

## Petitions Committee

15 February 2008

This paper provides specific information to help inform any decision the Petitions Committee may take on the "Consultation and the new South East Wales Draft Regional Waste Plan" petition.

### Outline of the environmental licensing process for power stations

The most relevant environmental regulatory instrument for power stations is Pollution Prevention and Control, soon to be regulated under *The Environmental Permitting (England and Wales) Regulations 2007*<sup>1</sup>, which will come into force on 6 April 2008. Section 12 of the Regulations states that an installation such as Aberthaw power station must only operate under the conditions of a permit, granted by the regulator (the Environment Agency).

When determining the conditions of this permit, the regulator must ensure compliance with the relevant provisions of the Large Combustion Plants Directive (LCPD) (this Directive applies to all combustion plants rated greater than 50MW). However, the LCPD applies without prejudice to the Integrated Pollution Prevention and Control (IPPC) Directive, meaning that any IPPC requirements which are additional to those of LCPD take precedence, notably the requirement for emission limit values to be based on the application of Best Available Techniques (BAT).

#### *The Large Combustion Plants Directive (LCPD)*

Under the LCPD, Environment Agency Wales should have ensured that by 1 January 2008 at the latest, the licence for the operation of Aberthaw power station contained conditions relating to compliance with the emission limit values established for new plants under the Directive<sup>2</sup>, or was subject to the UK National Emission Reduction Plan (NERP) (Aberthaw did not take the NERP option<sup>3</sup>).

In particular, the following criteria apply<sup>4</sup>:

- None of the calendar monthly mean values may exceed the emission limit values
- For sulphur dioxide (SO<sub>2</sub>) and dust, no more than 3 per cent of all the 48 hourly mean values may exceed 110 per cent of the emission limit values
- For nitrogen oxides (NO<sub>x</sub>), no more than 5 per cent of all the 48 hourly mean values may exceed 110 per cent of the emission limit values

The emission limit value for NO<sub>x</sub> (measured as NO<sub>2</sub>) is 500mg/Nm<sup>3</sup> until 31 December 2015, and 200mg/Nm<sup>3</sup> thenceforth (where Nm<sup>3</sup> is cubic metres at standard temperature and pressure). The 2016 limit will require new equipment to be installed at Aberthaw<sup>5</sup>.

<sup>1</sup> OPSI, *The Environmental Permitting (England and Wales) Regulations 2007*, SI 2007/3538,

[http://www.opsi.gov.uk/si/si2007/uksi\\_20073538\\_en\\_1](http://www.opsi.gov.uk/si/si2007/uksi_20073538_en_1)

<sup>2</sup> DEFRA, *Environmental permitting: Draft environmental permitting guidance – the Large Combustion Plants Directive*, July 2007,

<http://www.defra.gov.uk/corporate/consult/envpermitprog4/pdf/epp8-large-combustionplants-directive.pdf>

<sup>3</sup> Environment Agency Wales, *Appendix 1 consultation document: Aberthaw power station*,

[http://www.environment-agency.gov.uk/commondata/acrobat/aberthaw\\_1765423.pdf](http://www.environment-agency.gov.uk/commondata/acrobat/aberthaw_1765423.pdf)

<sup>4</sup> DEFRA, *Environmental permitting: Draft environmental permitting guidance – the Large Combustion Plants Directive*, July 2007,

<http://www.defra.gov.uk/corporate/consult/envpermitprog4/pdf/epp8-large-combustionplants-directive.pdf>

The emission limit value for SO<sub>2</sub> is 400mg/Nm<sup>3</sup>. The emission limit value for dust is 50mg/Nm<sup>3</sup>.

*The Integrated Pollution Prevention and Control (IPPC) Directive*

Under the IPPC Directive (transposed by *The Pollution Prevention and Control (England and Wales) Regulations 2000*<sup>6</sup>), installations must use 'best available techniques' – defined as "the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing in principle the basis for emission limit values...".

Installations should be operated in such a way that<sup>7</sup>:

- "All the appropriate preventative measures are taken against pollution, **in particular through the application of the best available techniques**; and
- No significant pollution is caused"

[emphasis added]

A permit to operate may impose limits on the amount or composition of any substance produced or utilised during the installation's operation. In particular, a permit shall include emission limit values for pollutants likely to be emitted in substantial quantities, such as sulphur dioxide, oxides of nitrogen, and dust, and **these values should be based on best available techniques**.

The Environment Agency has determined that the sector-level best available techniques are as follows<sup>8</sup>:

- From 1 January 2008, flue gas desulphurisation (FGD) or an equivalent technique to reduce emissions of SO<sub>2</sub>, for combustion plants such as Aberthaw
- Use of low NOx burners and Over Fire Air (OFA) (or equivalent measures) to limit NOx emissions, for combustion plants such as Aberthaw
- Electrostatic precipitators for the control of particulates (dust), for combustion plants such as Aberthaw

However, the Environment Agency's framework states that<sup>9</sup>:

2.1.5. BAT for NOx control on opted-in LCP at Aberthaw designed to operate on low volatile coal will be determined on the basis of its PPC application. It may comprise some combination of the established technique of Thermal Input Biasing; the dynamic classifier technology currently being trialed; SCR; and/or other techniques. An ELV will be set based on BAT, at least matching the minimum requirements of Annex VIA Note 3.

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<sup>5</sup> IEA Clean Coal Centre, *Future generation: Coal forum sub group report*, 23 January 2007, <http://www.berr.gov.uk/files/file39914.pdf>

<sup>6</sup> DEFRA, *The Pollution Prevention and Control (England and Wales) Regulations 2000*, unofficial consolidated version, <http://www.defra.gov.uk/environment/ppc/regs/pdf/ppcregs-consolidated.pdf>

<sup>7</sup> *ibid*

<sup>8</sup> Environment Agency, *A framework for the regulation of existing large coal- and oil-fired combustion plant at power stations in England and Wales: 2008-15*, May 2007, [http://www.environment-agency.gov.uk/commondata/acrobat/bat\\_combustion\\_1766013.pdf](http://www.environment-agency.gov.uk/commondata/acrobat/bat_combustion_1766013.pdf)

and:

2.2.4... All LCP except the downfiring boilers at Aberthaw are expected to have OFA (or equivalent) in operation by 1 January 2008, fixing the emissions rate.

and:

2.2.5. From 1 January 2008, transferable Operator NOx B-Limits would be allocated to coal-fired LCP taking the LCPD ELV route (except at Aberthaw) at **12.7 kt/year per GWe**. [emphasis as in original]

and:

2.2.6. Applying the same methodology, the down-firing LCP at Aberthaw burning low volatile coals would be allocated a transferable NOx B Limit at **27.9 kt NOx/year per GWe**. [emphasis as in original]

## Glossary

- B-limit – the limit applicable to ensure compliance with the environmental requirements across the sector (the allowances under the limits are transferable across power stations).
- BAT – Best Available Techniques. "The most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing in principle the basis for emission limit values".
- ELV – Emission Limit Values. The values that form the basis for limiting emissions of pollutants.
- FGD – Flue Gas Desulphurisation. These technologies are widely used to control the emissions of sulphur dioxide (SO<sub>2</sub>) and sulphur trioxide (SO<sub>3</sub>) from large stationary sources such as coal- and oil-fired power stations and refineries<sup>10</sup>. Most FGD processes use an alkali sorbent to recover the acidic sulphur compounds from the flue gas.
- GWe – GigaWatts electric = 1,000,000,000 (1 billion) Watts of electric capacity.
- LCP – Large Combustion Plant. Any combustion plant with a rating greater than 50MW.
- NOx – a generic term for mono-nitrogen oxides (NO and NO<sub>2</sub>). These oxides are produced during combustion, especially at high temperatures. In atmospheric chemistry the term NOx refers to the total concentration of NO plus NO<sub>2</sub>. NO<sub>2</sub> is associated with adverse effects on human health. At high levels, it causes inflammation of the airways; long-term exposure may affect lung function and respiratory symptoms<sup>11</sup>. NO<sub>2</sub> also enhances the response to allergens in sensitive individuals.
- OFA – Over Fire Air. A system for reducing NOx emissions by diverting secondary air flow above the burner zone in a generating station.
- PFA dust particles – Pulverised Fuel/Fly Ash dust particles. PFA is composed of inorganic material with a small proportion of carbon particles resulting from the incomplete combustion of

<sup>9</sup> *ibid*

<sup>10</sup> DTI, *Flue gas desulphurisation (FGD) technologies*, March 2000,

<http://www.berr.gov.uk/files/file19291.pdf>

<sup>11</sup> DEFRA, *The air quality strategy for England, Scotland, Wales and Northern Ireland*, July 2007,

<http://www.defra.gov.uk/environment/airquality/strategy/pdf/air-qualitystrategy-vol1.pdf>



the parent fuel, coal<sup>12</sup>. PFA is not considered to be "especially hazardous", but should be handled "in accordance with good occupational hygiene and safety practices"<sup>13</sup>. A paper on the health impacts of fly ash notes the following<sup>14</sup>:

A great deal of research has been conducted into the health implications of working with pulverised fuel ash. Data from cell test systems and animal experiments indicates that normal levels of exposure (ie exposure to levels below the limit for nuisance inhalable substances) are not likely to have any significant health implications. The results of epidemiological research confirm this conclusion.

- PPC – Pollution Prevention and Control.
- SCR technology – Selective Catalytic Reduction technology. SCR is a means of converting NOx into diatomic nitrogen (N<sub>2</sub>) and water, by means of a catalyst. Commercial systems have been shown to reduce NOx from 70 to 95 per cent.

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<sup>12</sup> United Kingdom Quality Ash Association, *Technical data sheet 9.0*,  
[http://www.ukqaa.org.uk/Datasheets\\_PDF/Datasheet\\_9-0\\_Aug\\_2004.pdf](http://www.ukqaa.org.uk/Datasheets_PDF/Datasheet_9-0_Aug_2004.pdf)

<sup>13</sup> *ibid*

<sup>14</sup> Meij R and te Winkel H, 2001, *Health aspects of coal fly ash*, 2001 International Ash Utilization Symposium, University of Kentucky,  
<http://www.flyash.info/2001/keynote/21meij.pdf>