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**The EU, Energy and Climate Change**

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## EXECUTIVE SUMMARY

- There are over 160 EU legislative instruments covering energy policy. Most of this legislation aims to establish internal markets for different types of energy (oil, gas etc.)
- The EU has two main ‘Energy targets’ which it aims to reach by 2020, known as the 20-20-20 targets:
  - The first target is a 20 per cent reduction in greenhouse gas emissions below 1990 levels across the EU.
  - The second target is for 20 per cent of the EU’s energy to come from renewable sources. Each EU country has its own renewables target, known as its “Renewables Obligation”, with some countries having targets higher than 20 per cent and some less, with the aim of achieving an overall EU average of 20 per cent by 2020. The UK’s Renewables Obligation is 15 per cent.
  - The UK has already met its first EU target of reducing its greenhouse gas emissions by 20 per cent by 2020. But it has no realistic prospect of meeting its 15 per cent Renewables Obligation.
- UK legislation sets tougher carbon emissions reduction targets than EU law. Under the 2008 Climate Change Act, the UK must reduce its greenhouse gas emissions by 34 per cent below 1990 levels by 2020 and by 80 per cent by 2050. The UK seems to have a reasonable chance of meeting the former target but the latter looks unrealistic.
- The EU’s main tool for reducing carbon emissions is the Emissions Trading Scheme (ETS), which sets carbon targets and allows participating industries to buy and sell carbon permits for emissions. It currently covers power stations, combustion plants and various production industries. But it has recently been expanded to cover airline emissions, which has provoked a hostile response from China and India.
- The Government estimates that EU climate change policies, primarily the ETS and the Renewables Obligation, will add 26 per cent to the cost of domestic electricity prices in real terms by 2015, and 10 per cent to domestic gas prices over the same period. It also expects similar rises in commercial prices, damaging the competitiveness of energy intensive industries and inflating prices across the board as businesses pass on higher energy prices.<sup>1</sup>
- The EU Large Combustion Plant Directive will mean nine UK power stations having to close early, years before they need have done.
- The UK Government wanted EU energy policy to focus on deepening the single market and improving competition in the EU energy market, in order to reduce consumer prices. But unfortunately EU policy measures are causing energy prices to rise faster than they would otherwise have done and are damaging the competitiveness of industrial users.

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<sup>1</sup> Richard Wellings, ‘Seriously Suboptimal: UK Energy and Climate Change policy’, in ‘Sharper Axes, Lower Taxes’, IEA, p269

- The future of nuclear energy in the UK looks very uncertain following the decision in March 2012 by RWE and E.ON to pull out of their Horizon joint venture to construct two new nuclear plants at Hinkley Point and Sizewell.
- The UK will be increasingly reliant on imported natural gas. Its main source of liquefied natural gas (LNG), Qatar, may be vulnerable to political instability in the Gulf region.
- Fracking of shale gas formations could provide a stable new domestic source of natural gas for the UK which could substantially reduce its energy costs. In the USA the shale-gas industry has been growing at 45 per cent per annum whilst gas prices have more than halved since the 2009 recession. By contrast, over the same period, gas prices have doubled in the UK and more than trebled in Japan.
- The UK has a number of policy options which it either is pursuing or is free to pursue which would not breach its EU treaty obligations such as:
  - Prepare plans to extend life of the two AGR nuclear plants now planned for closure in 2016
  - Find new contractors for the two new nuclear plants which RWE and E.ON will no longer be constructing
  - Plan construction of new gas-fired plants on a contingency basis
  - Ensure full exploitation of domestic potential for extracting natural gas by fracking
  - Negotiate contracts to enable the UK to benefit at favourable prices from growing availability of LNG derived from fracking in USA and rest of world
  - Campaign much more effectively to get other EU member states to fully implement the EU's Third Energy Package
  - Commission independent cost benefit analysis of alternative strategies to address climate change as called for by Peter Lilley in his new paper "What is wrong with Stern?"
  - Prepare plan to "mothball" the Kingsnorth coal-fired power plant scheduled to close in March 2013 and the eight other coal-fired plants planned for closure in 2015, compensating the operators as appropriate
  - Publicly announce that UK will refuse to make any further EU energy target commitments after current 20-20-20 targets expire
  - Repeal Climate Change Act 2008
- The UK could dramatically improve its freedom of action on energy policy if it were willing to take measures in breach of its EU treaty obligations such as:
  - Cancel plans to close the Kingsnorth coal-fired plant in 2013 and eight other coal-fired plants in 2015 and renounce the Large Combustion Plant Directive
  - Abandon its unrealistic EU 15 per cent Renewables Obligation commitment
  - Withdraw from the EU Emissions Trading Scheme
- If the UK ceased to be a full EU member it would of course no longer be in the position of having to defy the EU if it wished to pursue any of the above policy options which would now put it in breach of its EU treaty obligations.

## **EU AND UK ENERGY TARGETS**

As of September 2012, there are some 160 EU legislative instruments (directives and regulations) falling under the remit of the Directorate General for Energy. They cover oil, gas, electricity, renewable energy, and nuclear power (including radiation and safety standards) as well as energy efficiency.<sup>2</sup> They are concerned mainly with establishing internal markets for each of these energy sources and improving competition, market openness and security of supply across the EU energy sector.

In addition there are pieces of legislation like the EU Emissions Trading Scheme (also referred to in this paper as the “Emissions Trading Scheme” or the “ETS”) which fall under the competence of the Directorate General for Climate Action but can also be seen as being relevant to energy. Targets for CO<sub>2</sub> emissions and renewables are also the responsibility of the Directorate General for Climate Action.

### **EU Targets**

There are two main EU ‘Targets’ relating to energy, known as the ‘20-20-20’ targets. The first such Target is a reduction in EU greenhouse gas emissions of at least 20 per cent below 1990 levels by 2020. The EU’s main instrument for doing this is the Emissions Trading Scheme. The European Commission describes the scheme as a “cornerstone of the EU’s policy to combat climate change and its key tool for reducing industrial greenhouse gas emissions cost-effectively. Being the first and biggest international scheme for the trading of greenhouse gas emission allowances, the ETS covers some 11,000 power stations and industrial plants in 30 countries.”<sup>3</sup> For the UK, this 20 per cent emissions target has already been achieved (see Table A below).

The second EU Target is to have 20 per cent of the EU’s total energy supply coming from renewable energy sources by 2020. This is laid out in Directive 2009/28/EC, the ‘Directive on Renewable Energy’, which prescribes specific targets for each member state, known as “Renewable Obligations”, as well as the overall EU 20 per cent target.

The UK’s Renewables Obligation is for 15 per cent of its total energy supply to be provided by renewables by 2020. This is a fourfold increase compared to its 3.3 per cent level in 2010 and of over tenfold compared to its 1.3 per cent level in 2005. The Department of Energy and Climate Change estimate that around 30 per cent of the UK’s electricity generation will need to come from renewable sources for this target to be met<sup>4</sup>, which appears unrealistic.

In addition, at least 10 per cent of the energy needed for transport in the UK is required to come from renewable sources by 2020. In practice this means using bio-fuels, widely regarded as being one of the least cost-efficient ways of reducing carbon emissions.

### **Additional UK Targets**

Under the 2008 Climate Change Act the UK has its own targets for reducing greenhouse gas emissions by at least 34 per cent by 2020 and by at least 80 per cent by 2050 relative to its 1990 level. This is significantly higher than the EU emissions target. As Table A on page 6 shows, the UK’s total greenhouse gas emissions fell by 23.6 per cent between 1990 and 2010.

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<sup>2</sup> European Commission, ‘Overview of the secondary EU legislation (directives and regulations) that falls under the legislative competence of DG ENER and that is currently in force’, 25<sup>th</sup> July 2011

<sup>3</sup> European Commission – Climate Action, ‘Emissions Trading Scheme’: [http://ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm)

<sup>4</sup> [http://www.decc.gov.uk/en/content/cms/meeting\\_energy/renewable\\_ener/renewable\\_ener.aspx](http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/renewable_ener.aspx)

**TABLE A**

**Reductions in UK greenhouse gas emissions since 1990 by category of use.<sup>5</sup>**

<b>Category of energy use</b>	<b>1990</b> <i>million tonnes CO<sub>2</sub></i> <i>per annum</i>	<b>2010</b> <i>million tonnes CO<sub>2</sub></i> <i>per annum</i>	<b>Percentage Change</b>
CO <sub>2</sub> emissions			
Power stations etc.	242.5 (41.1%)	195.7 (39.5%)	- 19.3%
Business	110.6 (18.7%)	75.6 (15.2%)	- 31.6%
Transport	119.4 (20.2%)	120.6 (24.4%)	+ 1.0%
Residential	79 (13.4%)	86.5 (17.4%)	+ 9.5%
Other	38.8 (6.6%)	17.4 (3.5%)	- 55.4%
	-----	-----	
<b>Total CO<sub>2</sub> emissions</b>	590.3 (100.0%)	495.8 (100.0%)	- 16%
Other greenhouse gas emissions	179.0	92.0	- 48.6%
	-----	-----	
<b>Total greenhouse gas emissions</b>	769.3	587.8	- 23.6%
	=====	=====	

The prime means by which the UK has been reducing its CO<sub>2</sub> emissions since 1990 has been its gradual switch from coal and oil for electricity generation to gas. As shown in Table B below, the proportion of UK CO<sub>2</sub> emissions accounted for by coal fell from 36.9 per cent in 1990 to 20.2 per cent in 2010 whilst that accounted for by gas rose from 24.3 per cent to 45.5 per cent.

**TABLE B**

**Reductions in UK CO<sub>2</sub> emissions since 1990 by fuel.<sup>6</sup>**

<b>Type of fuel</b>	<b>1990</b> <i>million tonnes CO<sub>2</sub></i> <i>per annum</i>	<b>2010</b> <i>million tonnes CO<sub>2</sub></i> <i>per annum</i>	<b>Percentage Change</b>
Gas	143.7 (24.3%)	225.8 (45.5%)	+57.1%
Oil	191.0 (32.4%)	152.0 (30.7%)	- 20.6%
Coal	217.7 (36.9%)	100.2 (20.2%)	- 54.0%
Other	37.9 (6.4%)	17.8 (3.6%)	- 47.0%
<b>Total</b>	590.3 (100.0%)	495.8 (100.0%)	- 16.0%

With nine coal fired power plants due to have closed by the end of 2015, the UK seems to have a reasonable chance of meeting its 34 per cent reduction target for greenhouse gas emissions by 2020. But any serious delays in the government's nuclear construction plans, as discussed in the section on UK Electricity Generating Capacity below, would reduce the UK's chances of achieving the 34 per cent target by 2020, as would also any significant recovery in the UK economy. But the 80 per cent target by 2050 looks unrealistic as it would require revolutionary changes to sectors such as transport.

<sup>5</sup>[http://www.decc.gov.uk/en/content/cms/statistics/climate\\_stats/gg\\_emissions/uk\\_emissions/uk\\_emissions.aspx](http://www.decc.gov.uk/en/content/cms/statistics/climate_stats/gg_emissions/uk_emissions/uk_emissions.aspx)

<sup>6</sup>[http://www.decc.gov.uk/en/content/cms/statistics/climate\\_stats/gg\\_emissions/uk\\_emissions/uk\\_emissions.aspx](http://www.decc.gov.uk/en/content/cms/statistics/climate_stats/gg_emissions/uk_emissions/uk_emissions.aspx)

## **EU CLIMATE AND ENERGY PACKAGE**

The two EU Targets were put forward as part of the EU's 'Climate and Energy Package', which was agreed by the European Parliament and Council in December 2008 and came into force in June 2009. The core of the package comprises four pieces of complementary legislation:

1. A revision and strengthening of the Emissions Trading Scheme (see below).
2. An 'Effort Sharing Decision' governing emissions from sectors not covered by the Emissions Trading Scheme, such as transport, housing, agriculture and waste.
3. Binding Renewables Obligations intended to lift the average renewable share across the EU to 20 per cent by 2020, as mentioned above, more than double the EU's actual level of 9.2 per cent in 2006. National targets range from 10 per cent for Malta to 49 per cent for Sweden with the UK's target being 15 per cent. These targets are intended to contribute to decreasing the EU's dependence on imported energy and to reducing its greenhouse gas emissions.
4. A legal framework to promote the development and safe use of carbon capture and storage (CCS). CCS is a promising family of technologies that capture the carbon dioxide emitted by industrial processes and store it in underground geological formations where it cannot contribute to global warming.

Although the different components of CCS are already deployed on a commercial scale, the technical and economic viability of its use as an integrated system has yet to be shown. The EU therefore plans to set up a network of CCS demonstration plants by 2015 to test its viability. Revised EU guidelines on state aid for environmental protection, issued at the same time as the legislative package was proposed, will enable governments to provide financial support for CCS pilot plants.<sup>7</sup>

The UK Government estimates that by 2015 the aggregate cost of climate change policies, primarily the Emissions Trading Scheme and the 15 per cent Renewables Obligation, will represent 26 per cent of the total cost of domestic electricity and 10 per cent of the total cost of domestic gas, resulting in an overall increase in consumer costs by £11.5 billion per annum over the level to which they would otherwise have risen. The Government estimates that commercial prices will rise by similar rates to consumer prices, reducing the competitiveness of energy intensive industries and inflating prices across the board as businesses pass on higher energy prices.<sup>8</sup>

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<sup>7</sup> European Commission, 'The EU climate and energy package': [http://ec.europa.eu/clima/policies/package/index\\_en.htm](http://ec.europa.eu/clima/policies/package/index_en.htm)

<sup>8</sup> Richard Wellings, 'Seriously Suboptimal: UK Energy and Climate Change policy', in 'Sharper Axes, Lower Taxes', IEA, p269

## **EU EMISSIONS TRADING SCHEME**

The Emissions Trading Scheme was launched in 2005. It is a ‘cap and trade’ system, which means there is a ‘cap’ or limit on the total amount of greenhouse gas emissions that can be emitted by factories and power plants covered by the scheme. Within this total cap, each company which falls under the scheme receives an emissions allowance in the form of tradable permits (one allowance/permit equals one tonne of CO<sub>2</sub>) which they can buy and sell with other companies in the scheme – the ‘trade’ part of ‘cap and trade’.

Each EU member state (or EEA member state participating in the scheme) must draw up a National Allocation Plan (NAP) approved by the European Commission. This sets a national cap on the emissions allowed from companies covered by the scheme. Each Member State is then given their allowance to allocate to companies covered by the scheme. However from 2013 onwards, the EU will allocate allowances centrally, abolishing the NAPs.

At the end of each year, every company must submit permits to cover its total emissions or face sanctions and fines. Companies may save up permits surplus to present requirements for future use, or they may sell surplus emissions permits to other companies which need to emit more greenhouse gases. This market-based solution means that companies which are effective at reducing their emissions can profit from doing so.

The total emissions cap is being brought down gradually so that total emissions fall, with companies receiving fewer and fewer permits each year. In 2020, the ETS emissions cap will be 21 per cent lower than in 2005.

The ETS operates in all 27 EU member states and in the three other European Economic Area (EEA) countries, Liechtenstein, Iceland and Norway. According to the European Commission, “it covers CO<sub>2</sub> emissions from installations such as power stations, combustion plants, oil refineries and iron and steel works, as well as factories making cement, glass, lime, bricks, ceramics, pulp, paper and board. Nitrous oxide emissions from certain processes are also covered. Between them, the installations currently in the scheme account for almost half of the EU’s CO<sub>2</sub> emissions and 40 per cent of its total greenhouse gas emissions.”<sup>9</sup>

The Scheme is being implemented in three phases, with the number of permits available being set out at the start of each ‘Phase’. During ‘Phase 1’ (2005-08), the total emissions covered by the scheme rose rather than fell, and an over allocation of permits led to a collapse in the price of carbon permits to almost zero. A 2007 report by Open Europe concluded “The Emissions Trading Scheme is supposed to be the EU’s main policy tool for reducing emissions. But so far, it has been an embarrassing failure.”<sup>10</sup>

The results of ‘Phase 2’ (2008-12) remain to be seen whilst political pressure to increase the number of permits available under ‘Phase 3’ (2013-2020), given the economic slowdown, will mean the schemes effectiveness at reducing emissions may be limited.

In fact, the ETS may well serve to increase global carbon emissions through what is known as ‘carbon leakage’ as energy intensive industries are driven out of the EU to countries with lower emissions standards such as China. Job losses in the EU therefore look likely to be a second perverse effect of the ETS.

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<sup>9</sup> European Commission, ‘Emissions Trading Scheme’: [http://ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm)

<sup>10</sup> [Open Europe, ‘Europe’s dirty secret: Why the EU Emission Trading Scheme isn’t working’, August 2007](#)



Given the overwhelming Parliamentary support for the 2008 Climate Change Act, with only five Conservative MPs voting against, and the general cross party political commitment to ‘combating climate change’ it seems probable that even if the UK had been outside the European Union, it would have joined the ETS, in the same way as Norway, Liechtenstein and Iceland, despite there being no discernible benefit to the UK.

The Taxpayers Alliance estimates that the ETS cost British consumers nearly £3 billion in 2008. It also estimates that from its introduction in January 2005 to the end of 2008, the Scheme cost consumers across all participating countries an aggregate of £67 billion (€93 billion).<sup>11</sup>

On 1<sup>st</sup> January 2012, the ETS was extended to the aviation industry, covering all airlines which fly into and out of the EU. For 2012, the first year of the scheme, the total emissions level for the aircraft operators has been set at 97 per cent of historic aviation emission levels. This will decrease to 95 per cent in 2013, with permit levels issued in subsequent years staying at this level, pending the Commission’s review of the legislation at a future point.

Many airlines and foreign countries have expressed strong opposition to this move, with India and China going so far as to instruct their airlines companies to refuse to comply with the scheme. Chinese airlines have cancelled £8.8 billion of orders with the European manufacturer Airbus in response to their airlines being brought into the ETS scheme<sup>12</sup>. An Indian official said: “The question is, are you [the European Union] provoking the world into a trade war?”<sup>13</sup>

This row could lead to some airlines being banned from operating in the EU, although with airlines not having to submit their emissions permits until April 2013 there is still some time before any action may be taken. With David Cameron making trips to both India and China in order to promote trade and better relations with two of the world’s fastest growing economies, the growing hostilities between the EU and these countries over the ETS endanger British efforts to improve trade between the UK and these countries.

### **EU LARGE COMBUSTION PLANT DIRECTIVE**

The ‘Large Combustion Plant Directive 2001/80/EC’ (the “LCP Directive”) is an EU directive concerned with limiting pollution from Combustion Energy Plants with a thermal output of 50 MW (MegaWatts) or greater. The Department for Environment, Food and Rural Affairs describes the purpose of the directive as follows:

“The LCP Directive aims to reduce acidification, ground level ozone and particles throughout Europe by controlling emissions of sulphur dioxide and nitrogen oxides and particulate matter (i.e. dust) from large combustion plants in power stations, petroleum refineries, steelworks and other industrial processes running on solid, liquid or gaseous fuel. These pollutants are major contributors to acid deposition, which acidifies soils and freshwater bodies, damages plants and aquatic habitats and corrodes building materials.”<sup>14</sup>

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<sup>11</sup> Taxpayers Alliance, European Emissions Trading Scheme: <http://www.taxpayersalliance.com/research/2009/10/new-research-emissions-trading-scheme-costs-consumers-3-billion-a-year.html>

<sup>12</sup> The Daily Telegraph, ‘Threat of global trade war over airline emission charges’ 20<sup>th</sup> March 2012: <http://www.telegraph.co.uk/finance/newsbysector/transport/9156225/Threat-of-global-trade-war-over-airline-emission-charges.html>

<sup>13</sup> Ibid

<sup>14</sup> DEFRA, ‘Large Combustion Plant Directive’: <http://www.defra.gov.uk/environment/quality/industrial/eu-international/lcpd/>

The legislation sets maximum emission limits for these pollutants. All combustion plants built after 1987 must comply with the LCP Directive. Plants built before 1987 can either comply with the Directive by installing emissions abatement equipment (Flue Gas Desulphurisation) or choose not to apply the Directive in which case they must either close by 2015 or after using up an allowance of 20,000 generating hours from January 2008, whichever comes first.

The Directive has already caused the premature closure or planned closure of several UK power plants. In March 2012 the German company E.ON had to announce its Kingsnorth coal-fired power plant will close in March 2013 meaning redundancy for 123 members of staff and the loss of the station's power capacity which currently generates 1940 MW, enough electricity for nearly 2 million homes.<sup>15</sup>

Eight other plants (Didcot A, Ferrybridge, Ironbridge, Tilbury, Littlebrook, Fawley, Grain and Cogenzie) have also opted out of the Directive and are therefore scheduled to close by 2015 at the latest.<sup>16</sup> Together with the closure of the Kingsnorth plant, this will mean a total loss of 11,550 MW of energy capacity, or enough electricity for nearly 12 million homes<sup>17</sup>.

The UK retains the option of seeking to negotiate an opt-out from the Directive or even ultimately of defying it. At present it seems unlikely the Coalition Government would consider such a drastic expedient. But there must be some chance that faced with the imminent prospect of power shortages the Government would reconsider its position.

## **UK'S POSITION ON EU ENERGY POLICY**

The UK's prime aim remains to focus EU matters on the Single Market and improving growth and competitiveness. Consequently the UK Government has made clear its desire for further liberalisation and competitiveness to be at the heart of EU energy policy. Whilst it has set a good example in faithfully complying with EU requirements its EU partners as a whole have not kept their side of the bargain.

In a joint letter of 20<sup>th</sup> February 2012, addressed to President Van Rompuy and President Barroso, David Cameron and 11 other European Prime Ministers and Presidents set out an eight point plan for improving growth across the European Union. The third of these points addressed EU energy policy:

“Third, we must deliver on our commitment to establish a genuine, efficient and effective internal market in energy by 2014. All Member States should implement fully the “Third Energy Package”, swiftly and in recognition of agreed deadlines. Energy interconnection should be enhanced to help underpin security of supply. Urgent action is also needed, nationally and where appropriate collectively, to remove planning and regulatory barriers to investment in infrastructure to release the potential of the single market and support green growth and a low-emissions economy. We look forward to the Commission's forthcoming communication on the functioning of the internal market, which should include an assessment of the degree of liberalisation and energy market opening in Member States.”<sup>18</sup>

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<sup>15</sup> The Daily Telegraph, 'Kingsnorth power plant to close in a year as EU', 9<sup>th</sup> March 2012:

<http://www.telegraph.co.uk/finance/newsbysector/energy/9131849/Kingsnorth-power-plant-to-close-in-a-year-as-EU-rules-hit.html>

<sup>16</sup> National Grid, 'GCRP 07/32 – Large Combustion Plant Directive', September 2007

<sup>17</sup> National Grid, 'GCRP 07/32 – Large Combustion Plant Directive', September 2007

<sup>18</sup> David Cameron et al, 'Joint letter to President Van Rompuy and President Barroso', 20<sup>th</sup> February 2012:

<http://www.number10.gov.uk/news/joint-letter-to-president-van-rompuy-and-president-barroso/>

The ‘Third Energy Package’ referred to is the ‘Third package for Electricity & Gas markets’, a series of amendments to various EU directives designed to increase the competitiveness of the European electricity and gas markets and originally adopted by the Commission in September 2007. The Commission intended that these measures would “ensure that all European citizens can take advantage of the numerous benefits provided by a truly competitive energy market”. To achieve its objectives the Commission proposed “to separate production and supply from transmission networks, to facilitate cross-border trade in energy, more effective national regulators, to promote cross-border collaboration and investment, greater market transparency on network operation and supply, increased solidarity among the EU countries.”<sup>19</sup>

The UK is unique amongst EU member states in already having fully implemented the package. ‘Ownership unbundling’ has entailed separating energy producers (those who generate electricity) from energy suppliers (those who sell and transmit energy). As yet it is too early to tell whether the process has been successful in its aim of diluting the UK energy industry’s price setting power. But whether it has or not, the benefit will be surely outweighed by the aggregate cost of EU climate change policies as discussed on page 7 above.

Elsewhere in the EU there has been only patchy progress with the ‘Third Energy Package’ reforms. The UK’s entirely justified calls for the Commission to insist on other member states implementing the package have only been partly responded to. Energy is yet another area where the UK’s efforts to achieve EU reform have been less than successful.

## **UK ELECTRICITY GENERATING CAPACITY**

Table C below gives a breakdown of UK electricity generation by energy source in 2011<sup>20</sup>.

**TABLE C**

### **UK electricity generation by source in 2011**

<b>Energy source</b>	<b>Proportion of total UK electricity supply</b>
Gas	40%
Coal	30%
Nuclear	19%
Renewables	9.4%
Other fuels	2.5%
<b>Total</b>	<b>100%</b>

Source: Department of Energy and Climate Change

Note 1: Electricity represents 18.5 per cent of total UK energy consumption.

Note 2: The figures above do not add up to 100 per cent owing to rounding adjustments.

<sup>19</sup> European Commission, ‘Third Package for Energy and Gas Markets’, September 2007: [http://ec.europa.eu/energy/gas\\_electricity/legislation/third\\_legislative\\_package\\_en.htm](http://ec.europa.eu/energy/gas_electricity/legislation/third_legislative_package_en.htm)

<sup>20</sup> Department of Energy and Climate Change – Energy Statistics July 2012 – Chapter 5 Electricity, p121

Over the coming years the UK is planning to continue to reduce its reliance on coal for electricity generation, partly because it has to in compliance with the LCP Directive, as discussed on pages 9-10 above. It also plans to increase the proportion of its electricity generation deriving from nuclear and from renewables. Nevertheless, the UK is being forced to rely increasingly on imported natural gas.

### Renewables Obligation

Given the limited scope for replacing petroleum and gas with renewable energy for transport and heating it would appear that as much as 30 per cent of the UK's electricity generation would have to come from renewables by 2020 in order for the UK to meet its 15 per cent Renewables Obligation, as discussed on page 5. With only 9.4 per cent of the UK's electricity currently coming from renewables this appears an unrealistic target.

### Nuclear Energy

Nuclear power currently generates around 19 per cent of the United Kingdom's electricity (up slightly from 16 per cent in 2010). As of 2012, the United Kingdom operates 17 nuclear reactors at nine plants (seven advanced gas-cooled reactor (AGR) plants, one Magnox plant and one pressurised water reactor)<sup>21</sup>. The Magnox plant and two of the seven AGR plants are currently planned to close by 2016 and nearly all the remaining plants are due to close by 2023, which means the UK will need to replace its existing nuclear capacity almost entirely just to maintain its existing power supply capability. It may be possible to extend the life of the two AGR plants to meet demand until new plants can be built, although this would provide only a temporary solution.

In October 2010, the Government announced plans to build eight new nuclear power plants in the UK, which would start generating power from 2018 onwards. But it remains unclear how these are to be funded given the government's ban on subsidies. At present the future of the UK's nuclear power industry looks extremely uncertain:

- EDF Energy, which is 83 per cent owned by the French government, is planning two new reactors at Hinkley Point, Somerset and two more new reactors at Sizewell, Suffolk in partnership with Centrica. However negotiations continue over the price to be paid for the electricity they generate and no firm construction commitments have yet been made<sup>22</sup>.
- Horizon, a joint venture between the two German utility companies RWE and E.On, was planning two new reactors at Wylfa, Anglesey and two more new reactors at Oldbury, Gloucestershire. But the German companies pulled out following the German government's decision to ditch nuclear power in the wake of the Fukushima disaster in Japan. Two consortiums, led by Hitachi of Japan and by Westinghouse Electric (now owned by Toshiba of Japan), are in contention to take over Horizon. An announcement is expected shortly<sup>22</sup>.
- NuGen, a joint venture between Iberdrola of Spain and GDF Suez, is considering building a reactor at Moorside, near Sellafield in Cumbria but no decision is expected until 2015<sup>22</sup>.
- Chinese groups have been in talks about providing finance for some of these reactors but no agreements have been reached.

Given the uncertainty now hanging over its nuclear power plans the UK Government may now need to consider building more gas power stations. Unlike nuclear power plants, gas power stations can be constructed relatively quickly and cheaply.

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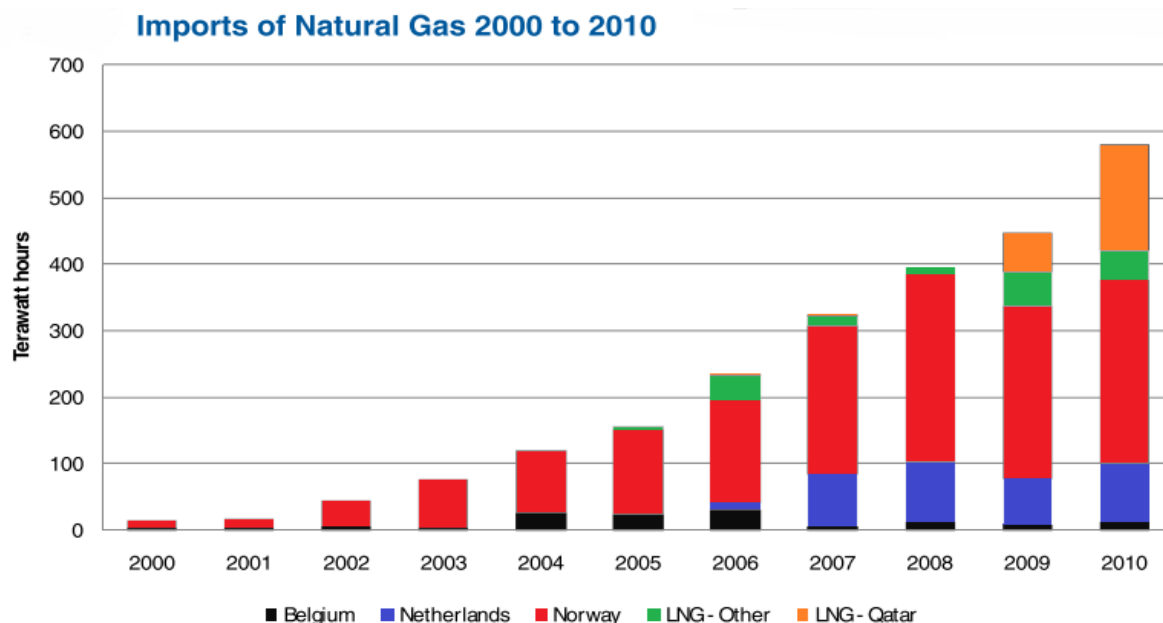
<sup>21</sup> World Nuclear Association, 'Nuclear Power in the United Kingdom', March 2012: <http://www.world-nuclear.org/info/inf84.html>

<sup>22</sup> Financial Times, 3<sup>rd</sup> October 2012

## Natural Gas

Until recently the UK has been able to produce enough gas to meet its domestic needs, without having to import large amounts of gas. However, in recent years production has fallen, and with increasing demand for gas, the UK has had to import gas in growing amounts.

The bar chart below shows UK gas imports from 2000-2010, with imports colour coded by country:<sup>23</sup>



Norway has remained the largest gas supplier to the UK throughout the period, whilst the Netherlands has also become a significant supplier. Norway, which provides some 25 per cent of the UK's total energy requirements, including petroleum, is clearly capable of increasing its gas exports to the UK, subject to price negotiation.

Liquefied Natural Gas (LNG) represents a growing proportion of UK gas imports. The more than 80 per cent of the UK's LNG supplies that come from Qatar has to be shipped through the Straits of Hormuz and could well be vulnerable to political instability in the region, particularly Iran.

## **UK ENERGY BILL 2012**

In May of 2012, the Secretary of State for Energy and Climate Change, Ed Davey announced the publication of a draft Energy Bill. The Bill's main reform is to introduce "capacity payments" a form of subsidy which will drive up consumer energy bills in order to provide energy companies with the money for "green electricity".

The Bill sets out the challenges facing the UK's energy supply: "Over the next decade, around a fifth of existing power plants are due to close, against a background of projected increased energy demand and increasing energy prices. This presents a major investment challenge – with an estimated £110 billion needed for electricity generation and transmission this decade alone. So we need electricity market reforms to incentivise this investment efficiently."<sup>24</sup>

<sup>23</sup> Table taken from Department of Energy and Climate Change, 'Digest of United Kingdom's energy statistics (DUKES): Chapter 4 Gas', p101, 28<sup>th</sup> July 2011: [http://www.decc.gov.uk/en/content/cms/statistics/energy\\_stats/source/gas/gas.aspx](http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/source/gas/gas.aspx)

<sup>24</sup> Department of Energy and Climate Change, [Draft Energy Bill, May 2012, p5](#)

One such reform to the electricity market being pursued by the government is the “carbon floor price”. From 2013, British industry will be charged £16 on every tonne of CO<sub>2</sub> they emit, rising to £30 per tonne by 2020 and £70 a tonne by 2030. The explicit aim of this is to make fossil fuels less profitable, to benefit low carbon technologies.<sup>25</sup> The ETS will count towards some of this; but EU carbon permits have recently fallen dramatically to under £6 per tonne. This leaves a gap of £10 per tonne, making UK business less competitive. Additionally this measure will see electricity bills soar to some of the highest levels in Europe.<sup>26</sup>

The UK Energy Bill also talks about reforming the electricity market to create new subsidies for green electricity; “The three families of low carbon electricity generation - Renewables, Fossil Fuels abated by Carbon Capture and Storage (CCS) and new Nuclear - could all play a role in our future energy mix, even though they each present their own challenges and have their own uncertainties. Yet our existing electricity market makes it more difficult for such low carbon technologies to develop and deploy, because they all have much higher upfront capital costs than unabated fossil fuel competitors like gas. Raising the carbon floor price will help but by itself will be insufficient. We need electricity market reform to reduce the risk and cost of capital for all these low carbon technologies.”<sup>27</sup>

In addition to the capacity payment subsidies, the bill also introduces “contracts for difference”, which will allow companies to sign long term fixed price contracts to supply electricity. This measure is designed to artificially raise the price of electricity in order to make it more attractive for companies to build nuclear energy plants. The Government has claimed this is not intended as a subsidy for the nuclear industry but as a measure which will prioritise all electricity produced by low carbon sources.

The Bill will also introduce an “emission performance standard” which will effectively stop energy companies building new coal fired power stations, as coal is too ‘dirty’ to meet the standard. Only coal stations with carbon capture technology will be allowed, although such technology is still in its infancy.

## **FRACKING**

One possible solution to the UK’s energy problems lies in “hydraulic fracturing” technology, commonly known as “fracking”. This involves injecting large quantities of a fluid into shale gas formations, allowing natural gas to be extracted from the ground.<sup>28</sup>

Fracking has radically altered the energy market in the USA. Just a few years ago, the USA was expected to be a large importer of natural gas, but it is now expected to be a net exporter as early as 2015. Between 2005 and 2010 the US shale-gas industry grew by 45 per cent a year. As a proportion of overall US gas production, shale gas has increased from 4 per cent in 2005 to over 24 per cent in 2012.

In consequence, US gas prices dipped below US\$ 2 per million British thermal units (mBtu) at one point, less than a sixth of the price before shale gas became widely available.<sup>29</sup> However, Royal Dutch Shell expect US gas prices to more than double from this low point in line with rising demand, reaching US\$ 4-6 per mBtu by 2015.<sup>30</sup>

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<sup>25</sup> [http://www.hm-treasury.gov.uk/consult\\_carbon\\_price\\_support.htm](http://www.hm-treasury.gov.uk/consult_carbon_price_support.htm)

<sup>26</sup> <http://www.telegraph.co.uk/comment/9575598/George-Osbornes-CO2-tax-will-double-UK-electricity-bills.html>

<sup>27</sup> Department of Energy and Climate Change, [Draft Energy Bill, May 2012, p5](#)

<sup>28</sup> <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/795/79505.htm#a2>

<sup>29</sup> <http://www.economist.com/node/21556242>

<sup>30</sup> <http://www.ft.com/cms/s/0/e34957ac-9f65-11e1-a255-00144feabdc0.html#axzz27UuyjDXK>



Nevertheless, US gas prices will still be well below expected levels in the rest of the world where gas prices have spiralled since the 2009 recession. In the UK they doubled to US\$ 9.90 per mBtu by October 2011 whilst in Japan they more than trebled to US\$ 17.50 per mBtu over the same period. Prior to the recession gas prices had been broadly the same all round the world in the US\$ 4-5 per mBtu range.

This raises the question of whether fracking could relieve the UK of its fast growing dependence on gas imports. The U.S Energy Information Administration (EIA) published a report in April 2011, which estimated that the UK had 560 bcm (billion cubic metres) of technically recoverable shale gas resources, equivalent to 5.6 years' of the UK's current gas consumption or 56 years' worth of LNG imports.<sup>31</sup> Furthermore, there may be potential to extract shale gas from the North Sea and other offshore sites. According to the British Geological Survey, offshore reserves are likely to be five times whatever lies onshore.<sup>32</sup> The Energy and Climate Change Committee report from May 2011 concludes that while offshore fracking might not be economically viable at present, this could change quickly as technology develops and prices shift.<sup>33</sup>

However, there are environmental concerns regarding the use of fracking. One study found that test drilling in Lancashire last year was “probably” responsible for minor earthquakes (of magnitudes 2.3 and 1.4 on the Richter scale) in the region, causing the energy company Cuadrilla to suspend its fracking test operations.<sup>34</sup> Another common complaint is that fracking may contaminate the local water supply. But on this issue a report by The Energy and Climate Change Committee in 2011 concluded that the risks of contamination through well failure in fracking were “no different than those encountered when exploiting oil and gas from conventional reservoirs”.<sup>35</sup> This suggests that proper regulation could prevent water contamination from becoming a major issue.

Environmental groups also point out that natural gas is a fossil fuel and therefore burning it will contribute to climate change. But natural gas produces about half as much carbon dioxide during combustion as coal. So the effect of the UK switching from coal as an energy source to natural gas derived from fracking would be to reduce its carbon emissions. Furthermore, unlike coal, natural gas produces almost no air pollutants and no solid waste.<sup>36</sup>

Overall there appears a strong case for maximising the use of fracking as a new domestic energy source for the UK. Most environmental concerns should be possible to address satisfactorily through appropriate regulation. As yet it is impossible to estimate the potential for fracking as a new source of natural gas in the UK. On balance, however, it should probably not be regarded as a miracle cure for the UK's energy problems.

Ultimately, the greatest significance of fracking technology for the UK's energy needs may lie in the prospect of being able to import large quantities of liquefied natural gas (LNG) derived from shale gas extracted in the USA and other countries such as Australia and Canada. However the UK would have to compete with the high prices that Asian countries such as Japan may be willing to pay for LNG derived from fracking, which may affect its economic viability for the UK.

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<sup>31</sup> <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/795/79502.htm>

<sup>32</sup> <http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/9209946/UK-could-become-one-of-worlds-biggest-shale-gas-producers.html>

<sup>33</sup> <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/795/79506.htm#a9>

<sup>34</sup> <http://www.bbc.co.uk/news/uk-14432401>

<sup>35</sup> <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/795/79508.htm#a20>

<sup>36</sup> [http://www.manhattan-institute.org/html/eper\\_08.htm](http://www.manhattan-institute.org/html/eper_08.htm)

## **STERN REVIEW AND ALTERNATIVE APPROACHES**

According to the UK Government's Stern Review of the "Economics of Climate Change" in 2006, the adverse effects of climate change could result in a permanent 5 per cent reduction in world GDP, or even as much as a 20 per cent reduction in the worst case scenario. To address this problem the Stern Report advocated sacrificing one per cent of world GDP now, arguing that the costs of inaction now would impose much greater costs later. It is upon this type of conventional wisdom that UK and EU energy and climate change policy is based.

Some have argued that this approach is economically inadequate and damaging. Perhaps the most notable is Nigel Lawson, former Chancellor of the Exchequer, who sets out an alternative approach in his book, "An Appeal to Reason."<sup>37</sup> He argues that the heavy current costs of EU/UK policy measures to combat climate change are economically impractical and their cost cannot be justified, given the inconclusive nature of the evidence for man-made global warming. He contends that it would be much better to defer such measures until the evidence becomes clearer, if indeed it ever does.

Tim Worstall, another critic, reaches similar conclusions to Lawson in his book "Chasing Rainbows: Economic Myths, Environmental Facts"<sup>38</sup> despite accepting the Stern Review's conclusions and offering a less sceptical approach to the science underlying climate change.

Peter Lilley MP, a former Secretary of State for Trade and for Industry and Social Security, has just published a trenchant new critique of the Stern Review "What is wrong with Stern?"<sup>39</sup> for The Global Warming Policy Foundation, which was established by Nigel Lawson in 2009. In Lilley's view the Stern Review's conclusions were "way outside the consensus of economic studies it supposedly reviewed." He is critical of many aspects of its approach and methodology, including the extraordinarily low 1.4 per cent per annum discount rate it uses. He comments that the Stern Review depends critically on "selective choice of facts, unusual economic assumptions and a propagandist narrative – which would never have passed peer review". Yet, as Lilley comments, the government continues to rely on the Stern Review to justify its policies to combat global warming. He calls for the government to cease basing its climate change policy on the flawed Stern Review and to commission a new independent cost benefit study of alternative strategies.

## **POLICY OPTIONS FOR THE UK INSIDE AND OUTSIDE THE EU**

From this paper is clear that that the UK faces a potentially serious energy crisis. The government's future policy options for addressing it are subject to three main sources of constraint:

- EU legislation over which it now has no control
- The Coalition Agreement
- The "green agenda" which is now so deeply engrained in Whitehall and Westminster

Policy options should now be examined first on the basis of the government's freedom of action as a continuing member of the EU and second on the basis of its freedom of action if the UK left the EU. None of those set out below would be consistent with all three of the above constraints. But all would merit consideration on a "clean sheet of paper" basis. And they will do so increasingly in the face of the power cuts and rising energy prices that many now fear are the inevitable consequence of current government policies.

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<sup>37</sup> Nigel Lawson, 'An appeal to reason: A cool look at Global Warming', 2008

<sup>38</sup> Tim Worstall, 'Chasing Rainbows: Economic Myths, Environmental Facts', 2010

<sup>39</sup> <http://www.thegwpf.org/peter-lilley-costly-decarbonisation-of-the-economy-is-based-on-flawed-stern-review/>



## **Policy options within EU**

### ***Without breaking EU treaty obligations***

*Already being pursued or likely to be under consideration*

- Be prepared to implement plans to extend life of the two AGR nuclear plants currently planned for closure in 2016
- Find new contractors for the two new nuclear plants which RWE and E.ON ON will no longer be constructing
- Plan construction of new gas-fired power plants as necessary
- Exploit maximum potential for extracting natural gas from shale by fracking in UK
- Negotiate contracts to enable the UK to benefit at favourable prices from growing availability of LNG derived from fracking in USA and rest of world
- Campaign much more effectively to get other EU member states to fully implement the EU's Third Energy Package.

*Not publicly under consideration*

- Commission independent cost benefit analysis of alternative strategies to address climate change, as called for by Peter Lilley, in expectation that this would stimulate new thinking in Whitehall, Westminster and the media
- Prepare plan to "mothball" the Kingsnorth coal-fired power plant scheduled to close in March 2013 and the eight other coal-fired plants planned for closure in 2015, compensating the operators as appropriate
- Publicly announce that UK will refuse to make any further EU energy target commitments after current 20-20-20 targets expire
- Repeal Climate Change Act 2008

### ***By special agreement with EU or otherwise in open breach of EU treaty obligations***

- Cancel plans to close Kingsnorth coal-fired plant in 2013 and eight other coal-fired plants in 2015 and renounce the LCP Directive
- Abandon the unrealistic EU 15 per cent Renewables Obligation commitment
- Withdraw from EU Emissions Trading Scheme

*Note:* An independent cost benefit analysis along the lines recommended by Peter Lilley could well give the UK justification for taking such measures.

## **Policy options outside EU**

If the UK ceased to be a full EU member it would of course no longer be in the position of having to defy the EU if it wished to pursue any of the above policy options which would now put it in breach of its EU treaty obligations.