



The Great Green Hangover

How to cut bills and avoid an energy crisis

TONY LODGE

THE AUTHOR

Tony Lodge is a leading energy and infrastructure analyst. His past publications include *Electrifying Britain – Forward with Coal, Gas or Nuclear?* (Economic Research Council, 2005) *Clean Coal – A Clean Affordable Alternative* (CPS, 2007), *All Hot Air – Labour’s Failed Strategy on Fuel Poverty* (Bow Group, 2008), *Wind Chill* (CPS, 2008), *Step off the Gas* (CPS, 2009), *Rescuing Renewables – How energy storage can save green power* (Bow Group, 2010) and *The Atomic Clock* (CPS, 2012).

Acknowledgment

*Support towards the publication of this study was given by the
Institute for Public Research*

ISBN No. 978-1-910627-18-1

© Centre for Policy Studies, November 2015

Printed by 4 Print, 138 Molesey Avenue, Surrey

CONTENTS

Summary

1. Time is running out	1
2. A problem mirrored by falling energy production at home	8
3. Righting the Coalition's Wrongs	20
4. Why do high carbon taxes threaten an energy crisis?	35
5. Managing electricity supply & what to do with the 'Big Six'	47
6. The UK has lost the freedom to change its energy policies	54
7. Conclusion	59

Glossary

Stylistic note: Throughout this report the term 'UK' will be used when referring to national energy policy. The author acknowledges that Northern Ireland operates within a Single Electricity Market with the Republic and is not subject to UK Carbon Price Support legislation.

SUMMARY

- Britain has lost over 15,400MW of dispatchable electricity generating capacity in the last five years as baseload power plants have closed with no equivalent replacement. National Grid has warned that the country has just 1.2% of spare generating capacity, down from 4.1% last year. Though the UK has legally binding carbon reduction targets there are no comparable targets to maintain security of energy supply, diversity or affordability.
- The burden of 'green' taxes on businesses nearly doubled under the Coalition according to official figures. The Treasury imposed £2.5 billion of levies in 2010-11 a figure predicted to reach £4.6 billion in 2015-16. In parallel average household gas and electricity prices have risen by over 25% since 2010, up by £251. Over the last ten years bills have risen by 131%, up by £705, easily outstripping any other household essential.
- The Coalition imposed carbon taxes on the British power sector that are now over three times higher than those in the rest of Europe – over £18 per tonne of CO₂ emitted compared with £6 as of October 2015. This 'Carbon Price Support' has already forced the premature closure of three large power plants with the fear that more could

follow. It has also kept prices unsustainably high for some energy intensive industries such as steel.

- Consequently, these interventionist policies have effectively dismantled the market driven system that was created after the privatisation of Britain's electricity supply industry in 1990. It has been replaced with a highly prescribing and controlling centralised body which attempts to pick winners and guarantees prices irrespective of cost, performance or technology maturity.
- According to National Grid, peak transmission demand for winter 2016/17 is forecast to be 54,200MW. Due to widespread coal plant closures by winter 2015/16 Britain will only have an average dispatchable electricity capacity of 51,850MW left. British electricity capacity will soon fall below the minimum necessary margin to guarantee secure supplies of electricity for a growing economy. Action must be taken now if the lights are to be kept on.
- High UK Carbon Price Support should be abandoned before it forces the premature closure of more baseload power plants and thus threatens energy security and affordability. Britain should enjoy the same carbon prices as its main EU competitors inside the EU Emissions Trading Scheme.
- The Government should prioritise energy security alongside its environmental commitments. In the spirit of the Conservative election pledge to enshrine in law not to raise income tax, national insurance or VAT, the Government should also legislate to deliver targets to maintain security of energy supply, diversity and affordability. In support of this the Government should introduce an independent Annual Statement assessing the economic impacts of its energy policy on British industry, consumers, competitiveness, energy security and diversity.

1. TIME IS RUNNING OUT

It is 25 years since a Conservative Government achieved what many believed to be impossible. Critics labelled plans to privatise the key utilities of electricity, water, gas alongside the industrial behemoths of coal and steel as over-ambitious and far too difficult. Gas was first (1986), followed by steel (1988), water (1989) the electricity supply industry (1990) and then, what had been described as the “ultimate privatisation”; the coal industry (1994).¹

The privatisation of the electricity supply industry delivered some of the lowest electricity prices in Europe for a generation. It created a genuine market for electricity in which initially over 15 electricity companies competed with each other to sell electricity to newly empowered customers who were fast to wake up to an energy consumer revolution. Chart 1 illustrates the dramatic fall in domestic energy bills (electricity and gas) between 1995 and 2005. Note 2005 is the point when Government intervention in energy markets

¹ Secretary of State for Energy, Cecil Parkinson, described coal as the “ultimate privatisation” in his 1988 speech to the Conservative Party Conference.

returned alongside vertical integration of the energy market with the emergence of the Big Six.²

Chart 1: Index of real domestic fuel and light prices (Q1 1987 = 100)



Source: Quarterly Fuel Prices, DECC, Table 2.1.1

In the period following these changes (2005 – 2015) average household gas and electricity prices have risen by £705 or 131% in real terms, easily outstripping any other living essential.³ Importantly these rises have occurred against the backdrop of an overall reduction in the amount of energy used; since 2000 household energy consumption has fallen by 9%.⁴

² “The Big Six” are Centrica, E.ON UK, EDF Energy, RWE npower, Scottish and Southern Energy and Scottish Power. These companies supply consumers with over 95% of domestic energy (electricity and gas) and generate up to 60% of UK electricity from their power plant and renewable portfolios. Four of the six are part of German, French and Spanish owned companies.

³ Statistics from uSwitch.com based on a medium user customer, on a dual fuel plan, paying on receipt of bill, with bill sizes averaged across all regions, correct as of 8th April 2015.

⁴ DECC ‘Energy Consumption in the UK (2014)’, July 2014.

Since 1991 the electricity generating sector in Britain has embraced the burning of North Sea gas in new Combined Cycle Gas Turbines (CCGT) power plants,⁵ a process which had previously been banned by the then European Economic Community (EEC). The coal industry was exposed to market forces which forced the industry to concentrate on its economic collieries and close loss-making pits; imports of cheaper coal helped keep electricity prices down and provided the generators with a vast choice in coal supplies.

But this initial surge in market-led activity, which adhered to the key ambitions of delivering affordability, diversity and security of energy supply, was slowly eroded by Whitehall's desire to decarbonise the electricity supply industry as quickly as possible. Certain mature energy technologies have now been banned, whilst new ones which are not as economically efficient have been supported. This adherence to EU renewable growth, and self-imposed carbon reduction policies has undermined any semblance of an electricity market and is similarly reducing the diversity of fuel sources from which the UK generates its electricity, whilst increasing costs.

1.1 No coherent energy policy for a generation

Britain has had no clear or coherent energy policy for nearly 20 years. A succession of 16 Ministers⁶ and 13 Secretaries of

⁵ <http://www.centricaenergy.com/power-generation/roosecote>

⁶ John Battle (Leeds West; May 1997 — July 1999), Helen Liddell (Airdrie and Shotts; July 1999 — January 2001), Peter Hain (Neath; January 2001 — June 2001), Brian Wilson (Cunninghame North; June 2001 — June 2003), Stephen Timms (East Ham; June 2003 — September 2004), Mike O'Brien (North Warwickshire; September 2004 — May 2005), Malcolm Wicks (Croydon North; May 2005 — November 2006), Lord Truscott (November 2006 — July 2007), Malcolm Wicks (Croydon North; July 2007 — October 2008), Mike O'Brien (North Warwickshire; October 2008 — June 2009), Lord Hunt (June 2009 —

State⁷ responsible for energy policy have failed to take timely action to prepare the nation for the future, in which by 2020:

- the UK will have become increasingly reliant on fuel imports to generate electricity as North Sea oil and gas production continues in steep decline, alongside coal production;
- up to a third of current UK electricity generating capacity could be forced to close early as result of high domestic carbon taxes;
- the UK will be required to raise its proportion of renewables-sourced energy to 33% of total electricity supply;⁸

May 2010), Charles Hendry (Wealden; May 2010 — September 2012), John Hayes (South Holland and the Deepings; September 2012 — March 2013), Michael Fallon (Sevenoaks; March 2013 — July 2014), Matthew Hancock (West Suffolk; July 2014 — May 2015), Andrea Leadsom (South Northamptonshire; May 2015 — present).

⁷ Margaret Beckett (Derby South; May 1997 — July 1998), Peter Mandelson (Hartlepool; July 1998 — December 1998), Stephen Byers (North Tyneside; December 1998 — June 2001), Patricia Hewitt (Leicester West; June 2001 — May 2005), Alan Johnson (Hull West and Hessle; May 2005 — May 2006), Alistair Darling (Edinburgh South West; May 2006 — June 2007), John Hutton (Barrow and Furness; June 2007 — October 2008), Ed Miliband (Doncaster North; October 2008 — May 2010), Chris Huhne (Eastleigh; May 2010 — February 2012), Ed Davey (Kingston and Surbiton; February 2012 — May 2015), Amber Rudd (Hastings and Rye; May 2015 — present).

⁸ EU 2020 Climate and Energy Package:

http://www.decc.gov.uk/en/content/cms/what_we_do/change_energy/european/cepackage/cepackage.aspx

- the UK has committed to reduce its greenhouse gas emissions by at least 34% from 1990 levels;⁹
- new gas fired CCGT power stations and nuclear power stations will still not be ready and could still be years from completion (particularly nuclear).¹⁰

This will be set against a period in which:

- National Grid has warned that the country has just 1.2% of spare electricity generating capacity, down from 4.1% in 2014.¹¹ National Grid's Director of Market Operations, Cordi O'Hara has told City AM, "Electricity margins for that coldest, darkest half hour of winter are currently tighter than they have been due to power station closures."¹²
- consumers face higher costs because the UK electricity supply industry is losing its balanced diversity and is thus increasingly unable to take advantage of fuel price falls; and
- the combination of self-imposed and EU based energy taxes are artificially forcing up the price of electricity for industry and households which are forecast to rise in real terms to 2020 and beyond.

⁹ http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/carbon_budgets/carbon_budgets.aspx

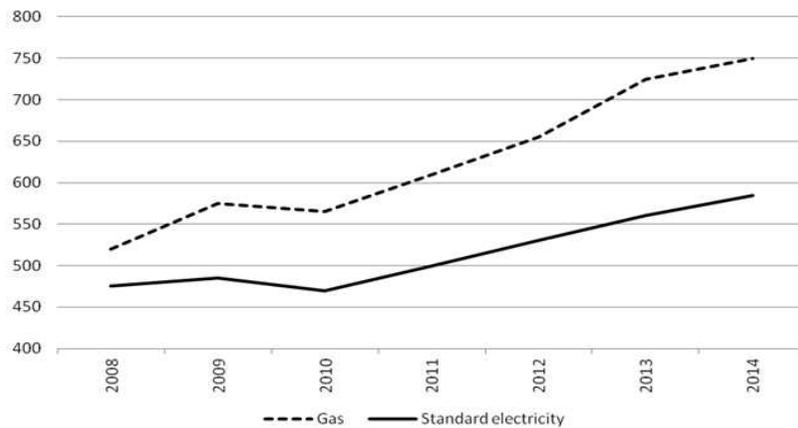
¹⁰ The proposed new Hinkley Point C nuclear power station is not expected to open before 2025, at the earliest.

¹¹ National Grid Winter Review and Consultation, p51, July 2015.

¹² <http://www.cityam.com/220189/britain-facing-winter-blackouts-national-grid-warns-tightest-power-supply-decade>.

All of these challenges came with ample warning. But the Coalition policies which were hoped would address them, as set out in the Electricity Market Reform legislation (now the Energy Act 2013), are already out of date, designed as they were when fossil fuel prices were far higher (and expected to go on rising) and based around Department for Energy and Climate Change (DECC) modelling – which predicted the cost of supporting renewable energy would fall by 2020. This has now been shown to be misguided.

Chart 2: Energy bills since 2010 (£)



Source: UK Energy Statistics, Q3, 2014, DECC

Indeed, families now face paying up to £40 extra each year for wind and solar farms to meet climate change targets after the Coalition revised its energy price forecasts in October 2014.

The subsidy required for each unit of renewable electricity will now rise after the DECC conceded that fossil fuels were now much cheaper than it had predicted. Indeed, the DECC modelling is largely based on its own forecasts of future soaring fossil fuel prices so to justify investments in renewables with the anticipation this will make renewables eventually economic; but this isn't happening.

A prolonged glut of gas, oil and coal on the world markets means power stations which run on these fuels have become cheaper to operate, making wind and solar farms comparatively even more expensive. The DECC's forecasts undermine the Coalition's claim that renewable energy is becoming more competitive.¹³ It is now likely that ministers could be forced to increase the budget for renewable energy subsidies, set at £7.6 billion in 2020, so that they meet the EU imposed legally binding renewable energy target. The DECC has "headroom" to increase the budget by 20%, which could push up the bill for consumers by another £1.5 billion per year, equal to about £40 extra on household energy bills. Importantly, Treasury demands to see a 40% cut in the DECC budget have placed further pressure on Ministers to reduce support for some renewable technologies, notably onshore wind and solar.¹⁴

This comes on the back of Government forecasts, buried in an annex to a DECC document released in October last year, which cut the forecast of the price of electricity from gas plants (CCGT) by about 15%.¹⁵ This means that subsidies funded by consumers through energy bills would need to increase by a similar amount to fund renewable energy projects.

Time is running out for a distinct and credible energy policy.

¹³ Contract for Difference: Final Allocation Framework for the October 2014 Allocation Round (page 40):

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/373002/Final_AF_11_Nov_2014.pdf

¹⁴ Daily Telegraph, August 28, 2015, 'The solar boom is over in the UK'

¹⁵ See footnote 15.

2. A PROBLEM MIRRORED BY FALLING ENERGY PRODUCTION AT HOME¹⁶

- UK domestic production of primary fuels has fallen by 31% since 2009 whilst net energy import dependency has reached 49%.
- By 2020, up to 70% of the natural gas used in the UK could be imported.
- Up to a third of UK electricity generating capacity is scheduled to have closed between 2010 and 2020 (on current policies) without equivalent replacement plans in place.¹⁷
- The anticipated construction of up to 25 new gas fired CCGT power stations (or 26,000MW) as heralded in DECC's 2012 Gas Generation Strategy has so far not materialised.¹⁸

¹⁶ The author is grateful to Adam Memon and Angeliki Terpou for their contributions to this chapter.

¹⁷ The EU Large Combustion Plant Directive has already closed 12,000MW of oil and coal plant and the looming EU Industrial Emissions Directive could close up to 15,000MW of remaining coal plant by 2021/22.

¹⁸ Gas Generation Strategy DECC, 2012, p16.

- Since the document was published only one new CCGT (gas fired) plant at Carrington near Manchester has prepared its site for construction.

Indeed, the present and future forecast price of gas is unlikely to stimulate a desire to build these new plants in the short to medium term. Primary fuel production falls continued in 2014. In the third quarter of last year, the UK's total energy production fell by 4.6% compared to the year before; this was mainly due to a fall in oil production. According to the DECC, the UK's net energy import dependency has now climbed to 48.7%.¹⁹ This is of particular concern because the rise in energy import dependency reflects almost entirely a fall in primary energy supply rather than an increase in imports. The free trade of energy is of course desirable but it is also clear that the health of the British economy is increasingly vulnerable to disruptions in energy supplies abroad.

2.1 Oil

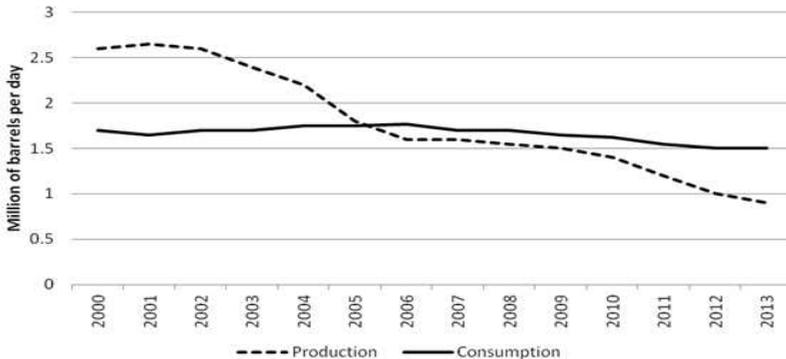
The Wood Review estimates that Britain has extracted around 42 billion barrels of oil so far from the North Sea and that a further 12 to 24 billion could potentially be extracted. The Government estimates that the UK's total proven and probable oil reserves amounts to 746 million tonnes.²⁰ According to the DECC in 2013 the UK produced 0.9 million barrels of oil per day and consumed 1.49 million. Data from the US Energy Information Administration (EIA) demonstrates the decline in liquid fuel production in the UK between 2000 and 2013 as well as the

¹⁹ DECC Energy Trends 2014.

²⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/443897/Productivity_Plan_print.pdf

continued decline after changes in the tax regime in 2011.²¹ Domestic oil production has fallen from 74.7 million tonnes in 2009 to 44.5 million in 2013. The third quarter of 2014 saw a particularly sharp slowdown of 11% compared to the year before.

Chart 3: Liquid fuels



Source: UK Energy Statistics, Q3, 2014, DECC

2.2 Natural gas

The Oil and Gas Journal estimates that the UK’s proven natural gas reserves are as high as 8.6 trillion cubic feet. According to the DECC, in 2013 the UK produced 1.24 trillion cubic feet of natural gas and consumed 2.7 trillion.²² Data from the EIA shows the decline in natural gas production between 2000 and 2013 which seems mainly due to the fact that the discovery of new reserves and new production has not kept pace with the maturation of existing fields. According to the DECC in the Natural Gas Imports and Exports Review in 2013 the majority of imported natural gas came from Norway (58%), Qatar (19%), the Netherlands (16%) and Belgium (7%).

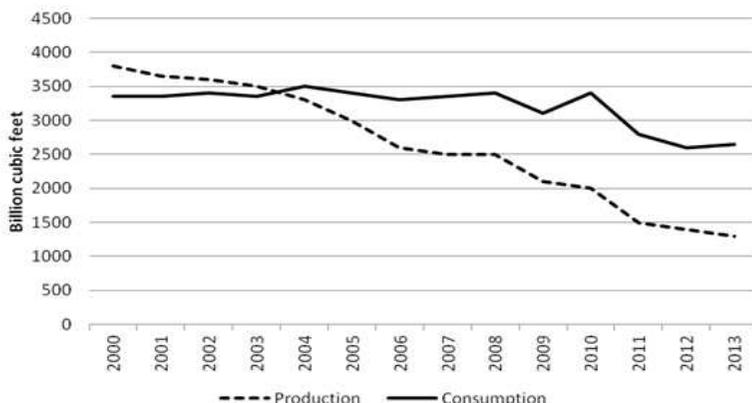
²¹ <http://www.eia.gov/countries/country-data.cfm?fips=UK&utm>

²² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/295362/ET_March_2014.PDF

Of particular concern is that Britain's gas import dependency is rising significantly. By 2020 it is estimated that 70% of the natural gas could be imported. Over a third of gas now used in the UK is for the generation of electricity, a sector which the Government wishes to significantly expand.²³ Domestic production of natural gas has fallen by almost 40% from the equivalent of 59.7 million tonnes of oil in 2009 to 36.5 million in 2013.

North Sea tax receipts have plunged into the red for the first time in the sector's history after the steep decline in global oil prices. Offshore corporation tax receipts for April to September this year were only £203m, compared with a six monthly peak of £3.3 billion in 2011. Petroleum revenue taxes (PRT) for those six months stood at -£242m, compared with periods when PRT raised £577 million in a single month. The sector effectively cost the taxpayer £39m over the first six months of this financial year.²⁴

Chart 4: Natural gas



Source: UK Energy Statistics, Q3, 2014, DECC

²³ Gas Generation Strategy DECC, 2012.

²⁴ HM Revenue and Customs.

2.3 Does a Russian threat to cut off Europe's gas matter to the UK?

Europe gets around a third of its gas from Russia, with roughly half being pumped via Ukraine. Some analysts argue that Russia supplies 15% of the UK's gas, but in an interconnected gas system there is no means of knowing exactly how much gas is sourced from Russia, as Centrica admitted last year.²⁵ However it is correct to assume in light of European gas network operations that a portion of this volume will have originally been imported via Europe to Britain.

Importantly, it is the knock on effect of a shortage of gas in Europe that is the issue as opposed to the current "normal" flows. Imports from the Continent and Norway would be affected, and extra seaborne liquefied natural gas (LNG) supplies would be required to fill the void. Supply would probably be fulfilled in most scenarios – but prices would inevitably rise.

National Grid's own analysis last autumn in its 'Winter Outlook' report warned that prices would rise significantly if Russia cut supplies. The company stated that the knock-on effect for the UK would be "significantly higher" prices to import more gas by LNG ship from elsewhere in the world.²⁶

National Grid also said that if there were an extremely cold spell and Russia were to cut off all exports then the UK might be forced to take emergency measures to protect household supplies such as paying industrial customers to use less gas. The resulting shortfall in UK supplies would need to be filled by imports of liquefied natural gas (LNG). Prices for LNG tend to be higher in

²⁵ *Daily Telegraph*, March 21, 2014, 'Where is our gas coming from, Centrica?'

²⁶ <http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Winter-Outlook/>

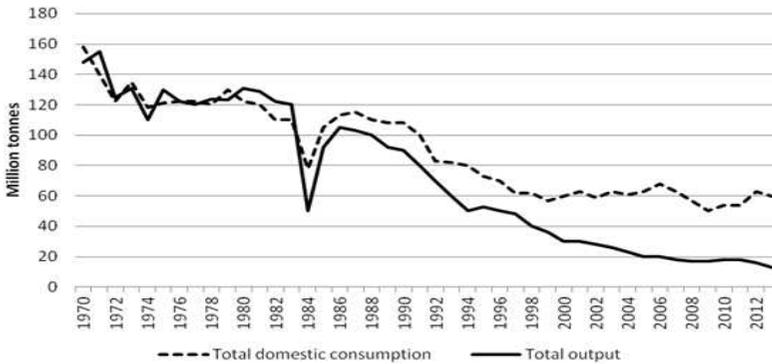
Asia than in Europe, meaning that if the UK wants more LNG deliveries it will have to pay a price premium. National Grid's modelling suggested that UK imports of LNG would more than double in the event of disruption to Russian exports.

2.4 Coal

The UK's possible, probable and proven deep coal resource is estimated by the Coal Authority to be 2.3 billion tonnes and the near-surface coal resource is 852 million tonnes. Coal mining in Britain is struggling to compete with cheaper imported coal. It is also struggling to make a strong case for future investment in mines as Carbon Price Support (also known as Carbon Price Floor) threatens the early closure of its main market in the existing coal fired power plants. This issue is explored in detail in Chapter 3.

Annual domestic coal production is fast approaching just 10 million tonnes (its lowest level since records began in the 19th century) as mines close and imports replace this production. Overall the total UK consumption of coal in 2014 was 48.5 million tonnes with 38.4 million tonnes used by power plants. Russia is now the source of half of the UK's coal imports alongside the US, Columbia and Poland.

Chart 5: Coal



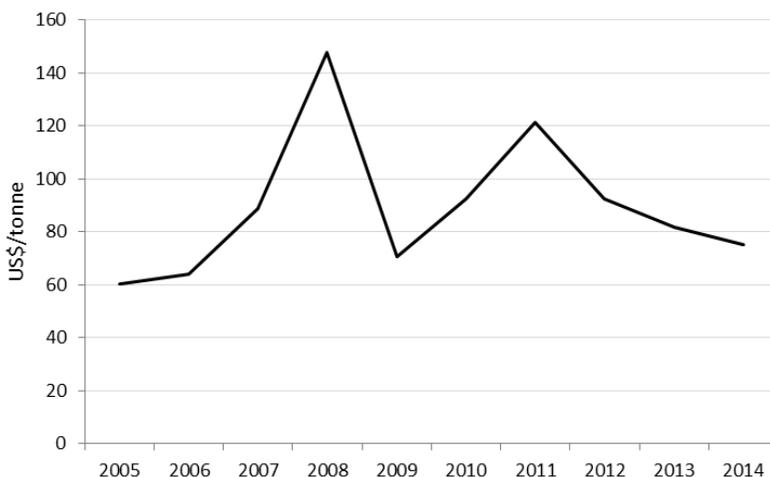
Source: Coal Authority

Note: the steep decline in output and consumption in the mid-1980s is due to the year-long miners' strike.

In the richer parts of the developed world coal has fallen out of favour for environmental reasons. However this does not change the fact that coal remains one of the most important fuels in UK electricity generation; more than 30% of electricity in the UK is still generated by coal; this can rise closer to 35% at times of high winter demand. International coal prices are low and remain depressed; partially as a result of the US shale boom which has led to the export of tens of millions of tonnes of American steam coal.²⁷

²⁷ Different types of coal have different uses. Steam coal – also known as thermal coal – is mainly used in the generation of electricity.

Chart 6: Coal price in North West Europe from 2005 to 2014



Source: BP Statistical Review of World Energy 2015, Coal prices

Whilst coal remains the UK's most abundant energy resource, providing a comparatively cheap fuel which can be stored and is not prone to outages or geopolitical factors, the Coalition's anti-coal policies have threatened to jeopardise projects which could deliver future cleaner coal plants with Carbon Capture and Storage technology (CCS). If existing coal plants close early, alongside the infrastructure and mines which supply them, then the bridge from existing coal to new coal with CCS will be lost; the skills base and access to the domestic coal resource will also be gone. Investors will need significant confidence to commit to any new domestic mining projects. In 2014 all three of Britain's remaining deep collieries announced their closure, blaming policies which had undermined any long-term future investments.²⁸

²⁸ Thoresby, Hatfield and Kellingley Collieries closed in June, August and December 2015 respectively.

Alternatively, Deep Offshore Underground Coal Gasification (UCG) represents a huge opportunity for the UK. Many coastal locations are flooded with deep but stranded coal reserves which conventional collieries could not access. UCG involves the controlled combustion of coal which is deep underground and the extraction of synthetic gas (syngas) which can be used as a valuable feedstock for industry or to generate electricity. Billions of tonnes of stranded coal can be utilised to provide a new indigenous gas supply for the UK; this is coal which will never be extracted by conventional mining techniques. UCG requires no coal extraction and the process is managed from the surface with two boreholes drilled deep offshore into the coal seam. Vast areas of the North Sea are flooded with deep coal seams thus encouraging prospects for a new North Sea energy sector which converts offshore coal into gas. The DECC has recently acknowledged this potential.²⁹

In 2006 the then Department for Trade and Industry (which at that time had responsibility for energy policy) recommended deploying the technology in the deep inshore coal seams of the Firth of Forth in Scotland for what it called, 'The Coalmine of the 21st Century'.³⁰ But new barriers are constantly emerging towards any new deployment of cleaner and more efficient technologies which can better harness the UK's vast fossil fuel resource.

New moves to give the Committee on Climate Change (CCC) an advisory role in the approval of any new fossil fuel projects such as coal mines and unconventional gas projects (including shale

²⁹ DECC Minister, Matthew Hancock speech to NOF Energy Conference, Gateshead, March 11 2015.

³⁰ <http://webarchive.nationalarchives.gov.uk/20090609003228/http://www.berr.gov.uk/files/file30689.pdf>

and UCG) are likely to act as a serious deterrent to investment in new fossil fuel technologies. An amendment was approved in the Infrastructure Bill in January to give the CCC a role in advising the Secretary of State for Energy on whether new fossil fuel projects in the UK are consistent with the Climate Change Act 2008.³¹ This has led to very real concerns from those considering any significant future investment in these sectors.

2.5 Shale – can the new Government lead on shale?

DECC data shows that electricity generation in the UK is increasingly reliant on natural gas. In Q3 2013, coal was the source of 33.6% of UK electricity generation and gas contributed 26.6%.³² Over the period of just one year, there had been a remarkable change. By Q3 2014, coal had fallen to 20.1% and gas had climbed to 38.6%. Coal will fall further as the rising tax of Carbon Price Support penalises coal burn. The share of renewables, nuclear and other energy sources remained similar between 2013 and 2014. So, electricity generated by coal declines as high carbon taxes bite and the strain on natural gas will continue to rise. Given that domestic production of natural gas is falling, this will mean that the UK's energy import dependency will rise. It is therefore particularly important that fracking for shale gas is encouraged as a tool to help maximise the UK's supplies of energy both for domestic and industrial purposes.

Fracking is the procedure of drilling deep into the earth before a high-pressure water mixture is directed at the rock in order to release the gas inside. The UK's shale gas reserves are not yet fully known but according to a British Geological Survey report

³¹ The Infrastructure Bill received Royal Assent on February 12 2015.

³² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/388462/Press_Note_Dec_14.pdf

(BGS) released in July 2013 the Bowland Shale, in North-West England, alone was estimated to contain around 1,300 trillion cubic feet of gas.³³ Even if the UK's reserves are not as high as is currently thought shale gas can still be a tool to help reduce the swift declines in domestic energy production and limit overdependence on imports.

A report from energy consultants Poyry outlines the consequences for import dependency if fracking is further delayed and blocked in the UK. It argues that if Lancashire shale gas production is allowed to proceed, gas prices will be between 2% and 4% lower from 2021. Furthermore, by 2030, gas import dependency will reach 58% compared to 79% without any shale gas production. If shale gas is extracted, the result would be a transfer of £3.3 billion a year on the UK's trade balance from debit to credit.³⁴

The shale revolution in the US cannot be replicated on the same scale in the UK but there will still be clear benefits in important regions outside the south east. Cheap energy is rapidly replacing cheap labour as the key differentiator between countries competing for investment in a global marketplace. As emerging markets' wage bills rise, the US energy advantage becomes ever more significant.

Yet the UK's nascent shale industry remains stuck. The Scottish Government has announced a moratorium on fracking until a long national consultation has reported and various new hurdles were placed in front of the industry in the Coalition's Infrastructure Act.

³³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226874/BGS_DECC_BowlandShaleGasReport_MAIN_REPORT.pdf

³⁴ http://www.poyry.com/sites/default/files/imce/files/shale_gas_point_of_view_small.pdf

As already mentioned, new powers to give the CCC Change a say in the go-ahead of future shale projects should cause significant concern.

In effect, if the CCC assesses a new shale development and believes it is likely to lead to an increase in UK greenhouse gas emissions, the Secretary of State must either prevent it from going ahead or explain to Parliament why it will be allowed to proceed.³⁵ Consequently, the development of new energy supplies in the UK is decreasingly related to what happens below the ground and increasingly influenced by the regulatory framework, political handwringing, fiscal regime and technological developments above the ground. Setting an energy policy which does not support a fast track for fracking would condemn Britain to an ever higher energy import dependency and damage the nation's reputation as an open economy keen to embrace technological leadership. The result would be higher prices, lower investment and greater dependence on increasingly uncertain supplies.

³⁵ Hansard, Jan 26 2015, Committee Stage, Infrastructure Bill.

3. RIGHTING THE COALITION'S WRONGS

The 'Carbon Price Floor', is a term not used frequently around Westminster, but it should be. Indeed the correct phrase rather is Carbon Price Support, and as such this is the term that will be used throughout this report.

Carbon Price Support is a tax levied on the power stations which provide the lion's share of Britain's electricity supply. By artificially inflating consumer prices for energy intensive industries, such as steel, the tax has resulted in the premature closure of key power stations and the loss or overseas migration ('carbon leakage') of thousands of manufacturing jobs. So what is Carbon Price Support, why is it so damaging and why did the Coalition introduce it?

Up until April 1 2013 Britain was a participant in the market based EU-wide Emissions Trading Scheme (ETS) and shared the same carbon prices as the rest of the EU. Though EU carbon prices were considered too low to penalise big polluters effectively, all of Europe's power plant emitters were on a level playing field and paid the same prices for their CO₂ emissions. Debate has raged over how to increase EU carbon prices so as to better incentivise

the construction of cleaner, lower pollution power plants. Initiatives to reform the ETS to boost prices are continuing.

In 2010, the new Coalition saw an opportunity to quickly raise billions of pounds a year in new environmental tax revenue. British carbon prices were raised significantly above those of the rest of the EU as a unilateral 'top up' on the EU price. This was introduced in 2013. This carbon price trajectory tax was introduced for the electricity generating sector – at a level far higher than that faced by similar fossil fuel power plants in the rest of the EU. This is Carbon Price Support or the 'Carbon Price Floor'.³⁶

The Coalition justified the tax as a response to the EU price for carbon being far too low to encourage investment in low carbon technology, and that Britain was to take the lead.³⁷ Claims were also made that such a tax would help to reduce carbon emissions to meet UK targets. An important backcloth to this was the admission early in 2015 by the then junior Energy Minister (now Secretary of State), Amber Rudd MP, that the UK does not have a 2020 target for emissions reduction from electricity generation irrespective of policies specifically targeting the electricity generating sector through Carbon Price Support. The tax is arguably a simple method to quickly reduce overall UK emissions whilst raising billions in tax revenue.³⁸ The new Government will set its targets for the future carbon intensity of the electricity supply industry in 2016, according to the Energy Act.

³⁶ Northern Ireland power plants are not subject to Carbon Price Support rules as they operate inside an "All-Ireland" electricity market.

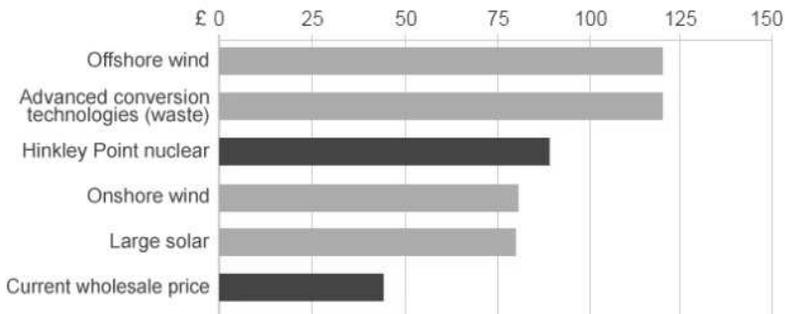
³⁷ *Carbon Price Floor: support and certainty for low carbon investment*, HM Treasury, December 2010.

³⁸ Commons Written Answer, Amber Rudd MP to Peter Lilley MP, March 24 2015, (Ref 227752).

The justification for Carbon Price Support was that Britain would be taking the moral and political lead to penalise big carbon emitters and encouraging them to make cleaner investments and replace existing polluting plant. But this argument and position was flawed from the start since new low carbon energy would receive a subsidy to operate anyway. Through Feed-in Tariffs and Contracts for Difference/strike prices announced under Electricity Market Reform, which became the Energy Act, fixed prices have been guaranteed. In short, low carbon energy does not need the Carbon Price Support tool in place to grow or survive.

Chart 7: Contracts for Difference for new renewable and nuclear projects in 2016 – 2018

Price per megawatt hour the government has guaranteed for electricity*



*Prices represent the average price per Mwh agreed by the Department for Energy and Climate Change for projects commissioned for 2016/17 and 2017/18 during round one of CFD auctions in February 2015

Source: DECC, Ofgem

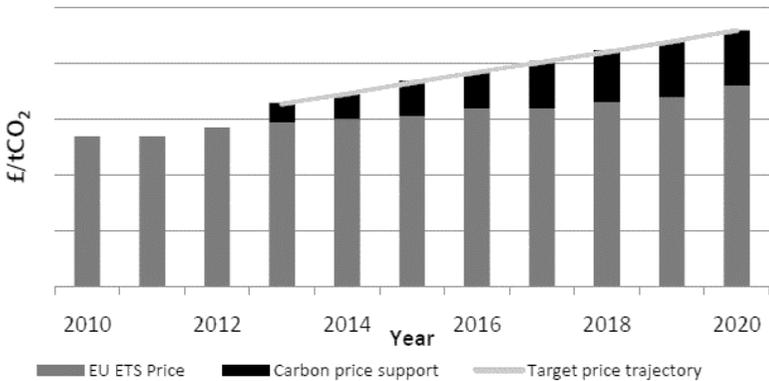
The Coalition expected to further justify its policy in anticipation that EU carbon prices would start to rise steadily, and even shadow the new UK trajectory as shown in Chart 8. But this has not happened – disastrously for the packaging, presentation and delivery of the tax policy. Indeed, the scenario that the Government and country faces today is stark. The Treasury’s own

rate for its 'top up' on the EU price in 2015/16 – to meet its price floor trajectory – is £18.08 for every tonne of CO₂ emitted, when the EU carbon price today (October 2015) is around just £6.20 (€8.44) a tonne.

With the combination of the 'top up' of the UK carbon price and the EU ETS price, British power plants are paying over £24 per tonne of CO₂ emitted compared with just over £6 in the rest of the EU.

In the March 2014 Budget Statement the Chancellor, facing protests from industry and consumer groups, was forced to cap Carbon Price Support at this rate and halt the escalator, but this still means UK carbon prices are now three times higher than those on the Continent.

Chart 8: The Treasury's 2010 forecast for EU carbon prices

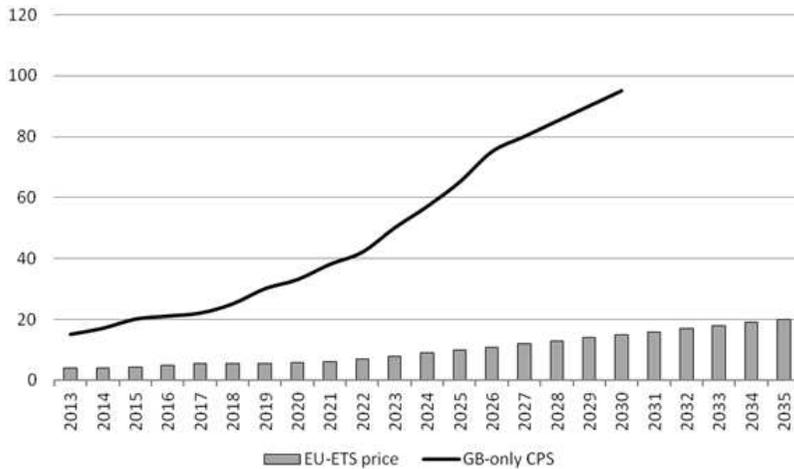


Source: HM Treasury, 2010

Chart 9 shows a more realistic anticipation of the future price of carbon in the EU, based around current trends and ETS reform proposals. The black rising line illustrates the price of UK carbon if the present Carbon Price Support policy is maintained, which has already resulted in the UK price becoming three times higher

than the EU figure. But the Chancellor has only frozen the UK price until 2020, so in theory the steep trajectory will recommence then and make UK carbon prices six or even seven times higher than the rest of the EU by 2030. This policy was reaffirmed in the 2015 Budget Red Book.³⁹

Chart 9: HM Treasury projection of Carbon Price Support (£) from 2013 to 2030



Source: UK CPS and EU ETS calculations based on EU and HM Treasury policy projections

Alongside a near doubling of environmental taxes under the Coalition, Carbon Price Support is set to rise to £30t/CO₂ immediately after 2020 and £70 a tonne in 2030 (2009 prices). The tax revenue raised in the ‘top up’ will increase from £740 million in 2013/14 to £1.4 billion in 2015/16.

³⁹ Budget 2015 ‘Red Book’ p88 ‘Carbon Price Support’.

3.1 High Carbon Price Support quickly removes a potentially steady stream of Treasury income

Table 1 shows that revenue receipts (top line) from Carbon Price Support policies begin to decline from 2017. This is a direct result of coal power stations choosing to close and run at lower levels of operation due to the high burden of carbon taxation.

Table 1: Proportion of Treasury revenue accounted for by environmental taxes

Tax	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Climate Change Levy & Carbon Price Floor (£bn)	0.7	0.7	0.6	1.1	1.5	2.0	2.0	1.9	1.7	1.5
Aggregates Levy (£bn)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Landfill Tax (£bn)	1.1	1.1	1.1	1.2	1.1	1.1	1.0	1.0	1.0	1.1
EU ETS (£bn)	0.4	0.2	0.3	0.4	0.3	0.4	0.4	0.5	0.6	0.8
Carbon Reduction Commitment (£bn)	0.0	0.0	0.5	0.6	0.6	0.8	0.7	0.6	0.6	0.6
Total Revenue from Environmental Taxes (£bn)	2.5	2.3	2.7	3.5	3.9	4.6	4.5	4.3	4.3	4.3
Total Current Receipts Forecast (£bn)	572.5	593.4	601.4	624.1	646.9	667.4	700.9	731.2	764.5	804.3
Proportion of total tax receipts	0.4%	0.4%	0.5%	0.6%	0.6%	0.7%	0.6%	0.6%	0.6%	0.5%

Source: HM Treasury, Commons Written Statement, March 25 2015, (HCWS481)

If Carbon Price Support had been levied at a lower, more sustainable, rate (possibly pegged slightly above the EU ETS rate

and allowed to fluctuate with it) then investment confidence in these plants would have been encouraged and Carbon Price Support revenues would have remained relatively stable over the following eight to twelve years, as coal plants chose to remain on the grid. The total tax recoverable from the current Carbon Price Support trajectory is potentially £15 billion (to 2023). However if Carbon Price Support was pegged at a lower and more sustainable rate, the tax recovered up to 2030 could be in the region of £39 billion as coal power plants instead invest to operate well into the 2020s.

Since April 1 2015 the new Carbon Price Support rate (£18.08 t/CO₂) has resulted in a chasm between UK carbon prices and those on the Continent, and a surge in the cost of generating electricity in most UK power stations.⁴⁰ The generators will pass these extra costs onto consumers and industry.⁴¹ As a result, wholesale UK electricity prices could soon be some of the highest in the EU, not only costing consumers and energy intensive industry but adding another layer of market distorting subsidy for already heavily subsidised renewables. Importantly, Carbon Price Support increasingly provides old nuclear power plants with a considerable windfall; unsurprisingly the operators of these plants have requested life extensions which will take their operating lives beyond 45 years.⁴²

⁴⁰ *Bloomberg*, 'Coal plants risk summer closures as carbon tax hits profits' April 4, 2015.

⁴¹ *Daily Telegraph*, 'Carbon levy will be a 'stealth poll tax' on energy' 31 March 2013.

⁴² <http://newsroom.edfenergy.com/News-Releases/EDF-Energy-announces-10-more-years-for-Dungeness-B-32f.aspx>

3.2 What does Carbon Price Support do to the price of electricity?

The marginal (fuel) cost of a megawatt hour (MWh) of gas fired electricity from a CCGT plant varies from £28/MWh for a 50% efficiency plant, to £25/MWh for a more efficient modern plant (e.g. 55% efficiency) as of October 2015. The marginal cost of a MWh of coal fired generation in the same period was approximately £12/MWh. Electricity generated from coal is therefore the cheapest available on the grid.⁴³ After carbon taxes are levied the prices change as follows:

The new marginal cost for coal: £13 fuel + £22 tax = £35/MWh

The marginal cost for gas (CCGT): £28 fuel + £9 tax= £37/MWh*

*Natural gas emits less than half the CO₂ compared with coal when used in electricity generation and is thus penalised less through Carbon Price Support.

Almost 80% of the carbon tax is the UK Carbon Price Support rate which is set at £18.08 per tonne CO₂ whilst the EU ETS price was £6.20 per tonne CO₂ in October 2015.

The baseload price of electricity in October 2015 was approximately £41/MWh. This is based on both gas and coal fired plants being the marginal price-setters. The stations require a few extra pounds per MWh to cover other non-fuel variable costs, which explains why the electricity price is slightly higher than the marginal cost of fuel and carbon levies.

⁴³ A megawatt hour (MWh) is equal to 1,000 Kilowatt hours (Kwh). It is equal to 1,000 kilowatts of electricity used continuously for one hour. It is about equivalent to the amount of electricity used by about 330 homes during one hour.

Importantly, this shows firstly that carbon taxes are pushing up electricity prices and secondly that gas plants are no longer financially viable – and thus there is consequently no incentive to build new ones.

The main implications of Britain not abolishing Carbon Price Support and reestablishing the same price as its EU competitors are:

- No new investment in existing coal fired power stations which are presently generating between 30% and 40% of electricity. This is because high Carbon Price Support will make such investment uneconomic, in order to comply with new EU IED pollution rules.⁴⁴ Therefore these plants are closing early, when many had planned to run through to the mid to late 2020s.⁴⁵ No comparable generating plant capacity (particularly

⁴⁴ The EU Industrial Emissions Directive (IED) further restricts Nitrogen Oxide emissions from industrial facilities such as coal fired power plants. All IED-non-compliant generation plants from the beginning of 2016 must either retrofit new technology, called Selective Catalytic Reduction, to reduce Nitrogen Oxide from existing plants to ensure they comply with the new pollution limits or agree to a Limited Life Derogation (LLD). This means that from the start on 2016 the LLD plant can only operate for a maximum of 17,500 hours from January 1 2016 until the end of 2023, or an average of only 2,500 hours per year. In reality, such a plant will use its allocated hours much faster and close before 2020 so as to maximise financial returns.

⁴⁵ Under the EU IED coal power station operators wishing to continue operating after December 31 2015 have three options. Plant can:

- be entered into the Limited Life Derogation (LLD) and be exempt from the emissions limits values, provided the plant is closed after 17,500 hours of operation from the January 1 2016 or closed by December 31 2023, whichever is first;
- enter a Transitional National Plan (TNP), which defines a maximum combined emissions ceiling for all participating plant for each of the three pollutants

CCGT plant) is presently being built (or planned to be) to replace them, contrary to the ambitions of the Government's 2012 'Gas Generation Strategy'.

- A reduction in the likelihood of new Carbon Capture and Storage (CCS) technologies for coal being developed, since there will have been no bridge from existing coal sector infrastructure to new coal technologies and no skills transfer.
- Increased costs for consumers and greater fuel poverty.⁴⁶
- Increased costs and some overseas relocation (known as carbon leakage) for the steel, paper, cement, lime, aluminium, basic inorganic chemicals, glass, ceramics and industrial gases industries (alongside general manufacturing) which currently employ 225,000 workers.⁴⁷ These industries are highly energy efficient but nevertheless consume large quantities of energy, which can account for between 20% and 70% of their production costs. The manufacturer's organisation, the EEF, has said "the next government should seek to remove the 'carbon price floor' as soon as fiscally possible. This unilateral carbon tax is now utterly redundant in its intended aim of incentivising investment in renewable electricity generation."⁴⁸

covered in the IED, declining over time and permitting decision making over full IED compliance to be delayed until 2020; or

- become fully compliant on a plant by plant basis with the emissions limit values mandated in the IED.

⁴⁶ <http://www.theccc.org.uk/wp-content/uploads/2014/12/Energy-Prices-and-Bills-report-v11-WEB.pdf>

⁴⁷ *The Atomic Clock*, Centre for Policy Studies, 2012, p44.

⁴⁸ 'Securing a Manufacturing Renaissance – priorities for the next government' EEF, March 2015.

- The collapse of the domestic coal mining sector and related infrastructure – costing up to 12,000 jobs by 2020 and thousands more in the skills chain, alongside the national coal resource becoming ‘stranded’.
- Security of supply diminished as the UK becomes over-dependent on imported gas for electricity generation.
- Huge market distortion with little overall reduction in emissions as more and more coal and gas generated electricity from the Continent is instead imported to the UK power market via interconnectors, where European generators have only had to pay the low EU carbon price, unlike British generators.⁴⁹
- The need to encourage, incentivise and subsidise the fast build of up to £12 billion worth of new CCGT power plants to replace the baseload coal plants which are being forced to close early. With lower Carbon Price Support, existing coal plants can be modernised for just £2.6 billion and run on well into the 2020s whilst new gas CCGT plants, nuclear plants and cleaner coal CCS plants are still years away.

The Government’s much heralded new nuclear renaissance with EDF’s planned 3,500MW EPR atomic plant in Somerset is already long delayed. The declared in-service date of 2023 now looks over-ambitious.

⁴⁹ The UK has 4,000MW of installed interconnector capacity with Ireland, France and the Netherlands.

3.3 What if Carbon Price Support is abandoned?

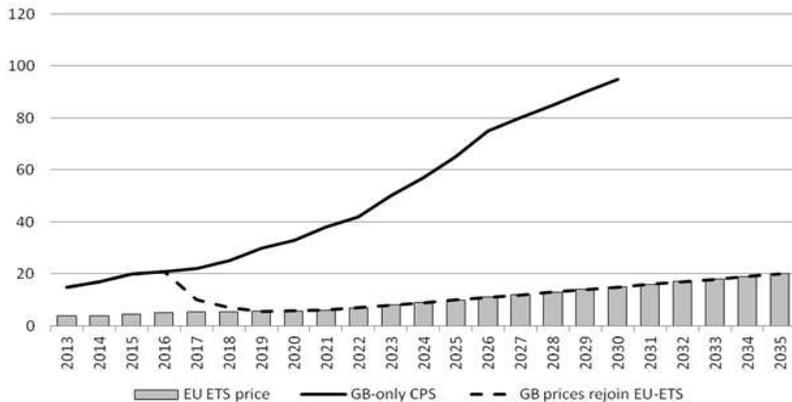
A return to the same carbon price as the rest of the EU would deliver a number of benefits both for consumers and industry, particularly the electricity supply industry. These include:

- **Improved affordability** – lower wholesale electricity prices would translate into reduced end user prices and savings for households and businesses.
- **UK supply security** – coal plants would choose to invest in life extensions enhancing UK energy security in the period before new CCGT (gas), nuclear and CCS plants would be ready to replace them on a plant by plant basis.
- **Economic growth** – driven by greater household consumption and industrial output the UK economy would grow more quickly.
- **Employment** – higher economic activity would prompt creation of additional jobs in the UK and help retain those under threat in energy intensive industries such as steel.
- **Government revenues** – lost revenues from phasing out Carbon Price Support would partially be offset by higher tax revenues from increased economic activity. Narrow based taxes such as Carbon Price Support are more distortionary (have a greater deadweight loss) than broad based taxes.
- **Emissions** – direct emissions would rise, but impact would be limited and would converge to the same long-term level.
- **Greater international confidence in UK and investment** – Four of the 'Big Six' energy companies are European owned. EDF (France), E.ON UK and RWE npower (Germany) and Scottish Power/Iberdrola (Spain). These companies desire a

clear and uncomplicated cross continent investment landscape. That Britain has a high, unilateral and self-imposed carbon price – which has since been capped and had its trajectory halted – both confuses and deters power market investment in the UK. Rejoining the EU ETS would end this uncertainty.

Chart 10 shows the impact of abandoning Carbon Price Support and Britain re-establishing the same carbon prices as the EU. The solid black line trajectory shows where the Treasury would like to see UK carbon taxes in the future, the grey shading shows the likely level of EU prices based on present trends and future forecasts. The dotted trajectory shows UK carbon prices after re-joining the EU wide price. This will require two to three years to manage the changes in necessary legislation and Treasury revenues. Such a policy change would require changes to primary legislation and enactment through the Government’s annual Finance Bill.

Chart 10: What would happen to the UK carbon price if it rejoined EU-ETS, (£)



Source: UK Carbon Price Support and EU ETS calculations based on EU and HM Treasury policy projections, CPS analysis

3.4 Was the 2014 freeze in Carbon Price Support enough?

The freeze of the tax at £18.08 t/CO₂ in the 2014 Budget was a step in the right direction but that level is still too high to be economically sustainable. Moreover it places most of Britain's existing coal generation fleet at risk of premature closure; i.e. before 2020, and notably before economic lower carbon replacement capacity is available. These early and unexpected closures have started. Consequently unless there are further changes to this policy then it will force price spikes and an energy crisis on the UK. The freeze still means that UK carbon prices are three times higher than the rest of the EU.

In March the outgoing Energy Secretary Ed Davey admitted that Carbon Price Support was flawed. He said that the Coalition has spent most of the Parliament dealing with the problems created by a "very badly designed CPS".⁵⁰

The burden of green taxes on businesses and consumers stemming from Carbon Price Support and other levies nearly doubled under the Coalition, according to official figures. The Treasury imposed £2.5 billion of levies in 2010-11 but the takings are predicted to reach £4.6 billion in 2015-16.⁵¹ No impact assessment was ever carried out to examine how these new taxes would impact consumers, energy intensive industry or energy security and diversity.

Wider environmental taxes raised a record £44.6 billion in 2014 while the bill for renewable energy levies rose sharply to £3 billion. New Office of National Statistics data shows the green tax burden

⁵⁰ Ed Davey MP comments to Policy Exchange conference, March 24 2015 (as reported by Cornwall Energy).

⁵¹ Written Commons Statement by Exchequer Secretary, Priti Patel MP, March 25 2015 (HCW S481).

has more than doubled over the past two decades, from £19.4 billion in 1994.⁵²

Environmental taxes typically fall into four categories, energy, which represents 72.9% of the total, transport at 23.7% and pollution and resource at 3.2%. The energy category comprises taxes on energy production, energy products (e.g. coal, gas and electricity) used for both transport and stationary purposes such as electricity generation.

⁵² ONS, Environmental Taxes – 2014, published 1 June 2015.

4. WHY DO HIGH CARBON TAXES THREATEN AN ENERGY CRISIS?

Carbon Price Support is making it increasingly uneconomic to justify the large scale investments required to clean up the emissions from coal fired generators. Such generators provide up to a quarter of present UK electricity generating capacity at just under 19,000MW.⁵³ If these plants were to continue running into the 2020s, and plug the gap left by a lack of any new significant size CCGT gas plants being built (and also cover the delayed new nuclear plants), then hundreds of millions of pounds of investment are needed into new oxide abatement technology – called Selective Catalytic Reduction (SCR).⁵⁴ This will then enable coal plants to comply with the strict new rules of the looming EU Industrial Emissions Directive and run into the next decade.⁵⁵

⁵³ Britain's current dispatchable electricity generation capacity is just under 69,000MW. The capacity of power plants is measured in megawatts (MW). 1000 watts equals a megawatt and 1000 megawatts equals a gigawatt (GW).

⁵⁴ The only CCGT plant that is planned to start construction is ESBI's 880MW CCGT at Carrington, Manchester.

⁵⁵ Selective Catalytic Reduction (SCR) technology is a proven and effective method to reduce nitrogen oxide (NOx) emissions from coal-fired power plants.

4.1 The capacity market

A key function of the Government's Energy Act 2013 is to allow existing power plants to bid for capacity to operate, known as the Capacity Market. The Capacity Market is one of the key parts of the Energy Act. The objective of the Capacity Market is to financially support and encourage investment in, and retention of, dispatchable electricity generating capacity. This capacity can include new and existing power stations, electricity storage, demand side management and in the future interconnected capacity.⁵⁶ In particular the Capacity Market is designed to financially support enough dispatchable capacity to reliably meet peak electricity demand. This is especially important as available margins are reducing and the grid is increasingly difficult to balance as more and more weather-dependent renewables are installed.

4.2 What does the recent Capacity Market auction tell us about future UK energy security?

The Capacity Market allows power plant to bid for contracts to generate over certain time periods. It is here where the actions of coal generators in the recent Capacity Market auction provide a strong signal as to their future intentions – intentions which should raise deep concerns for policy makers.⁵⁷

At present just over a quarter of existing coal fired power stations (5,500 MW) may decide to invest in life extensions to comply with the EU Industrial Emissions Directive. Such an investment would extend the lives of the plants well into the mid-2020s. EDF's Cottam plant and the neighbouring West Burton plant in Nottinghamshire both have three year capacity contracts to generate from 2018/19, and

⁵⁶ Coal, gas and nuclear generated electricity is classified as 'dispatchable' as it can be provided when required.

⁵⁷ <https://www.emrdeliverybody.com/Pages/AnnouncementDescription.aspx?CID=99>

E.ON's Ratcliffe on Soar plant has already committed to invest in life extension (though it has only secured a one year contract). This should raise concerns that these plants are very much in a 'wait and see' position. They could still close early.

Scottish and Southern Energy's Fiddler's Ferry plant in Cheshire, RWE's Aberthaw plant in Wales and the large Drax plant in Yorkshire only have one-year capacity contracts, for winter 2018/19. This then begs the question as to whether they have any commitment to operate beyond 2020.

Perhaps more crucially, over one third of the fleet of existing coal fired power stations in Britain have no capacity agreements at all. These include the largest power station in Scotland, at Longannet, the Yorkshire plants of Eggborough and Ferrybridge, and the Rugeley plant in Staffordshire. Just three months after the publication of the capacity agreements in March 2015, Scottish Power announced it was to close its large 2,300MW Longannet power plant in Fife due to it having become uneconomic.⁵⁸ The plant provides a quarter of Scotland's electricity. According to the National Grid, on 26 December 2014 less than 1% of power generated into the grid in Scotland came from wind, meaning that electricity generated south of the border and the doubling of output from Longannet power station in Fife was critical.⁵⁹ Following this announcement Scottish and Southern Energy stated its decision to close the 1,000MW Ferrybridge power station in March 2016. The company blamed the decision on the plant having become uneconomic due

⁵⁸ <http://www.bbc.co.uk/news/uk-scotland-scotland-business-32016538>

⁵⁹ DECC Questions, House of Commons, March 19 2015 Hansard, Column 886.

to “environmental legislation”.⁶⁰ In principle the plants could have operated until 2023 under the Limited Life Derogation (LLD).

In 2013 Longannet’s owners, Scottish Power, said that unless carbon taxes were reduced then closures would follow.⁶¹ More recently in a statement in March 2015 and later in August they emphasised that they had invested £350m in the plant over the last seven years and the plan had been to operate beyond 2020, but that early closure was now looming.⁶² Longannet is therefore the first large coal plant to close early as a result of high unilateral UK carbon taxes, quickly followed by Ferrybridge.

These closures were then followed by the announcement in September that the 2,000MW Eggborough coal plant would also cease generating in March 2016 citing high costs. Eggborough’s owners warned last year that closure in 2015/16 was likely due to escalating UK carbon taxes and the investment needed to meet new EU pollution rules.⁶³

⁶⁰ <http://sse.com/newsandviews/allarticles/2015/05/sse-announces-closure-of-ferrybridge-power-station/>

⁶¹ *Daily Telegraph*, December 8 2013, ‘Axe carbon tax to keep lights on and cut energy bills, says Scottish Power chief’.

⁶² <http://www.bbc.co.uk/news/uk-scotland-scotland-politics-31822315>.

⁶³ Utility Week, September 2 2015, ‘Eggborough set to close in March 2016’.

Table 2: Coal plants operating in 2015 (18,800MW)

Location	Owner & size (MW)	Capacity Market Status
Drax,^A Yorkshire	Drax Power (3,000MW)	1 year from 2018/19
Cottam, Nottinghamshire	EDF Energy (2,000MW)	3 years from 2018/19
West Burton, Nottinghamshire	EDF Energy (2,000MW)	3 years from 2018/19
Ratcliffe, Nottinghamshire	E.ON UK (2,000MW)	1 year from 2018/19
Rugeley, Staffordshire	International Power (1,000MW)	No capacity agreement
Aberthaw, Wales	RWE npower (1,500MW)	1 year from 2018/19
Ferrybridge,^B Yorkshire	Scottish & Southern (1,000MW)	No capacity agreement
Longannet,^C Scotland	Scottish Power (2,300 MW)	No capacity agreement
Eggborough,^D Yorkshire	EPH (2,000MW)	No capacity agreement
Fiddler's Ferry,^E Cheshire	Scottish & Southern (2,000MW)	1 year from 2018/19

^A *Part of the Drax plant has already been converted to burn wood pellets (biomass) instead of coal following the award of generous subsidies from the DECC.*

^B *In May 2015 Scottish and Southern Energy announced that Ferrybridge would close in March 2016, many years earlier than expected.*

^C *In August 2015 Scottish Power confirmed that Longannet would close in March 2016, many years earlier than planned.*

^D *In September 2015 EPH confirmed that Eggborough would close in March 2016.*

^E *In September 2015 Scottish and Southern Energy announced it would close one of its four 500MW units at Fiddler's Ferry in March 2016.*

In February, Trilemma UK published a study arguing that National Grid could manage the early closure of just under 19,000MW of coal powered electricity output by 2021, by scraping together

supplies from other sources including interconnectors, demand side response and short term measures.⁶⁴

However, the study did not cost this scenario. It also claimed that a greater reliance on interconnectors could help solve the problem. But a fundamental issue is that UK interconnector capacity of 4,000MW is nowhere near large enough to replicate even a third of such lost capacity.⁶⁵ On top of that, interconnectors do not always supply electricity when it is most needed. High electricity demand on the Continent, such as in a prolonged cold period, will significantly limit electricity supplies through the interconnector to Britain. The same applies to gas supplies as already detailed in Chapter 2.⁶⁶

Moreover, greater reliance on interconnectors would both lead to significant market arbitrage as coal and gas generated electricity from the Continent and Ireland would be entering the UK market without having been subject to UK Carbon Price Support taxation. It would also lead to a significant ‘offshoring’ of UK power market emissions, thus negating any EU carbon emissions reductions from a steady transition from existing coal plant in Britain to new cleaner coal plant with CCS, alongside CCGT plant and new nuclear.⁶⁷

⁶⁴ ‘Assessing the Balance of Risks Associated with Coal Plant Closure’, Trilemma UK, February, 2015.

⁶⁵ A leaked letter from the Energy Secretary to Cabinet colleagues dated October 29 2015 stated that a new interconnector with Norway will not be operational until “late 2021 at the earliest”.

⁶⁶ The UK has 4000MW of interconnector capacity with France, Belgium and Ireland.

⁶⁷ *The Atomic Clock*, Centre for Policy Studies, 2012, p38.

Importantly, following the energy regulator Ofgem's warning last year that Britain's spare electricity generating margins have been allowed to become dangerously tight, the UK endured a sobering warning when six large power plants unexpectedly closed due to fires or mechanical breakdowns in 2014.⁶⁸ They included three nuclear plants at Hartlepool, Heysham and Hunterston (engineering issues), the large coal plant at Ferrybridge (fire), a biomass plant at Ironbridge (fire) and a large gas plant at Didcot (fire). This represented nearly 6,500MW of dispatchable and reliable electricity generating plant, or just under 12% of peak electricity generating capacity, unexpectedly having to close for repairs. These events did however highlight the importance of retaining as much baseload plant as possible to maintain electricity supplies and retain a comfortable and responsible margin of generation capacity.

4.3 Why can't Britain just mothball closed coal plant and bring it back when it is needed?

'Mothballing' large industrial facilities like a power station is both expensive and is not in the interests of any generator which desires their generating portfolio to be active and profitable. There are no rewards for leaving plants idle; just costs to keep the plant in a state of reduced readiness or on 'care and maintenance'.

Any question of the strategic commercial long-term viability of mothballing closed plants was dealt a further blow in 2008 when the Labour Government ended the business rate exemptions on empty industrial buildings and increased rates from 50% to 100%.

Recent examples of large power plants being closed and then swiftly dismantled and demolished are Didcot in Oxfordshire and

⁶⁸ <http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Winter-Outlook/>

Kingsnorth in Kent. The 2000MW Didcot A coal plant closed in March 2013, was swiftly dismantled and then demolished in July 2014. Kingsnorth's fate (1940MW) was closure in December 2012 and demolition in October 2014.⁶⁹

No replacement power plants are presently proposed on either of these sites which enjoy National Grid connections. In 2008 the Government refused to approve a new high efficiency coal power plant at Kingsnorth to replace the existing plant, irrespective of it having secured borough and county level planning permission.

4.4 How much dispatchable power generation has closed in the last five years and what has replaced it?

By March 2016 21,400MW of dispatchable capacity will have been lost since 2012. To replace it only 6,000MW of new dispatchable electricity generating capacity has come online, predominantly gas (CCGT).⁷⁰ An additional 6,000MW of new renewables has also been built, including onshore and offshore wind and solar. These weather dependent renewables endure comparatively low load factors of around 22% for onshore wind, 33% for offshore wind and under 15% for solar.

The net effect is that 15,400MW of dispatchable electricity generating capacity has been lost with a swing from dispatchable to intermittent sources such as wind and solar – with very little new gas build proposed.

⁶⁹ Both Didcot A and Kingsnorth coal power plants had to stop generating electricity before 2015 as they had not invested to comply with the EU Large Combustion Plant Directive (LCPD).

⁷⁰ CCGT plants at Grain, Pembroke, Uskmouth, West Burton and Staythorpe have come on line since 2011/12.

Coal plant closures represent 16,000MW of the total 21,400MW that will be lost by March 2016, as shown in Table 3.

Table 3: Coal plant closures and planned closures since 2012

Plant	Capacity Lost	Status
Kingsnorth	1,940MW	closed 2012
Didcot A	2,000MW	closed 2013
Tilbury	1,428MW	closed 2013
Cockenzie	1,200MW	closed 2013
Ferrybridge C	1,000MW	closed 2014
Uskmouth	363MW	closed 2014
Drax	1,320MW	Half of the 4,000MW plant is being converted from burning coal to wood pellets (biomass) between 2012 and 2016).
Ironbridge B	1,000MW	closed 2015
Fiddlers Ferry	498MW	to close in March 2016*
Ferrybridge C	1,000MW	to close in March 2016
Longannet	2,300MW	to close in March 2016
Eggborough	2,000MW	to close in March 2016

* National Grid announced in September 2015 that 25% of the 2000MW Fiddlers Ferry plant would close early in March 2016 – NGT TEC Register, 24 September 2015.

4.5 What does this mean for electricity supplies in 2016/17?

Britain's present dispatchable electricity generating capacity now stands at just below 69,000MW. Due to the proposed closures announced throughout 2015 and into next year, by April 2016 this figure will have fallen by a further 7,400MW to just 61,600MW. This raises serious concerns for energy

security. Spare generating margins are becoming perilously tight, if non-existent, for the 2016/17 winter and beyond.⁷¹

Table 4: Remaining dispatchable capacity after plant closures

Current dispatchable electricity capacity:	68,966MW
Capacity lost to closures by March 2016	7,366MW
Total dispatchable capacity by April 2016	61,600MW
Average rating*	0.85
Average dispatchable capacity	52,360MW

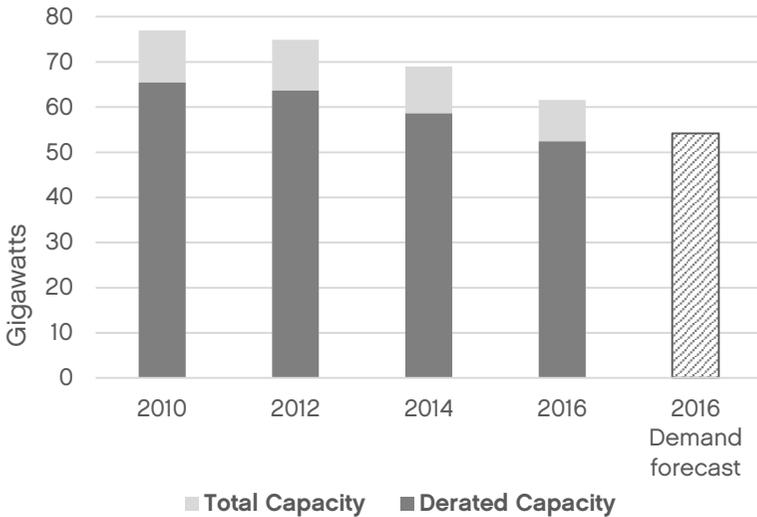
*Remaining dispatchable plant must be 'derated' at 85% in order to accurately reflect its availability over peak running.

In October National Grid published its 2015/2016 'Winter Outlook' Report. The report calculated that the peak transmission demand forecast for the coming winter will be 54,200MW, a slight increase from last year.⁷² It is now therefore clear that the winter of 2016/17 will present the most significant challenge to maintaining affordable and available electricity supplies, as key dispatchable power plants will be closed early in March 2016. By winter 2016/17 British electricity generating capacity will have fallen below the minimum necessary margin to guarantee secure supplies of electricity generation for a growing economy. Electricity generating margins have not been this tight since the 1950's.

⁷¹ As well as coal plant a significant amount of CCGT and atomic power announced its closure in 2015, including Killingholme CCGT (900MW) and the atomic plant at Wylfa (450MW). Alongside the coal plant this amounts to 7,366MW of dispatchable capacity.

⁷² National Grid 'Winter Outlook' Report, October 15 2015.

Chart 11: Due to widespread plant closures dispatchable capacity has been in decline – and now for the first time will be lower than forecast demand



Source: DECC, CPS analysis

National Grid are reacting to this looming crisis by spending millions of pounds to provide what it describes as ‘balancing services’ or reserves. This includes supporting the deployment of small scale and relatively inefficient localised diesel and gas fired generators, paying commercial and industrial consumers to reduce their electricity usage or switch to expensive backup generation sources at peak periods, and funding the operators of mothballed and uneconomic generating units to make them available at times of system stress. National Grid claim that these measures have secured an extra 2,400MW of extra ‘balancing services’ for winter 2015/16.⁷³

⁷³ Ibid

National Grid used this emergency measure for the first time in November 2015 after the unexpected shutdown of two large coal plants. The Demand Side Balancing Reserve (DSBR) was used to call on industry to reduce its power usage on Wednesday November 4 after National Grid issued the first Notice of Insufficient Margin (NISM) for three years. Electricity prices spiked with the Grid paying £2,500 per MWh to one operator, Severn Power, as it brought in emergency supplies. The present rate is under £60 per MWh.⁷⁴

⁷⁴ *'National Grid in emergency plea for heavy users to power down'* FT, November 5 2015.

5. MANAGING ELECTRICITY SUPPLY & WHAT TO DO WITH THE 'BIG SIX'

Since the introduction of the Climate Change Act 2008 and EU Renewables Directive, significant financial support has been directed at “low-carbon”, renewable power generation technologies.⁷⁵ If the renewable power encouraged, proposed and consented by the Coalition had been delivered (including biomass) then the Government’s “renewables” targets for 2020 would have been met, but at huge cost.

However, this initiative has also served to disincentivise investment into fossil-fired dispatchable or baseload capacity. Indeed, some of the Big Six have recently broken up their generating companies so as to concentrate on new technologies which guarantee a subsidy reward.⁷⁶

⁷⁵ The main driver of UK policy on renewables is the EU Renewables Directive of 2009, which requires that 15% of final energy consumption in the UK should come from renewable sources by 2020. This means that about 33% of final electricity supply will be from renewables.

⁷⁶ *Utility Week*, December 1 2014, 'E.ON to split business in strategy overhaul'.

This is cause for concern as only fossil-fired capacity and nuclear can deliver secure supplies in overcast, windless weather.

Table 5: Status and consented capacity of current and planned UK renewable energy plants

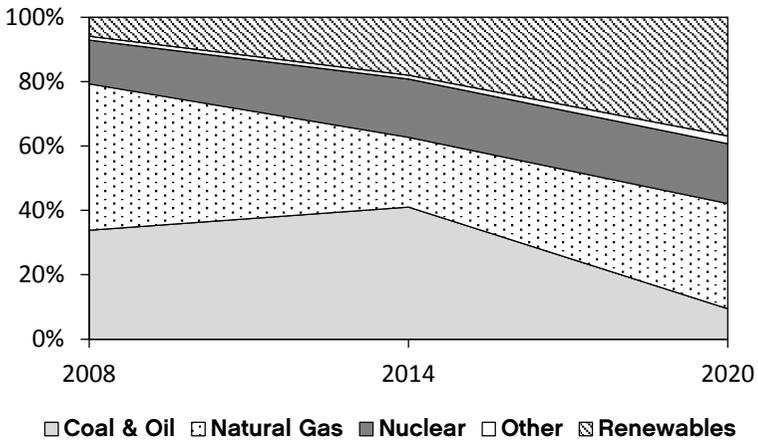
Project Status	Biomass	Hydro	Solar	Tidal	Waste	Wind Offshore	Wind Onshore	Total
Operational (GW)	3.0	0.4	1.1	0.0	0.5	3.7	7.3	16.1
Under Construction (GW)	0.3	0.01	0.6	-	0.5	1.4	1.5	4.3
Awaiting Construction (GW)	2.9	0.1	1.5	0.1	0.9	4.3	5.1	15.0
Total Consented Capacity (GW)	6.2	0.5	3.2	0.1	1.9	9.4	13.9	35.3
Submitted in the Planning System (GW)	0.5	0.02	1.4	0.3	0.2	9.1	6.5	17.9
Load factor	66%	36%	10%	8%	68%	34%	26%	-
Est. output from consented capacity (TWh)	36.0	1.7	2.8	0.1	11.3	27.8	13.1	110.8
Est. output from capacities in planning (TWh)	2.9	0.1	1.2	0.2	0.9	26.7	14.6	46.6

Source: Renewable Energy Foundation

By 2020 if all consented capacity in 2014 is built, there will be 53GW (53,000MW) of renewable capacity of which only 6,000MW, mostly biomass-fired boilers, like Drax, could be said to be dispatchable. Wind power will constitute over 30,000MW. Total renewable capacity will deliver an expected 157 Terrawatt hours (TWh) in 2020.

If so much intermittent wind and solar capacity is built, without provision made also for non-intermittent capacity, the existing electricity infrastructure will struggle to balance the increase in weather dependency introduced into the system.

Chart 12: Growth of intermittent electricity generation in the UK



Source: DECC, *Updates energy and emissions projections: 2014, Annex G: Major power producers' generation by source*

Intermittency is likely to grow in the next decade, particularly as levels of supply from intermittent renewables (such as wind and solar) increase. It is currently relatively simple to balance the UK grid, with roughly only 10% of generation supplied from weather-dependent renewables. Demand is predictable as long as the system still has ample reserves of dispatchable thermal generation, such as coal and gas. However, as has been detailed earlier, the retention and continued availability of such plants is now uncertain.

Japan is an important case study for the UK. In March 2011, following the Fukushima atomic incident all of Japan's 48 nuclear reactors were shut down. During this period the Japanese Government encouraged a vast expansion in renewable power, particularly household rooftop solar, with power companies required to pay producers a generous 40 Yen per kWh. The response was dramatic. In 2011 Japan had just 4,900MW of installed solar capacity. Just three years later, at the

end of 2014, this had increased to 23,000MW. This made Japan the third largest solar energy producer in the world.

But this dash for solar has ground to a halt. In late 2014 Japan's power companies began telling solar producers they could take no more electricity from them. At the same time the Government slashed the price utilities would have to pay for electricity from solar to 27 Yen per kWh.

Prime Minister Shinzo Abe is now pushing ahead with a return to dispatchable nuclear power. His repeated argument for doing so is that Japan needs reliable dispatchable power that only nuclear can provide.⁷⁷

In the UK, if a growing portion of electricity is to be generated from renewable resources by 2020, and 88% of this is planned to be wind, the grid-connected wind fleet will grow from 8,400MW (2014) to over 30,000MW. This will be a vast and expensive balancing challenge for National Grid.

5.1 Britain's electricity generating system in 2020

By 2019/20 it is unlikely that any new interconnectors will have been built and commissioned.⁷⁸ Due to the combination of the Large Combustion Plant Directive (LCPD), Carbon Price Support and the looming new rules of the EU Industrial Emissions Directive (IED) it is likely that dispatchable capacity, particularly coal, will have reduced considerably.

As was the case with the EU LCPD, it seems highly likely that those generators who have not yet decided to go for early closure will

⁷⁷ <http://www.bloomberg.com/news/articles/2014-12-09/nuclear-poised-to-be-winner-as-abe-eyes-broader-japan-majority>

⁷⁸ http://investors.nationalgrid.com/~/_media/Files/N/National-Grid-IR/factsheets/2014/interconnector.pdf

run their plants through their 17,500 allocated operating hours as fast as possible rather than upgrade them, causing a sharp reduction of dispatchable capacity towards 2020.

Accordingly, as has been set out in Chapter 4 it is increasingly likely that premature large scale closures of some coal and even some CCGT capacity will occur before 2020, spurred not least by the gradually increasing Carbon Price Support, which, as explained, is expected to resume its trajectory from 2020, rising to £70 t/CO₂ by 2030.

5.2 The long overdue inquiry

The Competition and Markets Authority (CMA) launched an investigation into the energy sector in 2013 amid allegations companies were overcharging their customers. Profits of the Big Six energy companies had increased tenfold from 2007 to 2013, from a combined £110 million from their domestic gas and electricity supply in 2007, to more than £1.1 billion in 2013 (figures before interest and tax).⁷⁹

That equates to average profits of just £2.31 per fuel, per household in 2007, rising to £23.71 per fuel, per household in 2013. Not all households receive gas as well as electricity. However, for households that do, company profits increased even more dramatically, from £1.32 per household in 2007 – when gas supply was loss-making – to £48.16 per household in 2013. A typical dual fuel bill increased by 45% over the same period, from £841 in 2007 to £1,217 in 2013.

⁷⁹ 'Energy Market Investigation – Profitability of retail energy supply/profit margin analysis', Competition and Markets Authority, March 16 2015.

Most energy companies made much higher profit margins on their standard variable tariffs, which the majority of households remain on, rather than on fixed price deals. In February the CMA published initial findings showing that the vast majority of UK households had been paying £234 too much for their energy, because companies charged loyal customers higher prices.

5.3 A return to the electricity 'pool' and the Bulk Tariff

The CMA's findings and recommendations provide a valuable opportunity to reassess the best model for the future.

Until the middle of the last decade up to 15 separate electricity boards competed to sell electricity to customers. The cost of electricity to these boards was determined by the generators. This was the 'Bulk Tariff'. Importantly, this led to generators regularly assessing the efficiencies and performances of their power plants which emphasised a policy where those plants providing the cheapest electricity were taken first in the provision of electricity with the dearest taken last. Importantly, as cheaper and more efficient plants were introduced this would lead to older plants being less frequently utilised. This would not lead to their immediate closure; this would only occur when their generation was no longer required by a grid which saw benefits to having a robust and diverse electricity generating sector with a healthy margin of surplus available capacity, unlike today. This model helped produce some of the cheapest electricity in Europe (see Chart 1).

It is encouraging today to see a greater number of smaller electricity suppliers competing in the market alongside the market erosion of the major suppliers and their traditional dominance. Applications for gas and electricity supply licences doubled in the six months to December 2014, compared to the previous half year. By August 2015 the total number of energy

supply companies selling either electricity or gas to household customers in the UK was 29.⁸⁰ This is welcome and competition between retailers is vital. But the key point remains that policy must be targeted at reducing the generation costs of electricity at its source.

⁸⁰ Energy UK, September 2015 'Competition in British energy supply markets'.

6. THE UK HAS LOST THE FREEDOM TO CHANGE ITS ENERGY POLICIES

The EU has a long history of involvement in energy issues, though it was only given the formal power to legislate on energy in 2009 via the Lisbon Treaty. The Treaty created a new title on energy (Article 194 TFEU) which expanded the EU's legal basis and gave the organisation new powers to pass laws affecting energy policy. For the first time the Treaty made it clear that energy policy is a shared competence between the EU and its member states, stating that the EU was tasked with ensuring the functioning and security of energy supply and promoting energy efficiency, interconnection and renewable energy. The year 2009 also saw the EU introduce the Third Energy Package, which aimed to finally create single markets in electricity and gas.

As of July 2014 there were 224 legislative instruments falling under the remit of the Directorate General for Energy. These are the inevitable product of decades of both legislative creep and the EU's ambition of integrating Europe's energy markets. There are, at first glance, strong arguments in favour of integrating energy markets, not least to allow energy firms access to larger markets and to improve the UK's energy security.

EU renewable targets have been embraced by many long standing EU members, including the UK. One of Tony Blair's last major initiatives as Prime Minister was to sign Britain up to high renewable energy targets at the 2007 Spring European Council in Brussels. This action was taken despite concerns raised by the then Department for Trade and Industry (DTI) that the steepness of the targets could be damaging to the British economy.⁸¹ The UK started from a very low base of renewables deployment requiring the most significant annual growth in renewables deployment of any EU member state. At no stage has DECC or its predecessor subsequently published any analysis showing why the DTI's view was wrong, or explaining why meeting the EU renewables target constitutes the lowest cost path to reducing emissions of CO₂.

6.1 The Large Combustion Plant Directive

The most direct and arguably damaging impact that EU energy policy has had on the UK is the premature closure of large power stations which did not conform to EU pollution rules. These closures were forced on the UK as a result of the EU Large Combustion Plant Directive (LCPD) (Directive 1988/609/EC).

The LCPD was approved in 2001 and intended to limit the operation of power plants which did not retrofit sulphur and nitrogen oxide reduction technology. Coal and oil plants which did not fit the new reduction technology were granted a maximum of 20,000 hours of operation between January 1 2008 and

⁸¹ Read the leaked DTI document:

<http://www.theguardian.com/environment/2007/aug/13/renewableenergy.energy>

Furthermore the Secretary of State has since acknowledged that these renewable targets will not be met. *SoS Letter to Cabinet Colleagues*, 29/10/2015.

December 31 2015. In the event many of the plants ‘under sentence’ from the LCPD simply burned their permits away as quickly as possible and the majority closed well before 2015.

Table 6: UK Power Station closures under the EU LCPD

UK Coal Power Stations	Generating Capacity	UK Oil Fired Stations	Generating Capacity
Didcot A <i>(closed 2013)</i>	2,000 MW	Littlebrook <i>(closed 2015)</i>	1,475 MW
Kingsnorth <i>(closed 2012)</i>	1,940 MW	Grain <i>(closed 2012)</i>	1,300 MW
Tilbury <i>(closed 2013)</i>	1,428 MW	Fawley <i>(closed 2013)</i>	968 MW
Cockenzie <i>(closed 2013)</i>	1,200 MW		
Ferrybridge C <i>(closed 2014)</i>	1,000 MW		
Ironbridge B <i>(closed 2015)</i>	1,000 MW		
Total	8,568 MW		3,743 MW

In total the EU LCPD has closed 12,300MW of UK power plant in the last three years. At no stage, despite warnings from Ofgem of thinning capacity generating margins, did the Government seek a derogation from this regulation.

6.2 The Industrial Emissions Directive

The pressure of EU energy policy on Britain’s key power stations continues to grow. The next EU regulation which threatens Britain’s remaining coal plant (which was modernised to meet the requirements of the LCPD) is the Industrial Emissions Directive (IED). As explained, the Government’s unilateral Carbon Price Support is severely threatening the possibility of any investment

to meet the multi-million plant improvement costs which this regulation requires. Consequently, it will place extra pressure on existing coal plant to close before 2020.

Furthermore the European Commission (EC) has recently announced it will take the UK to court concerning emissions from the largest power station in Wales, at Aberthaw. The EC claims that the plant is breaking emissions rules as a result of it using locally mined Welsh coal which requires unique treatment due to its low volatility. This move could undermine the future of that plant; the operators had proposed significant investments.⁸²

6.3 EU policy must consider unilateral energy security

A mounting number of investigations, including EC reports and government studies, have highlighted the role of the EU in driving up the cost of energy.

Requiring the Commission to consider the impact of its proposals, such as the impact of the LCPD and IED on British business and the power sector, replacing the complex set of targets with one emissions target and making greater use of opt outs would help to reduce the burden on British businesses.

For too long opposition to EU energy policy has been dismissed with claims that the UK would have introduced similar laws unilaterally. It is true that Britain may have introduced the Renewables Obligation before it was required to by the EU, but it is also true that it has since voiced opposition to retaining a steep renewables target. Under the current terms of EU membership the UK has lost its freedom to change its policies. The UK is now stuck with an incompatible renewables target and EU rules that

⁸² *Utility Week*, March 26th 2015, 'UK to face legal action over Aberthaw emissions, says EC'.

demand early power station closures, raising serious concerns about national energy security and diversity, despite warnings from National Grid.

7. CONCLUSION

Britain's new energy ministers must re-examine energy policy as a priority. The over-focus on renewables and carbon reduction targets has resulted in a long-term energy policy that ignores priorities such as affordability, diversity and security of supply. Most of the DECC statements around energy policy rarely mention diversity but it is as vital as decarbonisation. Ministers regularly call for a balanced energy mix but any real balance has been undermined by policies such as Carbon Price Support, bans on some new power plants, and a refusal to effectively support new energy technologies which are not weather-dependent.

Last year Ofgem, the energy regulator, upstaged the then Energy Secretary's own set of announcements on subsidies for renewables by warning that a lack of progress on energy investment meant a real risk of power cuts as older plant might close too early, and before replacements plants were ready. National Grid extended the embarrassment by further raising the prospect of blackouts and short-time factory working. The analysis in this report shows that the 2016/17 winter and beyond could see supply shortages and electricity rationing.

As the US becomes more energy competitive, spawning a manufacturing resurgence in the process, Europe and particularly the UK slip ever further behind. Ironically, unilateral British policies like Carbon Price Support are making British energy policies even more uncompetitive than those across the rest of the EU and place huge extra pressure on energy intensive sectors such as steel.

Having now rejected the nuclear option, Germany is building new high efficiency coal plants but such carbon capture ready plants are now not permitted in Britain even though coal prices are at a record low.⁸³ The Government is right to have pledged not to subsidise new onshore wind farms, but this in itself does not address the present block of onshore wind in development which will present National Grid with the biggest energy balancing challenge in its history.

The suppliers of onshore and offshore wind extracted a heavy initial draft price from the Coalition – at £100 and £155 per MWh respectively, the latter was more than three times the going rate for electricity generation, falling to £117MWh in today's prices. This completely undermines the assertion, much touted by ministers and officials when the concept of "minimum prices" was first conceived, that the new renewables regime would deliver affordable energy quickly, and indeed a lower price than current arrangements because of the flawed assumption that fossil fuel prices would soar. Coal, gas and nuclear plants are maintaining electricity prices below £50 per MWh.

Similarly with nuclear, with its fixed 'strike price', the Government has pledged to underwrite the financing costs of EDF new nuclear build. In its desperation to ensure that energy renewal is seen as privately

⁸³ The Energy Act 2013 introduced an Emissions Performance Standard which set a maximum limit on CO₂ emissions from power plants; this permits new gas plant but not new coal plant without Carbon Capture and Storage (CCS).

financed, the Government has been forced to give so many guarantees that it might as well have funded the whole thing from the public purse in the first place. With nuclear power, the initial up-front outlay and construction costs are significant but the ongoing operation costs are comparatively low. It would arguably have been cheaper for the Government to borrow the money to build the plants; they would pay less interest on the capital outlay rather than incentivising EDF to borrow the money. It must now, at least, extract from EDF a binding in-service delivery date for Hinkley C. Similar plants in France and Finland are years behind schedule.

The guaranteed high price of £92.50/MWh (which was agreed at 2013 prices and is now almost £97) for every hour in every year of the plant's expected 50 year operation is in effect a fixed annuity to the French taxpayer via a French state owned company for the next half century. The new 3,200MW plant at Hinkley will cost £16 billion; this equates to £5 million per megawatt; comparatively a new gas plant costs around £0.72 million per megawatt and takes under three years to complete. It risks becoming the world's most expensive power station, generating profits of up to £2 billion for EDF.

On multiple fronts, the Energy Act and its associated carbon taxes are proving a failure. The problems arise because the private sector isn't being asked to finance a market opportunity but a politically determined goal – decarbonised electricity supply. The consequent tensions are proving impossible to reconcile and the disastrous side effects of this policy could be just over a year away. As detailed in this report, it could force the early and premature closure of most of Britain's dispatchable coal fired plant (a quarter of UK electricity generating capacity) with no equivalent plant either proposed or ready to replace it, particularly new gas plants.

Proposals

- No government can tolerate power shortages, energy rationing or prolonged and erratic price spikes. The new Government will need to move fast and do more to rectify and address the mistakes of the Coalition. The next five years will contain serious challenges in this policy area which have been looming for more than a decade. The following are a list of proposals that are urgently necessary to correct a failed doctrine whose risks were clear but which ministers and officials ignored.
- The high unilateral UK Carbon Price Support should be abandoned before it forces the premature closure of more baseload power plants and thus threatens energy security and affordability. Britain should enjoy the same carbon prices as its main EU competitors inside the EU Emissions Trading Scheme. Carbon Price Support has made them over three times more expensive. The Government should seek to renegotiate EU renewable growth targets in light of recent admissions that they will not be met.⁸⁴
- The Government should urgently review and revise the measures passed in the Coalition's Infrastructure Act which will see the CCC enjoy new blocking powers over future fossil fuel energy projects. Consideration should be given to adopting a Norwegian style oil and gas exploration tax credit to encourage increased drilling in UK waters. In 2004 fewer than 10 exploration wells were drilled in Norway but once the tax credit was introduced in 2005 exploration activity increased four-fold, whilst UK activity has declined.

⁸⁴ Section 4: *Engaging with Other EU Member States*, SoS Letter to Cabinet Colleagues, 29/10/2015.

- The Government should pledge to introduce an independent Annual Statement assessing the economic impacts of its energy policy on British industry, consumers, competitiveness, energy security and diversity. The Statement should provide a definitive estimate cost of electricity prices over the next ten years every two years so to judge the success, or failure, of policies.
- In the spirit of the Conservative election pledge to enshrine in law not to raise income tax, national insurance or VAT, the Government should also legislate to deliver targets to maintain security of energy supply, diversity and affordability. In November, five days after the National Grid called for UK power rationing, the World Energy Council slashed Britain's energy sustainable rating from AAA to AAB due to the UK's failure to deliver secure, affordable and sustainable energy supplies.⁸⁵
- The DECC should appoint an independent 'not for profit' Security of Supply System Operator (SSSO) with responsibility to maintain the resilience and integrity of the electricity grid. The SSSO's main responsibility should be the maintenance and delivery of secure and abundant electricity supplies in the immediate future and for the two to four years ahead as new plant is built. No such body exists to require the suppliers of electricity to maintain a sufficient margin of capacity to secure supplies for their customers. Ofgem and National Grid should report every quarter to the new SSSO with a report placed before Parliament. UK spare capacity margins have fallen from 15% in 2009 to under 2% in 2016.

⁸⁵ *World Energy Council, 2015 Annual Trilemma Index, November 10 2015.*



GLOSSARY

CCC	Committee on Climate Change
CCGT	Combined Cycle Gas Turbine (gas fired power station)
CfD	Contracts for Difference
CPS	Carbon Price Support
CMA	Competition and Markets Authority
CCS	Carbon Capture and Storage
DECC	Department of Energy and Climate Change
DSBR	Demand Side Balancing Reserve
EU ETS	European Union Emissions Trading Scheme
EMR	Electricity Market Reform
IED	Industrial Emissions Directive
LCPD	Large Combustion Plant Directive
LLD	Limited Life Derogation
LNG	Liquefied Natural Gas
MWh	Megawatt Hour
OFGEM	Office of Gas and Electricity Markets
SCR	Selective Catalytic Reduction
SSSO	Security of Supply System Operator
TNP	Transitional National Plan
TWh	Terrawatt hour
UCG	Underground Coal Gasification



ABOUT THE CENTRE FOR POLICY STUDIES

- One of the UK's leading think tanks, independent from all political parties and pressure groups.
- Founded by Margaret Thatcher and Sir Keith Joseph in 1974 to encourage vigorous support for the free market, liberty and a strong nation.
- Promotes policies for lower tax, smaller government, competitive markets, greater freedom and responsibility for individuals, business and civil society.
- Relies for funding entirely from individual and corporate supporters.
- Chairman: Lord Saatchi.

The aim of the Centre for Policy Studies is to develop and promote policies that provide freedom and encouragement for individuals to pursue the aspirations they have for themselves and their families, within the security and obligations of a stable and law-abiding nation. The views expressed in our publications are, however, the sole responsibility of the authors. Contributions are chosen for their value in informing public debate and should not be taken as representing a corporate view of the CPS or of its Directors. The CPS values its independence and does not carry on activities with the intention of affecting public support for any registered political party or for candidates at election, or to influence voters in a referendum.



BECOME AN ASSOCIATE OF THE CENTRE FOR POLICY STUDIES

The Centre for Policy Studies is one of Britain's best-known and most respected think tanks. Independent from all political parties and pressure groups, it consistently advocates a distinctive case for smaller, less intrusive government, with greater freedom and responsibility for individuals, families, business and the voluntary sector.

Through our Associate Membership scheme, we welcome supporters who take an interest in our work. Associate Membership is available for £100 a year. Becoming an Associate will entitle you to:

- all major CPS reports produced in a 12-month period
- invitations to lectures and conferences
- advance notice by e-mail of our publications, briefing papers and invitations to special events

For more details, please write or telephone to:

Jenny Nicholson, Deputy Director of Fundraising
Centre for Policy Studies
57 Tufton Street, London SW1P 3QL
Tel: 020 7222 4488
Email: jenny@cps.org.uk
Website: www.cps.org.uk