

**ELECTRICITY MARKET REFORM: UPDATE ON
THE EMISSIONS PERFORMANCE STANDARD**

Contents

Excutive Summary	3
Background.....	3
Level and Compliance	4
Administration - Monitoring and Enforcment arrangements.....	7
Accounting for heat (Good Quality Combined Heat and Power).....	8
Grandfathering.....	10
Upgrades and life extensions that bring exisitng plant under the EPS...	10
CCS exemptions	11
EPS in the Devolved Administrations	12

EXECUTIVE SUMMARY

The Electricity Market Reform (EMR) White Paper confirmed Government's intention to introduce an Emissions Performance Standard (EPS) as an annual limit on carbon emissions from new fossil fuel plant equivalent to 450g/kWh at baseload and signalled the Government's intention to work closely with stakeholders to further develop aspects of the mechanism's detailed technical design and implementation.

This update details the Government's intentions on the technical design of the EPS, including:

- Examples of how annual emissions will be monitored, and the intention to closely align reporting with reporting of emissions under the EU Emissions Trading System;
- How heat will be accounted for, and the intention to exclude emissions associated with heat production from Good Quality Combined Heat and Power plants (GQCHP);
- That, as an exception to the principle that the EPS will not apply retrospectively, where coal plant undertakes significant upgrades or extensions by replacing a boiler, they will be subject to the EPS regime;
- That projects which form part of the CCS Programme, will be exempt from the EPS, with exemptions applied on a case-by-case basis and qualified by the receipt of public funding or a Cod.
- That the level of the EPS will be maintained for plant consented under the 450g/kWh-based limit until 2045;
- Confirmation of plans to review the EPS as part of the decarbonisation reports required under the 2010 Energy Act;
- The scope of the type of plants that will be affected, including the Government's intention that "fossil fuel" be defined in such a way as to cover plant whose main source of fuel is natural gas, coal or oil, or products derived from them for use as a fuel.

BACKGROUND

1. The Electricity Market Reform (EMR) White Paper confirmed that Government's intention is to introduce an Emissions Performance Standard (EPS) as an annual limit on carbon emissions from new fossil fuel plant, and signalled the Government's intention to work closely with stakeholders to further develop aspects of the mechanism's detailed technical design and implementation. Policy decisions on EPS announced in the Electricity Market Reform White Paper cover:

- **Scope:** EPS would be applicable to new fossil fuel power stations at or over 50MWe¹, and not applied retrospectively to those already consented
 - **Level:** set as an annual limit of CO₂ equivalent to 450g/kWh (at baseload)
 - **Grandfathering:** from the point of consent for a clear and pre determined period
 - **Review:** regular reviews of EPS in line with decarbonisation reporting (3 yearly)
 - **Upgrades:** existing plant which undergo significant upgrade or life extension to be subject to EPS
 - **Exemptions:** exemptions for plant in the CCS Programme
 - **Biomass:** zero rated, in line with EU ETS
 - **CHP:** consider how to accommodate heat use
 - **Administration:** Environmental Regulator, using existing processes and reporting, subject to more detailed implementation planning
 - **Exceptions:** power to make exceptions to maintain energy security
2. The EMR Technical Update committed to releasing further technical details on EPS policy. This update covers:
- Method of calculating compliance with the EPS level
 - Administration (monitoring and reporting arrangements)
 - Accounting for Heat (CHP)
 - Grandfathering
 - Upgrades and life extensions that bring existing plant under the EPS
 - Exemptions for projects in the UK CCS programme or benefiting from European funding for commercial scale CCS.
 - Further detail on types of plant affected

LEVEL AND COMPLIANCE

3. The White Paper confirmed that the EPS would be set as an annual limit on emissions equivalent to 450g/kWh at baseload. This is the same as 450kg/MWh.
4. In practice, this means giving plant a total tonnage allowance of CO₂ within which they would have to remain each year. It is intended that this tonnage be calculated based on a plant's installed electrical capacity², and for baseload to be based on 85% load factor.

¹ Electrical capacity

² Figures for individual power stations' installed capacity in MW can found in 'Digest of UK Energy Statistics (DUKES)', table 5.11

http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/source/electricity/electricity.aspx

The total allowance for a plant would therefore be:

$450\text{kg/MWh} \times \text{hours in a year} \times 85\% \times \text{plant capacity}$

i.e. $450 \times 8760 \times 85\% \times Z \text{ MW} = \text{allowance in tonnes}$

This equates to 3350.7t per MW of capacity.

This will impact new coal plant, and reinforces the requirement that they demonstrate CCS on at least 300MW (net) of the proposed generating capacity³. The EPS will not, however, constrain new gas plant.

Example 1 – 1600MWe Advanced Supercritical Coal, operating at Baseload

Annual Limit = $450 * 8760 * 85\% * 1600$

Annual limit = 5,361,120,000 kg

= 5.36 mt

If the plant's emissions are 790g/kWh, at baseload it will emit

Annual Emissions (illustrative) = $790 * 8760 * 85\% * 1600$

Annual Emissions = 9,411,744,000 kg

= 9.41 mt

The plant's annual emissions would be greater than their annual limit, so would not be compliant with the EPS. In this instance, they would have needed to abate over 4 million tonnes of CO₂.

ASC coal would need to demonstrate CCS on roughly 40% of the plant to abate enough CO₂ to be compliant with the EPS through CCS alone.

³ The National Policy Statement for fossil fuel electricity generation (EN-2) requires that any new coal fired plant demonstrate CCS on at least 300MW (net) of the proposed generating capacity as a condition of its consent.

Example 2 – 800 MWe CCGT plant, operating at baseload

$$\text{Annual limit} = 450 * 8760 * 85\% * 800$$

$$\text{Annual limit} = 2,680,560,000 \text{ kg}$$

$$= 2.68 \text{ mt}$$

If the CCGT's emission intensity is 360g/kWh, at baseload it will emit, for example:

$$\text{Annual Emissions (illustrative)} = 360 * 8760 * 85\% * 800$$

$$= 2,144,448,000 \text{ kg}$$

$$= 2.14 \text{ mt}$$

The plant's annual emissions are below their limit, so it is compliant with the EPS.

Example 3 – 100 MWe OCGT plant, providing peaking capacity

$$\text{Annual limit} = 450 * 8760 * 85\% * 100$$

$$\text{Annual limit} = 335,070,000 \text{ kg}$$

$$= 0.33507 \text{ mt}$$

Whilst the average carbon emissions intensity of OCGT – 460gCO₂/kWh – is higher than the level at which the EPS would be set, these plants operate at very low load factors therefore they will be able to comply with the EPS by running for a limited number of hours and it will not interfere with their ability to provide load balancing services. For example:

$$\text{Annual Emissions (illustrative)} = 460 * 8760 * 2\% * 100$$

$$= 8,059,200 \text{ kg}$$

$$= 0.008 \text{ mt}$$

The plant's annual emissions are below their limit, so it is compliant with the EPS.

5. The calculation on annual emissions is illustrative only. Under the EPS, we intend this to be based on actual emissions as reported by plant to the environmental regulator for the purposes of EU Emissions Trading System (see below).

ADMINISTRATION - MONITORING AND ENFORCEMENT ARRANGEMENTS

6. The monitoring and enforcement arrangements will be subject to detailed new regulation. However, as indicated in the White Paper, the Government will be looking to keep any additional regulatory burden to a minimum, and believes the EPS can be implemented in a manner consistent with the administration of other mechanisms by the environmental regulators.
7. In particular, it is our intention that monitoring compliance with the EPS will be assessed based on the annual CO₂ emissions reported for the purposes of the EU Emissions Trading System. We intend to keep the reporting year the same (calendar) and for the determination of whether a plant has complied with the EPS limit to be based on an operator's annual verified emission report submitted to the relevant environmental regulator by the 31 March following the relevant calendar year.
8. Provisions have also been proposed which allow for regulations to specify categories of emissions by reference to provision made by or under regulations implementing the ETS Directive.
9. For most operators, there should be no more additional steps in the process, and they will not be required to undertake any reporting in addition to their annual ETS emissions reporting. However, as explained below, it may be necessary to add in an additional step in order to avoid a situation in which the EPS could create a disincentive to utilise heat from Good Quality CHP plant.
10. We expect that enforcement measures will, generally, follow the regulators' usual enforcement routes. Much of the detail of enforcement provisions is likely to be set out in secondary legislation, after consultation. As outlined in the EMR overview document, the UK's Government's preference is for the EPS to apply across the UK. This legislation would, therefore, also need to take account of the roles of the different environmental regulators across the UK.

ACCOUNTING FOR HEAT (GOOD QUALITY COMBINED HEAT AND POWER)⁴

11. In the EMR White Paper, the Government confirmed that it would “look to avoid structuring the EPS in a way which would act as a disincentive to investment in CHP, as far as is practicable.”
12. Good Quality CHP will be a key technology in helping to deliver our carbon budgets while the electricity generation sector decarbonises, and will still play a pivotal role in providing secure and cost-effective energy supplies, particularly for industry. The Government will therefore continue to promote the development of Good Quality CHP in the UK, and EPS will make allowances for the fuel used to generate useful heat when calculating allowed emissions to ensure that CHP facilities are not penalised.
13. Our preferred approach, subject to detailed regulations, is to use only those emissions attributable to electricity production when determining whether a Good Quality CHP⁵ plant has complied with the EPS limit. This would be on the basis that their Qualifying Heat Output (QHO) would be displacing separate heat generation, the emissions of which would therefore be discounted.
14. For plant which qualifies to discount the emissions associated with heat production, it is the intention that the regulator would use the Qualifying Heat Output detailed on the relevant year’s CHPQA certificate. It is expected that the process would involve submitting a copy of the certificate to the regulator alongside their annual verified emissions report, together with a copy of either their Secretary of State (Energy Efficiency) Certificate or Secretary of State (combined heat and power) exemption certificate. The regulator would then use these to confirm that the plant is eligible for the discount and determine the emissions to be discounted.
15. For example, if a plant reports its total annual emissions as X million tonnes of qualifying CO₂⁶, but as well as generating electricity it has displaced heat generation that would have resulted in y million tonnes of CO₂, then X-minus Y would be used to determine whether the plant is within the EPS.

⁴ <http://chpqa.decc.gov.uk/>

⁵ In receipt of a CHPQA certificate

⁶ E.g. excluding emissions relating to biomass

- This would be calculated on a ‘boiler displacement’ method, assuming that the QHO is displacing a gas-fired boiler with a net efficiency of 90%⁷.
- The total emissions to be discounted will therefore be the QHO of the plant, in kWh, multiplied by the emission intensity of a 90%⁸ efficient gas boiler (0.205⁹ ÷ 90%).

16. In practice, a plant will be reporting its total annual emissions to the regulator for the purposes of the ETS. Under this approach, the operator would undertake an exercise to discount the relevant emissions associated with heat, and the regulator would then verify the calculation. It is intended that the QHO detailed in a plant’s CHPQA certificate will be used for this calculation.

Calculation of emissions for Good Quality CHP

Total Emissions Reported under ETS = w tonnes

Qualifying Heat Output from CHPQA certificate = x kWh

Total emissions for electricity = $w - (x * 0.205 / 0.9) = y$

Plant’s allowed emissions under EPS = z

If $y < z$, plant is compliant.

n.b. ($x * 0.205 / 0.9$) is the estimated emissions that are displaced by the Good Quality CHP heat

Worked Example – Gas CHP – 150MWe generating capacity

At 450g/kWh at baseload, it is permitted 3350.7t of CO₂ per MW of installed capacity. Its total annual limit is therefore 0.5mt (500,000t) CO₂ per year.

In 2015, it reports 700,000t of CO₂. There are no zero-rated biomass emissions.

Its Qualifying Heat Output is recorded as 2,000,000 MWh

Total emissions for electricity, on the basis that the heat is displacing a 90% efficient gas boiler, is calculated as follows:

$$700,000 - (2,000,000 * 0.205 / 0.9) = 244,445t$$

This is less than the allowed 500,000t – **plant is therefore compliant**

⁷ Net calorific value

⁸ This is the reference efficiency quoted in Annex II of Commission Decision 21 December 2006, establishing efficiency reference values for the separate production of electricity and heat

⁹ Emission factor of natural gas at LHV, in t/MWh

17. Under this approach, plant which do not hold a CHPQA certificate would not be eligible to discount their emissions, as they will not be able to verify their QHO which is key data to calculating the emissions for Good Quality CHP.

GRANDFATHERING

18. The EMR White Paper confirmed that the Government would apply a principle of 'grandfathering' to the EPS, meaning that once a plant is consented under the 450g/kWh-based level, it would not be affected by any potential changes to the level for a pre-determined period.

19. Further to the White Paper, we have undertaken an informal consultation exercise and engaged further with stakeholders on how grandfathering should work in practice. Given the importance of investment in new gas as we make the transition to low carbon, and the need to provide investors with sufficient certainty, we propose that the Bill should provide that the 450g/kWh-based level will apply to any plant that falls within the scope of the EPS at this level until 2045.

20. The Government will review the EPS on a regular basis. As outlined in the White Paper, this will form part of the decarbonisation reporting process required under s5 of the Energy Act 2010. If it were deemed that changes were necessary for future plants¹⁰, for example to the emissions limit if it was considered that there sufficient new gas generation was in place to maintain security of supply as older fossil fuel plant close, these would be consulted on and introduced through primary legislation.

UPGRADES AND LIFE EXTENSIONS THAT BRING EXISTING PLANT UNDER THE EPS

21. As an exception to the general principle that the EPS will only be applied to new, and not to existing plants, the EMR White Paper indicated the decision that those existing plants which undergo significant upgrades or life extension after the EPS regime has come into force would be subject to it, whilst upgrades to comply with EU law, retrofitting CCS or conversion works to facilitate the use of biomass would not trigger EPS on existing plant.

22. It is our intention that the upgrades that should trigger the application of EPS to existing plants should be upgrading a coal plant to supercritical technology or the

¹⁰ i.e. new consents

replacement of an existing coal plant's boiler. It is intended that provision will be made for this in secondary legislation.

23. This approach offers certainty to investors and operators, and is consistent with allowing plant to undertake routine maintenance and equipment replacement which is part of normal plant operation, as well as ensuring that if a plant needs to carry out other major works, e.g. installation of CCS or equipment needed to meet European environmental standards¹¹, it will not be caught.

CCS EXEMPTIONS

24. The EMR White Paper indicated that the EPS will not undermine CCS projects forming part of the UK's CCS Programme or benefiting from European funding for commercial scale CCS, and that we would consider further how to implement exemptions to ensure that the UK CCS Programme is given maximum flexibility to select projects based on its objectives.

25. The Government intends to exempt projects which form part of the CCS programme, the construction and/or operation of which is supported by public funding, EU funding for commercial scale CCS development or through a Cod. We expect these exemptions to be applied on a case-by-case basis.

26. Any decision to grant such an exemption, and any conditions attached to it, would be taken with regard to published criteria on which there has been prior consultation, subject to legislation.

Further detail on types of plant affected

27. The EMR White Paper confirmed that the EPS would be applied to new fossil fuel plant. It is our intention that "fossil fuel" for these purposes should be defined in such a way that the EPS covers power stations whose main source of fuel is natural gas, coal or petroleum (oil) or other products derived from them for use as a fuel.

28. As such, other power stations, designed to use other input fuels, for example dedicated biomass or Energy from Waste plant, would not be covered by the mechanism.

¹¹For example, equipment to reduce NOx or other emissions as required by the Industrial Emissions Directive.

29. In the future, it is possible that plants will be built which extract fuels that do not produce CO₂ when burnt (e.g. hydrogen) from fossil fuels such as coal, with a view to supplying those non-CO₂ emitting fuels to power stations that will burn them to generate electricity. In some cases these extraction plants are likely to be fully integrated into a power station complex, and to supply the non-CO₂ emitting fuels wholly or mainly to the on-site power station. In such cases the combined extraction plant and generating station should be subject to the EPS regime, although the generating part of it would not have to take any action to comply with the EPS as it would not be burning a CO₂-emitting fossil fuel. In other cases, the extraction plant may be physically separate, and under different management, from any power station they supply (and they may also serve non-power station customers). However, they would still be potentially large emitters of CO₂ whose emissions would be likely (at least in part) to be related to the generation of electricity, ultimately from fossil fuel sources. The Government therefore intends that the EPS regime should include provision for such “free-standing” extraction plants, if they become a commercial reality, to be made subject to EPS.

EPS IN THE DEVOLED ADMINSTRATIONS

Northern Ireland

30. Energy policy is transferred to the Northern Ireland Executive (with the exception of most elements of nuclear power). The Northern Ireland Executive has agreed that extension of the EPS provisions will apply to Northern Ireland, while taking into account both devolved competencies and Northern Ireland's position within the Single Electricity Market (SEM).
31. We will continue to involve Northern Ireland Ministers in further design and development work to ensure that the Northern Ireland Executive's devolved competency is respected.

Scotland

32. On the EPS, the UK Government recognises the Scottish Government's responsibilities relating to the control of emissions and consenting thermal generation. The UK Government considers this to be an electricity generation measure and would prefer to legislate for an EPS to apply UK wide. We will undertake further work with Scottish Ministers to discuss the application of the EPS in Scotland.

Wales

33. On the EPS, the UK Government recognises the Welsh Government's responsibilities relating to the control of emissions. The UK Government

considers this to be an electricity generation measure and would prefer to legislate for an EPS to apply UK wide with the level defined in Primary legislation. We will undertake further work with Welsh Ministers to discuss the application of the EPS in Wales.