



Department for  
Business, Energy  
& Industrial Strategy

# COAL GENERATION IN GREAT BRITAIN

The pathway to a low-carbon future:  
consultation document

November 2016

# COAL GENERATION IN GREAT BRITAIN

## The pathway to a low-carbon future: consultation document

The consultation and Impact Assessment can be found on the BEIS website:

<https://www.gov.uk/government/consultations/coal-generation-in-great-britain-the-pathway-to-a-low-carbon-future>

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[coalconsultation@beis.gov.uk](mailto:coalconsultation@beis.gov.uk)

# Foreword by the Secretary of State

Throughout most of the modern age most of our electricity has come from coal-fired generation. However, a fundamental change is now underway – not least due to the urgent need to cut carbon emissions.

In Paris in December 2015, the UK was one of 195 countries to sign a historic deal to limit global temperature rises and avoid the worst impacts of climate change. If we are to honour this agreement, we must continue to take action.

My priority is to ensure that our country has the electricity it needs to meet all of our needs, at the lowest possible cost and to ensure that we decarbonise our energy supplies in line with the UK's legally-binding commitments.

Coal power stations emit around twice the carbon dioxide of a modern gas fired power station. One of the biggest contributions we can make to reducing power sector emissions is to replace coal power stations with lower-carbon alternatives.

Setting a clear end date for unabated coal generation will send a clear signal to investors in new generation capacity, including new gas power stations and low-carbon alternatives such as renewables and nuclear.

Our relatively inefficient and ageing fleet of coal power stations is not sustainable in the long-term. Nearly all of the remaining coal stations in Great Britain are operating beyond their original design life – and without substantial spending on extending their lives even further most are likely to close in the next few years.

I would welcome your views on whether the proposals in this consultation document would help us deliver these objectives.

A handwritten signature in black ink, appearing to read 'G Clark', with a stylized flourish at the end.

**Greg Clark**

Secretary of State for Business, Energy and Industrial Strategy

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# General information

## Purpose of this consultation

This consultation seeks stakeholder feedback on proposals to put into effect an end to unabated coal generation by 2025.

**Issued:** 9 November 2016

**Respond by:** 8 February 2017 (*extended from 1 February*)

### Enquiries to:

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3 Whitehall Place  
London, SW1A 2AW  
Email: [coalconsultation@beis.gov.uk](mailto:coalconsultation@beis.gov.uk)

## Territorial extent:

This consultation relates to England, Wales and Scotland.

Energy policy is a reserved matter in Scotland, a non-devolved matter in Wales, and a devolved matter for Northern Ireland.

## How to respond

**Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.**

Electronic responses should be enclosed to [coalconsultation@beis.gov.uk](mailto:coalconsultation@beis.gov.uk)

If you disagree with any of the proposals within this document and have alternative suggestions, it would be helpful if you can provide supporting analysis to explain your position.

## Additional copies:

You may make copies of this document without seeking permission. An electronic version can be found at <https://www.gov.uk/government/consultations/coal-generation-in-great-britain-the-pathway-to-a-low-carbon-future>. The Impact Assessment accompanying this consultation can be found on the same page.

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Other versions of the document in Braille, large print or audio-cassette are available on request. This includes a Welsh version. Please contact us under the above details to request alternative versions.

## Confidentiality and data protection

Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the access to information legislation (primarily the Freedom of Information Act 2000, the Data Protection Act 1998 and the Environmental Information Regulations 2004).

**If you want information that you provide to be treated as confidential please say so clearly in writing when you send your response to the consultation.** It would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded by us as a confidentiality request.

We will summarise all responses and place this summary on the [GOV.UK website](#). This summary will include a list of names or organisations that responded but not people's personal names, addresses or other contact details.

## Quality assurance

This consultation has been carried out in accordance with the [Government's Consultation Principles](#).

If you have any complaints about the consultation process (as opposed to comments about the issues which are the subject of the consultation) please address them to:

BEIS Consultation Co-ordinator  
3 Whitehall Place  
London SW1A 2AW  
Email: [consultation.coordinator@beis.gov.uk](mailto:consultation.coordinator@beis.gov.uk)

# Executive summary

Coal has historically played a very important role in meeting the UK's needs for electricity. However, recently the importance of coal has declined with the growth of the renewables sector and the construction of new gas power stations.

Coal is the most carbon intensive fossil fuel. It produces twice the carbon dioxide per unit of electricity as natural gas. Ending our reliance on coal for power generation is therefore a swift and effective way of reducing the carbon intensity of electricity generation.

Last year coal accounted for just under a quarter of electricity generation and the eight stations that remain operational today represent around 15% of Great Britain's total generating capacity.

The remaining coal power stations are ageing, relatively inefficient by modern standards, and require costly modifications to comply with air quality standards. As a result, many have closed in recent years, and when they do close this is often at short-notice. This can put pressure on short-term security of electricity supplies, unless the market has anticipated this loss of capacity sufficiently in advance.

**This consultation explores how to take action to regulate the closure of unabated coal to provide greater market certainty for investors in the generation capacity that is to replace coal stations as they close, such as new gas generators.**

The Government wants to see an orderly transition away from unabated coal generation and is clear that action will only be taken if there will be no risks to the security of our electricity supplies. Our analysis suggests that taking action will not present such risks.

We also seek views on options for determining whether a power station has been sufficiently abated to continue to operate. Both options would reduce emissions to at or below those of a newly constructed gas fired power station and would require investment to put into effect.

Finally we have considered options for constraining the operation of coal fired power stations in the years leading up to 2025 in order to smooth the rate of unabated coal power station closures. Our conclusion, based on the constraint we modelled, is that these are unlikely to have a significant effect, although we would welcome evidence to the contrary and ideas on the profile and design of a constraint that would help achieve this objective.

The analytical evidence supporting the conclusions in this consultation is set out in the Impact Assessment published alongside this document. We would welcome views on this Impact Assessment as part of this consultation. This includes reference to an assessment of feasible new build rates for gas generation undertaken for DECC in 2014. We would welcome views on whether these remain a reasonable basis for assessing technical constraints on the construction of new capacity.

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Subject to stakeholders' views and any evidence we receive as part of this consultation, the Government anticipates bringing forward any required legislative changes as soon as the legislative timetable allows.



# Chapter 1: Coal and Electricity Generation

1. The December 2015 Paris agreement marked a clear turning point towards a low carbon future. It sends a strong signal to business that the shift to a clean economy is global, transformational and irreversible, and provides markets with the confidence to drive the scale of investment needed. It clears the path for the private sector to drive a long-term solution to avoiding harmful climate change.
2. The Climate Change Act 2008 is at the heart of the Government's efforts to reduce carbon emissions and sets a target of at least an 80% reduction in emissions by 2050 from 1990 levels. This will require significant reductions in emissions across the whole economy, including the power sector.
3. Generating electricity from coal emits approximately twice the carbon dioxide (CO<sub>2</sub>) for each unit of electricity compared with gas. The Climate Change Committee has estimated that by dispatching gas ahead of coal, the average carbon intensity of the power sector in 2014 would have reduced from around 450g/kWh to 250g/kWh<sup>1</sup>. Coal is also responsible for significant emissions of other pollutants, including Nitrogen Oxides (NO<sub>x</sub>), Sulphur Dioxide (SO<sub>2</sub>), Mercury and particulate matter (PM), all of which have a negative impact on human health and the environment.
4. The UK's remaining coal stations are 47 years old on average, and all but the three newest units at Drax are beyond their original intended design life. While stations have been upgraded and modified over time to extend life and improve efficiency (including: refurbishing boilers, upgrading turbines and installing equipment to clean up flue gases), they are nevertheless relatively inefficient by modern standards and require continued investment.
5. All coal stations go through a sequence of regular maintenance, including major refurbishments every four years. Most of the UK's coal stations also require much more significant investment before 2020 if they are to meet more stringent atmospheric pollution standards. Our understanding is that, in current market conditions, the owners of coal fired power stations are finding it increasingly difficult to justify the case for such investments. Stations are therefore likely to close in the near term as further investment becomes necessary to remain operational, to comply with strengthened pollution standards and as policies to encourage decarbonisation of electricity generation take effect.
6. The likelihood is that under current market conditions the remaining stations are therefore likely to close in the near term. When they do close, past experience suggests this will be at relatively short-notice. This leads to uncertainty for investors in replacement flexible capacity such as gas that is crucial to secure electricity supplies.

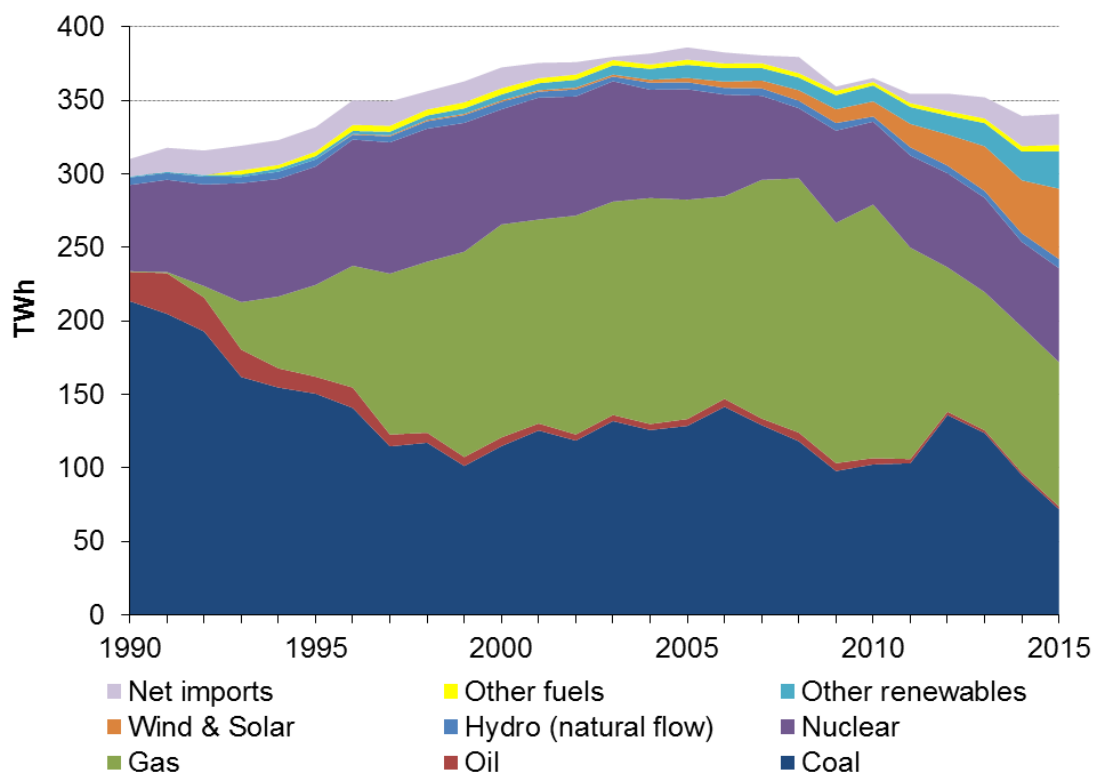
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<sup>1</sup> Committee on Climate Change, November 2015 (p.32): <https://documents.theccc.org.uk/wp-content/uploads/2015/11/Sectoral-scenarios-for-the-fifth-carbon-budget-Committee-on-Climate-Change.pdf>

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## Chapter 2: Coal's role in the electricity market

7. Coal has historically been the largest source of electricity generation in the UK, but this began to decline in the mid-1990s with the construction of new gas-fired power stations. Between 2003 and 2014, coal consistently met around a third of demand. More recently, the share of coal has begun to fall again from 30% in 2014 to 22% in 2015 (a record low generation of 76 TWh<sup>2</sup>) driven by increases in renewables, gas generation, and other forms of lower-carbon generation. Coal generation in the first two quarters of this year fell to record lows<sup>3</sup>. Figure 1 shows the sources of generation between 1990 and 2015<sup>4</sup>.



**Figure 1 – Contribution to net generation over the period 1990 – 2015**

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<sup>2</sup> Digest of UK Energy Statistics, BEIS, July 2016

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/541005/DUKES\\_2016\\_FINAL.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/541005/DUKES_2016_FINAL.pdf)

<sup>3</sup> Energy Trends, BEIS, September 2016

<https://www.gov.uk/government/statistics/electricity-section-5-energy-trends>

<sup>4</sup> UK Energy Trends, BEIS July 2016

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/540135/UK\\_Energy\\_in\\_Brief\\_2016\\_FINAL.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/540135/UK_Energy_in_Brief_2016_FINAL.pdf)

8. The number of coal power stations has also reduced. In 2012 there were 17 stations in Great Britain (with a total capacity of 23GW), and, taking into account recent closures and conversions to biomass, there are now eight, either generating electricity for the wholesale market or available under the Contingency Balancing Reserve. The current fleet of coal power stations in Great Britain is summarised in Figure 2, with further detail in Annex 1.

Company name	Station	Installed capacity (MW)	Commissioned	Location
RWE Npower Plc	Aberthaw B	1,586	1971	Wales
EDF Energy	Cottam	2,008	1969	East Midlands
Drax Power Ltd	Drax (coal units)	1,980	1974 (Unit1) 1986 (4, 5, 6)	Yorkshire
Eggborough Power Ltd	Eggborough	1,960	1967	Yorkshire
Scottish and Southern Energy	Fiddler's Ferry	1,971	1971	North West
E.On	Ratcliffe-on-Soar	2,000	1968	East Midlands
Simec	Uskmouth	363	1959	Wales
EDF Energy	West Burton	2,012	1967	East Midlands
	Total installed capacity	13.9GW		

**Figure 2 – Fleet of coal power stations in Great Britain (as at July 2016)<sup>5</sup>.**

## The impact of policy interventions

9. The amount of electricity we generate from coal at any point in time depends, amongst other things, on the relative economics of coal and gas generation. This changes depending based on a number of factors including the relative price of coal and gas on international markets, but also because of the direct and indirect effects of Government policies, such as carbon pricing and the success of policies to increase the penetration of renewables and other low carbon alternatives (which dispatch ahead of fossil fuels in the wholesale electricity market and therefore reduce the available market for coal and gas.)
10. A detailed outline of the existing policy interventions most relevant to coal generation is set out in Annex 2. Each intervention contributes to the Government's objectives of maintaining secure, affordable electricity whilst reducing CO<sub>2</sub> emissions and air pollution from the power sector.
11. Historically either coal or gas generators have been the marginal plant in the UK electricity market. This is because low carbon plant, such as most renewables or nuclear, have a lower marginal cost of generation than fossil fuel plants and therefore dispatch ahead of them in the merit order. Measures to increase the uptake of low carbon generation therefore tend to reduce the load factors available to fossil fuel generators. Increased

<sup>5</sup> Taken from Digest of UK Energy Statistics, BEIS, July 2016, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/541005/DUKES\\_2016\\_FINAL.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/541005/DUKES_2016_FINAL.pdf)

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investment in renewables and low carbon generation through measures such as Contracts for Difference, the Renewables Obligation and Feed in Tariffs have all decreased the opportunity for fossil fuels to provide baseload power.

12. Coal generation is also relatively inflexible, taking longer to respond to changes in demand than more modern, flexible plant, including gas; in particular at times of low generation from intermittent renewable sources.

13. In addition to CO<sub>2</sub>, coal combustion also results in higher levels of emissions of other pollutants, in particular Nitrogen Oxides (NO<sub>x</sub>), Sulphur Dioxide (SO<sub>2</sub>) and particulate matter, in comparison to an equivalent gas powered station. The Industrial Emissions Directive (IED)<sup>6</sup> came into force on 6 January 2011 and into effect on 1 January 2016 in relation to existing large combustion plant, and sets new emission limits for key air pollutants. Three compliance options were available to plants:

- To meet the emissions limit requirements from 1 January 2016. Compliance is estimated to require investment of the order to £50m-£75m per 500MW unit<sup>7</sup>;
- To participate in the Transitional National Plan (TNP). The TNP allows certain older plants until July 2020 to meet the emission limit requirements described above. Plants in the TNP are subject to an annual emissions allocation within a declining overall UK maximum emissions ceiling. By July 2020 they must either meet the emission limit requirements, close, or they can continue operation with a higher emissions limit but limited to 1,500 hours a year (i.e. 17% annual load factor). Or;
- To utilise the Limited Lifetime Derogation (LLD) which limits plants to 17,500 hours of operation between 1 January 2016 and 31 December 2023, after which they must close.

14. The majority of remaining coal stations are participating in the Transitional National Plan and therefore have until 30 June 2020 to install the equipment needed to meet the emission limit requirements, close, or be limited to 1,500 hours a year (which may still require some investment to reduce emissions). Coal stations' compliance statuses are set out in Annex 1. Our understanding is that one station has already installed the equipment necessary to comply with the emissions limits set out in the IED, and that one has made use of the LLD and therefore must close by 2023. The remaining plants have each made investments that put them on a path to meeting the emissions limits, but further investments will be necessary to achieve full compliance. The scale of these investments varies by plant, but we would expect them to continue only if warranted by the expected underlying return over the station's remaining life.

15. On 23 June 2016, the EU referendum took place and the people of the United Kingdom voted to leave the European Union. Until exit negotiations are concluded, the UK remains a full member of the European Union and all the rights and obligations of EU membership

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<sup>6</sup> See <http://ec.europa.eu/environment/industry/stationary/ied/legislation.htm> for more information on the IED.

<sup>7</sup> Coal and Gas Assumptions. DECC (Parsons Brinckerhoff), March 2014  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/315717/coal\\_and\\_gas\\_assumptions.PDF](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/315717/coal_and_gas_assumptions.PDF)

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remain in force. During this period the Government will continue to negotiate, implement and apply EU legislation. The outcome of these negotiations will determine what arrangements apply in relation to EU legislation in future once the UK has left the EU.

## Ensuring security of supply

16. The Government has made clear that it will not proceed to impose requirements that would lead to the closure of unabated coal by 2025 without assurance that a secure and reliable electricity supply will be maintained. Safeguarding secure and reliable energy supplies is a key priority, and we face a legacy of years of underinvestment.
17. The Capacity Market is a technology-neutral mechanism for ensuring security of supply while minimising the impact on the wholesale market. It provides payments for reliable generation on top of wholesale revenues, except for plants that are in receipt of support through other incentives. The Capacity Market is also designed to encourage the investment needed to bring forward new generation to replace retiring power stations and provide back-up for more intermittent and inflexible low-carbon generation sources.
18. A Capacity Market agreement places obligations on an operator to make capacity available when it is needed in return for payments. Capacity auctions are held approximately 4 years in advance of the delivery year, with agreements awarded to successful plants for 1 year, or up to 3 or 15 years (dependent on whether the station is existing, refurbishing or new). A further auction takes place one year ahead of the delivery year for additional one-year agreements.
19. Two main auctions have been held to date for delivery in 2018/19 and 2019/20 and a number of coal fired power station units have secured one year capacity agreements in both auctions. Annex 1 provides more detail. These plants have a guaranteed revenue stream for the years they have agreements in place in return for commitments to generate.
20. While the two auctions have brought forward sufficient capacity for the delivery years in question, they have led to relatively little new baseload generation capacity. In light of this the Government has brought forward reforms to secure the required level of new build replacement capacity, such as new gas, as older plants such as coal comes off the system. These reforms<sup>8</sup> include:
  - Buying more capacity, and buying it earlier, with the next Capacity Market 4-year ahead auction in December 2016 buying materially more capacity than might otherwise have been the case;
  - Tightening delivery incentives on those who have agreements to deliver against them and to penalise those who fail to meet their commitments more severely, and;

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<sup>8</sup> Consultation and response available at <https://www.gov.uk/government/consultations/consultation-on-reforms-to-the-capacity-market-march-2016>. Electricity Capacity (Amendment) Regulations 2016 available at [http://www.legislation.gov.uk/uksi/2016/742/pdfs/uksi\\_20160742\\_en.pdf](http://www.legislation.gov.uk/uksi/2016/742/pdfs/uksi_20160742_en.pdf)

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- Responding to a short-term security of supply challenge, by bringing forward the first Capacity Market delivery year to 2017/18, instead of rolling over current Contingency Balancing Reserve (CBR) arrangements.

21. We consider that the Capacity Market will secure the capacity we need in both the long and short term and also provide a robust mechanism for protecting against unforeseen circumstances that may lead to unplanned outages. The Government is therefore satisfied that the Capacity Market will bring forward the investment needed to compensate for the closure of unabated coal.

22. It should be noted that coal plants are eligible to bid into the auction for 2017/18 and may therefore have a role to play in meeting generation needs in the short to medium term, if they can provide capacity cost-effectively compared with alternatives. Coal plants are also able to bid into the 2020/21 four-year ahead auction in December 2016, and provided they meet the investment thresholds could bid for three-year refurbishment contracts to 2022/23.

## Future of coal without further intervention

23. In order to support the analysis in this consultation we have modelled the future of coal generation in Great Britain without intervention. This is outlined in the Impact Assessment published alongside this document.

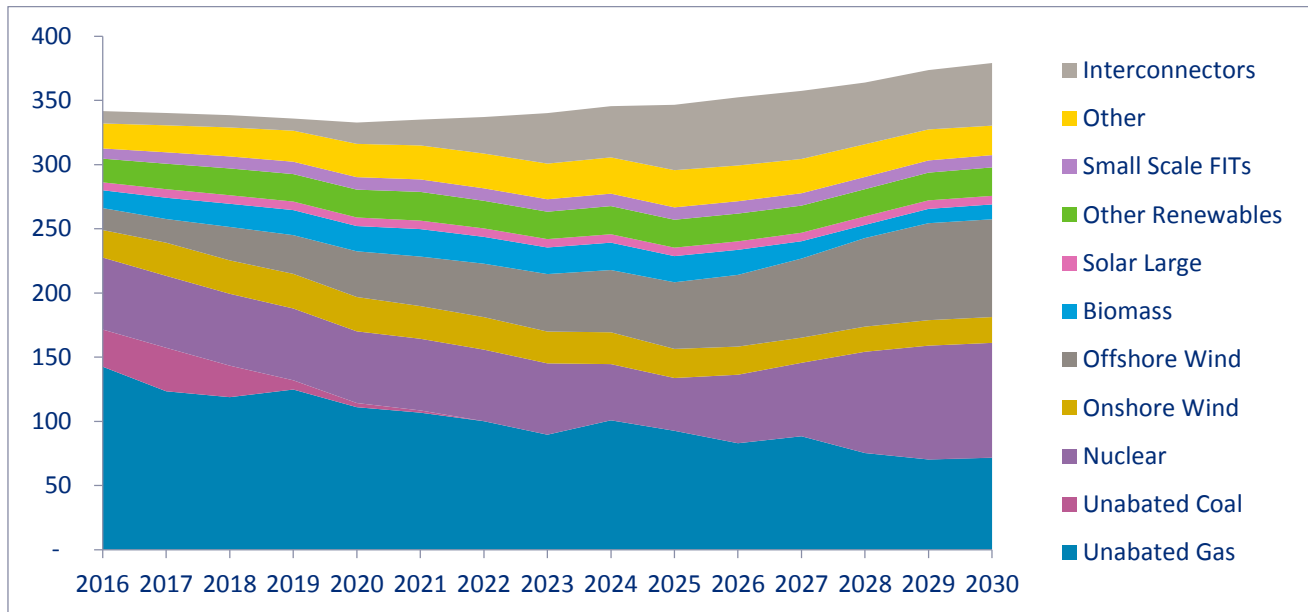
24. To reflect the inherent uncertainty in future market conditions, the Impact Assessment has considered two scenarios: a “central” scenario that reflects our best view of the evolution of the electricity market, and a conceivable “high coal” scenario where assumptions are flexed to create more favourable economics for coal plant. Table 1 in the Impact Assessment sets out the assumptions that underpin both scenarios, including the price forecasts employed. It is important to note that the assumptions underpinning the “high coal” scenario do not reflect established Government policy or expectation and are designed only to demonstrate the risks that investors may perceive.

25. In the central scenario we project forward the current economic conditions affecting the level of coal generation. In this scenario, coal and gas prices follow BEIS’s 2016 interim central trajectory<sup>9</sup>. In addition, the level of penetration of low carbon generation is consistent with the Government’s declared policy ambition and it has been assumed that given the challenging economic conditions for coal, only two plants make the investment needed to meet the requirements of the Industrial Emissions Directive and are therefore able to operate without constraint after 2020. In these circumstances all coal plants are projected to have closed by 2022 due to economic factors (see figure 3).

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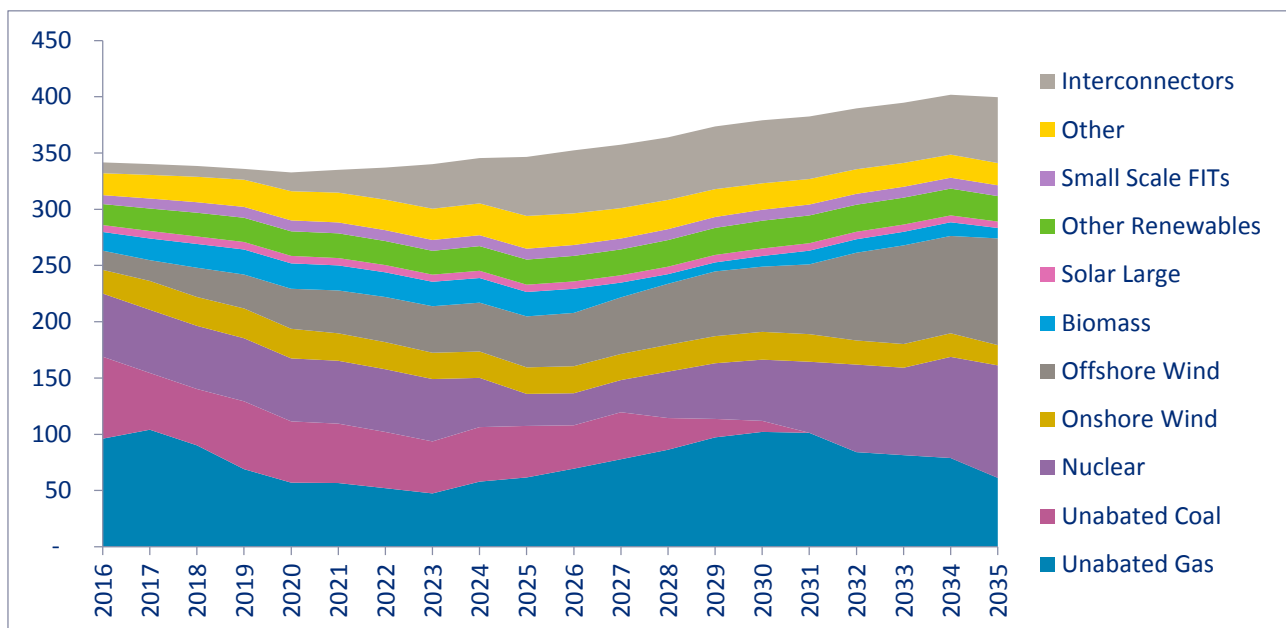
<sup>9</sup> The analysis set out in the Impact Assessment will be updated following this consultation prior to final decisions, making use of updated price forecasts available at the time. Official 2016 fuel price projections are due to be published later in 2016.

**Figure 3: Total UK generation mix in the central Do-nothing scenario between 2016 and 2030, TWh**



26. In the “high coal” scenario coal prices are adjusted downwards (using DECC’s 2015 low prices) to create more favourable economic conditions for coal plants. In order to replicate the risks that may be perceived by the market, we also make assumptions over delays to the deployment of offshore wind and to new nuclear build<sup>10</sup>. In addition, the underlying profitability of coal generation under these conditions justifies the investment needed for five plants to comply with the IED without policy intervention and those plants are therefore able to operate unconstrained after 2020. In these circumstances the last coal fired power unit would be expected to close in 2030 (see figure 4).

**Figure 4: Total UK generation mix in the high coal Do-nothing scenario between 2016 and 2035, TWh**



<sup>10</sup> It is important to note that the scenario is not one that reflects established Government policy or expectation.

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27. These scenarios serve to demonstrate the potential uncertainty over the future of coal generation capacity without further intervention. While we know that existing coal power stations will close, projections for the rate and timing of closures are highly uncertain and dependent on a range of factors that are difficult to forecast.
28. Uncertainty about when the remaining coal stations will close creates uncertainty for those considering investing in new flexible replacement capacity, such as new gas generation. This is compounded by the relatively short notice that the market is given of impending coal power station closures compared to the lead time for building replacements.
29. While projections and modelling can reflect possible changes to the composition of the electricity mix over time, and assumptions can be made about the future of specific plants based on their forward commitments to supply power under SBR and Capacity Market arrangements, the market would expect to receive no more than about a year's formal notice of impending power station closures. Experience suggests actual notice of potential closure is usually triggered either by the start of the statutory consultation period with potentially affected staff, or the need to notify changes to the Transmission Entry Capacity (TEC) register<sup>11</sup>. An application to reduce or cancel TEC is required just over a year in advance of a deadline at the end of March each year, but a power station may do so sooner with a corresponding cancellation charge. Any plants holding Capacity Market agreements for future years would also be liable for penalties.
30. It is against this backdrop of more challenging conditions for coal generation and uncertainties over the rate and timing of closures that we are seeking views through this consultation on when and how to put into effect the closure of unabated coal while ensuring secure, reliable and affordable supplies in intervening years. By doing this, we expect to improve the investment climate for new, lower-carbon, flexible replacement capacity, such as gas generation.

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<sup>11</sup> National Grid's TEC Register is at <http://www2.nationalgrid.com/UK/Services/Electricity-connections/Industry-products/TEC-Register/>



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# Chapter 3: Our proposals

## What are we trying to achieve?

31. The Government's objective is to ensure that the closure of the remaining coal fired power stations in Great Britain takes place in a way that minimises the impact on the electricity system and provides certainty for investors to enable them to invest in lower carbon alternatives in good time to replace the lost capacity. This section considers how to do this most effectively.
32. Currently there are no direct requirements on existing coal stations to reduce their CO<sub>2</sub> emissions, although there are indirect interventions through carbon pricing. This contrasts with requirements on any newly constructed coal power station to both:
  - meet an annual Emissions Performance Standard (EPS), which sets an annual limit on total CO<sub>2</sub> emissions dependent on a plant's capacity: this is equivalent to emissions of 450g/kWh for a plant operating at baseload (see box below for more detail on the EPS), and;
  - comply with planning requirements to demonstrate Carbon Capture and Storage (CCS) abatement technology on at least 300MW (net) of the station's capacity and be Carbon Capture Ready for the remainder.

### **What is the Emissions Performance Standard (EPS)?**

The EPS is set out in the Energy Act 2013 and applies to all new fossil fuel electricity generation plants that are above 50MWe. The EPS works on a "mass-basis" and sets an annual limit on emissions at a level equivalent to 450gCO<sub>2</sub>/kWh for a plant operating at baseload. This is around half the level of emissions of unabated coal generation and is fixed until end 2044.

It is set on a mass basis. This means each plant is given a total tonnage allowance of CO<sub>2</sub> within which they would have to remain each year. This tonnage is calculated based on the plant's installed electrical capacity, and assumes an 85% baseload load factor.

The total emissions limit for a new build plant in any given year would therefore be:

$$\text{Emissions limit} = [450\text{g/kWh}] \times [8760 \text{ hours in a year}] \times [85\%] \times [\text{plant capacity (MW)}]$$

This equates to 3,350 tonnes of CO<sub>2</sub> per MW of installed electrical capacity and is broadly equivalent to a typical British coal fired power station operating at an approximate 40% load factor.

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33. These measures are intended to ensure that new coal power stations are not built unless emissions are broadly consistent with those from gas, CCS abatement technology is demonstrated, and that further decarbonisation of the plant is possible in the future. Existing coal stations are currently not required to meet these requirements in the expectation that their remaining economic life is limited. However, as outlined in chapter 2, there are plausible scenarios where existing coal plants could continue to operate to 2030. This would place considerable pressure on other parts of the energy sector and the wider economy to reduce emissions more than would otherwise be the case.

34. This consultation seeks views on four areas:

- i) Possible approaches for placing obligations on unabated coal plant from 2025;
- ii) Whether and how we might go about constraining coal generation before 2025, and our assessment of the impacts;
- iii) Whether, in the context of the reformed Capacity Market and concerns over security of supply, it will now be necessary to put in place powers to suspend the proposed obligations on coal;
- iv) The wider impacts of these proposals.

## 1. Putting closure of unabated coal into effect

### Scope

35. In line with the Government's objectives, we propose to put in place a backstop after which it will not be possible for existing stations to operate unless they significantly reduce emissions to levels that are consistent with decarbonisation commitments. Our approach is not to preclude existing coal stations from continuing to operate if they can be adapted to reduce emissions and meet CO<sub>2</sub> abatement requirements.

36. We consider that this approach will help stimulate investment in lower-carbon alternatives leading to an overall reduction in the carbon intensity of the generation sector and, by setting a clear market signal to replacement lower-carbon, flexible, capacity, reduce risk to the security of the electricity system. We have identified two options, though there may be alternative approaches and we welcome suggestions through this consultation.

### Options

37. **Option 1:** One approach for putting the closure of unabated coal into effect would be to reflect the existing regime for new coal power stations onto existing plant from 2025. This would specifically require existing stations to do three things:

- Demonstrate CCS technology on a proportion of the station's capacity;

- 
- Undertake any necessary modification or action to ensure that the remainder of the plant could be retrofitted with CCS in the future, and;
  - Comply with the existing “mass based” Emissions Performance Standard.

38. Under these arrangements coal stations could continue to operate with investment in the abatement technology required. Current requirements for new coal power stations are for CCS technology to be demonstrated on at least 300MW of the station’s capacity, however given the variation in capacity of the existing coal fleet (see figure 2, Chapter 2) it might be more appropriate to require CCS to be demonstrated on a greater proportion of a station’s capacity. We seek views on how much a proportion might be appropriate. In addition, the application of the EPS would require annual emissions to be at levels that are broadly consistent with CCGT plant. Given the age of the remaining coal plant in Great Britain it might be considered unlikely that any plants would choose to invest in retrofitting CCS technology, but any decision to do so would encourage the development of this technology.

39. **Option 2:** Another approach for putting the closure of unabated coal into effect could be to modify the existing Emissions Performance Standard (EPS) to apply a concentration-based limit on emissions per unit of generated electricity at any point in time, rather than setting an annual limit on emissions, taking effect from 2025. This could be set at the current statutory rate of emissions of 450g/kWh<sup>12</sup>. This would prevent coal generating units from operating without investment to reduce emissions, but would not specifically mandate CCS technology to be retro-fitted if generating units were able to find other ways to reduce their carbon intensity.

40. Under both the above approaches, to avoid unintended consequences for other fossil fuel plant, including peaking plant which can have a relatively high emission intensity, we would expect to apply requirements only to *units* that:

- use solid fossil fuel to generate electricity (irrespective of plant boundaries). This will include *inter alia*: steam coal, anthracite, lignite and petroleum coke (pet coke), and;
- have an installed nameplate *thermal* capacity of 300MWth or greater, and;
- were commissioned before 1987 (the year after the last currently active coal generator was commissioned).

41. Similarly, dedicated biomass or energy crop power stations as well as full-station or unit biomass conversions<sup>13</sup> are *not* intended to be within the scope of these proposals.

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<sup>12</sup> Energy Act 2013, Clause 57(2) <http://www.legislation.gov.uk/ukpga/2013/32/part/2/chapter/8>

<sup>13</sup> The Renewable Obligation Order 2015 permits such stations to use fossil fuel, including coal, for permitted ancillary purposes. This is limited to 10% of the energy content of all energy sources used in any month in the

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42. We recognise that co-firing with solid and gaseous biomass, including energy crops and bioliquids, at relatively high levels is one way generators may be able to meet the modified EPS emissions limit described in option 2. Biomass co-firing is currently supported under the Renewables Obligation (RO) for which all coal power stations are currently accredited. There are three main support bands<sup>14</sup>:

- low range, using up to 50% biomass;
- mid-range, using between 50% and up to 85% biomass, and;
- high-range, using between 85% and up to 99.9% biomass.

43. Recent levels of co-firing have generally been sporadic, using less than 10% biomass. Our analysis suggests that the levels of biomass that would be needed to meet a modified EPS emissions limit would need to be significantly higher. We would be interested in views on the likelihood of generators moving to higher levels of co-firing under this option.

44. It is noted that any increase in co-firing levels by generators accredited under the Renewables Obligation scheme would give rise to additional pressure on the Levy Control Framework (LCF), with a consequent impact on consumers' bills. We therefore welcome any views and evidence on the impact of these proposals on generators accredited for co-firing under the RO. In light of this evidence we will if necessary seek to identify action to enable control of spend on biomass co-firing under the RO.

45. There may be alternative approaches to putting into effect the closure of unabated coal power stations and we welcome suggestions through this consultation. We have considered alternatives to those set out above, but have not included them here either because we do not consider they would achieve the desired effect of reducing the carbon intensity of the generation sector, or due to reasons of practicality. These include:

- Applying the EPS as it currently applies to new fossil fuel stations on to existing coal units, but without the additional requirement to demonstrate CCS that also applies to new coal generators. We have dismissed this on the grounds that this would be unlikely to lead to closure by 2025 and that it would permit plant to continue to operate, even if that was not at baseload levels. This would lead to uncertainty about the timetable for coal plants closing and not lead to the same investment signal for new capacity; and,

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combustion unit or generating station. Such permitted ancillary services include; flame stabilisation, temperature control at start up and control of fouling and corrosion. Contracts for Difference and Investment Contracts include equivalent provision limiting the use of fossil fuel to 10% of the energy content of all energy sources used in any month, including ancillary purposes.

<sup>14</sup> For further information on rules governing support for biomass co-firing under the RO see Ofgem's guidance to generators at: <https://www.ofgem.gov.uk/publications-and-updates/renewables-obligation-guidance-generators-2>

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- Mandating the closure of existing coal-fired power stations explicitly through regulation. However, without provision for exempting plant that invested in abatement, this would not be in line with the objectives outlined above.

46. We would welcome views on the date in 2025 that the requirements should take effect. A 31<sup>st</sup> December 2025 date would leave plant operators with the greatest level of flexibility on when to either close or to meet the proposed requirements. It might however be appropriate to align the requirements with the Transmission Entry Capacity (TEC) year on 31<sup>st</sup> March 2025, though it is also possible that the requirements could be aligned with the Capacity Market year on 30<sup>th</sup> September 2025.

## Consultation Question

1.

Do you have any views and evidence on the options outlined above, including on relative benefits and risks? Are the principles above a sound basis for designing a regulatory approach?

With reference to the Impact Assessment published alongside this consultation, do you have any views and evidence on the impact of these proposals? Are there alternative approaches that meet the objectives of closing unabated coal generation?

Under option 1, do you have any views on the proportion of generation capacity on which CCS demonstration should be mandated?

Do you have any evidence or analysis on the impact of these proposals on the likelihood of generators moving to higher levels of biomass co-firing?

Might there be any unintended consequences for other forms of generation? Are there better alternatives, and if so, why? If so, do you have any evidence to support your suggestions?

Do you have any views or suggestions on the date in 2025 from which the proposed obligations should take effect?

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## 2. Constraint in years ahead of 2025 closure

### Approaches to setting a constraint

47. One of the Government's objectives in taking action on unabated coal generation is to ensure an orderly transition and avoid the risk of coal closures happening at once.
48. In the "high coal" scenario outlined in Chapter 2, market conditions would allow for existing coal stations to continue to operate into the early 2030s, with 6GW remaining on stream in 2025. In such circumstances there is a risk that by acting to limit emissions in 2025, a significant amount of coal generation capacity will close at once. We have therefore modelled the effect of interventions to constrain coal generation<sup>15</sup> ahead of 2025 that might result in the progressive closure of coal stations. This should also send a clear signal for investment in replacement capacity, including new gas generators. There is no impact in our central case from imposing any of the constraints we have modelled, because in these circumstances coal stations will have already closed by 2025.
49. We have looked at the effect of a 40% constraint on coal generation from 2023 as part of the modelling in the Impact Assessment accompanying this consultation. In our high coal scenario, while the constraint has the effect of reducing coal generation and therefore CO<sub>2</sub> emissions, it has no impact on the rate of coal plant retirements, as the remaining plants are able to earn sufficient revenue from the constrained generation levels to stay on-line. While this is expected to be sensitive to the scenario modelled, it suggests potential difficulties in setting a constraint that leads to progressive closure, particularly given wider uncertainties in the market.
50. We consider that there are at least two broad approaches through which a constraint could be applied: either to individual plant or across the remaining fleet of coal stations overall. In either case the constraint could be implemented by limiting running hours or CO<sub>2</sub> emissions.
51. It has not been possible to model directly the effect of applying a constraint across the whole fleet of coal stations and providing for trading between power stations. Such an arrangement might be expected to enable the more efficient plant to operate longer, although this benefit is likely to be more significant the longer the transitional period. It might also be more complex to implement.
52. We welcome any views on whether a constraint would be beneficial and, if so, any ideas on the possible profile and design. Given that any constraint would be for a limited period ahead of the 2025 requirements coming into force, our view is that its design should be straightforward. We are open to considering other approaches to a constraint, including of a non-regulatory nature.

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<sup>15</sup> It is recognised that plant that is non-compliant with the IED from 1 July 2020 will have an effective constraint of 1,500 hours per annum (i.e. 17% annual load factor).

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53. It is recognised that application of any constraint might be an impact on coal plants' ability to participate in the Capacity Market. We would welcome views on the extent to which this risk might materialise.

## Consultation Question

2.

Do you agree with the principle of establishing a constraint on coal generation in the years ahead of 2025?

Have you any views on how a constraint might be implemented, including on whether a constraint should be applied uniformly to each plant or across the fleet of generators, and any supporting evidence?

We would welcome views and supporting evidence on the level of constraint and time from which might it apply, including the impact on Capacity Market commitments.

Have you any views on the extent to which a constraint might affect coal plants' ability to participate in the Capacity Market?

Are there alternative ways of delivering the objective of phasing out coal generation by 2025 without negative impacts on the security of supply?

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### 3. Ensuring Security of Supply

54. The Government is clear that ensuring a secure supply of electricity to families and businesses is not negotiable. We will only proceed with the proposals in this consultation if we are confident that sufficient capacity will be available to compensate for the coal capacity that will close, such as new gas capacity.

55. The Government does not intend to specify the level of replacement generation that will need to come forward to proceed with these policies. Rather, the specific level of generation, including new gas, that will need to come forward in order to meet this condition will be decided on the advice of the System Operator, scrutinised by the Panel of Technical Experts taking account of the expected rate of coal closure as well as the range of other factors that influence the need for capacity.

56. **Our modelling suggests that in both scenarios, the Capacity Market will ensure that there is sufficient capacity in place and that there will be no impact on the security of electricity supply.** This view is strengthened by the reforms that have been brought

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forward to the Capacity Market this year<sup>16</sup> and subject only to any technical constraints on the rate of new build.

57. Under our central scenario, modelling suggests that replacement capacity begins to come on stream in the years ahead of 2021 when the final coal station closes.. This implies that the proposals will not have implications on security of supply under this scenario.
58. In the “high coal” scenario the modelling suggests that around 6GW of coal will retire in 2025 as a result of the proposals in this consultation. We have assumed that under these conditions three plants undertake the investment needed to comply with the IED before 2020, in full knowledge that they would have to recover that investment before closing in 2025. We think this is unlikely given the cost of IED compliance, but we have taken this precautionary approach primarily to help us understand the new build implications.
59. Our modelling suggests this level of retirements can be replaced by a mixture of new gas plant, reciprocating engines, interconnection and renewable capacity.
60. Fundamental to our assessment of security of supply are the assumptions we have made about the rate at which new replacement capacity, such as new gas generators, can be built and commissioned. In 2014 DECC commissioned Parsons Brinckerhoff<sup>17</sup> to consider, amongst other things, the maximum feasible technical build rates for large scale gas generation. The work takes account of historical build rates and physical constraints such as the availability of grid connections, regulatory requirements, manufacturers’ production capabilities and the capacity of the construction sector to construct and commission new plants.
61. The analysis suggested that the likely maximum feasible technical build rates for new power plants in the UK appears to be limited by a construction capability to about three Combined Cycle Gas Turbine (CCGT) or Open Cycle Gas Turbine (OCGT) plants per year, typically 6GW per year if all three were CCGT or 4GW if all three were OCGT. As a technical maximum build rate, it is unlikely to be sustained year-on-year. It is also higher than the build rates for CCGTs previously achieved (an average maximum of 2.5GW a year during the 1990s, with a maximum of 2.8GW in 2000).
62. These conclusions are built into our modelling as described in the Impact Assessment. We would however welcome any further evidence on this matter.
63. Whilst it could be possible for a future Government to remove the obligations placed on existing coal stations through primary legislation, we would welcome views in this consultation on whether in designing the arrangements we should also make provision for the Secretary of State to have the power to suspend or amend the proposed arrangements

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<sup>16</sup> Consultation and response available at <https://www.gov.uk/government/consultations/consultation-on-reforms-to-the-capacity-market-march-2016>

<sup>17</sup> Coal and Gas Assumptions. DECC (Parsons Brinckerhoff), March 2014  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/315717/coal\\_and\\_gas\\_assumptions.PDF](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/315717/coal_and_gas_assumptions.PDF)



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and, if so, the conditions that might apply to such a power. Limited suspension arrangements are in place for the current Emissions Performance Standard that applies to new plant.<sup>18</sup>

64. It is recognised that any such power might act against the certainty that our proposals intend to help create for those considering investing in new lower carbon capacity, and we would therefore welcome views on the balance of the argument together with views on the conditions that should apply to any suspension.

65. Our preliminary assessment is that these disadvantages probably outweigh any advantages.

## Consultation Question

3.

We would welcome comment on our proposals. What are the positive and negative aspects of the Secretary of State retaining powers to be able to temporarily suspend the closure date or constraint in previous years if he believes this is justified?

If such a measure were introduced how might it be best designed to minimise the impact on the investment climate for new capacity?

Does the assessment of future build rates summarised above and in the Impact Assessment published alongside this consultation represent a *reasonable* benchmark against which the closure of coal can be assessed?

With reference to the analysis set out in the Impact Assessment, what additional factors and evidence might we need to take account of to measure the impact on investment in replacement capacity?

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## 4. Wider Impacts of Coal Closure

66. While the scenarios we have modelled in the Impact Assessment suggest that unabated coal power stations are expected to close in any case (under central scenarios by the early 2020s, and under “high coal” scenarios by the early 2030s), the Government recognises that the proposed measures in this consultation are likely to have implications for the wider economy.

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<sup>18</sup> Clause 59 of the Energy Act 2013 [http://www.legislation.gov.uk/ukpga/2013/32/pdfs/ukpga\\_20130032\\_en.pdf](http://www.legislation.gov.uk/ukpga/2013/32/pdfs/ukpga_20130032_en.pdf) and clause 16 of the Emissions Performance Standard Regulations 2015 [http://www.legislation.gov.uk/uksi/2015/933/pdfs/uksi\\_20150933\\_en.pdf](http://www.legislation.gov.uk/uksi/2015/933/pdfs/uksi_20150933_en.pdf)

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67. Closure of coal fired power stations can have a significant impact on communities. A coal power station typically employs around 100-500 people directly, depending on the plant's size, with a similar number of people employed on a contractual basis.
68. There is also associated employment in the coal production, shipping and freight elements of the supply chain, as well as products that rely on the by-products of coal combustion as a feedstock, including construction blocks and gypsum. In addition, it is reasonable to conclude that as the market for coal generation continues to decline there will be a corresponding impact on businesses that provide goods and services to those stations or rely on their by-products, which might also impact on the ability of the affected businesses to serve remaining markets. These impacts would however be expected at some point in time even in the absence of the proposals in this consultation. The Government is able to work with local partners, including the Jobcentre Plus' Rapid Response Service, to support the workforce into new employment and arrange re-training where needed.
69. On the other hand, we would expect that the losses of activity in the coal supply chain will to some extent be compensated by increased activity in supply chains for lower-carbon forms of generation. Further, it is anticipated that the proposals set out in this consultation would increase certainty in future wholesale market revenues for replacement capacity. However the level of benefit our proposals will bring in terms of improved market certainty is difficult to quantify.
70. The sites of coal power stations can be redeveloped for a number of uses, including new energy infrastructure. In recognition of this, the Government recently organised a workshop with the energy industry and the Planning Inspectorate to help industry make the most of the planning pre-application process, including for the redevelopment of coal plant sites for new gas generators. We shall continue to work with industry and others as appropriate to keep this under review.
71. In our "high coal" scenario, where coal stations would otherwise continue generating throughout 2020s, a relatively high amount of new lower-carbon capacity, including gas, would be required to be built quickly to provide replacement. This could lead to temporary increases in construction costs for new plants, if resources need to be diverted from other sectors in the economy.

## Emissions reductions

72. Our assessment is that in the "high coal" scenario, the closure of coal in 2025 is projected to yield 124 MtCO<sub>2</sub>e in savings over the period 2016-2030. A constraint applied in the years ahead of 2025 would increase this. While in the modelled "central" scenario coal stations close before the policy takes effect, the action we are taking guarantees these savings in the face of uncertainties inherent in the market.
73. Combustion of fossil fuels to produce energy results in emissions of NO<sub>x</sub>, SO<sub>2</sub> and PM. It is noted that the removal of coal from the generation mix will have positive consequences for air quality, in particular reducing NO<sub>x</sub>, SO<sub>2</sub> and PM emissions, as well as Mercury. This reduction will have a corresponding benefit on human health and environment under the

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modelled scenario where the market favours coal generation. However, the replacement of coal with biomass will not result in as significant a reduction in these pollutants. In considering any requirements to end unabated coal generation by 2025 following this consultation, we will evaluate the air quality impacts of the options.

## Consultation Question

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| 4. | We would welcome views and supporting evidence on the wider impacts of regulating the closure of unabated coal by 2025, particularly where these are additional to what might be expected without this measure. |
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## Annex 1: Current fleet of coal power stations

A summary of information for remaining coal generating stations (as at August 2016), including status under the Industrial Emissions Directive (IED), agreements under the Capacity Market (CM) and the Supplemental Balancing Reserve (SBR).

Company	Station	IED Status <sup>19</sup>	2016/17 SBR	2018/19 CM	2019/20 CM
RWE Npower Plc	Aberthaw B	TNP	No	Yes	Yes
EDF Energy	Cottam	TNP	No	Yes	No
Drax Power Ltd	Drax 1, 4, 5, 6	TNP	No	Yes - for 2 units	Yes - or 2 units
Eggborough Power Ltd	Eggborough	Limited Life Derogation	Yes – for 2 units	No	No
Scottish and Southern Energy	Fiddler’s Ferry	TNP	Yes – for 1 unit	Yes – for 3 out of 4 units	No
Uniper	Ratcliffe-on-Soar	Meets requirements	No	Yes	Yes
Simec	Uskmouth	TNP	No	No	No
EDF Energy	West Burton	TNP	No	Yes – for 3 out of 4 units	No

<sup>19</sup> See Chapter 2 or Annex 2 for detail on the Industrial Emissions Directive



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## Annex 2: Existing policy Interventions

1. A number of interventions are in place with the aim to reduce our reliance on carbon-intensive electricity generation, to ensure a secure and reliable supply, and to mitigate atmospheric pollutants from industrial emitters. These measures each have an impact on the current and future profitability of coal stations and therefore affect their remaining economic life. The most relevant of these to coal generators are set out below.

### Carbon Pricing

2. Carbon emissions from the power sector are subject to a declining cap on emissions under the **Emission Trading System**. In addition to this, the UK requires power stations burning fossil fuels to pay the **Carbon Price Support** (CPS). The government has capped the carbon price support at £18 per tonne of CO<sub>2</sub> until 2020/21<sup>20</sup> and further announcements will be made on the trajectory beyond 2021 in the 2016 Autumn Statement. As coal emits around twice the CO<sub>2</sub> per unit of electricity as gas, the higher the level of the CPF the greater the impact on the profitability of coal generation compared with gas and other forms of generation.

### Security of Supply

3. The Capacity Market is a technology-neutral mechanism for ensuring security of supply while minimising the impact on the wholesale market. It provides payments for reliable generation on top of wholesale revenues, except for plants that are in receipt of support through other incentives. The Capacity Market is also designed to encourage the investment needed to bring forward new generation to replace retiring power stations and provide back-up for more intermittent and inflexible low-carbon generation sources.
4. A Capacity Market agreement places obligations on an operator to make capacity available when it is needed in return for payments. Capacity auctions are held approximately 4 years in advance of the delivery year, with agreements awarded to successful plants for 1 year, or up to 3 or 15 years (dependent on whether the station is existing, refurbishing or new). A further auction takes place one year ahead of the delivery year for additional one-year agreements.
5. Two main auctions have been held to date for delivery in 2018/19 and 2019/20 and a number of coal fired power station units have secured one year capacity agreements in both auctions. Annex 1 provides more detail. These plants have a guaranteed revenue stream for the years they have agreements in place in return for commitments to generate.
6. While the two auctions have brought forward sufficient capacity for the delivery years in question, they have led to relatively little new baseload generation capacity. In light of this the Government has brought forward reforms to secure the required level of new build

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<sup>20</sup> Uprating with RPI in 2020/21

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replacement capacity, such as new gas, as older plants such as coal comes off the system. These reforms<sup>21</sup> include:

- Buying more capacity, and buying it earlier, with the next Capacity Market 4-year ahead auction in December 2016 buying materially more capacity than might otherwise have been the case;
  - Tightening delivery incentives on those who have agreements to deliver against them and to penalise those who fail to meet their commitments more severely, and;
  - Responding to a short-term security of supply challenge, by bringing forward the first Capacity Market delivery year to 2017/18, instead of rolling over current Contingency Balancing Reserve (CBR) arrangements.
7. We consider that the Capacity Market will secure the capacity we need in both the long and short term and also provide a robust mechanism for protecting against unforeseen circumstances that may lead to unplanned outages. The Government is therefore satisfied that the Capacity Market will bring forward the investment needed to compensate for the closure of unabated coal.
  8. It should be noted that coal plants are eligible to bid into the auction for 2017/18 and may therefore have a role to play in meeting generation needs in the short to medium term, if they can provide capacity cost-effectively compared with alternatives. Coal plants are also able to bid into the 2020/21 four-year ahead auction in December 2016, and provided they meet the investment thresholds could bid for three-year refurbishment contracts to 2022/23.
  9. The **Contingency Balancing Reserve** (CBR) is used by National Grid in its role as system operator to protect consumers in the unlikely event that there is insufficient capacity on the system and comprises the Supplemental Balancing Reserve (SBR) and the Demand Side Balancing Reserve (DSBR). As part of this and ahead of the Capacity Market, National Grid contracts with stations that would otherwise have closed or mothballed to keep them in reserve through the SBR. Two coal stations have entered into SBR agreements to be at least partly available in winter 2016/17. Units that have such SBR contracts are prohibited from selling into the wholesale market. The DSBR is similar to the SBR, but contracted with demand side responders.

## Decarbonisation

10. **Contracts for Difference** (CfDs) were also implemented as part of package of Electricity Market Reforms. CfDs aim to bring forward investment in low carbon generation at the lowest cost to the consumer. In addition, low carbon generation is supported by the **Renewables Obligation** and **Feed-in Tariffs**. In general terms the greater the proportion of

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<sup>21</sup> Consultation and response available at <https://www.gov.uk/government/consultations/consultation-on-reforms-to-the-capacity-market-march-2016>. Electricity Capacity (Amendment) Regulations 2016 available at [http://www.legislation.gov.uk/ukxi/2016/742/pdfs/ukxi\\_20160742\\_en.pdf](http://www.legislation.gov.uk/ukxi/2016/742/pdfs/ukxi_20160742_en.pdf)



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low carbon generation on the system, the less opportunity there will be for higher emitting stations such as coal to dispatch into the wholesale market.

## Atmospheric Pollution Abatement

11. In addition to CO<sub>2</sub>, coal combustion also results in higher emissions of other pollutants, in particular Nitrogen Oxides (NO<sub>x</sub>), Sulphur Dioxide (SO<sub>2</sub>) and particulate matter, in comparison to an equivalent gas powered station. The National Emissions Ceiling Directive sets a total emissions ceiling for key air pollutants which must be met from 2010 onwards in the UK. A revised National Emissions Ceiling Directive which would set stricter emissions ceilings for 2020 (implementing an agreement under the Gothenburg Protocol) and for 2030 has been agreed, subject to final approval. Meeting these new ceilings is expected to require further action from all parts of the economy.
12. The Industrial Emissions Directive (IED)<sup>22</sup> came into force on 6 January 2011 and into effect on 1 January 2016 in relation to existing large combustion plant, and sets new emission limits for key air pollutants. Three compliance options were available to plants:
- To meet the emissions limit requirements from 1 January 2016. Compliance is estimated to require investment of the order to £50m-£75m per 500MW unit<sup>23</sup>;
  - To participate in the Transitional National Plan (TNP). The TNP allows certain older plants until July 2020 to meet the emission limit requirements described above. Plants in the TNP are subject to an annual emissions allocation within a declining overall UK maximum emissions ceiling. By July 2020 they must either meet the emission limit requirements, close, or they can continue operation with a higher emissions limit but limited to 1,500 hours a year (i.e. 17% annual load factor). Or;
  - To utilise the Limited Lifetime Derogation (LLD) which limits plants to 17,500 hours of operation between 1 January 2016 and 31 December 2023, after which they must close.
13. The majority of remaining coal stations are participating in the Transitional National Plan and therefore have until 30 June 2020 to install the equipment needed to meet the emission limit requirements, close, or be limited to 1,500 hours a year (which may still require some investment to reduce emissions). Coal stations' compliance statuses are set out in Annex 1. Our understanding is that one station has already installed the equipment necessary to comply with the emissions limits set out in the IED, and that one has made use of the LLD and therefore must close by 2023. The remaining plants have each made investments that put them on a path to meeting the emissions limits, but further investments will be necessary to achieve full compliance. The scale of these investments varies by plant, but we would expect them to continue only if warranted by the expected underlying return over the station's remaining life.

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<sup>22</sup> See <http://ec.europa.eu/environment/industry/stationary/ied/legislation.htm> for more information on the IED.

<sup>23</sup> Coal and Gas Assumptions. DECC (Parsons Brinckerhoff), March 2014  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/315717/coal\\_and\\_gas\\_assumptions.PDF](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/315717/coal_and_gas_assumptions.PDF)

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14. As part of the IED, large combustion plants must also apply **Best Available Techniques** (BAT). BAT is the concept used to identify the most effective technologies for reducing emissions of pollutants from industrial processes, including power generation. “BAT Reference documents” (BREFs) are the reference documents to identify how BAT applies at each plant. It is for the environmental regulator (the Environment Agency in England & Wales) to determine what the BAT is for each combustion power plant, taking account of the BAT Conclusions set out in the BREF. BAT can therefore require more stringent emission limits than the ‘backstop’ emissions levels contained in the Directive. Individual plants may seek to use alternative BAT subject to consideration of the technical characteristics of the plant concerned or its geographical location.
15. On 23 June 2016, the EU referendum took place and the people of the United Kingdom voted to leave the European Union. Until exit negotiations are concluded, the UK remains a full member of the European Union and all the rights and obligations of EU membership remain in force. During this period the Government will continue to negotiate, implement and apply EU legislation. The outcome of these negotiations will determine what arrangements apply in relation to EU legislation in future once the UK has left the EU.

### Obligations in place for new coal generators

16. The **Emissions Performance Standard** (EPS), as set out in the Energy Act 2013, applies to all new fossil fuel electricity generation plants that are above 50MWe. The EPS works on a “mass-basis” and sets an annual limit on emissions at a level equivalent to 450gCO<sub>2</sub>/kWh for a plant operating at baseload. This is around half the level of emissions of unabated coal generation and is fixed until end 2044.
17. In practice, this means giving individual plants a total tonnage allowance of CO<sub>2</sub> within which they would have to remain each year. This tonnage is calculated based on the plant’s installed electrical capacity, and for baseload to be based on 85% load factor.
18. The total emissions limit for a new build plant in any given year would therefore be:

$$\text{Emissions limit} = [450\text{g/kWh}] \times [8760 \text{ hours in a year}] \times [85\%] \times [\text{plant capacity (MW)}]$$

This equates to 3,350 tonnes of CO<sub>2</sub> per MW of installed electrical capacity.

19. The EPS reinforces a **National Policy Statement planning requirement**<sup>24</sup> in place since 2011 in England and Wales for new coal-fired power stations to be equipped with at least 300MW (net) full chain carbon capture and storage (CCS). Stations are also required to show that the proposed plant will be able to have CCS on its whole capacity.

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<sup>24</sup> National Planning Policy Statement EN1 and EN2, DECC, July 2011  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47854/1938-overarching-nps-for-energy-en1.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf) (section 3.3.6) and  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47855/1939-nps-for-fossil-fuel-en2.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47855/1939-nps-for-fossil-fuel-en2.pdf) (section 2.3.6).

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20. Broadly, these measures ensure that new coal plants will not be constructed and operated unless emissions are equivalent to those from a gas station. However, it is unlikely to be cost effective to retrofit existing coal plants to enable them to be refurbished and fitted with CCS technology. These plants are at or beyond their design life and relatively inefficient, an important consideration given the energy penalty of capturing and permanently storing CO<sub>2</sub>.



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# Catalogue of consultation questions

## Consultation Question

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| 1. | <p>Do you have any views and evidence on the options outlined above, including on relative benefits and risks? Are the principles above a sound basis for designing a regulatory approach?</p> <p>With reference to the Impact Assessment published alongside this consultation, do you have any views and evidence on the impact of these proposals? Are there alternative approaches that meet the objectives of closing unabated coal generation?</p> <p>Under option 1, do you have any views on the proportion of generation capacity on which CCS demonstration should be mandated?</p> <p>Do you have any evidence or analysis on the impact of these proposals on the likelihood of generators moving to higher levels of biomass co-firing?</p> <p>Might there be any unintended consequences for other forms of generation? Are there better alternatives, and if so, why? If so, do you have any evidence to support your suggestions?</p> <p>Do you have any views or suggestions on the date in 2025 from which the proposed obligations should take effect?</p> |
| 2. | <p>Do you agree with the principle of establishing a constraint on coal generation in the years ahead of 2025?</p> <p>Have you any views on how a constraint might be implemented, including on whether a constraint should be applied uniformly to each plant or across the fleet of generators, and any supporting evidence?</p> <p>We would welcome views and supporting evidence on the level of constraint and time from which might it apply, including the impact on Capacity Market commitments.</p> <p>Have you any views on the extent to which a constraint might affect coal plants' ability to participate in the Capacity Market?</p> <p>Are there alternative ways of delivering the objective of phasing out coal generation by 2025 without negative impacts on the security of supply?</p>  |

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3.

We would welcome comment on our proposals. What are the positive and negative aspects of the Secretary of State retaining powers to be able to temporarily suspend the closure date or constraint in previous years if he believes this is justified?

If such a measure were introduced how might it be best designed to minimise the impact on the investment climate for new capacity?

Does the assessment of future build rates summarised above and in the Impact Assessment published alongside this consultation represent a *reasonable* benchmark against which the closure of coal can be assessed?

What additional factors and evidence might we need to take account of to measure the impact on investment in replacement capacity?

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4.

We would welcome views and supporting evidence on the wider impacts of regulating the closure of unabated coal by 2025, particularly where these are additional to what might be expected without this measure.

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