Title: Emissions Performance Standard **Lead department or agency:** **DECC** **Other departments or agencies:**	Impact Assessment (IA)
	IA No: DECC0064
	Date: 12/07/2011
	Stage: Consultation
	Source of intervention: Domestic
	Type of measure: Other
	Contact for enquiries: Selcan Kayihan 0300 068 6913

Summary: Intervention and Options

What is the problem under consideration? Why is government intervention necessary?

Climate Change is a global market failure. In response to this the UK has set itself emission reductions targets and whilst the UK is on target to reduce its greenhouse emissions in 2020 by 34% on 1990 levels, in line with carbon budgets and the EU target, the longer term goals are more challenging. For example, in 2008 the Climate Change Act set a target to reduce greenhouse gas emissions by at least 80% by 2050, compared to 1990 levels.

The electricity system needs to be substantially decarbonised during the 2020s, particularly if it is to play its part in decarbonising the heat and transport sectors in the 2030s and beyond. Fossil fuel fired electricity generation is responsible for a significant proportion of the UK's emissions. It is necessary to limit these emissions to help meet decarbonisation targets.

The Coalition Programme for Government stated that the Government would establish an Emissions Performance Standard (EPS) "that will prevent coal-fired power stations from being built unless they are equipped with sufficient carbon capture and storage to meet the emissions performance standard."

What are the policy objectives and the intended effects?

The policy objective is for the EPS to act as a regulatory backstop, alongside the other decarbonisation policies set out in the accompanying EMR White Paper, ensuring that while fossil fuel-fired electricity generation continues to make an important contribution to electricity security of supply it does so in a manner consistent with the UK's decarbonisation objectives.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

The policy options that have been considered are:

- Option 1: Introduce an EPS of 600gCO_2/kWh
  An annual limit on the amount of CO2 a plant can emit, equivalent to 600gCO2/kWh for plant operating at baseload[1]
- Option 2: Introduce an EPS of 450gCO_2/kWh
  An annual limit on the amount of CO2 a plant can emit, equivalent to 450gCO2/KWh for plant operating at baseload[2], with exemptions for projects in the UK Carbon Capture and Storage demonstration programme or projects benefiting from European funding for commercial scale CCS.

The preferred option is Option 2. This option allows for greater flexibility for the CCS Demonstration Programme.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 2015 **What is the basis for this review?** PIR **If applicable, set sunset clause date:** To be determined in the final IA	
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	Yes

Ministerial Sign-off For consultation stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options

[1] For the purposes of the analysis presented in the IA, baseload is assumed to be 85%
[2] For the purposes of the analysis presented in the IA, baseload is assumed to be 85%

Signed by the responsible Minister:  Date: 12/07/2011

Summary: Analysis and Evidence — Policy Option 1

An EPS as an annual limit on the amount of CO2 a plant can emit, equivalent to 600gCO2/KWh for plant operating at baseload.

Price Base Year 2010	PV Base Year 2010	Time Period Years 17	Net Benefit (Present Value (PV)) (£m) -£0.6m		
			Low:	High:	Best Estimate: -£0.6m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low				
High				
Best Estimate	0.06		**0.05**	**0.6**

Description and scale of key monetised costs by 'main affected groups'

There would be a one-off cost to business for an initial regulatory exchange to establish the EPS value for each plant. The Environmental Agency estimated that this cost could be approximately £5,000 for each new plant.

Also there will be the annual operating costs of a central body administering the EPS. The Environmental Agency estimated that this cost could be approximately £50,000 per year. This estimate is based on the Environment Agency's experience of administering the EU ETS and is for the cost of administering an EPS in England and Wales only. Administering the EPS in Scotland may increase this cost and if so will be taken into account in the final stage IA.

The EPS proposed at this level is not expected to result in an impact on investment, operation decision making or security of supply.

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low				
High				
Best Estimate	0		0	**0**

Description and scale of key monetised benefits by 'main affected groups'

This option does not give rise to any changes compared to the baseline with regards to generation mix or load factor, as the emissions of the new fossil fuel plants that the modelling suggests will become operational, combined with their estimated load factors under the baseline, do not breach the emissions limit created of this level of EPS.

Other key non-monetised benefits by 'main affected groups'

The EPS will provide further clarity on the regulatory environment for fossil fuel power stations

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Use of different fossil fuel price scenarios does not change the conclusions.

The analysis presented relies on the baseline as modelled by Redpoint for the Electricity Market Reform (EMR) White Paper using a sophisticated economic model of investment in electricity generation. All modelling is dependent on the assumptions and methodology used. While the Government's view is that the policy will improve clarity and investor confidence, it is not possible to model with accuracy the impact of the policy on investor sentiment.

The details of grandfathering have not been finalised although the objective of policy in this area will be that investment in gas needed to maintain security of supply is not deterred. The IA assumes the EPS is grandfathered for all new fossil fuel plant with no time limit. Further analysis will be carried out prior to a final IA.

Direct impact on business (Equivalent Annual) (£m):			In scope of OIOO	Measure Qualifies as
Costs: 0.05	**Benefits**: 0	**Net**: -0.05	Yes	IN

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			Great Britain		
From what date will the policy be implemented?			2014		
Which organisation(s) will enforce the policy?			Environmental Regulator		
What is the annual change in enforcement cost (£m)?			0.02		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			N/A		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:**	**Non-traded:**	
Does the proposal have an impact on competition?			No		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:**	**Benefits:**	
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	**Micro**	**< 20**	**Small**	**Medium** 100%	**Large**
Are any of these organisations exempt?	No	No	No	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on…?	**Impact**	**Page ref within IA**
Statutory equality duties[3] Statutory Equality Duties Impact Test guidance	No	
Economic impacts		
Competition Competition Assessment Impact Test guidance	No	19
Small firms Small Firms Impact Test guidance	No	19
Environmental impacts		
Greenhouse gas assessment Greenhouse Gas Assessment Impact Test guidance	No	19
Wider environmental issues Wider Environmental Issues Impact Test guidance	No	19
Social impacts		
Health and well-being Health and Well-being Impact Test guidance	No	
Human rights Human Rights Impact Test guidance	No	
Justice system Justice Impact Test guidance	No	
Rural proofing Rural Proofing Impact Test guidance	No	
Sustainable development Sustainable Development Impact Test guidance	No	

[3] Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2011, once the Equality Bill comes into force. Statutory equality duties part of the Equality Bill apply to GB only. The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Summary: Analysis and Evidence — Policy Option 2

An EPS as an annual limit on the amount of CO2 a plant can emit, equivalent to 450gCO2/KWh for plant operating at baseload, with exemptions for projects in the UK CCS demonstration programme or benefiting from European funding for commercial scale CCS.

Price Base Year 2010	PV Base Year 2010	Time Period Years 17	Net Benefit (Present Value (PV)) (£m) -£0.6m		
			Low:	High:	Best Estimate: -£0.6m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low				
High				
Best Estimate	0.06		**0.05**	**0.6**

Description and scale of key monetised costs by 'main affected groups'

There would be a one-off cost to business for an initial regulatory exchange to establish the EPS value for each plant. The Environmental Agency estimated that this cost could be approximately £5,000 for each new plant. Also there will be the annual operating costs of a central body administering the EPS. The Environmental Agency estimated that this cost could be approximately £50,000 per year. This estimate is based the Environment Agency's experience of administering the EU ETS and is for the cost of administering an EPS in England and Wales only. Administering the EPS in Scotland may increase this cost and if so will be taken into account in the final stage IA

The EPS proposed at this level is not expected to result in an impact on investment, operation decision making or security of supply.

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low				
High				
Best Estimate	0		0	**0**

Description and scale of key monetised benefits by 'main affected groups'

This option does not give rise to any changes compared to the baseline with regards to generation mix or load factor as the emissions of the new fossil fuel plants that the modelling suggests will become operational, combined with their estimated load factors under the baseline do not breach the emissions limit created of this level of EPS.

Other key non-monetised benefits by 'main affected groups'

The EPS will provide further clarity on the regulatory environment for fossil fuel power stations.
This policy option exempts projects in the UK CCS demonstration programme so the choice of CCS projects that will go ahead to form the programme will not be constrained by this policy.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Use of different fossil fuel price scenarios does not change the conclusions.

The analysis presented relies on the baseline as modelled by Redpoint for the Electricity Market Reform (EMR) White Paper using a sophisticated economic model of investment in electricity generation. All modelling is dependent on the assumptions and methodology used. While the Government's view is that the policy will improve clarity and investor confidence, it is not possible to model with accuracy the impact of the policy on investor sentiment.

The details of grandfathering have not been finalised although the objective is that investment in gas, needed to maintain security of supply in the transition to a low carbon electricity system, is not deterred. The IA assumes the EPS is grandfathered for all new fossil fuel with no time-limit. Further analysis will be carried out prior to a final IA.

Direct impact on business (Equivalent Annual) (£m):			In scope of OIOO	Measure Qualifies as
Costs: 0.05	**Benefits**: 0	**Net**: -0.05	Yes	IN

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			Great Britain		
From what date will the policy be implemented?			2014		
Which organisation(s) will enforce the policy?			Environmental Regulator		
What is the annual change in enforcement cost (£m)?			0.02		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			N/A		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:**	**Non-traded:**	
Does the proposal have an impact on competition?			No		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:**	**Benefits:**	
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	**Micro**	**< 20**	**Small**	**Medium** 100%	**Large**
Are any of these organisations exempt?	No	No	No	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on…?	**Impact**	**Page ref within IA**
Statutory equality duties[4] Statutory Equality Duties Impact Test guidance	No	
Economic impacts		
Competition Competition Assessment Impact Test guidance	No	19
Small firms Small Firms Impact Test guidance	No	19
Environmental impacts		
Greenhouse gas assessment Greenhouse Gas Assessment Impact Test guidance	No	19
Wider environmental issues Wider Environmental Issues Impact Test guidance	No	19
Social impacts		
Health and well-being Health and Well-being Impact Test guidance	No	
Human rights Human Rights Impact Test guidance	No	
Justice system Justice Impact Test guidance	No	
Rural proofing Rural Proofing Impact Test guidance	No	
Sustainable development Sustainable Development Impact Test guidance	No	

[4] Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2011, once the Equality Bill comes into force. Statutory equality duties part of the Equality Bill apply to GB only. The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Evidence Base (for summary sheets) – Notes

References

Include the links to relevant legislation and publications, such as public impact assessment of earlier stages (e.g. Consultation, Final, Enactment).

No.	Legislation or publication
1	Electricity Market Reform: Consultation Document, DECC (2010) http://www.decc.gov.uk/assets/decc/Consultations/emr/1041-electricity-market-reform-condoc.pdf
2	Electricity Market Reform: Analysis of policy options, Redpoint (2010) http://www.decc.gov.uk/assets/decc/Consultations/emr/1043-emr-analysis-policy-options.pdf
3	
4	

Evidence Base

Please see spreadsheet attached for full time series of costs.

Annual profile of monetised costs and benefits* - (£m) constant prices

	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7	Y_8	Y_9
Transition costs	0	0	0	0	0	0	0	0	0	0
Annual recurring cost	0	0	0	0	0.05	0.05	0.05	0.05	0.05	0.05
Total annual costs	0	0	0	0	0.05	0.05	0.05	0.05	0.05	0.05
Transition benefits	0	0	0	0	0	0	0	0	0	0
Annual recurring benefits	0	0	0	0	0	0	0	0	0	0
Total annual benefits	0	0	0	0	0	0	0	0	0	0

* For non-monetised benefits please see summary pages and main evidence base section

Microsoft Office
Excel Worksheet

Evidence Base (for summary sheets)

Climate Change is a global market failure. In response to this the UK has set itself emission reductions targets and whilst the UK is on target to reduce its greenhouse emissions in 2020 by 34% on 1990 levels, in line with carbon budgets and the EU target, the longer term goals are more challenging. For example, in 2008, the Climate Change Act set a target to reduce greenhouse gas emissions by at least 80% by 2050, compared to 1990 levels.

The electricity system needs to be substantially decarbonised through the 2020s, particularly if it is to play its part in decarbonising the heat and transport sectors in the 2030s and beyond. See for example, the fourth carbon budget report from Committee on Climate Change (published December 2010[5]). Their analysis suggests the need for 30-40GW of low-carbon capacity to be built during the 2020s to replace ageing capacity and meet demand growth.

The main focus of this Impact Assessment is to set out the analysis of the impacts of introducing an EPS against a 'do nothing' option. While the proposed designs for the introduction of an EPS formed part of the Electricity Market Reform (EMR) consultation[6], the other EMR policies (please see details below) are not considered in depth here[7]. As explained below the EPS does not impact on modelled trajectories for investment in electricity generation either with or without EMR policies. This limits the need to consider the interaction between the EPS and other EMR policies[8].

Further, this Impact Assessment assesses the policy decisions regarding the introduction of the EPS that have been made up to this point and also highlight areas which are to be developed in the future subject to further analysis. For example, policy decisions have been made to grandfather the EPS, but the question of the length of time that the EPS will be grandfathered and the time period in which generators have to take advantage of the provision require further analysis and discussion with stakeholders. Where there are policy decisions that have not been made at this time, assumptions have been made for the purposes of this analysis, which will be revisited in future IAs.

The appraisal period is from the 2014, when the proposed EPS would be introduced, to 2030.

Background

The Coalition Programme for Government stated that the Government would establish an Emissions Performance Standard (EPS) "that will prevent coal-fired power stations from being built unless they are equipped with sufficient carbon capture and storage to meet the emissions performance standard."

As the policy developed, it was decided that the EPS would cover all new fossil fuel plant, including gas plants from the outset. This will provide a degree of certainty for investors as they will know from the date the policy is implemented what regulatory emissions limit they will face, and it is designed to reduce any perceived risk that an EPS of an unknown level is introduced at a later date (see also section on Grandfathering).

The proposed designs for the introduction of an EPS formed part of the Electricity Market Reform (EMR) consultation, published in December 2010, which closed on 10th March 2011.

The Government's proposals for reform of the electricity market represent a coherent and complementary package designed to ensure the security of future electricity supply and the decarbonisation of electricity generation, at least cost.

The package of measures proposed in the EMR consultation included the introduction of a Carbon Price Floor. The Carbon Price Floor was subject to a separate consultation lead by HMT[9]. Following this, Budget 2011 announced that from April 2013 a Carbon Price Floor would be introduced to the power sector in the UK.

[5] http://www.theccc.org.uk/reports/fourth-carbon-budget
[6] Electricity Market Reform: Consultation Document, DECC (2010)
[7] The other EMR policies are classified as Environmental Taxation and so are analysed seperately
[8] Other EMR policies will be analysed separately
[9] http://www.hm-treasury.gov.uk/consult_carbon_price_support.htm

Policy options for incentivising low carbon generation

There are two financial support mechanisms considered in order to incentivise investment in low-carbon generation plant (by providing revenue certainty for investors):

- A Premium Feed-in-Tariff (Premium FiT) for all low carbon generation. This is a static premium payment that all low-carbon generation would receive on top of the wholesale electricity price.
- A Contract for Difference (CfD) Feed in Tariff for all low carbon generation. The CfD on the wholesale electricity price would provide generators with a top-up from the revenues received in the wholesale market up to a contracted strike price, settled against an indicator of the average market wholesale electricity price.

Policy options for ensuring security of supply

The options for a capacity mechanism to ensure security of electricity supply include:

- A targeted mechanism, with a proposed model of a Strategic Reserve- this is an amount of generating capacity which is held outside of the normal market.
- A market-wide mechanism, potentially in the form of a Reliability Market.

EMR packages

The combination of the policies listed above result in four packages of EMR policies for reform that are considered in the EMR White Paper:

- A Contract for Difference (CfD) Feed in Tariff (FiT) on the wholesale electricity price for low carbon generators with a targeted capacity mechanism
- A fixed top up on the wholesale electricity price (a Premium FiT) with a targeted capacity mechanism
- A CfD FiT with a market wide capacity mechanism
- A Premium FiT with a market wide capacity mechanism

In addition, all four packages include the preferred EPS option. The preferred option is Option 2; an EPS as an annual limit on the amount of carbon dioxide a plant can emit equivalent to 450gCO_2/kWh for plant operating at baseload. The details of this option are set out in the "Options considered" section below.

Rationale

The objective of the EPS is to ensure that while fossil fuel-fired electricity generation continues to make an important contribution to security of supply, it does so in a manner consistent with the UK's decarbonisation objectives. The EPS will act as a regulatory backstop to limit how much carbon new fossil fuel plants can emit, and sit alongside the other decarbonisation policies set out in the accompanying White Paper. For example, if measures such as the EU ETS and other EMR policies do not result in a reduction in emissions, the EPS will ensure that each new plant does not emit more than the limit.

The EPS will provide further clarity on the regulatory environment for fossil fuel power stations, building on the Government's current policy. Currently new coal-fired power stations are required to be constructed with a full CCS chain fitted on at least 300MW (net) of their generating capacity and be carbon capture ready on the rest, while all new combustion plant[10] at or over 300MW must be carbon capture ready (CCR) on the whole plant, i.e. they must demonstrate that there are no economic or technical barriers to retrofitting CCS. In England and Wales these requirements are contained in the National Policy Statements. These requirements do not, however provide clarity in respect to the operating regime of these plant, nor do they provide any emission limits. An EPS goes a stage further, and ensures that not only are new coal plant built with CCS but that it is operated in accordance with emissions requirements. Further, the requirement for 300MW CCS applies irrespective of the size of the

[10] Of a type covered by the EU Large Combustion Plant Directive

plant, i.e. the larger the plant the smaller the proportion required to have CCS. Where it applies, an EPS will therefore ensure that total annual emissions from new plant are consistent with the EPS requirements, regardless of their total size.

Further, the EPS will complement the economic signals provided by the carbon price floor and low carbon support mechanism. Initially it will support the requirements set out in the National Policy Statements, and in the longer term could be used to give a clear regulatory signal on emission reductions to back up the economic signals provided for through the rest of EMR. In the future it may be appropriate to use the EPS in a different way, for example to require CCS on new plant once the commercial and technical viability of CCS is better understood (in line with grandfathering principles). Introduction of an EPS at this stage provides for this opportunity, and the Government will review the mechanism in line with the decarbonisation reports required under the 2010 Energy Act.

The Energy and Climate Change Select Committee have recently stated that the introduction of the EPS proposed in the EMR consultation could create uncertainty among investors, without promoting decarbonisation. However, Government believes that the introduction of the measure now will provide certainty on emission limits for new plant built under this framework. An alternative of 'do nothing' leaves open uncertainty on whether Government will introduce an EPS at a later stage which could impact plant.

Overall, there were differing views to the responses on the EPS questions posed in the EMR consultation, with some stakeholders in support of the introduction of the policy, while others were in opposition. Most stakeholders agreed on the importance of grandfathering as a means of ensuring investor confidence.

Current market arrangements

Current market arrangements do not restrict the amount of carbon dioxide released into the atmosphere from sources of electricity generation. However there are existing and confirmed policies which make polluters pay for their emissions of carbon dioxide and certain other greenhouse gases.

The EU ETS is the primary EU wide policy driving decarbonisation across a number of sectors in the UK economy, including the power sector. It is a cap and trade system, which creates a Europe wide price for carbon. While the EU ETS does set a cap for emissions, the limit is for all sectors within scope and so does not directly restrict emissions from the electricity generation. In addition to this electricity generators, along with other emitters, can buy allowances to cover their emissions instead of reducing their emissions.

In addition to the EU ETS, Budget 2011 announced that from April 2013 a Carbon Price Floor would be introduced to the power sector in the UK. The floor will start at around £16 per tonne of carbon dioxide and follow a linear path to target £30/tCO_2 in 2020 (2009 prices).

Options considered

Baseline/ 'do nothing' option

In order to analyse the impacts of the EPS designs considered in the White Paper, the instrument designs were assessed against a "business as usual" baseline scenario where there are no additional policies that impact on the electricity market other than those already existing or confirmed, e.g. EU ETS, Carbon Price Floor, and the Renewables Obligation.

This baseline was modelled by Redpoint out to 2030 so that it would meet a 29% share of renewable electricity on the system in 2020, rising to 35% in 2030, but no other explicit constraint was placed on this scenario. For example, Redpoint did not impose on the baseline the need to meet any indicative carbon emission intensity targets, nor did the baseline include any of the other EMR policies. The

modelling is based on DECC's central assumptions around fossil fuel prices[11] and Mott MacDonald's assumptions on the cost of electricity generation technologies[12]. Please refer to Annex 2 for more detail.

Redpoint's model of the electricity sector is an economic investment decision model in which decisions on build rates of new electricity plant by technology and dispatch decisions are made within-model, based on the current and expected economics of generation technologies and prevailing market conditions. Details of the general analytical approach taken by Redpoint in their modelling are set out in the report published alongside the EMR consultation document[13].

The results from Redpoint's baseline modelling indicated that no new unabated coal plants would be built going forward. This is in accordance with consenting policy and the National Policy Statements. The results also suggested that only coal capacity as part of the CCS Demonstration Project will come forward and that there will be some new CCGT gas plants (which will all be Carbon Capture Ready); a total of 12GW between 2014 and 2030. It should be noted as with all modelling, the output is dependent on the assumptions and methodology used.

Details of the proposed EPS policy

The design principles of the EPS include:

- application to individual fossil fuel-fired plants larger than 50MW from 2014;
- setting an annual limit on the total amount of carbon dioxide permitted, equivalent to a per unit of electricity emissions limit for a plant operating at baseload (which is assumed to be 85% for the purposes of the analysis in this Impact Assessment);
- application to new power stations, or existing plants that undergo significant life extensions or upgrades only[14];
- consistency with the UK CCS Demonstration Programme covering the full range of approaches to carbon capture.

The annual limit on the total amount of carbon dioxide permitted, as set out in the second design principle above, will be dependent on the size of plant in question. The annual limit permitted for an individual plant will be equal to the amount of carbon dioxide emitted from a plant of the same size that operates at baseload and has an emissions intensity factor equal to that set out in the EPS.

For example if the EPS were to be set at 450gCO_2/kWh, then the annual limit permitted for a 1GW combustion plant would be equal to the amount of carbon dioxide emitted from a 1GW plant that ran at baseload for a year and had an emissions intensity factor of 450gCO_2/kWh (see calculation in Table 2 below).

Two options were proposed for the level of the EPS in the Electricity Market Reform consultation document:

- Option 1

  An EPS as an annual limit on the amount of carbon dioxide a plant can emit, equivalent to 600gCO_2/kWh for plant operating at baseload.

  This level is consistent with demonstrating CCS on a new, supercritical coal fired power station, which are typically sized at around 1600MW (gross). It would allow stations to demonstrate CCS on around a quarter of their capacity (300MW net, around 400MW gross) if it were to run at baseload. This is consistent with the National Policy Statements, yet it goes further by ensuring that the CCS capacity would be utilised sufficiently over the year to meet the emission limit or else the generator would have to limit its load factor if it wished to operate the plant unabated.

[11] http://www.decc.gov.uk/en/content/cms/statistics/projections/projections.aspx Annex F
[12] http://www.decc.gov.uk/assets/decc/statistics/projections/71-uk-electricity-generation-costs-update-.pdf
[13] http://www.decc.gov.uk/assets/decc/Consultations/emr/1043-emr-analysis-policy-options.pdf
[14] This does not include Retrofit of CCS or upgrades to meet requirements under European directives (specifically the Industrial Emissions Directive)

The Government also considers that this would be consistent with the CCS Demonstration Programme, which is predicated on the Government funding four commercial-scale demonstrations, around 300-400MWe, across a range of technologies, but there may be some limitations on the size of the host plant that could be used.

- Option 2

An EPS as an annual limit on the amount of carbon dioxide a plant can emit equivalent to 450gCO_2/kWh for plant operating at baseload. Plant forming part of the UK's CCS Demonstration Programme or benefiting from European funding for commercial-scale CCS would be given exemptions.

This option would require new plant to meet the tighter standard. For example, it would require a new, supercritical coal plant, sized at around 1600MW (gross) to use CCS on around 700MW (gross) of its capacity, around 40%, if it were to run at baseload. Again, this EPS design option necessitates a sufficient utilisation of the CCS technology in order to meet the emissions limit or the generator would have to limit its load factor if it wished to operate the plant unabated.

The rationale for exempting plant forming part of the UK's CCS Demonstration Programme or benefiting from European funding for CCS demonstration[15] is to ensure that the EPS policy is consistent with the UK CCS Demonstration Programme, as set out in the fourth design principle.

The UK CCS demonstration programme aims to gather and disseminate valuable information on CCS, which will help reduce costs of future CCS deployment in the UK and internationally. Studies undertaken by the International Energy Agency (IEA) on behalf of the G8 have concluded that, to achieve a 50% reduction in carbon emissions by 2050 cost effectively, CCS will be needed to deliver about a fifth of this target. Without CCS the global delivery cost was increased by 70%[16,17].

The government intends to financially support CCS demonstration projects around 300-400MWe. This option would require more CCS capacity than supported by the Demonstration Programme on new coal plants if they were to run at baseload. In order not prejudice against any one CCS technology and allow the full range of CCS approaches to come forward plant forming part of the UK's CCS Demonstration Programme are exempt for the EPS under this option.

Whilst this approach would mean that plant deciding to fund CCS themselves would be subject to tighter rules than plant funded through the UK or European programmes, this is consistent with the aims of demonstration. The Demonstration Programme will allow the UK to demonstrate CCS across a range of technologies to support successful demonstration in the UK and eventual deployment. As the plants on which CCS will be demonstrated will still emit from the unabated part of the plant, projects which do not form part of the programme or do not form part of a wider European programme, would not be consistent with balancing objectives to decarbonise the electricity system as well as successfully demonstrating CCS, since we would have no way of ensuring that that they advanced demonstration goals. Exempting projects would allow any measures deemed necessary on operation, emissions or storage to be taken as part of the contractual or funding arrangement, and also allow the respective programmes to select the projects based on the programmes' objectives rather than dictating this at the outset with regulation.

In the future, when CCS has been technically proven and the costs have been reduced sufficiently to bring about commercial roll out, the government expects that CCS fully fitted to fossil fuel plants will (at a minimum) be used to an extent that those plants' emissions will be within the limit set by this policy option.

[15] Under EU ETS Directive negotiations in 2008, a funding programme was agreed to support CCS and innovative renewable technologies. Projects will be funded from a ring-fenced pot of 300m EU ETS allowances, and the UK has put forward seven CCS projects.

[16] A 50% reduction in greenhouse gas emissions is consistent with a strategy to limit the long term global temperature rise to an average of 2°C to 3°C.

[17] Technology Road Map – Carbon capture and storage, IEA, Paris, September, 2009

Putting the EPS emission limit options into context

The tables presented in the section present emissions intensity factors and total emissions for illustrative new fossil fuel plants, as well as some sensitivity analysis around load factors[18]. This is to provide context for the EPS design options set out above.

Table 1 – emission intensity of new fossil fuel generation

	Gas (CCGT)	Gas (OCGT)	Coal (ASC)[19]	Coal (ASC with CCS) - 90% CO2 capture
Net Thermal Efficiency[20]	52%	40%	39%	28%
Fuel Emission Factor	0.184	0.184	0.308	0.308
Emissions g/kWh	353.8	460.0	789.7	110.0

Net thermal efficiency is the ratio of the net electricity generated by a unit to the thermal energy of the fuel consumed during the same period by the same unit. The ratio of net thermal efficiency and the fuel emission factor give the emissions intensity of the plant. This shows that the emissions intensity factor of a plant is dependent on the efficiency of that plant and emissions factor of the fuel it uses to generate electricity.

Table 2 – Comparison of the emissions of new 1GW fossil fuel plants of different technologies with the constraints imposed by the two EPS options

	Gas (CCGT)	Gas (OCGT)	Coal (ASC)	Coal (ASC fully fitted with CCS) - 90% CO2 capture	EPS equivalent to 450g/kWh	EPA Equivalent to 600g/kWh
Total Annual Emissions (mt)	2.63	3.43	5.88	0.82	3.35	4.47

The table above shows that a 1GW Coal plant (ASC[21]) has higher emissions than that permitted by the two EPS options when it runs at baseload, while OCGT has higher total emissions than one of the EPS options – option 2, which imposes an annual limit on the amount of carbon dioxide a plant can emit equivalent to 450gCO_2/kWh for plant operating at baseload. As discussed further below, OCGT is a peaking plant for which it would never be commercially viable to operate at anything approximating baseload, and so this constraint will not be binding in practice. Emissions from CCGT and CCS coal plants are less than the limit of both EPS options.

The following tables illustrate the emissions from the four technologies under different load factor assumptions. They assume a constant efficiency, although in practice efficiency may decrease under lower load factors depending on the operational profile.

Table 3 – Gas (CCGT) – 52% net efficiency

Load factor	Total Annual Emissions (mt)	EPS equivalent to 450g/kWh (mt of CO2)	EPA Equivalent to 600g/kWh (mt of CO2)
85%	2.63	3.35	4.47
55%	1.70	3.35	4.47
25%	0.77	3.35	4.47

Table 4 – Gas (OCGT) - 40% net efficiency

Load factor	Total Annual Emissions (mt)	EPS equivalent to 450g/kWh	EPA Equivalent to 600g/kWh

[18] Source of all data in tables: DECC (2010) Digest of UK Energy Statistics
Mott MacDonald (2010) UK Electricity Generation Cost Update
[19] Advanced Supercritical
[20] These are considered best efficiencies
[21] Advanced Supercritical

		(mt of CO2)	(mt of CO2)
85%	3.43	3.35	4.47
55%	2.22	3.35	4.47
25%	1.01	3.35	4.47

Table 5 – Coal (ASC) – 39% net efficiency

Load factor	Total Annual Emissions (mt)	EPS equivalent to 450g/kWh (mt of CO2)	EPA Equivalent to 600g/kWh (mt of CO2)
85%	5.88	3.35	4.47
55%	3.80	3.35	4.47
25%	1.73	3.35	4.47

Table 6 - Coal (ASC fully fitted with CCS) - 28% net efficiency

Load factor	Total Annual Emissions (mt)	EPS equivalent to 450g/kWh (mt of CO2)	EPA Equivalent to 600g/kWh (mt of CO2)
85%	0.82	3.35	4.47
55%	0.53	3.35	4.47
25%	0.24	3.35	4.47

The tables presented above indicate that OCGT and unabated ASC coal plants would have limits on their load factors or need to fit CCS to their plant in order to meet the emissions limits implied by the EPS options, unlike CCGT, which has emission levels below either limit.

Further details on scope

The EPS options described above were proposed to be technology neutral. However there were some issues considered in the consultation and some issues raised by responses to the consultation.

It was stated in the consultation document that the EPS needs to be designed to support the burning and co-firing of biomass, and a question was asked as to how biomass should be treated for the purpose of meeting the EPS. Following the consultation responses, it has been decided that the EPS should only cover emissions from fossil fuels, therefore ensuring that dedicated biomass, or co-firing, is not discouraged as it plays an important role in providing a renewable source of energy. This approach is consistent with that used by other polices such the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme where biomass is zero-rated.

Further, responses to the consultation also highlighted the risks an EPS places on combined heat and power (CHP) plant, and the Government will be considering how to account for emissions from such plant (e.g. if they generate heat, as opposed to electricity) before introducing any legislation (intended in spring 2012). For the purposes of this IA it is assumed that the EPS will not impact CHP investments.

The result is that new fossil fuel plant (principally coal plants and gas plants) will fall under the scope of the proposed EPS policy and be subject to the same emissions limit.

Security of Supply

Around 12GW of fossil fuel capacity will be closing by 2016 as a result of the EU Large Combustion Plant Directive, coupled with additional retirements of nuclear this decade (up to 9GW). The UK needs to ensure sufficient generation is built to accommodate this. While significant amounts will come from low carbon (including renewables, new nuclear and CCS), there will also be an important role for new gas plant over the next few years, including CCGT. Further, as more renewables enter onto the system, it will be important to have sufficient back up generation and sufficient capacity to providing ‘peaking’ services to accommodate increased amounts of intermittent generation. Such backup and peaking can be provided in a number of ways (e.g. demand-side response, pumped storage, and existing fossil fuel power stations). Open Cycle Gas Turbines (OGCT) are one of the technologies that are adept at providing such services.

New fossil fuel plant providing peaking services generally have higher emissions than plant operating at higher load factors – OCGT generally has an emissions intensity greater than 450g/kWh[22]. Whilst the EPS will apply to such plant, as an annual limit based on a high-load factor, it will ensure that it does not constrain those plant which may have a higher emissions intensity, but do not operate for long periods of the year or as peaking plant. As seen in Table 4 above, an OCGT plant would need to operate at a load factor of just under 85% to hit the EPS level – existing OCGTs are estimated to have annual load factors of less than 1% between now and 2030[23].

Further, the Government intends to provide for the Secretary of State to make exceptions to maintain energy security (e.g. limited exceptions in supply emergencies). For example, it is thought that CCS technology could have a parasitic load on a power station of around 20%. Exemptions, should they be provided, would allow for CCS equipped plant to switch off their capture technology and have a greater net electricity output, but without being penalised for the increase in emissions which could breach the limit set by the EPS.

Grandfathering

The consultation document proposed that the EPS level should be grandfathered for each new plant at 'point of consent' for the economic life of the plant.

Grandfathering provides clarity to developers over the emissions limits that their plant will face for a set period of time, and hence clarity over what load factors they can run their plant at during that time, or the technology solutions they will need to use (e.g. CCS or biomass) during that time. This clarity will help developers when making a decision of whether or not to invest in the electricity market.

This issue received mixed views as part of the consultation, but was strongly supported by a significant proportion of industry as an essential tool in enabling the new gas (CCGT) generation needed to come forward over the next few years to maintain security of supply.

However, some respondents were critical that the policy could perpetuate the relative attractiveness of unabated gas over other forms of low carbon, notably fossil fuel with CCS, and of how long it would remain on the system.

Following careful consideration of the arguments, it has been decided that the principle of grandfathering will be implemented. Other mechanisms are designed to incentivise investment in low carbon technologies (including fossil fuels with CCS), and creating too much uncertainty with the EPS at this stage could discourage investment.

The questions of the length of time that the EPS will be grandfathered and the time period in which generators have to take advantage of the provision are still to be decided. Further analysis of the impacts of the options for grandfathering and an informal consultation will be carried out to develop the policy in this area. The analysis will take into account more than just modelling outputs as it is important that this aspect of the policy is considered carefully and considers all information; setting an ill-informed limit on the length of time an EPS is grandfathered could lead to unnecessary load factor risk for developers when considering whether to invest. Following this an Impact Assessment will be developed to update the analysis presented here before any legislation is introduced (expected spring 2012).

It should be noted that in the development of these elements of an EPS the Government is minded to set the period for which the EPS is grandfathered to a period sufficient to give enough certainty so as not to deter the investment needed in new gas over the next few years, whilst not locking in unabated fossil generation far into the future.

Feedback and some high level preliminary analysis suggest that investment decisions in CCGT are based on expectations over the next 20 years.

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[22] New OCGT have a net efficiency of 40%, resulting in an emission intensity of 457g/kWh as set out in Table 1
Source: DECC (2010) Digest of UK Energy Statistics
Mott MacDonald (2010) UK Electricity Generation Cost Update

[23] Source: Redpoint

Due to the uncertainty surrounding the detailed development of grandfathering policy at this stage and the need for further analysis to be carried out on this, an assumption had to be made about how grandfathering would be treated in the analysis presented in this IA. It was decided to assume that all new fossil fuel plants that become operational during the period considered here would be grandfathered.

Furthermore, the period for which each plant has certainty over the emissions limit they face (i.e. the grandfathering period) is assumed not to be time-limited for this analysis. This assumption is considered reasonable as this approach to the modelling is consistent with the Government's objective that grandfathering ensures developers have enough certainty to invest. Given that preliminary analysis suggests that investment decisions are based on 20 years into the future and the appraisal period for this IA is 17 years, it is anticipated that analysing an EPS that is grandfathered without a time limit will produce the same results as analysing an EPS that is grandfathered for a period that is sufficient to provide enough certainty so as not to deter investment that would come about under the business as usual baseline.

Also, not choosing a time-limit on which to base the analysis in this IA, means that the government is not pre-empting the outcome of the further analysis and stakeholder engagement that will be carried out on this policy area.

Impacts of the policy options

The policy will have an impact if it changes a generator's decision about whether to invest in an unabated plant compared to what they would do in the absence of the policy. And if a generator does decide to invest, the policy will have an impact if it changes the generators' ability to run at a load factor that is dictated by the wholesale electricity market.

The baseline[24] modelled to 2030 by Redpoint indicates that no new unabated coal plants would be built going forward (this is in accordance with consenting policy and the draft National Policy Statements) and that only coal capacity as part of the CCS Demonstration Project will come forward. The model baseline also suggests that there will be some 12GW of new CCGT gas plants.

The new partly abated coal plants that are assumed to be built under the baseline have sufficient capacity of CCS attached to meet the requirements of the first EPS option. These plants also form part of the UK CCS Demonstration Programme and so are exempt from the second EPS option.

Neither of the options for the EPS as set out above would have an impact on any of the new CCGT gas capacity, as the emissions limit of the EPS options are higher than the emissions factors of CCGT gas plants that we would expect to see in the future[25]. This is based on the assumption that the EPS is grandfathered without a time-limit[26], as neither of the levels considered in this IA limits the operation of gas plants.

In summary, the analysis suggests that the proposed options for the EPS do not have an effect on investment in new plants or their load factors compared to the baseline modelled by Redpoint.

It should be noted that the analysis presented here does not capture the impacts of any perceptions of the policy, only the impact of the fundamentals of the policy designs. The future development of the grandfathering policy is strongly linked to the perception of the policy, most importantly developers' perceived load factor risk when they are considering investing. In response to the EMR consultation, most stakeholders agreed on the importance of grandfathering the EPS as a means of ensuring investor confidence.

[24] Used to illustrate a state of the world where there are no additional policies that impact on the electricity market other than those already existing or confirmed, e.g. Carbon Price Floor.
[25] Emissions factors of new CCGT gas plants are estimated to be 350gCO_2/kWh, as set out in Table 1
[26] As set out in the "Grandfathering" section, the assumption of grandfathering that is not time-limited is considered to be consistent with an EPS that is grandfathered for a length of time for which the EPS level that is sufficient to provide enough certainty to invest

There is also uncertainty surrounding the modelling results, as with any modelling. So while the modelled baseline suggests that no new unabated coal comes onto the system, the effect of the EPS will be to act as a back-stop to ensure that any new carbon emitting generating capacity that may come forward is run in such as way that complements the UK's decarbonisation targets.

Given this, the incentive for market entry for coal plants was considered despite the analysis suggesting that the only coal plants that would be built are those associated with the CCS Demonstration Programme.

Incentives for market entry and exit

If an EPS equivalent to 600gCO_2/kWh for a plant operating at baseload were to be grandfathered for new fossil fuel plants, there will be no change in the incentives for market entry. This is because this level of EPS is consistent with demonstrating 300MW of CCS on a typically sized new, supercritical coal fired power station. This is consistent with the draft National Policy Statements.

On the other hand, the introduction of an EPS equivalent to 450gCO_2/kWh for a plant operating at baseload may change the incentives for coal generators to enter the market as they would need a sufficient proportion of their emissions to be captured by CCS. This is true whether the policy is grandfathered or not. The additional amount of investment needed to construct and operate CCS technology above 300MW may deter entry.

Adding clarity and certainty

Significant upgrades and life extensions

The National Policy Statements will require that a "significant extension" to existing coal-fired power stations will trigger a requirement that the station demonstrate 300MW CCS. This will prevent developers circumnavigating the CCS requirement by building additional (or replacement) capacity on existing power stations.[27]

Nevertheless, it is possible that an existing coal power station could undertake works which would significantly extend its life in some way that would not be caught by the Planning Act regime.

The introduction of regulation will allow for very clearly defined situations that would trigger an existing plant coming under an carbon reduction framework (although this will specifically exclude upgrades to meet European environmental standards, those needed to facilitate CCS and those need to increase the use of biomass).

Effect on the cost of capital

Not to proceed with an EPS leaves open the question about whether it will be introduced at a later stage, and whether it will affect an investor's assets. If it is not introduced now, it may also be perceived that the later an EPS regime is introduced, the more likely investors may be concerned about pressure to include measures such as retrospective effect on existing plant. Introduction of the mechanism now, with clarity on the scope of this policy intervention and with safe-guards for investment (grandfathering and level) could provide more certainty.

Should introduction of the measure now provided increase certainty, one way this may be considered by investors is through a reduction in their required rate of return for a project. The cost of the policy is extremely small when considered against the investment cost of fossil fuel plant, approximately £5,000 compared against approximately £600 million for a CCGT and £2.5 billion for an unabated coal plant[28]. Given this, any reduction in investment costs would only

[27] EN-1 Overarching National Policy Statement para 4.7.5
[28] Parsons Brinckerhoff (2011) Electricity Generation Cost Model – 2011 update

need to be very small to more than offset the costs of the policy. However, quantifying the possible benefit of reducing regulatory uncertainty by introducing an EPS is inherently uncertain. Investors would need to perceive the introduction of an EPS as providing more certainty than no EPS.

Interactions with other EMR policies

The proposed introduction of an EPS is part of the EMR set of policy reforms, as set out in the "Background" section, but this policy has so far been appraised in isolation in this IA.

DECC's own analysis as well as quantitative modelling by Redpoint consultants for DECC suggest that the EPS as currently proposed will have *no interactions* with low carbon incentives or security of supply option policies. In other words, the inclusion of EPS in the package modelling does not have any impact on the results. This is because the analysis suggests that any new fossil fuel plant to be built will fall below the EPS emission levels as proposed in this IA, or be exempt, for example CCS demo plant.

Cost to business of administering an EPS

The cost of setting up the EPS depends on the final design details of the EPS, so it can't be estimated in detail at this time, though full costs will be detailed in any final stage Impact Assessment accompanying legislation to be laid in Parliament. However, the cost to business has been estimated and consists of the following two other elements:

Firstly, an initial regulatory exchange will be required to establish the EPS value for each new fossil fuel-fired plant individually. An initial estimate provided by the Environment Agency of the cost of this to each plant is approximately £5,000 in current prices. Using Redpoint modelling results it is estimated that 12 new CCGT gas plants will become operational by 2030. The NPV cost to business is estimated at £36,000.

Secondly, it is expected that the operating costs of the EPS will be directly paid for by operators. The Environment Agency estimates that the cost of a central body administering the EPS could be approximately £50,000 per annum, based on staff costs, IT costs and enforcement costs (applicable to both EPS design options).

Staff costs are estimated to be approximately £20,000. This would cover 0.1 FTE Grade 5 and 0.1 FTE Grade 6 to carry out calculations and act as points of contact for enquiries[29]. IT and website costs were estimated to be around £10,000, while enforcement (or non-respondent action) costs were estimated at around £20,000. These enforcement (or non-respondent action) cost estimates are based on one or two non-compliant sites per annum receiving enforcement notices and issuance/receipt of monetary fines i.e. assuming minimal amount of legal staff input.

This £50,000 estimate is based the Environment Agency's experience of administering the EU ETS and is for the cost of administering an EPS in England and Wales only. Administering the EPS in Scotland may increase this cost and if so will be taken into account in the final stage IA. Over the period to 2014-2030, the £50,000 estimated annual cost leads to an NPV cost to business of £570,000.

There should be no further costs if the EPS is to be grandfathered, as the monitoring is already covered by the EU ETS.

Combining the costs from the initial regulatory exchange and the EPS operating costs, the best estimate of the total net cost to business at the present time is therefore £606,000 (NPV). Assessed over the 17 year appraisal period (2014-2030), this leads to an estimated regulatory 'in' of £46,000 under the one-in,

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http://www.decc.gov.uk/assets/decc/11/about-us/economics-social-research/2127-electricity-generation-cost-model-2011.pdf

[29] However EA noted that the estimate of staff costs would increase slightly if the operational work were to be financed through charges as some finance staff costs would be added for payment/exchequer services.

one-out framework. The exact value of any 'in' that may need offsetting will be determined in a Final Stage IA prior to legislation being introduced following publication of the White Paper.

A micro-business exemption for this policy will not be required as no business affected by EPS are assumed to have fewer than 10 employees due to the nature of conventional combustion plant electricity generation business

Bills

As previously explained, it is not envisaged that the introduction of an EPS will change the pattern of new electricity plant build. Also, the EPS assessed would not impact on the operation pattern of the existing electricity generation plant fleet. Therefore, there is no reason to expect that wholesale electricity prices will change as a result of the introduction of EPS and no reason to expect any impact on bills.

In theory, there could be a very small indirect impact on electricity bills if the cost of setting up and administering the EPS were passed through from business to electricity consumers. However, even if this was the case (and it has yet to be established how the cost of setting up and administering the EPS will be funded) the costs are sufficiently small compared to the number of consumers so that any impact on average bills would be negligible.

Fossil fuel price sensitivities

The analysis presented above was carried out under the assumption of DECC central fossil fuel prices. However the analysis does not differ under either the DECC low or high fossil fuel price scenarios. This is because under both these sensitivities, the modelling for the baseline suggests that there will be no new unabated coal plants being built going forward (this is in accordance with consenting policy and the National Policy Statements). While there are no new gas plants built under the high fossil fuel price baseline scenario, the new CCGT gas plants built under the low fossil fuel price baseline scenario would not be affected by either of the EPS options as their emissions are lower than the EPS level.

The modelling also suggests that under the high fossil fuel price baseline scenario, a small amount of commercial scale CCS is built. However these would not be affected by either of the EPS options as their emissions will be lower than the EPS level.

Specific Impact Tests

The analysis presented in this IA suggests that there will be no impact on either generators' decisions to invest in plants, or generators' operation decisions compared to business as usual baseline. Given this it is considered that the policy does not have any economic effects.

Similarly, as the analysis suggests that the policies will not lead to a change in electricity generation compared to the business as usual baseline, at this time it is felt that there are no environmental impacts of the policy options presented.

Preferred option

The quantified negative NPV for both EPS options is very small. There are unquantified benefits of providing a clear regulatory approach to managing emissions from new plant, to provide fossil fuel plants with regulatory certainty, and provide a framework for future action.

The preferred option is Option 2, introducing an EPS as an annual limit on the amount of CO_2 a plant can emit, equivalent to 450gCO_2/kWh for plant operating at baseload, with exemptions for projects in the UK CCS demonstration programme or benefiting from European funding for commercial scale CCS.

By exempting projects that form part of the UK CCS demonstration programme, Option 2 does not place restrictions on the development of the programme and allows for greater flexibility for the CCS Demonstration Programme, compared to Option 1.

Annexes

Annex 1: Post Implementation Review (PIR) Plan

Basis of the review: [The basis of the review could be statutory (forming part of the legislation), it could be to review existing policy or there could be a political commitment to review The policy will be reviewed in line with decarbonisation reporting under the Energy Act 2010. This is required every three years.
Review objective: [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?] The review will enable to UK to consider whether it is on track to meet its decarbonisation targets.
Review approach and rationale: [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach] Ongoing assessment of the degree to which the policy helps the UK meet its decarbonisation targets, with consideration of security of supply and the status of generation technology development.
Baseline: [The current (baseline) position against which the change introduced by the legislation can be measured] Measured against an assumed baseline where the EPS was not introduced
Success criteria: [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives] The UK remains on track to meet its decarbonisation targets.
Monitoring information arrangements: [Provide further details of the planned/existing arrangements in place that will allow a systematic collection systematic collection of monitoring information for future policy review] The central body that administers the EPS will collect and monitor information.
Reasons for not planning a PIR: [If there is no plan to do a PIR please provide reasons here]

Annex 2: Redpoint modelling for the EMR White Paper

For the EMR consultation, DECC commissioned Redpoint Energy to analyse policy options for EMR reform. The findings of their analysis were published in a report accompanying the EMR consultation document. This report also sets out Redpoint's approach to modelling the electricity system and key assumptions used in the modelling. DECC subsequently commissioned Redpoint to update the modelling for the consultation to reflect policy developments and changes to DECC assumptions around some electricity generation technologies. For example, the Carbon Price Floor policy was included in the baseline alongside other current polices like the Renewable Obligation.

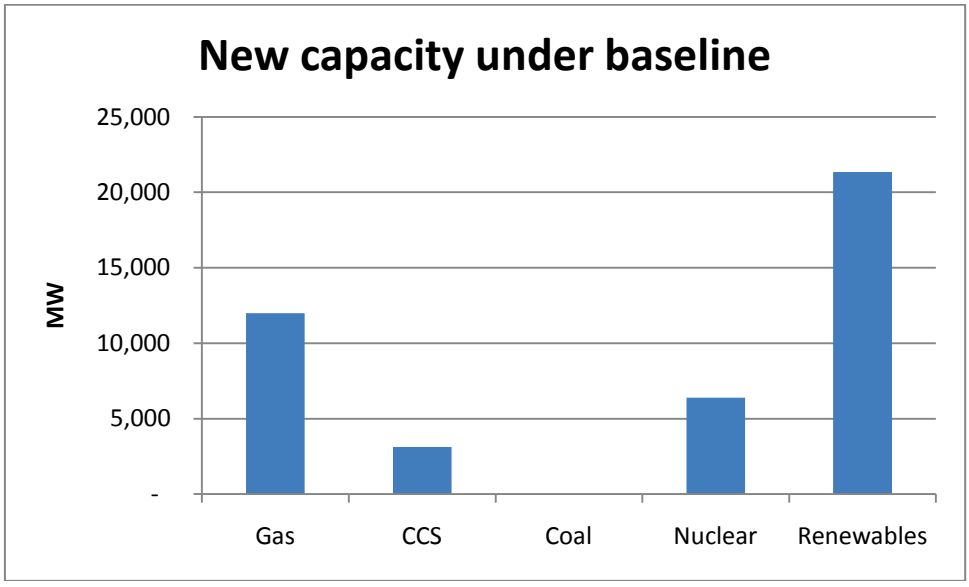
Redpoint's model of the electricity sector is an economic investment decision model in which decisions on build rates of new electricity plant by technology and dispatch decisions are made within-model, based on the current and expected economics of generation technologies and prevailing market conditions. As such, the outcome of the modelling is an assessment of what new electricity plant will be built and when, according to plant economics and the policy environment. Details of the general analytical approach taken by Redpoint in their modelling are set out in the report published alongside the EMR consultation document[30].

The baseline scenario used in this Impact Assessment was modelled so that it would meet a share of renewable electricity on the system of 29% in 2020 and 35% in 2030, on the assumption that the Renewables Obligation policy would deliver these indicative renewables targets. No further explicit constraint was placed on the modelling for this scenario. For example, Redpoint did not impose on the baseline to meet any indicative carbon emission intensity targets, nor does it include other EMR policies.

The modelling is based on DECC's central assumptions around fossil fuel prices and Mott MacDonald's assumptions on the cost of electricity generation technologies[31].

The results from the baseline scenario modelling (using central fossil fuel price scenarios) indicate that no new unabated coal plants would be built going forward, as seen in figure 1 below. As stressed in this IA, this is in accordance with consenting policy and the National Policy Statements. The modelling results also suggested that only coal capacity as part of the CCS Demonstration Project will come forward and that there will be some new CCGT gas plants (which will all be Carbon Capture Ready); while a total of 12GW of CCGT gas plants become operational between 2014 and 2030.

Figure 1: Cumulative new electricity generation capacity build 2014-2030, baseline scenario



[30] http://www.decc.gov.uk/assets/decc/Consultations/emr/1043-emr-analysis-policy-options.pdf
[31] http://www.decc.gov.uk/assets/decc/statistics/projections/71-uk-electricity-generation-costs-update-.pdf

The estimated new capacity under the baselines modelled using DECC's high and low fossil fuel price scenarios are presented in Figures 2 and 3 below, respectively.

Under both these sensitivities, the modelling for the baseline suggests that there will be no new unabated coal plants are built going forward (this is in accordance with consenting policy and the National Policy Statements). While there are no new gas plants built under the high fossil fuel price baseline scenario, the new CCGT gas plants built under the low fossil fuel price baseline scenario would not be affected by either of the EPS options as their emissions are lower than the EPS level.

The modelling also suggests that under the high fossil fuel price baseline scenario, a small amount of commercial scale CCS is built. However these would not be affected by either of the EPS options as their emissions will be lower than the EPS level.

Figure 2: Cumulative new electricity generation capacity build 2014-2030, baseline scenario under high fossil fuel price scenario

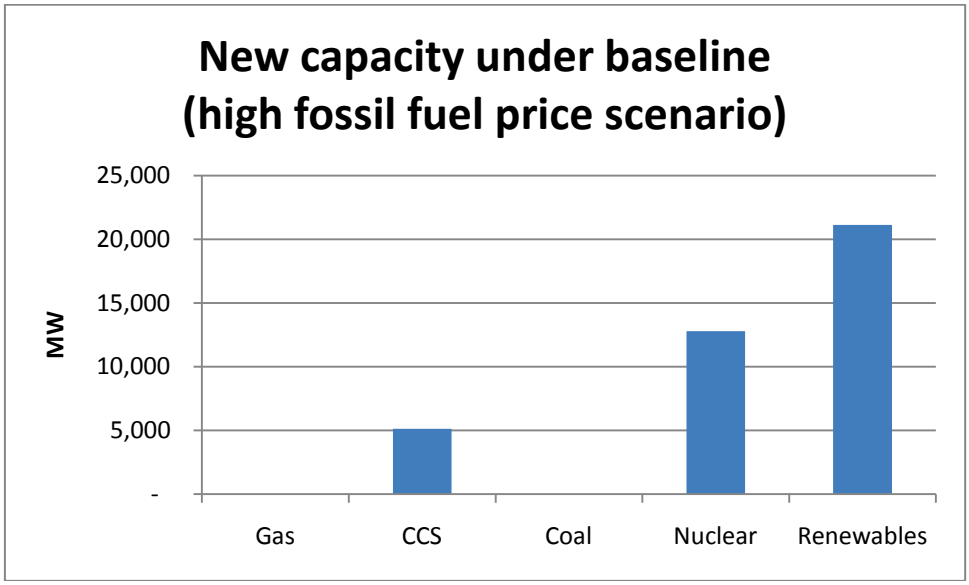
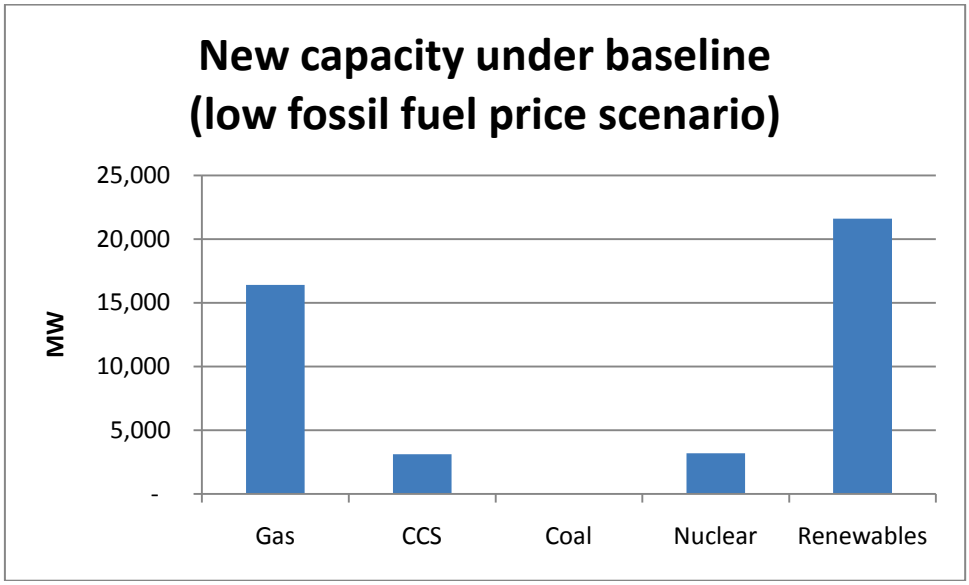


Figure 3: Cumulative new electricity generation capacity build 2014-2030, baseline scenario under low fossil fuel price scenario



It is important to note that, as with all modelling, there is some uncertainty surrounding the result and that these scenarios were not modelled with an aim to predict the exact generation mix going forward. Nevertheless, given in particular the current consenting framework, it is likely that the finding in this modelling that there will be no new build of unabated coal fired plant going forward seems robust.