending Council Directive 96/61/EC; provisional, unofficial version.

*Are there any further comments on the interpretation issues?*

12.2 See Section 13.

*Are there any comments on the Regulatory Impact Assessment?*

12.3 See Section 14.

*Are we correct that the Directive limits the choice of the allocation mechanism? And are there any other ways around this?*

12.4 DEFRA correctly identifies a plethora of difficulties associated with allocating emission allowances. COALPRO's preference would be for SO<sub>2</sub> emission allowances to be granted only to power stations fitted with FGD, thus forcing non-FGD stations to either close, *opt out* or fit FGD. Such a discriminatory allocation would raise competition issues and is unlikely to be a viable way forward. **However, COALPRO believes that if non-FGD power stations are allowed to purchase emission allowances within a trading scheme, then there would be insufficient allowances available to burn UK coal anywhere.**

*Is the list of plants in Annex C complete? Is the underlying information correct? Are the calculations correct?*

12.5 COALPRO is not aware of any omissions or errors.

*Have we identified a suitable mechanism to handle plant closures and the derogation in note 2 to Part A of Annex VI? Are there better alternatives?*

12.6 COALPRO does not believe that DEFRA's interpretation of how plant closures are treated under a NERP is correct (see paras. 13.5 *et seq*).

*Would a trading scheme deliver the cost savings expected? And, if not, what changes would be necessary to make this happen?*

12.7 COALPRO does not believe that a trading scheme would deliver any cost savings (see Section 9). **The central thesis of our submission is that SO<sub>2</sub> emission allowance trading is unworkable, so the only change that should be made is to abandon the proposed scheme.**

*Do you agree that we should adopt the national plan approach?*

12.8 No.

### *Corrections to the consultation paper's text*

- 12.9 In para. 1.2, the exclusion from the LCPD of gas turbines licensed before 27/11/02 is missing, leaving the reader with the impression that gas-fired CCGT power stations built during the 1990s would be covered by the LCPD (which they are not).
- 12.10 In para. 3.11, DEFRA suggests that load factor management is an option for complying with ELVs. This is only correct in so far as the LCPD provides less stringent ELVs for SO<sub>2</sub> and NO<sub>x</sub> for plants which operate at low load factors. Load factor management itself is not a means of complying with ELVs.
- 12.11 On auctioning of emission allowances, DEFRA enthusiastically states that “*auctioning would entail a more neutral, market determined, revenue cost/balance as the difference between initial permit purchase cost and final selling price would probably be minimal.*” (para. 4.12). COALPRO do not understand what this means.
- 12.12 In para. 5.13, DEFRA states that 6 GW of FGD plant currently under construction or planned are assumed to be commitments not directly attributable to the LCPD. COALPRO is aware of 4 GW under construction but is not aware of any other power station owners who have made a commitment such that costs can be considered to be “sunk”.

### **13 Interpretation issues**

- 13.1 There are many interpretation issues where COALPRO agrees with DEFRA's interpretations. However, in the case of how NERP allocations are dealt with on plant closure, we strongly disagree as explained below in paras. 13.5 *et seq.*

#### *Definitions of “combustion plant” and “common stack”*

- 13.2 COALPRO believes DEFRA has interpreted the words of the LCPD very precisely which, for the majority of coal-fired power stations, results in the correct outcome – each unit treated as a plant.

#### *Meaning of “operational hours” – limited operating time derogation*

- 13.3 COALPRO agrees that start-up and shut-down periods should not be included when calculating operational hours. However, this has important implications on the calculation of NERP emission bubbles which are based on generating hours with no additional allowances to cover start-up and shut-down periods. Once again, this imposes a constraint beyond what is required under the ELV approach.

*Application of derogations to national plan*

- 13.4 COALPRO believes DEFRA has correctly interpreted how derogations should be applied under a NERP. The messy result highlights the fact that the revised LCPD was not conceived with the NERP option in mind, it was added hurriedly at a late stage.

*Plant closures and a national plan*

- 13.5 **For the coal industry, this is a key interpretational issue: whether emission allocations remain in circulation following plant closure.** DEFRA's interpretation is based wholly on the wording found in the LCPD, in particularly the paragraph:

*“The closure of a plant included in the NERP shall not result in an increase in the total annual emissions from the remaining plants covered by the plan.”* Article 4(6)

- 13.6 The UK government itself proposed the addition of a NERP to the LCPD and presumably helped to draft the wording. In the case of the above paragraph, COALPRO believes that the wording was poorly drafted and therefore ambiguous. The intent was simply that:

*“The closure of a plant included in the NERP shall not result in an increase in the total annual emissions.”*

In other words, when a plant closes, its allowances to emit may be redistributed, but under no circumstances should this result in an increase in the size of the national “bubble”.

- 13.7 COALPRO agrees with DEFRA's interpretation of the paragraph (sentence) in question, which clearly means that allowances must be cancelled if a plant closes – they would not be available for others to use. However, with this interpretation, parts of the preceding paragraph defining how the NERP allocations are to be calculated, serve no purpose. In particular, most of the words:

*“...to the existing plants in operation in the year 2000, (including those existing plants undergoing a rehabilitation plan in 2000, approved by the competent authority, to meet emission reductions required by national legislation)...”*

are superfluous and could be replaced with simply:

*“...to the existing plants in operation...”*

- 13.8 If allocations were intended to be lost upon plant closure, then there would be no need for the LCPD to consider which plants were operating in 2000 since this would have no

relevance to any calculations or decisions made during the life of the LCPD. It would only be necessary to know which plants *currently* operate and what their average annual emissions were during the 1996-2000 baseline period. It would seem bizarre to define, in a EC directive, the calculation of an original “bubble” for the year 2000 which serves no useful purpose whatsoever. If there had been no intention that year 2000 was to be a base year for a NERP, then the LCPD would not have required the calculation of what average emissions from plants running in 2000 would have been if they had met the ELVs stipulated in the LCPD during 1996-2000.

13.9 In fact, both COALPRO and DEFRA know that during negotiation of the revised LCPD, 2000 was intended to be the base year to determine which large combustion plants would be included in the calculation of the NERP’s 1996-2000 emission baseline. This baseline was intended then to be fixed (apart from the “low load factor” derogation allowing less stringent ELVs for NO<sub>x</sub> in footnote 2 to Part A of Annex VI) and was certainly not expected to reduce when plants closed. Indeed, the great value of a NERP, was in allowing consolidation of, for example, coal-fired electricity generation and emission allowances at a smaller number of plants with emission abatement equipment, but without necessarily meeting ELVs. This was a sensible approach for the UK government to adopt because it gave the country a degree of flexibility in how to implement the LCPD; a flexibility which is completely lost with the interpretation now presented by DEFRA.

13.10 For the avoidance of any doubt about the UK government’s intent when negotiating the NERP option, Appendix I contains a letter sent from the then Department of the Environment, Transport and the Regions to a COALPRO member in May 2001 which states:

*“So within a National Plan, some plant, such as TXU’s West Burton, would be able to emit at a level greater than the ELVs, provided equivalent emission reductions are made elsewhere, for example through plant closures.”*

13.11 The UK government could choose to interpret the directive as originally intended; after all, the negotiating history is all recorded in the minutes of Council of Environment Minister meetings and the wording of the actual LCPD points to what was intended, albeit imprecisely. For greater certainty, the government could seek the European

Courts' view on the LCPD – a time consuming and costly exercise, but not impossible and very necessary if the NERP option is to have any value.

13.12 An interesting parallel can be drawn with a similar interpretation issue encountered by DEFRA during its development of a National Allocation Plan under the EU ETS<sup>24</sup>. In this case, DEFRA adopts a rather different approach when interpreting the meaning of “*combustion installation*”. The Department justifies its interpretation, which limits the meaning to a subset of combustion installations “*designed for the production of energy for use by or in another appliance*”, with three supporting arguments:

- consistency with other language versions of the ETS Directive;
- compatible with the listing of other activities in Annex I of the ETS Directive; and,
- **supported by the negotiating history of the ETS Directive.**

13.13 **COALPRO believes very strongly that the government, if it chose to, could similarly interpret the issue of plant closures under the LCPD's NERP option based on the negotiating history and compatibility within the text of the LCPD. It mystifies COALPRO that government does not pursue an interpretation based on the UK government's original proposal to the Commission for a NERP.**

13.14 Finally, with the intended method of treating plant closure, there is no need to define what the word “closure” means because closing a plant does not change the bubble calculation for the base year. DEFRA's rather laborious definition of closure would actually result in an *increase* in bubble size when plants re-open following temporary closure; so would not be in accord with the ambiguous paragraph in Article 4(6) which does not allow an *increase* following closure (no matter that the increase might occur some time later).

*Aggregation – gas turbines*

13.15 No comment.

*PPC aggregation rules – definition of combustion plant*

13.16 Agree.

*Stand-by generators – supplement firing*

13.17 No comment.

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<sup>24</sup> *Consultation paper on the implementation of the EU Emissions Trading Scheme*, DEFRA/DTI, August 2003.

*Standby fuel – derogation under Article 7(3)*

13.18 No comment.

*Fixed national plan cap*

13.19 There should be no adjustment to the national “bubble” due to plant closures.

*“Opt-out” derogation in Article 4(4)*

13.20 COALPRO believes the words “*They may be allowed to continue to operate...*” in DEFRA’s interpretation should be replaced with “*They can continue to operate...*”.

*Gas turbines – application of directive*

13.21 No comment.

*“Multi-fuel firing unit”*

13.22 No comment.

*LCPD and IPPC*

13.23 See Section 11 above.

*Article 8(3) – ELVs for multi-fuel refineries*

13.24 No comment.

## **14 Regulatory Impact Assessment**

### *Effect on the coal industry*

14.1 **It is unbelievable that the Regulatory Impact Assessment (RIA) does not consider the effect on the UK coal industry of implementing the LCPD (para. 13). COALPRO would even venture that the dominant impact of the revised LCPD will be on the coal industry, not on the electricity generation industry.**

14.2 COALPRO estimates that the initial impact of a NERP on the UK economy could be £700 million per year as mines close (see Section 9 above). Given that the RIA reports a one-off saving of just £150 million if the LCPD is implemented via a NERP rather than ELVs, COALPRO believes that the provisional preference for a NERP, based largely on the result of a cost-benefit analysis, is misplaced because the cost impact on the UK coal mining industry has not been taken into consideration.

### *Cost-benefit analysis*

14.3 The RIA presents a cost-benefit analysis prepared by ENTEC. COALPRO remains deeply sceptical about the monetary values attached to the benefits from reduced

environmental pollution. There is a temptation for policy-makers to over estimate these benefits, and work conducted by AEA Technology on behalf of the Commission concluded that a similar analysis underpinning the National Emission Ceilings Directive does not prove “*beyond all reasonable doubt*” that the benefits exceed the costs<sup>9</sup>. Similarly, COALPRO believes that the cost-benefits reported by ENTEC are subject to a great degree of uncertainty, to the extent that they are not a reliable basis for decision-making.

**14.4 COALPRO believes that DEFRA is wrong to have attributed the costs of pollution abatement solely to the LCPD (para. 16). Many of these costs will be incurred anyway under the IPPC Directive (see para. 9.8 above).**

*Competition issues*

14.5 COALPRO does not know how the government’s “competition filter” works (para. 27). However, the competitive position of the UK coal industry would be severely compromised under a NERP, so we cannot agree with the conclusion made that there are no significant competition issues. Beyond this, whilst we agree that most industrialised countries outside the EU are signatories to the Gothenburg Protocol, this glosses over the fact that the USA has only agreed to provide an “*indicative value*” for total SO<sub>2</sub> emission levels for 2010 when it ratifies the Protocol, which it has not done to date. Table 8 details historic SO<sub>2</sub> emissions from the UK, EU and USA along with future limits. It is clear from this table that there is a competition issue between the UK, where SO<sub>2</sub> emission have fallen substantially and will continue to fall, and the USA where reductions are being made at a much slower pace with no future targets.

**Table 8 – Sulphur dioxide emissions with Gothenburg Protocol limits for 2010**  
(thousand metric tonnes)

	1980	1990	2000	2010	% reduction for 2000 (base year 1980)
UK	4,863	3,731	1,165 <sup>a</sup>	625	76%
EU	26,456	16,436	6,625 <sup>b</sup>	4,059	75%
USA	23,501 <sup>c</sup>	21,481 <sup>c</sup>	16,492 <sup>c</sup>	?	30%

<sup>a</sup> *Digest of Environmental Statistics*, Department for Environment, Food and Rural Affairs, Table 2.8 [www.defra.gov.uk/environment/statistics/des/airqual/raq3036.htm].

<sup>b</sup> Co-operative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP) database established under the Convention on Long-Range Transboundary Air Pollution [www.emep.int].

<sup>c</sup> *National Air Quality and Emission Trends Report*, 2000, United States Environmental Protection Agency.

*Sulphur trading*

14.6 The RIA states that, in the case of a NERP, “*It provides for emissions trading and the experience so far with other emissions trading schemes is that they offer a more cost*

*effective way of reducing emissions.*” (para. 33) – a sentiment reiterated in the consultation paper’s executive summary and para. 5.23. We can only guess at which other trading schemes are referred to, perhaps the UK ETS or sulphur trading in the US, but presumably not the EU ETS which does not begin until January 2005.

14.7 The National Audit Office (NAO) is currently scrutinising the UK ETS from a value-for-money perspective, looking at the design of the scheme and its progress to date, so it would be premature to pass any judgement on this particular trading scheme until the NAO publishes its report early in 2004.

14.8 The US SO<sub>2</sub> cap and trade system is sometimes heralded as an example to follow. In fact, despite the rhetoric from the US Environmental Protection Agency (EPA), relatively little progress has been made in reducing sulphur emissions from the USA as Table 8 shows. The New Source Plant Standards under the Clean Air Act 1970 (and 1979 revisions to the CAA), along with the 1990 amendments (CAAA), which established the Acid Rain Program and SO<sub>2</sub> trading, have not had the impact promised, such that US sulphur emissions now exceed those from the EU15 by 150%.

14.9 Sulphur trading in the USA has allowed industry to make some early reductions in sulphur emissions at a relatively low cost. The situation in the UK is very different, we have already made significant reductions and are now faced with reducing the last few hundred thousand tonnes in an orderly manner.

14.10 Sulphur trading was proposed by the Department of the Environment during the early 1990s and HMIP (forerunner to the Environment Agency) was largely opposed to such measures which would have compromised its ability to impose BATNEEC limits (equivalent to BAT under IPPC).

14.11 The debate that took place during the early 1990s is well documented<sup>25</sup>. There were many reasons why sulphur quota switching (as trading was euphemistically known) was not adopted at that time:

- Independent developments in energy markets – the “*dash for gas*”.
- A conflict of regulatory principles – if trading drives some to emit less than BAT, then BAT must itself be redefined.

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<sup>25</sup> Sorrell, S. (1998) ‘Why sulphur trading failed in the UK’, in S. Sorrell and J. Skeas (eds.), *Pollution for Sale: Emissions Trading and Joint Implementation*, Edward Elgar, pp.277-343.

- A conflict of regulatory culture – pollution control in the UK has evolved successfully with co-operation between regulator and regulated. Emissions trading threatened to destroy this relationship.
- A conflict over quota allocation – an intractable problem that could become bogged down in appeals.
- Persistent regulatory uncertainty – for example, prior to 31 December 2004, the European Commission must review the impact of the LCPD and assess the need for further measures.
- Inadequate political support – having made significant progress towards reducing SO<sub>2</sub> emissions over the last 20 years (a reduction of almost 80%), it seems unlikely that any stakeholder would have much appetite for a scheme now.

14.12 With over 12 GW of FGD either operational, under construction, contracted or with serious intent to proceed beyond planning consent, the rationale for sulphur trading has receded even further. Power station owners do not need to trade themselves out of emission limits, they can meet the LCPD ELV requirements without trading.

**14.13 The government should not attempt to implement an SO<sub>2</sub> emission trading scheme under a NERP since this would introduce the same insurmountable problems that were seen almost ten years ago.**

*Specific comments on RIA text*

14.14 In para. 11(b), the words “*add up to*” should be replaced with “*sum to less than*”.

14.15 COALPRO questions how the 89 ktSO<sub>2</sub> figure for 2016 presented in Table 1 of the RIA will be achieved with the assumed coal-fired electricity generation of 72 TWh? It suggests the achievement of a very much tighter ELV than the 400 mg/Nm<sup>3</sup> required by the LCPD.

14.16 COALPRO does not understand the meaning of the oxymoron, “*The measures that need to be adopted to ensure compliance will often deliver greater emission reductions than are required.*” (para. 18.). In particular, what are the required emission reductions? We believe that they are defined in the National Emission Ceilings Directive (585 kt in the case of SO<sub>2</sub>) and will be achieved under either an ELV or NERP implementation of the LCPD (see para. 10.3 above).

14.17 In Table A4 of the RIA, industry is shown as a net purchaser of emission allowances from the electricity generation industry. In the case of SO<sub>2</sub> this will not be the case because industry has an over-allocation of allowances (see Table 2a), dust cannot be traded, and in the case of NO<sub>x</sub>, the industrial allocation is 96% of what it emitted in 2001, so again, industry is unlikely to be a net purchaser.

14.18 The final sentence of the annex to the RIA states that “*the benefits of a national plan increase as electricity generation from coal increases*”. Relative to a lower coal burn scenario, this is true. However, it hides the fact that, relative to today, both the NERP and ELV approaches bring significant, positive environmental benefits. Importantly, any increased benefits under a NERP are obtained at a sub-optimal cost (see para. 4.5).

## **15 Coal industry’s lobbying position on LCPD and NECD**

15.1 For the last five years or more, the coal industry has lobbied the European Commission, MEPs, Ministers, MPs, Lords and civil servants at every stage to ensure that the revised LCPD and NECD did not discriminate against higher-sulphur UK coal. **Despite this lobbying, the Commission based its cost-benefit analysis on the free availability of 0.6% sulphur imported coal which could displace UK coal at no cost.**

15.2 In 1999, correspondence with the Chairman of the House of Lords European Communities Sub-committee B – Energy, Industry and Transport, and subsequently with the Environment Minister, resulted in some positive words of assurance. The government’s line then was that existing plants should be *excluded* from the scope of the revised LCPD<sup>26</sup>.

15.3 The political process in Europe moved on and the UK government agreed, in June 2000, to the inclusion of existing large combustion plants under a NERP option that it had successfully negotiated<sup>27</sup>. During a speech given at Wakefield in March 2001, the Environment Minister announced that the “*hard-won deals*” would benefit the coal industry:

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<sup>26</sup> Letter dated 20 September 1999 from Michael Meacher, Environment Minister to Richard Budge, Chief Executive, RJB Mining PLC.

<sup>27</sup> *UK agrees further cuts in European air pollution*, news release no. 433, Department of the Environment, Transport and the Regions, 22 June 2000.

*“The wider use of FGD that is being encouraged will enable compliance with the Directive’s SO<sub>2</sub> ELVs with coals having an average sulphur content of less than 1.7%. This would accommodate many types of UK coal.”* (see Appendix II for full text).

- 15.4 This speech demonstrated to COALPRO members that government had considered our position and taken our concerns seriously. Indeed, the average 1.7% sulphur assumption was realistic and most in the industry viewed it as viable. More precise details of the government’s thinking emerged in a letter to a COALPRO member in May 2001 which clearly states that plant closure would be an eligible means of achieving SO<sub>2</sub> emission reductions under a NERP (see Appendix I).
- 15.5 By August/September 2002, it became clear that the Environment Minister’s past assurances were not being honoured within DEFRA as officials began the task of implementing the LCPD. COALPRO immediately reminded officials of the past assurances. Today, we have a consultation paper, supported by analyses, that assumes higher-sulphur UK coal can be displaced by low-sulphur imports at no cost – resurrecting the concerns expressed by COALPRO and its members over five years ago.

## **16 Conclusions**

- 16.1 Sulphur dioxide (SO<sub>2</sub>) is an environmental pollutant and the Confederation of UK Coal Producers (COALPRO) accepts the need to further reduce SO<sub>2</sub> emissions from coal use where this can be achieved cost-effectively and in a carefully managed way that does not unnecessarily discriminate against the UK coal mining industry. Both the economic and social costs of abatement measures must be considered, and balanced against the environmental benefits. Valuing these benefits is uncertain, such that determining what constitutes a cost-effective reduction becomes a political, rather than a purely scientific process. **The revised Large Combustion Plants Directive (LCPD) and National Emission Ceilings Directive (NECD) are recent results of this on-going process in Europe and balance the tension between those who aim to protect the environment whatever the cost, with those who strive to meet society’s need for energy.**
- 16.2 Coal continues to play a crucial and significant role in the UK by underpinning electricity supplies that are competitively priced to assist economic growth, and affordably priced to assist those who live in fuel poverty. **The coal industry has been warning government since 1999 that a poor implementation of the revised LCPD and NECD puts British coal mining jobs at risk as generators are forced towards**

**importing low-sulphur coal into the UK, rather than retrofitting flue gas desulphurisation (FGD).**

- 16.3 Against this background, COALPRO welcomed the clear policy statement made by DEFRA that government has no desire to go beyond the requirements of the LCPD<sup>28</sup>. To do so would have upset the balance achieved during negotiations leading to the LCPD. DEFRA's interpretation of the directive and its preference for a National Emission Reduction Plan (NERP) would mean going beyond what the UK government had originally envisaged when it agreed to the revised LCPD. **Poor drafting of the directive's wording means that the flexibility expected by government under a NERP is lost, unless the UK government seeks a court's positive interpretation of the intent behind the words.**
- 16.4 In this submission, COALPRO has considered how a NERP might effect the UK coal industry using low, central and high coal-burn scenarios, a general assessment of the market size for indigenous coal, and a cost analysis of different abatement options. In every case, the conclusion reached is that switching to low-sulphur imported coal would be encouraged under a NERP, whereas under ELVs the incentive to switch is largely removed. **The proposed NERP would reduce demand for indigenous coal to one half or less of what could be produced in 2008-10. Demand could even be ZERO.**
- 16.5 The social and economic impact on the coal industry and the wider economy of a NERP would be substantial: 15,000 job losses and an initial economic impact of £700 million per year. These are COALPRO's own conservative estimates which we hope will be refined by government as it develops its cost-benefit analysis. **However, our analysis of the costs demonstrates conclusively that an ELV approach is the lowest cost option.**
- 16.6 Beyond the powerful socio-economic case for an ELV approach, COALPRO believes it brings environmental benefits and legal certainty. **We have identified a number of serious legal questions that need to be carefully considered by DEFRA before it makes a final implementation decision. In particular, we do not believe emission trading would be legal under the Integrated Pollution Prevention and Control**

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<sup>28</sup> *Consultation paper on the transposition of the revised Large Combustion Plant Directive*, Department for the Environment, Food and Rural Affairs, August 2002.

**(IPPC) Directive; whereas, ELVs will be a feature of the new IPPC régime in any case, and are already used by the Environment Agency.**

- 16.7 Adopting ELVs is a sure way to encourage power stations to fit FGD, which captures about 90% of the sulphur in coal, allowing the 400mg/Nm<sup>3</sup> ELV in the LCPD to be met whilst using 1.8%S coal. **It breaks the perversely negative linkage between demand for indigenous coal and amount of coal-fired electricity generation. Complying with the LCPD through ELVs is economically, environmentally and strategically a better option at no cost to the Treasury.**
- 16.8 COALPRO derives no satisfaction from the critical assessment we have made of DEFRA's consultation paper and the supporting work carried out by consultants. Our detailed submission is intended to be objective and, by exploring the issues from the perspective of a key stakeholder, COALPRO hopes our response assists government in reaching the right decision. **In Appendix III, we list ten questions that DEFRA needs to address before making a decision. COALPRO would greatly appreciate an early response to these.**
- 16.9 **Our conclusion is that a NERP unnecessarily places the UK coal industry on a cliff edge with every chance that it will topple over as coal-fired generators opt for low-sulphur imports – not for cost reasons, but to gain commercial advantage based on an arbitrary allocation of SO<sub>2</sub> emission allowances. As such, the Ministers' provisional decision to opt for a NERP is wrong and must be changed when the impact on the UK coal industry is included in the Regulatory Impact Assessment.**

**Appendix I – Letter dated 18 May 2001 from Louise Whall, DETR to Gordon McPhie, Acting Chief Executive, RJB Mining (UK) Ltd**



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YOUR REF: GMcP/SG

18 MAY 2001

Dear Mr McPhie,

**REVISED LARGE COMBUSTION PLANT DIRECTIVE**

Thank you for your letter of 26 April to Environment Minister Michael Meacher concerning the Large Combustion Plant Directive. I have been asked to reply on his behalf. I apologise for the delay in letting you have a response.

Your letter expresses concern that the common position compromise on the revised Large Combustion Plant Directive would threaten the existence of several of RJB's deep mines.

As you will be aware, the treatment of older 'existing' (licensed before Jul 1987) plant under the Directive is a very contentious issue. A majority of Member States, and the European Parliament, favour automatic imposition of Emission Limit Values to these plant. Others, including the UK, require more flexibility to make emission reductions where most cost-effective to do so. The UK Government shares your analysis that the imposition of stringent limit values on existing plant could have serious implications for the UK's Electricity Supply Industry and the amount of coal-burn. That is why the UK fought hard for, and was successful in obtaining, a flexible **National Plan option** for these plant in the common position.

Under the common position compromise, Member States have the option of either applying the new plant ELVs in the original Directive, or reducing emissions under a national emission reduction plan by 1 January 2008. Additionally, an existing plant may be exempted from compliance with the ELVs, or the plan, if it will not be operated for more than 20,000 hours after 1 January 2008, and the operator chooses this option by June 2004. So within a National Plan, some plant, such as TXU's West Burton, would be able to emit at a level greater than the ELVs, provided equivalent emission reductions are made elsewhere, for example through plant closures.

The Government is of course aware that the sulphur content of UK coal spans a range, with coal from your Harworth colliery coming at the top end of the range. The 1.7% figure referred to by Michael Meacher was intended only to be an average indicative of this range, and not a limit of



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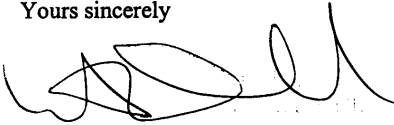
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any kind. During negotiations on the Directive, the UK Government has and continues to press for sufficient flexibility to protect UK industry, thereby achieving the goals of fuel diversity and security. These goals would not be achieved by an LCPD which would effectively drive out high sulphur UK coal.

You should be aware, however, that in their second reading opinion, the European Parliament has sought to upset the delicate compromise of the common position. Many of their proposed amendments seek to increase the stringency of the Directive's emission limit values, or otherwise reduce flexibility. The Council is now in the middle of a conciliation negotiation with the Parliament. It is a negotiating reality that both sides are likely to have to move from their opening position. I can assure you, however, that the UK will again be pressing hard within the Council to retain the flexibility in the Directive.

You may wish to consider lobbying MEPs about the conciliation negotiations. UK MEPs on the conciliation delegation for this Directive are Caroline Jackson (EPP), David Bowe (PES) and Chris Davies (liberal).]

Yours sincerely



**LOUISE WHALL**

RJB mining 17 May 01

**Appendix II – Speech by the Rt Hon Michael Meacher MP, Environment Minister to Yorkshire Coal Task Force seminar held at Wakefield Town Hall, 9 March 2001**

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09:03 2001 16:29 FAX 0113 2536587

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MICHAEL MEACHER Speech  
(9 parts)

**Speech for the Yorkshire Coal Task Force seminar on the UK coal industry - 9 March 2001**

**Introduction**

I am delighted to be taking part in this seminar today. We all recognise that coal has a vital role to play in providing the security and diversity that we seek from our energy supply. Our energy policy aims to put all fuels on a level playing field. It means that if British coal can be competitive - and I am very sure it can - then it can have a very positive future in electricity generation and our policy allows British coal to compete on a fair and equitable basis.

But this must be balanced with the need to protect our environment from the pollutants produced when coal is burned, and the effects that coal mining and opencast working can have. We have set ourselves pretty demanding targets to help protect the environment from these effects, in particular our target for reducing sulphur dioxide emissions in line with the Gothenburg Protocol. But they are targets which we think are achievable with a future for coal, and indeed targets that we intend to achieve.

As I say, coal has a real role as fuel for electricity generation but we need to look to ways of reducing those emissions. Currently regulation under Integrated Pollution Control seeks to limit emissions through use of low sulphur coal or through the use of Flue Gas Desulphurisation (FGD) abatement equipment. I know that the

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Environment Agency are keen to see increasing use of FGD abatement equipment over the next few years. In my view FGD can not only make coal cleaner, but if anything can, it can guarantee the future for coal

This seminar provides an important opportunity to stand back and take a hard look at where we are going. To ask the fundamental questions about whether we are moving towards or further away from sustainability. It provides an opportunity to take stock of achievements on sustainable development so far. To help inform us about the big long term changes that are necessary to achieve sustainable development. It provides an opportunity to look at how the coalmining industry can contribute to that process.

I firmly believe that we must integrate environmental thinking into all areas of public policy, not just coal. There is now recognition globally that we have a responsibility to ourselves and future generations to meet the challenge of climate change and achieve sustainable development. We know that if carbon dioxide emissions are maintained at current levels the concentration in the world's atmosphere will continue to grow. What these global trends show us is that marginal improvements will not be enough. I should also add that we are not just looking to energy intensive industries to bring about these reductions. We have shown we mean business by announcing policies in a wide range of areas.

— 3 —

Let no one be in doubt about the climate change challenge we face - the Climate Change Levy and Negotiated Agreements start next month, as a means of securing phased reductions in energy use and hence CO<sub>2</sub> reduction.

**Climate Change**

Our plans have been developed against the background of :

- our greenhouse gas projections, which show an increase after 2010, partly because of the anticipated reduction in electricity from nuclear plants, and
- the knowledge that we are likely to face tougher international targets in the future, in the light of experts' predictions that global emissions will need to be cut by perhaps 60-70% or more, if we are to avoid extremely dangerous climate change conditions

We know that there are significant challenges ahead for energy supply industries around the world, and that what happens in this sector will be critical to the UK's ability to make deeper emission cuts in the longer term.

We announced in the programme our plans to review the options for longer term energy choices, considering the scale of emissions reductions that might be needed in view of current projections of energy use, and the scope and cost of low carbon or energy

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efficiency options which may exist to bridge the gap. We hope that this work will begin shortly and I do think there is a matter of urgency in this.

Cleaner coal technology may well have a part to play in global efforts to cut greenhouse gas emissions. We know that in the UK, the availability of gas as a fuel for electricity generation means that clean coal does not offer environmental advantages other than over existing coal capacity. However, coal use for electricity generation will continue in the UK and it is expected to grow substantially in some developing countries - not least India and China, the biggest in the world - and the difference between clean coal technology and conventional plant could make a substantial difference to emissions at the global level.

Another way in which the coal mining community can contribute to the climate change programme is by using methane, either from existing or disused, coal mines as an energy source. I know that we already have some of these plants operational in the UK, but we would like to see more of them developed. They have the potential for not just cutting methane emissions into the atmosphere, but also to offer new local employment opportunities to coalfields communities. That is a truly win-win solution.

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### **The Role of Science**

This Government is committed to ensuring the excellence of our science base and through the Foresight Programme, industry and the research base in the UK can come together. It presents opportunities for the best and most creative minds in the country to engage with each other to tackle new challenges, including those in energy. The Energy Futures Task Force has set itself the aim of developing a robust view of tomorrow's opportunities and threats across a wide range of future possibilities, looking as far ahead as 2040.

Of course 40 years is a long time to look forward in a pretty uncertain world but providing energy supplies involves large scale investment over this sort of timescale and must be planned for. The environmental consequences of energy use also have very long term consequences. Even if we stop climate change now in its tracks, it will take two centuries for the effects to wither away totally.

The Energy Futures Task Force has recently finished its consultation phase and will shortly be reporting on its recommendations.

### **Clean Coal Technologies**

The UK has long been at the forefront in coal-related technologies, building up a wealth of expertise and experience. The Government wants a fruitful working relationship with UK industry in the development of cleaner coal technologies. We are keen to see this

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happen. DTI has developed a cleaner coal programme of R&D and technology transfer with a budget of £12m for its first 3 years.

This is designed to make coal-fired generation more environmentally acceptable as well as more efficient. Looking further ahead, the Government is committed to reviewing the case for a demonstration plant for these new technologies. It is an opportunity to look at the vital importance of technical innovation by industry to help meet the world's material needs in a way that is more sustainable.

Such plant would make a considerable contribution to reducing greenhouse gases in many parts of the world - that's the real attraction of it. If environmentally acceptable ways can be found of using coal in power generation this will provide alternative sources of cleaner energy and no doubt can be exploited via the Kyoto mechanism.

Developing cleaner coal technologies is particularly important in relation to potential exports of equipment and expertise to countries that are, and will remain, heavily dependent on coal for power generation - India and China are again two examples and have a colossal coal reserve. In these and other developing countries, current technologies are often less clean and less efficient than conventional technologies used in the UK. So the potential environmental gains from switching to the new, cleaner technologies are all the greater, especially as demand for power in developing countries continues apace.

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However, the viability, security and environment acceptability of this approach has yet to be convincingly demonstrated. We believe that the environmental benefits, would occur, principally if clean coal replaces existing coal burn. If it works, it will complement ongoing and future investment by the generators in FGD abatement equipment which we see as the most efficient and in fact an essential way of achieving the targets we have set, and a way which is consistent with energy policy.

#### **Revised Large Combustion Plant Directive**

The Revised Large Combustion Plant Directive will require the most polluting power stations across the EU to make further reductions in emissions of sulphur dioxide, nitrogen oxides and particulates to help safeguard people's health and the environment.

For existing coal-fired plants, the Directive is not likely to come into force until 2008. Because of hard-won deals reached by the UK, the impacts on the UK coal industry will be minimised. In particular, a flexible National Plan option can be adopted which gives credit for those emission reductions already planned and any additional emission reductions can be achieved where most cost-effective. There are also derogation options for power stations used less intensively where abatement technology is not viable and for those plants expected to run for a limited time only. For any new coal power stations, the Directive will not generally go beyond emission standards that the Environment Agency would expect. This will

give coal-fired plant the operational flexibility it needs to operate in the UK energy market.

We should not forget that coal power stations in England and Wales are already required by the Environment Agency to make significant reductions in emissions. The wider use of flue gas desulphurisation that is being encouraged will enable compliance with the Directive's SO<sub>2</sub> emission limit values with coals having an average sulphur content of less than 1.7%. This would accommodate many types of UK coal.

#### **Yorkshire Coal Mining Communities**

In moving forward we must not forget the heritage of the coal mining industry in this region. With the move to review improved cleaner coal technologies and potentially create new employment opportunities, we are also providing support for those in the former coalfield areas. I like to think that the Government has put a great deal of money where its mouth is. We have to show that we are not abandoning a significant minority to pay a high cost in the name of helping the environment for the rest of us. That is why the social aspects of sustainable development lie at the heart of our policies.

Communities in areas such as Wakefield, Barnsley and the Dearne Valley, which grew up around the mining industry have had to cope with large scale redundancies and the consequent effects on social structure.

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COI COMMUNICATIONS V&H



In this region one of Yorkshire Forward's key objectives is to implement targeted, community based regeneration programmes that improve the living standards of the region's most depressed and excluded communities including in the former coalfields. Yesterday we published the RPG which identifies South Yorkshire as a priority area for regeneration.

#### **Conclusion**

We need to be clear that environment policies are pro jobs policies, not anti-jobs policies and can reduce inequality. Our long term vision for sustainability must see high employment, reduced inequality and better health as part and parcel of an improved environment. Only that vision is going to gain public support and be sustainable. Integration is vital. The environmental, social and economic aspects of sustainable development need to be integrated, and it is this "joined up" policy that we have committed ourselves to.

Mr Chairman, I thank you for allowing me this opportunity to speak on this subject today.

### **Appendix III – Questions to DEFRA**

Questions in bold are additional to those already posed by COALPRO to DTI and DEFRA.

- 1) What is the government's projection of UK coal sulphur content?
- 2) **With what efficiency and at what cost does government believe SO<sub>2</sub> emissions can be abated using FGD processes?**
- 3) How small does the government expect the NERP sulphur bubble to shrink due to *opt-outs* and further plant closures?
- 4) At what price and with what liquidity does the government expect SO<sub>2</sub> emission allowances to trade?
- 5) **How much demand does government expect there to be for indigenous coal in 2008-10 under a NERP?**
- 6) Does government have any evidence that 12.2 GW of FGD will run under a NERP?
- 7) Why are mine closure costs not included in the cost-benefit analysis?
- 8) Why does the government continue to pursue the NERP option given that the LCPD's actual wording does not allow the flexibility that the government originally believed it had secured during LCPD negotiations (*i.e.* transfer of bubble from plants that close)? We fail to understand how the NERP option can remain credible given this fundamental loss of flexibility.
- 9) How is a NERP "*compatible with future obligations on reducing the production of greenhouse gases*" (para. 2.6 of consultation paper) given that coal-fired generation could remain well above 100 TWh?
- 10) Why discriminate against indigenous coal on the one hand, whilst implementing a Coal Investment Aid scheme on the other?

### **Appendix IV – COALPRO LCPD position paper, March 2003**

# A position paper on the EC Large Combustion Plants Directive by the Confederation of UK Coal Producers (COALPRO)

March 2003

The EC Large Combustion Plants Directive (LCPD) places limits on the emissions of sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>) and dust from the combustion of coal, oil and natural gas. NO<sub>x</sub> and dust emissions are largely determined by the manner in which fossil fuels are used, not by their composition or quality. However, in the case of SO<sub>2</sub>, emissions are in direct proportion to the sulphur content of the fuel. Legislation that limits SO<sub>2</sub> emissions has a direct impact on the demand for coal and the LCPD itself threatens the displacement of relatively high sulphur UK coal (~2% sulphur) with imported, low sulphur coal (<1% sulphur) from, for example, Russia and Indonesia.

COALPRO views the revised LCPD as tough but manageable, providing the Department of Environment, Food and Rural Affairs (DEFRA) does not “gold plate” the Directive’s requirements. Unfortunately, it appears that DEFRA intends to do just that. Derogations, negotiated by the UK Government to provide industry with some flexibility, are now being re-interpreted in a way which will do exactly the opposite of what was envisaged.

## Sulphur dioxide

All coal contains sulphur, principally in the form of pyrites and organically-bound sulphur. These turn to sulphur dioxide (SO<sub>2</sub>) when coal is burnt, a noxious gas that can aggravate breathing difficulties and cause damage to buildings and vegetation where it has dissolved in water to form “acid rain”.

Today, SO<sub>2</sub> emissions are a fraction of those seen in the past when smokeless fuels and abatement technologies were not used. For example, in the 1950s, UK SO<sub>2</sub> emissions are estimated to have been over 7 Mt, some seven times the quantity now emitted.

## International sulphur control

The United Nations Economic Commission for Europe’s (UNECE) Convention on Long Range Transboundary Air Pollution, adopted in 1979, was the first legally binding instrument to “endeavour to limit” air pollution. In 1987, the Helsinki Protocol (signed by the “30% Club”, which did not include the UK) set a 30% reduction in SO<sub>2</sub> emissions by 1993, based on a 1980 baseline. The Second Sulphur Protocol was signed in 1994, setting new targets - a SO<sub>2</sub> reduction of 80% to 980 kt by 2010 for the UK. Finally, in 1999, the Gothenburg Protocol (*a.k.a.* Multi-pollutant, Multi-effect Protocol) was signed and places an upper limit of 625 kt SO<sub>2</sub> emissions per annum from the UK by 2010. The growing use of natural gas for power generation in the UK has resulted in far lower sulphur emissions than anticipated, as illustrated in Figure 1.

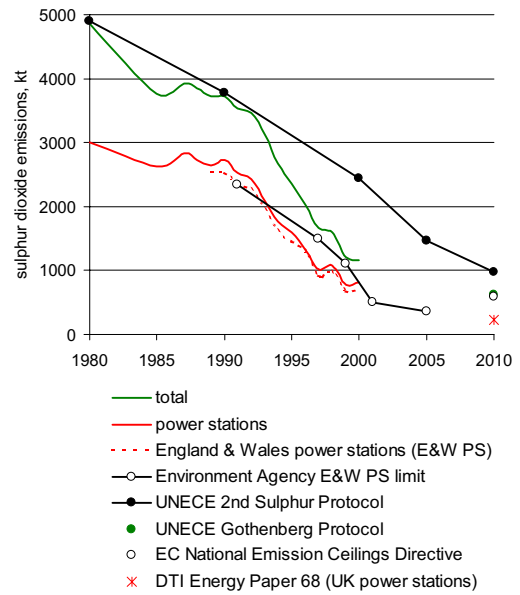


Figure 1 - Sulphur dioxide (SO<sub>2</sub>) emissions from the UK

## European legislation

The UNECE protocols are perhaps of academic interest, since more recent EC directives introduce tougher controls on SO<sub>2</sub>. For example, the National Emission Ceilings Directive (NECD) (2001/81/EC) means that the UK must restrict its annual SO<sub>2</sub> emissions to 585 kt by 2010, an 88% reduction from 1980 levels as shown in Figure 1.

## Large Combustion Plants Directive

The most important directive is the revised Large Combustion Plants Directive (2001/80/EC) which, for the first time, introduces emission limit values (ELV) for existing coal-fired plants >50 MWth from January 2008 (see Figure 2), excluding cement kilns and coke ovens. The original LCPD (88/609/EEC) applied only to new plants, so had little impact in the UK where no new, coal-fired power stations have been built since the sixth unit at Drax power station was commissioned in 1986.

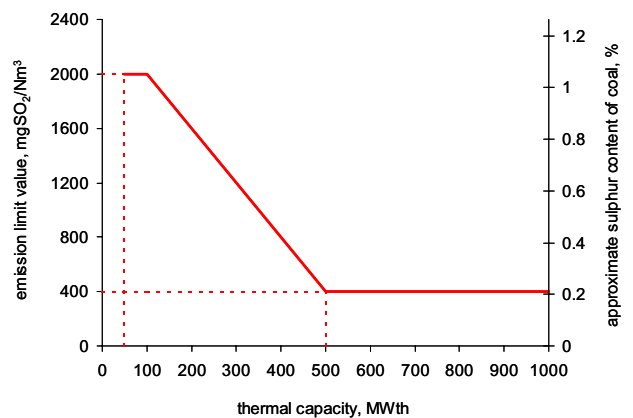


Figure 2 - Sulphur dioxide (SO<sub>2</sub>) emission limit values (ELVs) to be applied to existing plants from 1 January 2008 (showing approximate sulphur content of coal to achieve ELVs in plants with no SO<sub>2</sub> abatement) *n.b.* the thermal capacity of a typical 500 MWe unit at a coal-fired power station is >1,400 MWth

## Integrated Pollution Prevention and Control

The Integrated Pollution Prevention and Control (IPPC) Directive (96/61/EC) covers existing combustion plants from March 2006 and demands that best available techniques (BAT) are applied to the prevention and control of all emissions to air, water and land. In the case of power stations, the Environment Agency will implement this Directive and has yet to decide whether the ELVs in the revised LCPD will be considered BAT, or whether tighter SO<sub>2</sub> limits will be demanded.

### Air Quality Framework Directive

The Air Quality Framework Directive (96/62/EC) and its “daughter directives” set atmospheric pollution limits which are largely met by the UK’s objectives as set out in *The Air Quality Strategy White Paper* (Cm 4548). In this, the UK Government sets air quality objectives for SO<sub>2</sub>, based on work by the World Health Organisation and expert advisers, that aim to protect the population and ecosystems from any harmful effects.

**Table 1 - UK air quality objectives for sulphur dioxide (SO<sub>2</sub>)**

concentration	measured as	date to be achieved by
350 µg/m <sup>3</sup> (132 ppb) not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
125 µm <sup>3</sup> (47 ppb) not to be exceeded more than 3 times a year	24 hour mean	31 Dec 2004
266 µm <sup>3</sup> (100 ppb) not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2005

### Control of sulphur emissions in the UK

Control of sulphur emissions from UK power stations has been accomplished through the use of an annual quota system (the “National Plan” which was required under the original LCPD): tonnage caps limit emissions from individual plants to protect local air quality (“A” limits) and “B” limits apply to groups of plants under common ownership to ensure total sulphur emissions do not exceed national targets. This system became difficult to administer with the break-up of National Power and Powergen, so the Environment Agency implemented revised plans which, though complex and lacking in transparency, have encouraged investment in pollution control equipment.

Introduction of the revised LCPD provides the Government and the Environment Agency with the opportunity to implement a new sulphur control regime. However, there are a number of options available under the LCPD, with very different outcomes for the coal industry. Table 2 shows the timetable for implementing the LCPD; decisions taken in the next few months will have a long-term impact.

Local Authorities have a responsibility to achieve the UK’s air quality objectives and are currently implementing action plans in designated Air Quality Management Areas where monitoring has suggested that the objectives will be exceeded. Authorities are able to use their powers, including those under the Environment Act 1995, against anyone who causes exceedances of air

quality objectives. This may take the form of traffic restrictions, creation of “smokeless zones” or an instruction to reduce emissions from particular plants during certain weather conditions. In many cases, this involves working in close collaboration with the Environment Agency.

**Table 2 - LCPD implementation timetable**

23 Oct 2001	Directive finally agreed after conciliation between Commission, Parliament and Council
27 Nov 2001	revised LCPD 2001/80/EC published in OJ and enters into force
27 Nov 2002	Commission issued National Emission Reduction Plan guidelines
27 Nov 2002	Member States transposed Directive into national law (Directions given to the Environment Agency 18 Oct 2002)
27 Nov 2003	Government must submit National Emission Reduction Plan to Commission (but this does not appear to commit a Member State to this option)
30 Jun 2004	operators may elect to “opt out” (by informing the Environment Agency) and undertake not to operate for more than 20,000 hrs between 1 Jan 2008 and 31 Dec 2015
31 Dec 2004	Commission to conduct review of LCPD
<b>1 Jan 2008</b>	<b>LCPD applies to existing plants</b>

### Flue gas desulphurisation

Whilst some sulphur is retained in the ash when coal is burnt (5-10%), most is emitted to atmosphere unless captured using flue gas desulphurisation (FGD). Table 3 summarises which UK power stations already have FGD, or where owners have expressed an intention to retrofit FGD. In most cases, this will remove 85-90% of the SO<sub>2</sub> that would otherwise have escaped to atmosphere. All use the well-proven, “wet scrubber” process (except Fifoots Point with its dry limestone injection), reacting a slurry of crushed limestone with the SO<sub>2</sub> to produce gypsum, a useful by-product that finds a ready market amongst plasterboard manufacturers.

### Options under the LCPD

The LCPD has three plant categories:

- **existing** plants licensed before 1 July 1987;
- **new** plants licensed after 1 July 1987 but before 27 November 2002 (and operational before 27 November 2003); and,
- **new-new** plants licensed after 27 November 2002.

In the case of the UK, the category of interest is existing plants; we have no new coal-fired power stations, and the new-new ones proposed use integrated gasification combined cycle (IGCC) technology that easily achieves the required emission standards. The subsections below discuss the three implementation options under LCPD.

It should be noted that the LCPD sets minimum standards, Member States may implement more stringent limits, but DEFRA has stated that “Government do not intend to go beyond the LCPD by imposing any additional obligations on operators” (*Consultation paper on the transposition of the revised LCPD*, DEFRA, August 2002).

Table 3 - Summary of coal-fired power station FGD status

station	capacity	capacity with FGD	owner	status
Drax	4.0 GW	4.0 GW	AES	operational
Ratcliffe	2.0 GW	2.0 GW	Powergen	operational
Fifoots Point	(0.4 GW)*	(0.4 GW)*	AES	has FGD but in administration
West Burton	2.0 GW	2.0 GW	London Power (EdF)	commissioning
Eggborough	2.0 GW	1.0 GW	British Energy	under construction
Cottam	2.0 GW	1.0 GW	London Power (EdF)	under construction
Longannet	2.4 GW	1.2 GW	Scottish Power	call for tender published in OJ
Ferrybridge	2.0 GW	1.0 GW	AEP	S36 consent granted
Fiddlers Ferry	2.0 GW	0.5 GW	AEP	applied to DTI for S36 consent
Rugeley	1.0 GW	1.0 GW	International Power	applied to DTI for S36 consent
Aberthaw	1.5 GW	-	Innogy	
Didcot	2.0 GW	-	Innogy	
Drakelow	(1.0 GW)*	-	Powergen	to close Spring 2003
Cockenzie	1.2 GW	-	Scottish Power	
High Marnham	(1.0 GW)*	-	Powergen	to close Spring 2003
Ironbridge	1.0 GW	-	Powergen	
Kingsnorth	1.5 GW	-	Powergen	
Tilbury	1.0 GW	-	Innogy	
	27.6 GW	13.7 GW		

\* plants in administration or scheduled for closure, so not included in totals

### Emission Limit Values (ELV)

Plants may operate providing the ELVs in Figure 2 are met during normal operation. Commercially available, wet FGD systems achieve these limits. In this case, the Government would have to ensure that the national sulphur ceiling is not breached because simply meeting the ELVs cannot guarantee this.

Existing plants >400 MWth may emit 800 mg/Nm<sup>3</sup>, if they operate for less than 2,000 hours per year (23% load factor) before 31 December 2015 and less than 1,500 hours (17%) from then on.

### National Emission Reduction Plan (NERP)

As an alternative to ELVs, a Member State may implement a national plan based on the average emissions over the five years 1996-2000 from plants operating in 2000, providing overall emissions fall to the level they would have been had ELVs applied during the five year period. In the UK, a national plan would severely constrain the quantity of coal, especially UK coal, that could be consumed to roughly half what would be allowed under an ELV approach.

DEFRA favours a national plan, and justifies this based on a cost-benefit analysis. In DEFRA's opinion, a national plan would have to apply to all plant (*i.e.* it does not allow some to meet ELVs outside of a plan). The Environment Agency also wants a national plan and has already consulted on a sulphur trading mechanism to achieve the required reductions.

With over 12 GW of FGD either operational, under construction, contracted, or with serious intent to proceed beyond planning consent, there is little rationale for a national plan or for sulphur trading. Plant operators do not need to trade themselves out of emissions limits - they will be able to meet the LCPD ELV requirements without trading.

### Limited life derogation

An operator may unilaterally "*opt out*" (see Table 2 for timetable). Operators of the UK's oldest coal-fired power stations may find this commercially attractive. At the end of the 20,000 hour derogation, these stations could only continue operating if upgraded to meet new-new plant standards (although the LCPD does not explicitly cover this situation).

### IPPC implementation in the UK

The European IPPC Bureau in Seville, on behalf of the European Commission, is producing BAT reference documents (BREFs) which Member States must take into account when issuing IPPC permits. The BREF for large combustion plants exists as an initial working draft. It is a detailed, 400 page document that has allowed the Environment Agency to reach some initial views:

- Continued use of "A" and "B" mass limits for SO<sub>2</sub> emissions from power stations will be required, and extended to cover NO<sub>x</sub>, regardless of whether Government elects for ELVs or a national plan.
- FGD is considered BAT to the extent that the Agency would expect at least half of the units at a power station to be fitted with FGD.
- In the case of *opted-out* plants, FGD is not BAT, so **low sulphur coal or fuel switching** (*e.g.* to natural gas) would be expected.
- Regulation under IPPC should not commercially disadvantage owners of FGD plants; in particular, no commercial advantage should result to those who elect to *opt out* under the LCPD's 20,000 hour derogation. The Agency expects to award lower "A" and "B" mass limits to *opted-out* plants for this reason.
- Fuel switching and/or use of lower sulphur coals is considered BAT for industrial combustion processes (*i.e.* similar to current advice from the Agency contained in Technical Guidance IPC S3 1.01)

## LCPD interpretation Issues

There are a number of crucial questions which remain unanswered by Government. DEFRA is keen to interpret the LCPD in the most legally exact way. Unfortunately, the Directive itself is badly drafted in certain areas (notably the national plan). Moreover, DEFRA's legal advice is that the Directive should be interpreted so as to ensure the highest environmental standards - somewhat at odds with its stated intent not "to go beyond the LCPD".

The following list gives COALPRO's interpretations where these have differed from DEFRA's. It should be noted that Ministerial approval has been given to many of DEFRA's interpretations; any changes would now require intense lobbying or successful legal challenge.

- A single unit at a power station forms a "combustion plant" (e.g. the directive applies individually to each of the 4x500 MW units at the 2,000 MW Didcot power station) [Art.2(7)].
- "Operating hours" do not include start-up and shut-down, regardless of whether an ELV approach or national plan is adopted [Art.4(4)a, Art.5(1) & Art.14].
- A national plan should limit total emissions to the same level as would have been achieved with ELVs - no more nor less is demanded [Art.4(6)].
- Under a national plan, plant closures do not reduce the national sulphur bubble (i.e. the closed plant's emission allowance is redistributed) [Art.4(6)]. DEFRA promised this flexibility in a letter to a COALPRO member on 18 May 2001.

Past uncertainty surrounding interpretation of the LCPD has meant that neither the coal industry nor the electricity industry have formed definitive positions on its implementation. Beyond this, the uncertainty has put all FGD investment decisions on hold.

### Impact of LCPD on UK coal industry

The Government maintains that its goals on energy diversity and security would not be compromised by the LCPD. Indeed, the Environment Minister, Michael Meacher has stated publicly that the requirements of the LCPD and NECD could be met by burning coal with an average sulphur content of 1.7% if the FGD encouraged by Government following the 1998 *Energy Sources* White Paper (Cm 4071) is built.

COALPRO's calculations agree with the Minister's assessment for the NECD, but the implications of a national plan under the LCPD are only now becoming apparent, and the result may be out of line with Government's past promises.

The Department of Trade and Industry's (DTI) "central high" (CH) forecast in Energy Paper 68 (EP68) has power stations emitting 237 kt of SO<sub>2</sub> in 2010 for a coal burn of 32.3 Mt (see Table 4). The UK's agreement to the LCPD and NECD in Brussels on 22 June 2000 was based upon this projection. Assuming the 1.7% average sulphur content, this implies an average sulphur removal efficiency across the power generation sector of 78%, easily achievable at the 11 GW of power stations forecast by the DTI to have FGD in 2010 and 1 GW without.

However, with coal burn already running above EP68 forecasts, and new FGD under construction, we could contemplate a higher coal burn, still meeting the ELV requirements of the LCPD and remaining below our national SO<sub>2</sub> ceiling. There is, in fact, plenty of scope for more FGD retrofits and new, clean coal power stations to allow an annual coal burn of up to 50 Mt, mainly at power stations with efficient sulphur abatement.

A very different picture emerges if a national plan is chosen. The Government has recently employed the consultants Entec to estimate coal burn under a national plan using different LCPD interpretation scenarios. In practice, Entec's estimates are simply guesses, since it is impossible to judge what commercial decisions will be made before 2010. **However, if a national plan is adopted, then the sulphur "bubble" would shrink to 144 kt in 2010 and constrain coal burn for power generation to around 20 Mt per year - far below previous assessments and providing a market of just 10 Mt per year for the UK's high sulphur coals.** Table 5 summarises these calculations.

This paper has focused on power generation in Great Britain, yet some industrial users of coal will be severely hit by the LCPD from 1 January 2008 and are likely to face real difficulties and costs when burning higher sulphur, UK coals. Whilst a national plan appears to offer these users the flexibility to emit SO<sub>2</sub> providing reductions are made elsewhere, COALPRO believes that there is no such flexibility available under the IPPC Directive, thus removing any perceived benefit of a national plan. Such users must either fit sulphur abatement equipment or switch away from UK coals.

Table 4 - Annual sulphur dioxide (SO<sub>2</sub>) emissions from the UK

sector	actual in 2000, kt SO <sub>2</sub>	subtotals	EP68 projection for 2010, kt SO <sub>2</sub>	change, %
power stations	826	826	237	-71%
industrial power generation	81			
refineries	72			
other industrial combustion	34			
production processes	31			
other industrial	12			
iron and steel	11	241	285	+18%
domestic	44	44	15	-66%
commercial, public & agricultural combustion	17	17	20	+18%
shipping	20			
transport	11	31	16	-48%
other	6	6	4	-33%
total	1,165	1,165	577	-50%

**Table 5 - Showing the calculation of a sulphur bubble under a national plan (DEFRA) and how this compares with DTI Energy Paper 68 (EP68 CH) and COALPRO's own assessment using ELVs**

	1996	1997	1998	1999	2000	2010		
						DEFRA	EP68 CH	COALPRO
ESI electricity generated <sup>1</sup> , GWh	135,994	110,059	112,894	97,348	111,850	50,000	83,000	125,000
ESI coal burn <sup>2</sup> , kt	53,423	45,323	46,627	39,583	44,762	20,000	32,300	50,000
ESI SO <sub>2</sub> emissions <sup>3</sup> , kt	1,320	1,025	1,072	776	826	144	237	237
coal used per unit of electricity, g/kWh	393	412	413	407	400	400	389	400
SO <sub>2</sub> emitted per unit of electricity, g/kWh	9.71	9.31	9.50	7.97	7.38	2.88	2.86	1.90
SO <sub>2</sub> in flue gas (approx.), mg/Nm <sup>3</sup>	2,623	2,517	2,566	2,154	1,996	777	772	512
sulphur in coal (est.), %	1.67%	1.50%	1.42%	1.37%	1.25%	1.30%	1.30%	1.30%
overall sulphur removal, %	26%	25%	19%	28%	26%	72%	72%	82%

ESI - electricity supply industry

<sup>1</sup> Digest of UK Energy Statistics - Table 5.6, DTI, London: The Stationary Office, July 2002

<sup>2</sup> *ibid.* Table 2.7

<sup>3</sup> Digest of Environmental Statistics - Table 2.8, DEFRA, London: The Stationary Office, October 2002

### **COALPRO position statement**

**COALPRO wants to see a fully competitive market for high sulphur UK coals.** Its members do not want to be restricted to supplying coal to just a handful of power station units fitted with FGD. With no alternative customers, UK coal producers would be in a hopelessly weak commercial position and be forced to accept low selling prices. COALPRO's aim is to avoid such a situation by seeking Government encouragement for the construction of the remaining FGD retrofit projects resulting from the 1998 *Energy Sources* White Paper and identified in Table 3.

**COALPRO is concerned that DEFRA is implementing the LCPD in a way that will actually force coal burn to decline as projected in DTI Energy Paper 68** (towards the *central low / central high* (CL/CH) average). If this projection turns out to significantly underestimate coal burn, then there is a real risk that the UK will not meet its Kyoto commitment on reducing greenhouse gas emissions, including carbon dioxide (CO<sub>2</sub>). COALPRO asks that the Government is explicit about its intentions with respect to the future use of coal for power generation and not to use LCPD implementation as a means to achieve other policy objectives.

**COALPRO is fundamentally opposed to a National Emissions Reduction Plan and sulphur trading.** The proposed national plan is founded on the presumption that coal consumption declines in the future towards the CL/CH average case in EP68. Any increase in coal burn, allowed under the NECD, would be constrained by the national plan. In practice, a national plan under LCPD would introduce another, much lower ceiling for SO<sub>2</sub> emissions. This ceiling would be further reduced with sulphur trading because some headroom would be needed to insure against those who emit without the requisite allocation.

The national plan is based on the coal burn during the five years 1996-2000 during which time, coal consumption fell to an all-time low; a trend that has since reversed such that coal burn is now above the Government's projections in EP68. Under an ELV approach, an increased coal burn can be accommodated, but under a national plan, with its shrinking sulphur bubble, it would perversely result in power stations having to achieve even tighter ELVs than called for in the LCPD.

COALPRO has examined the cost-benefit studies reported by DEFRA. These are based on projections from EP68 which already assume the requirements of the LCPD and NECD will be met, largely through reduced coal burn and switching from indigenous coal use to low sulphur imports. Not surprisingly therefore, DEFRA reports that the cost of compliance will be significantly less under a national plan than with an ELV approach. **COALPRO believes that the projections in EP68 are now dated and do not represent a suitable baseline against which to make a decision between ELVs or a national plan.**

The UK Government should not close the door on future coal use. This is especially true today with so much uncertainty over the source and cost of our future supplies of natural gas. **A national plan under the LCPD is strategically wrong for the UK.**



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