

October 2011



Friends of  
the Earth

# Report

# The Dirty Half Dozen

## Contents

<a href="#">Introduction</a>	Page 2
<a href="#">Section 1: The electricity market in the UK</a>	Page 2
<a href="#">Section 2: Who are the Big Six?</a>	Page 3
<a href="#">Section 3: Where do the Big Six source their energy from?</a>	Page 4
<a href="#">Section 4: The UK's dash for gas</a>	Page 5
<a href="#">Section 5: How much does our energy cost us?</a>	Page 7
<a href="#">Section 6: How much profit do the Big Six make?</a>	Page 9
<a href="#">Section 7: What do the Big Six energy companies do with these profits?</a>	Page 11
<a href="#">7.1: Dividends to shareholders</a>	Page 11
<a href="#">7.2: Executive pay</a>	Page 13
<a href="#">7.3: Investing in new plant and R&amp;D</a>	Page 14
<a href="#">Section 8: Lobbying Government</a>	Page 17
<a href="#">Conclusion</a>	Page 18
<a href="#">Appendix: How much will coal and gas for electricity be costing us in 2020?</a>	Page 19
<a href="#">References</a>	Page 24

## Introduction

With spiralling energy bills leaving an estimated quarter of UK households in fuel poverty – unable to afford to heat their homes properly – more and more questions are being asked about our energy system and the companies we rely on to heat our homes and keep our lights on.

Six big companies supply 99% of our households' energy<sup>1</sup> and own more than two thirds of our power stations. They are E.ON, EDF, Scottish Power, Centrica (who own British Gas), RWE npower and SSE.

Collectively the Big Six are heavily dependent on fossil fuels. Coal and gas are used to produce 73% of our household electricity, and gas for heating 80% of our homes, leaving us vulnerable when wholesale fossil fuel prices rise, as they have done in recent years. The price power producers pay for gas has gone up 90% in real terms in the last ten years<sup>2</sup>.

Consumers are paying a massive price for this dependency through spiralling energy bills. This is a taste of things to come. The cost of gas is set to continue rising, not to mention the hefty cost attached to dealing with accelerating climate change.

But the current situation suits the Big Six very nicely. It doesn't affect their bottom line if fossil fuel prices rise – they can pass the costs on to consumers. While consumer bills spiral, they can still make huge profits and their dividends to shareholders and executives' pay continue to rise.

Meanwhile the cost of renewable energy is predicted to fall rapidly.<sup>3</sup> Cutting the energy we waste in our homes through better insulation saves money. Getting out of fossil fuels and wasting less energy offers us the best hope of putting an end to nightmare price hikes in the long run.

There are clear ways to mend our broken energy system, but they are being blocked:

- The Big Six are not investing enough in clean, safe energy. The Government's uncertain energy policy means that overall they are still largely sticking with what they know – building more fossil fuel power stations, keeping us all firmly on the fossil-fuel hook.
- The electricity and gas markets are set up in ways which make it very hard for new companies to come in and offer consumers an alternative<sup>4</sup>. Change is glacially slow.
- Pricing structures are opaque and complex, making it very difficult for even the regulators to understand what is going on.

The Government is currently reviewing huge swathes of energy policy – the Comprehensive Review of the Feed-in Tariff, the Renewables Obligation banding review and Electricity Market Reform. The Big Six are lobbying Government hard to keep the energy system largely as it is. If they succeed, British households will continue to pay a steep price.

Energy market regulator Ofgem is currently conducting a review of specific aspects of the dysfunctional energy market, but what is needed is a root-and-branch inquiry into the energy market and the actions and dominance of the Big Six, with the goals of getting Britain off its fossil fuel addiction and giving affordable electricity and gas to all households.

The Big Six dominate both the electricity and the gas markets – this report looks at the Big Six's dominance in the electricity market, and provides evidence for the points summarised above.

## Section 1: The electricity market in the UK

In the UK the electricity market is split into:

- the **wholesale market**, where electricity is bought and sold by generators, suppliers and large customers;

- the **retail market** (where suppliers provide energy to customers and bill them).

The generators produce the power we use, and the suppliers buy power from the generators and sell it on to the consumers. The Big Six energy companies are what are known as “vertically integrated companies”: by operating in both wholesale and retail markets they both generate power and sell it on to customers.<sup>5</sup>

Each of the ‘Big Six’ energy companies is essentially a group of companies, with interests in both generation and supply. For example, Centrica comprises Centrica Energy (which focuses on generation) and British Gas (which supplies energy to customers). The Big Six supply businesses (such as British Gas) buy power from the generator companies within their group (such as Centrica Energy) as well as from other generators on the wholesale markets. There are often significant numbers of companies and subsidiaries within each group – for example, EDF Energy has 37 subsidiaries in the UK alone, while RWE has 998 across Europe.<sup>6</sup>

When referring to the Big Six in this report, we are referring to the supply and generation businesses collectively.

## **Section 2: Who are the Big Six?**

The Big Six companies are:

	<b>% share of Great Britain electricity MWh generation</b>	<b>% share of electricity supply to Great Britain retail market</b>
<b>Électricité de France (EDF energy)</b>	20	20
<b>SSE</b>	14	18
<b>RWE (RWE npower)</b>	12	16
<b>Centrica (British Gas)</b>	10	15
<b>E.ON (E.ON UK)</b>	9	16
<b>Iberdrola (Scottish Power)</b>	8	8
<b>Big Six total</b>	<b>72</b>	<b>93</b>

Source: [www.newpowerconsulting.com](http://www.newpowerconsulting.com), August 2011, 2010/2011 data (subsidiary companies in brackets)

### **COMPANY SNAPSHOTS:**

- **Centrica (which owns British Gas)**

British Gas is Centrica’s retail company in the UK (Scottish Gas in Scotland) and supplies electricity and gas to nearly 16 million customers in the UK.<sup>7</sup> On the production side, Centrica operates eight combined-cycle gas-fired power stations in the UK with a combined output of 4,200 MW<sup>8</sup>, and in 2009 bought a 20% stake in nuclear power generator British Energy from EDF.<sup>9</sup> Centrica also has a subsidiary company Direct Energy operating in North America.<sup>10</sup>

- **Électricité de France /EDF Energy**

EDF Energy is the UK subsidiary of France’s state-owned EDF SA and was formed in 2002. It has 5.5 million customers<sup>11</sup> and in 2009 took over British Energy, the UK’s nuclear generator. EDF owns two 2,000 MW coal-fired power stations, as well as two gas-fired stations. EDF now owns the UK’s seven nuclear power stations, which have 9,000 MW capacity. EDF is also a chief sponsor of the London 2012 Olympics. EDF maintain that nuclear energy is green, a claim with which Friends of the Earth disagrees.

- **E.ON UK**

The German company E.ON took over Powergen (the smaller of the two successor companies to the old state-owned Central Electricity Generating Board – CEGB) in 2002, to form a UK subsidiary now known as E.ON UK. They have more than 6 million customers in the UK.<sup>12</sup> The bulk of the electricity that the company generates comes from five

major gas-fired power stations and three coal-fired power stations. Renewable energy makes up a very small proportion of the energy E.ON generates in the UK, with 15 onshore wind farms producing 126 MW of electricity, and two offshore windfarms producing 64 MW. E.ON UK has also formed a joint venture with RWE npower called Horizon Nuclear Power with the aim of putting in place 6,000 MW of new nuclear power in the UK in the next 15 years at a cost of £15bn.<sup>13</sup>

- **RWE npower**

Originally formed as National Power in 1989 as the larger of two successor companies to the old state owned CEGB, National Power rebranded as Innogy, acquiring a number of regional supply companies in the process, who were called npower. In 2002, Innogy was bought by German utility company RWE and is now officially known as RWE npower. The company has 6.5 million gas and electricity customers. The company operates three coal-fired power stations, five gas-fired power stations and three oil-fired power stations in the UK with an overall capacity of over 11,000 MW.<sup>14</sup> RWE npower renewables, UK subsidiary of RWE Innogy, in turn a subsidiary of RWE, has 270 MW of renewable generation capacity in the UK. RWE npower has also teamed up with E.ON UK to create the Horizon Nuclear Power joint venture.

- **Iberdrola/Scottish Power**

In 2006, Scottish Power was taken over by Spanish energy firm Iberdrola. The company currently has 5.3 million customers in the UK<sup>15</sup> and owns and operates two coal-fired power stations in Scotland and three gas-fired power stations in England, as well as a number of hydro-electric sites in Scotland.<sup>16</sup> With SSE having pulled out of the NuGeneration consortium to build new nuclear power stations in the UK (see above), Iberdrola have increased their stake in the venture.<sup>17</sup> Sister company Scottish Power Renewables operates 20 onshore windfarms in the UK and Ireland.<sup>18</sup>

- **SSE**

Scottish and Southern Energy (or SSE) was formed in 1998 following the merger of Scottish Hydro-Electric and Southern Electric. They supply more than 10 million customers in the UK and Ireland.<sup>19</sup> Of the Big Six companies, SSE is comfortably the largest generator of renewables in the UK, with 2 GW of renewable energy capacity (a mixture of pre-privatisation hydro-electric and newer wind power). The company also owns 8 GW of fossil fuel power stations. In 2001, the company acquired the gas exploration assets of Hess Corporation in three areas of the UK's continental shelf – Everest/Lomond, Easington and Bacton. In 2009, SSE also formed a consortium with GDF Suez and Iberdrola called NuGeneration Ltd with plans to develop new nuclear power stations in the UK, but SSE has recently withdrawn from this consortium stating that they wished to focus on other areas.<sup>20</sup> As this report went to press in October 2011, SSE announced plans to sell all of their electricity on the open market – a welcome step in the right direction to as part of a 10-point plan to improve transparency in the market.

### **Section 3: Where do the Big Six source their energy from?**

In the UK, just 7.9% of our electricity comes from renewable sources. The majority of our electricity is now produced using gas-powered turbines (44%) or in coal-fired power stations (29%). Nuclear accounts for 17%.<sup>21</sup>

With the exception of EDF, a high proportion of gas is a common theme among the Big Six energy companies. The table and graph below show the relative percentages of sources used to supply electricity by the different companies (NB: These figures indicate where the supply side of each company sourced its electricity, rather than the exact portfolio of their sister generation companies. As 'vertically integrated' companies, they have the option to 'self-supply' to a large degree, so one would expect the figures to broadly reflect the relevant generation portfolio):

%	Coal	Gas	Nuclear	Renewables	Other	gCO <sub>2</sub> /kwh
British Gas <sup>22</sup>	11	57	23	8	1	338
EDF Energy <sup>23</sup>	28	6	62	4	1	280
E.ON UK <sup>24</sup>	34	47	5	10	4	543
RWE npower <sup>25</sup>	28	60	1	9	2	509
Iberdrola/Scottish Power <sup>26</sup>	49	43	0	8	0	535
SSE <sup>27</sup>	29	59	1	10	1	505
UK overall <sup>28</sup>	29	44	17	8	2	413

The final column is a measure of how much carbon is produced for each unit of energy supplied by each of the companies. Generally speaking the more coal and gas used to produce the electricity, the higher the figure. Nuclear is much lower, but has separate and well-documented problems over the storage and disposal of the waste produced. The Committee on Climate Change, independent advisors to the Government, has said the UK's electricity production needs to have decreased in its carbon-intensity to 50 gCO<sub>2</sub>/kWh (grammes of carbon dioxide per kilowatt hour of electricity produced) by 2030, and that this action is part of an "absolute minimum" compatible with the UK's climate change goals.

	Coal	Gas	Nuclear	Renewables
Électricité de France/EDF energy	4.1	0.8	7.0	0.1
SSE	6.7	0.7	0	2
RWE npower	7.5	4.2	0	0.3
Centrica/British Gas	0	4.3	1.8	0.2
E.ON	6.4	4.6	0	0.5
Iberdrola/Scottish Power	3.5	1.9	0	1.5

(source, UK Digest of Energy Statistics, 2011 table 5.11)

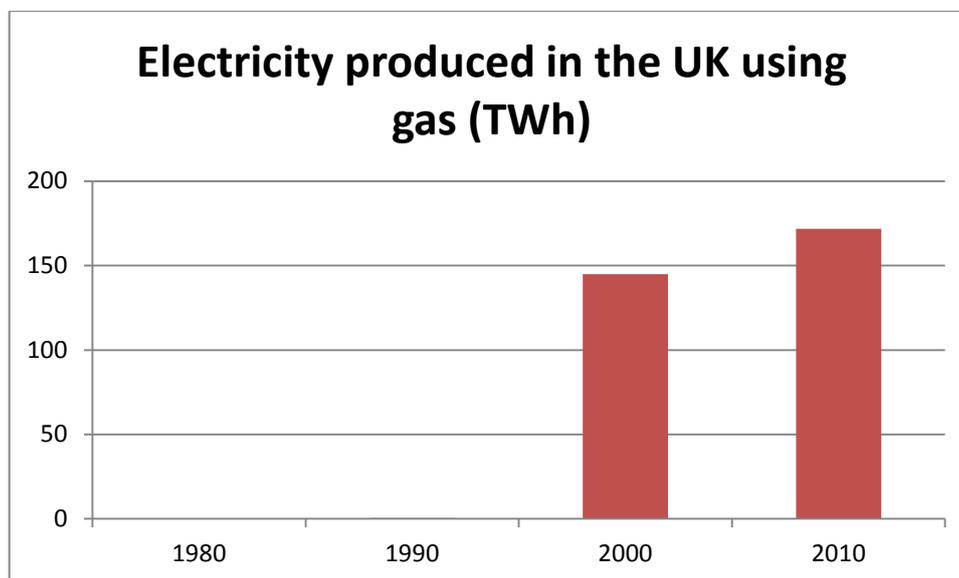
Overall, only 8% of the Big Six's capacity is renewable, compared with 18% for the non-Big Six companies. Within the Big Six, four of the companies have a truly terrible renewables record at present (see table below). Iberdrola/Scottish Power (22%) and SSE (21%) are higher – SSE thanks to a legacy of older hydropower stations, Iberdrola due to a newer fleet of mainly onshore windfarms.

	% of installed capacity that's renewable
Iberdrola/Scottish Power	22
SSE	21
E.ON UK	4
Centrica	3.5
RWE npower	2
Électricité de France/EDF energy	1

(source, UK Digest of Energy Statistics, 2011 table 5.11)

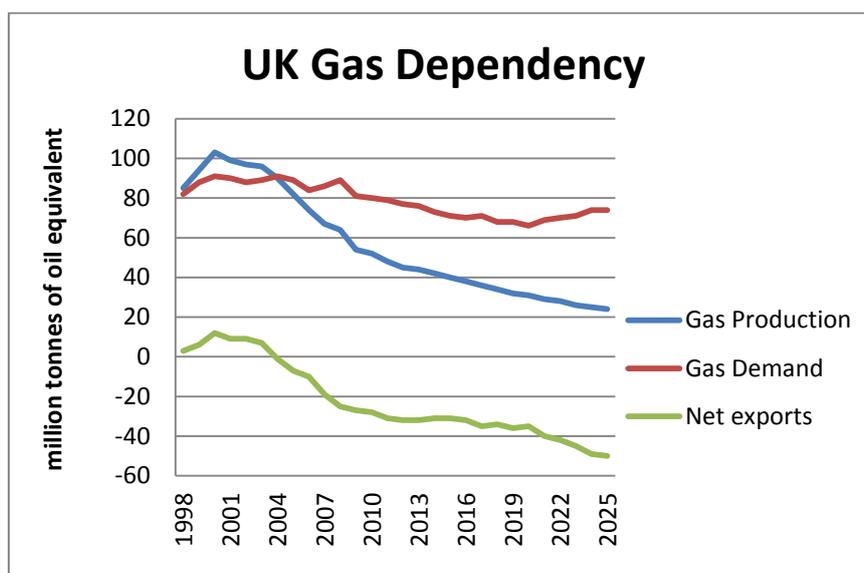
## Section 4: The UK's dash for gas

In the 1980s, the UK used virtually no gas to produce electricity, but the discovery of North Sea gas reserves and then the last Conservative Government's removal of the ban on burning gas in power stations in 1988 led to the so-called "dash for gas" in the 1990s. By the year 2000, companies had built large numbers of gas-fired stations to take advantage of cheap gas. Gas-fired electricity now accounts for more than 40% of total electricity produced.<sup>29</sup>



But the UK is now faced with two major problems with this heavy reliance on gas. First, prices have spiralled as global demand has increased. Second, the UK is running out of gas. In 2000, we were net exporters of gas, now we are importing 35% of the gas we need. The Government estimates that by 2025 we will be importing 65% of our gas.

The graph below shows the striking level to which we have become dependent on imported gas over the past decade, thanks to our increased use of gas-fired power stations to produce electricity in the context of dwindling domestic production of natural gas:<sup>30</sup>



Source: [https://www.og.decc.gov.uk/information/bb\\_updates/chapters/production\\_projections.pdf](https://www.og.decc.gov.uk/information/bb_updates/chapters/production_projections.pdf)

The UK's imports of all gas cost around \$8bn in 2009; this will grow to \$25bn by 2026, if we take International Energy Agency projections for future gas prices. The impact of relying on gas for electricity bills is examined in Section 5 below.

In addition, it's likely that these prices will continue to rise given projected increases in global demand and major uncertainties around supply. DECC is currently revising its projections, due out end October 2011. Their 2009 figures said that 2010 oil prices would be \$73 a barrel ('central' prices), \$89 a barrel ('high' prices), or \$113 a barrel ('high-high' prices) – in fact, as of October 2011 the price was \$104. This is somewhere between the 'high' and 'high-high' scenarios, which put 2020 prices at \$123 to \$153 a barrel. Future gas prices are even more uncertain, but future projections for gas out to 2015 and 2020 both show increases over today's prices.

## Section 5: How much does our energy cost us?

Our reliance on coal and gas has already cost us dear – and it’s likely that if we stay dependent on them we will be even more out of pocket.

From 2000 to 2010, and after adjusting for inflation<sup>31</sup>:

- Average electricity bills increased in real terms by **30%**
- Average gas bills increased in real terms by **78%** - peaking at 91% above 2000 levels in the year 2009

This has been overwhelmingly driven by one factor alone: the rising costs of fossil fuels. From 2000 to 2010, and again after adjusting for inflation:

- The price paid by power producers for coal increased in real terms by **71%**
- The price paid by power producers for natural gas increased in real terms by **90%** - peaking at 123% above 2000 prices in the year 2008

**Table: Breakdown of price increases in real terms (2005 prices)**

Source: DECC Energy Price Statistics 2011

	Average Electricity Bill	Average Gas Bill	Price paid for coal by power producers (p/KwH)	Price paid for gas by power producers (p/KwH)
2000	£292	£335	0.46	0.68
2001	£278	£326	0.49	0.74
2002	£268	£334	0.44	0.66
2003	£262	£335	0.41	0.71
2004	£262	£339	0.46	0.78
2005	£285	£386	0.50	1.02
2006	£328	£460	0.51	1.25
2007	£356	£505	0.53	1.16
2008	£398	£572	0.85	1.50
2009	£404	£639	0.71	1.27
2010	£381	£597	0.79	1.28
<b>% increase</b>	<b>+30%</b>	<b>+78%</b>	<b>+71%</b>	<b>+90%</b>

These bills are rising again. In Summer 2011, the Big Six increased their prices heavily, driven by rises of 20-30% in the price of the coal and gas that is used to generate the electricity in most of our power stations. Ben Moxham, the Prime Minister’s special adviser on climate and energy policy, said in a leaked memo in September 2011: “recent wholesale gas price increases [are] a significant factor behind the household energy price hikes announced in recent weeks... both wholesale gas and electricity costs are largely driven by gas prices set in international markets (since gas-fired generation determines wholesale electricity prices most of the time).”<sup>32</sup>

Table: 2011 price rises		
	Gas	Electricity
Scottish Power <sup>33</sup>	19%	10%
British Gas <sup>34</sup>	18%	16%
EDF <sup>35</sup>	15.4%	4.5%
SSE <sup>36</sup>	18%	11%
E.ON <sup>37</sup>	18.1%	11.4%
Npower <sup>38</sup>	15.7%	7.2%

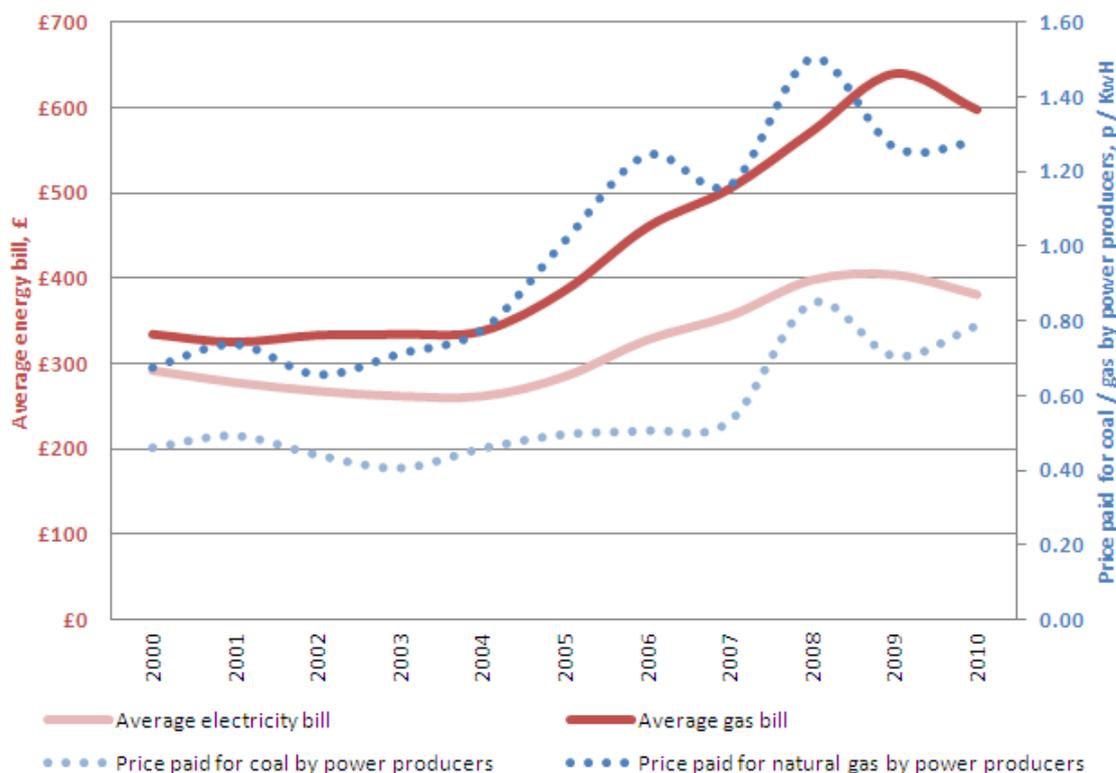
Overall, it's quite clear that these price rises are due to the rising cost of fossil fuels, which provide most of our electricity.

In addition, the Big Six fossil fuel-related energy bill price rises in 2011 alone are more than the cost of all the Government's energy and climate change policies on bills.

**Table: Comparing the recent additional impact of price rises on bills with the total effects of energy and climate change policies:**

	Effect on gas and electricity bills
Scottish Power's price rises	+£151
British Gas's price rises	+£168
EDF Energy's price rises	+£109
SSE's price rises	+£149
E.ON UK's price rises	+£151
RWE npower's price rises	+£121
Total effect of all energy and climate change policy in 2010 <sup>39</sup>	+£42

**Graph: Energy bills and fossil fuel prices, 2000-2010:**



These price rises will be very significant for most households, but particularly serious for those on low incomes or in poorly insulated homes. Working in collaboration with the Centre for Sustainable Energy, Consumer Focus have estimated that these price rises will push an additional 1.3 million households (2.8 million people) into fuel poverty (where 10% or more of a household's net income has to be spent to heat the home to an adequate standard). This means that a total of nearly 12 million people are now estimated to be living in fuel poverty in England, Wales and Scotland.<sup>40</sup>

However, the Big Six energy companies have been spending very small amounts of money, compared to their profits, on supporting vulnerable customers:

- In written evidence to the House of Commons Energy and Climate Change Select Committee on fuel poverty **E.ON** stated that they spent £20.1m on social assistance in the year 2008-2009.<sup>41</sup>
- In a similar memorandum from May 2009, **EDF** stated they were providing “£40 million between 2008 and 2011 on social initiatives to support customers in or at risk of fuel poverty.”<sup>42</sup>
- **RWE npower** offered £18m of such support in 2009.<sup>43</sup>
- In their memorandum submitted as written evidence to the House of Commons Energy and Climate Change Select Committee in 2011 on the Retail Market Review, **SSE** stated that they spent £27m helping vulnerable customers in 2010-2011 and will increase this to £45m in 2011-2012.<sup>44</sup>
- **British Gas** spent £58m on social programmes in 2010.<sup>45</sup>
- No figures for **Scottish Power** were available, though they did state in written evidence to the House of Commons Energy and Climate Change Committee that “Scottish Power has significantly increased its spending on social programmes in recent years.”<sup>46</sup>

Overall, total social assistance in the last three years has been:

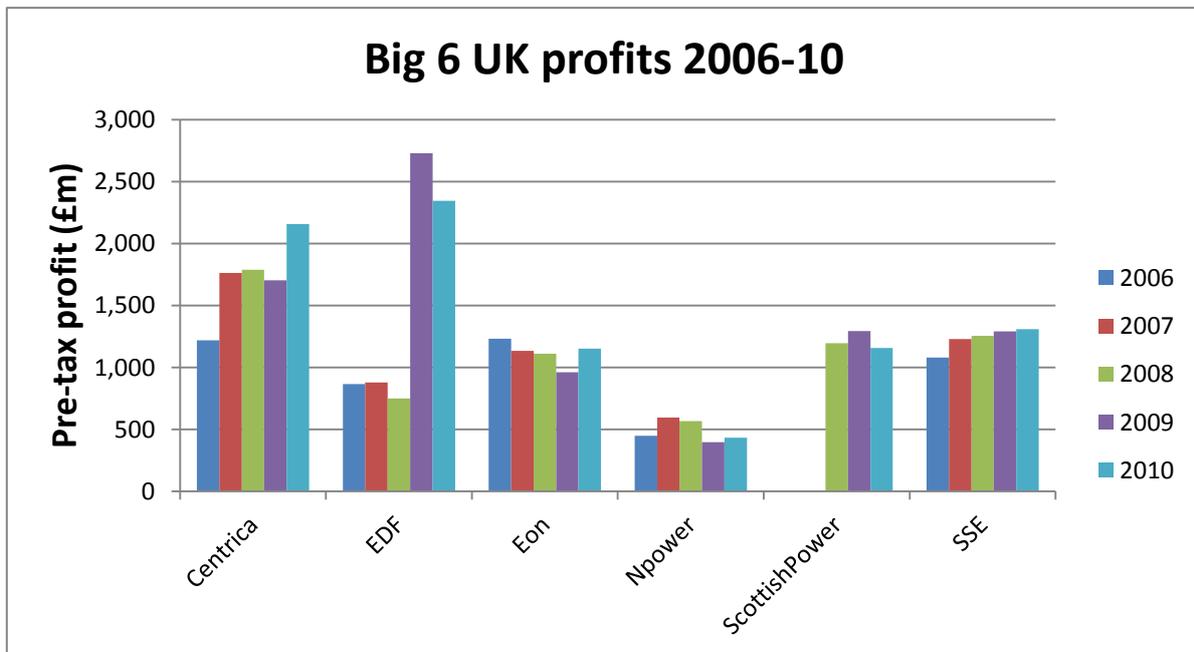
2008-2009	£157m
2009-2010	£125m
2010-2011	£150m <sup>47</sup>

On the other hand, the Big Six’s much higher rates for people on pre-payment meters more than counters these sums. People on pre-payment meters still pay on average more than £80 more than people on direct debit – in total over £280m more – much more than the “social assistance” sums the Big Six are paying out.<sup>48</sup>

Our continuing dependence on and vulnerability to global fossil fuel prices is costing us dearly.

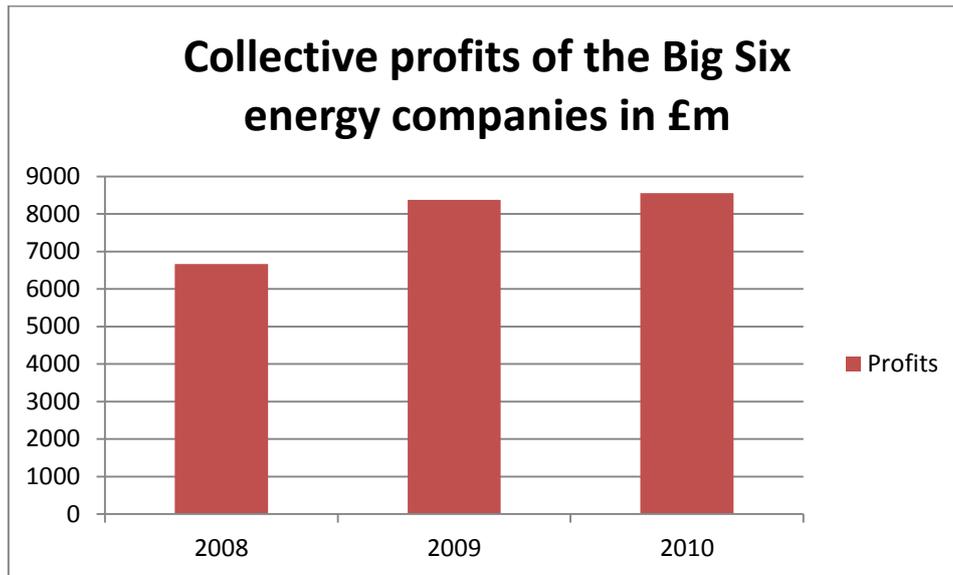
## Section 6: How much profit do the Big Six make?

The profits<sup>49</sup> of the Big Six in total have increased steadily over the past few years, with combined pre-tax profits of £6.6bn in 2008, £8.35bn in 2009 and £8.55bn in 2010. 2010 profits are almost a third higher than in 2008.<sup>50</sup>



(Source: Consumer Focus<sup>51</sup>)

The graph below shows the collective UK profits of the Big Six over the past three years (nominal figures, not adjusted for inflation):



This increase in profits has been particularly controversial due to the price rises imposed by the energy companies on consumers. Some of the headline figures are<sup>52</sup>:

- **Centrica's** (British Gas's parent company) UK profits rose by 57% between 2006 and 2010 (from £1.2bn to £2.2bn) after allowing for inflation.
- **EDF's** UK profits rose by 140% between 2006 and 2010 (from £865m to £2.34bn), after factoring in inflation.
- **SSE's** profits rose by 8% between 2006 and 2010 after adjusting for inflation (from £1.079bn to £1.3bn).
- **Npower, E.On and Scottish Power's** profits have been largely stable, at £2-3bn a year combined.

The means by which the Big Six make these profits is complex, and hidden by the extremely opaque vertically-integrated structures of their operations.

Ben Moxham, advisor to David Cameron on climate and energy, recently observed in a leaked memo that: "Looking specifically at suppliers' retail operations, profit margins have averaged 12% for sales of electricity and 6% for sales of gas over recent years. [...] However [...] it's possible that higher margins are hidden through transfer pricing, for example opaque contracts between suppliers' generation and retail arms. E.ON, RWE and EDF reported negative margins in their domestic supply business in 2009 but they did not make a loss across the whole value chain. Ofgem's accountants are investigating."<sup>53</sup>

In their ongoing investigation of the energy market, the Retail Market Review (RMR), Ofgem has found for the first time that: "There is evidence that the big six suppliers have adjusted prices in response to rising costs more quickly than they reduced them when costs fell."<sup>54</sup> They found specifically that if the early price rises of last winter of five of the Big Six had been held off until March, consumers would have been £250m better off.<sup>55</sup> Ofgem's March 2011 conclusions as part of the RMR found that competition in the energy retail market was "being stifled by a combination of tariff complexity, poor supplier behaviour, lack of transparency and the degree of influence the Big Six energy suppliers [...] have on the energy market."<sup>56</sup>

As a result of these concerns, in August 2011 Ofgem announced that it was bringing in a team of forensic accountants to investigate whether the Big Six had announced that their profits from selling electricity and gas were lower than they really were in order to justify charging customers higher prices. A report is expected in December 2011. The investigation will also look at the wholesale prices paid by the companies as well as tactics they use to "hedge" – buying and selling gas supply contracts at different prices.<sup>57</sup>

Ofgem has also proposed forcing the Big Six to auction off 20% of the power they generate to increase openness, transparency and liquidity in the wholesale market, and to help new supply businesses to enter the market.

Depending on the final findings of the Review, Ofgem has also indicated it may call for a Competition Commission Inquiry.<sup>58</sup>

The Big Six claim that the high prices consumers face are not due to their profiteering, but due to factors beyond their control, such as fossil fuel prices, which they have to pass on. Ofgem have suggested that there is clearly a gas wholesale driver, but that *on top* of this, the Big Six are not adjusting prices as they should. In November 2010 they published evidence that the margin on a dual fuel bill rose by 38% in two months, saying: “This acted as another indicator that we should review the market.”<sup>59</sup>

Overall, the Big Six are making very large profits, profits which overall have increased substantially over recent years. These profits are a sign of a broken system. It’s one thing to increase profits, dividends and executive pay from providing a good service, but it’s another to do the same while millions of people shiver in their homes.

## **Section 7: What do the Big Six energy companies do with these profits?**

### **7.1: Dividends to shareholders**

All the Big Six pay significant amounts of money every year back to their shareholders as dividends. This is of course standard corporate practice – the question is whether the dividend payments are excessive.

The value of these dividend payments per share for most of the Big Six has increased sharply over the past decade. For example:

- E.ON’s dividend payments (E.ON UK’s parent company) have increased by 154% since 2000, allowing for inflation, from €0.45 to €1.50.<sup>60</sup>
- RWE (parent company of RWE npower) has increased its dividend payments since 2005 by 72%, allowing for inflation (from €1.75 to €3.50).<sup>61</sup>
- SSE has almost trebled its dividend payments since 1999, as they’ve increased by 117%, allowing for inflation from 25.7p to 75p.<sup>62</sup>
- Centrica (British Gas’s parent company) has increased dividends an incredible 323% since 1999, allowing for inflation (from 2.5p to 14.3p).<sup>63</sup>

And just this year, Centrica approved a 12% increase in dividend payments at the same time as British Gas customers’ bills went up by at least 16%.<sup>64</sup> Collectively, in 2010 the Big Six (or their parent companies) made dividend payments totalling £6.2bn (these are all figures from the most recent annual reports of the Big Six energy companies, or their parent companies):

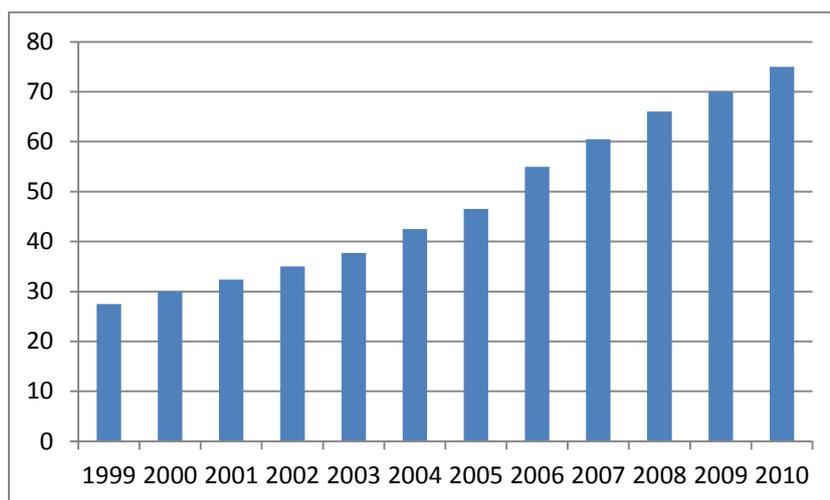
SSE <sup>65</sup>	£660m
Centrica (British Gas’s owner) <sup>66</sup>	£668m
Iberdrola (owner of Scottish Power) <sup>67</sup>	€2.37bn
RWE (npower’s owner) <sup>68</sup>	€1.87bn
EDF (owner of EDF Energy) <sup>69</sup>	€2.37bn
E.ON (parent of E.ON UK) <sup>70</sup>	€2.86bn

The total amount SSE paid out to shareholders has risen from £278.5m in 2002<sup>71</sup> to £659.8m in 2011<sup>72</sup>, an increase of 137%, or 87% once inflation is factored in.

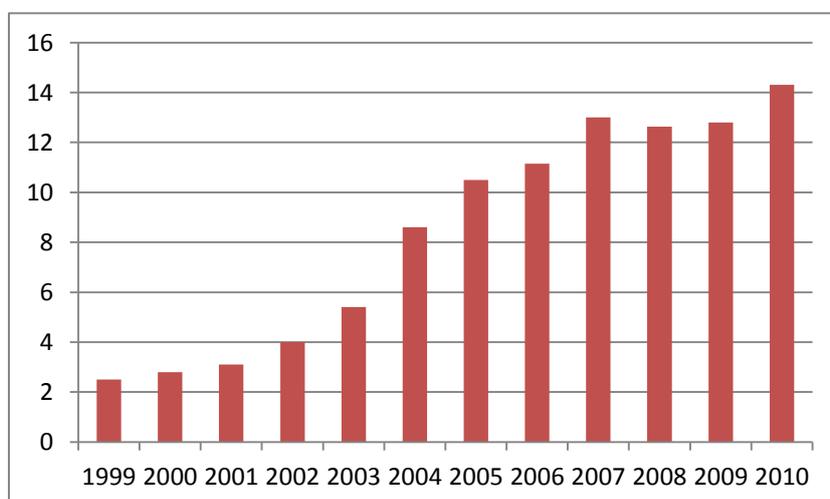
Centrica’s total dividend payments to shareholders have risen from £100m in 1999<sup>73</sup> to £668m in 2010<sup>74</sup>, an increase of 568%, or 394% when taking inflation into account.

The actual dividend payments per share have also increased steadily in recent years, as the following graphs show:

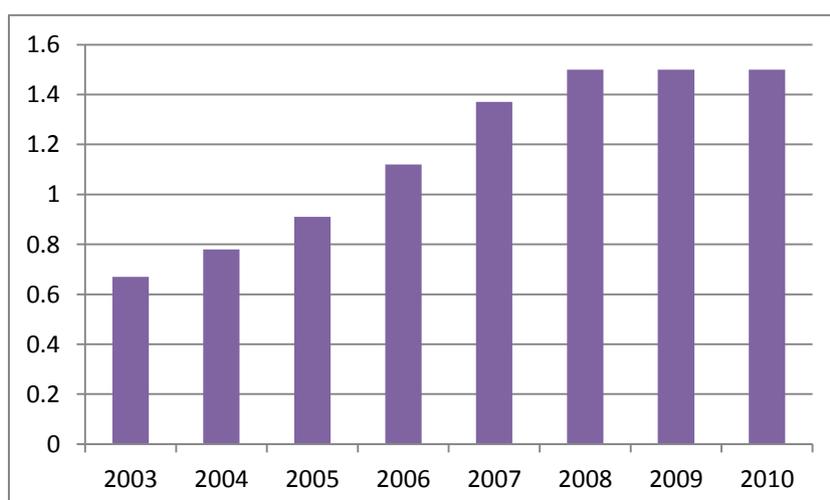
**Graph: SSE dividend payments in pence, 1999-2010 (nominal figures, not adjusted for inflation):<sup>75</sup>**



**Graph: Centrica dividend payments in pence, 1999-2010 (nominal figures, not adjusted for inflation):<sup>76</sup>**



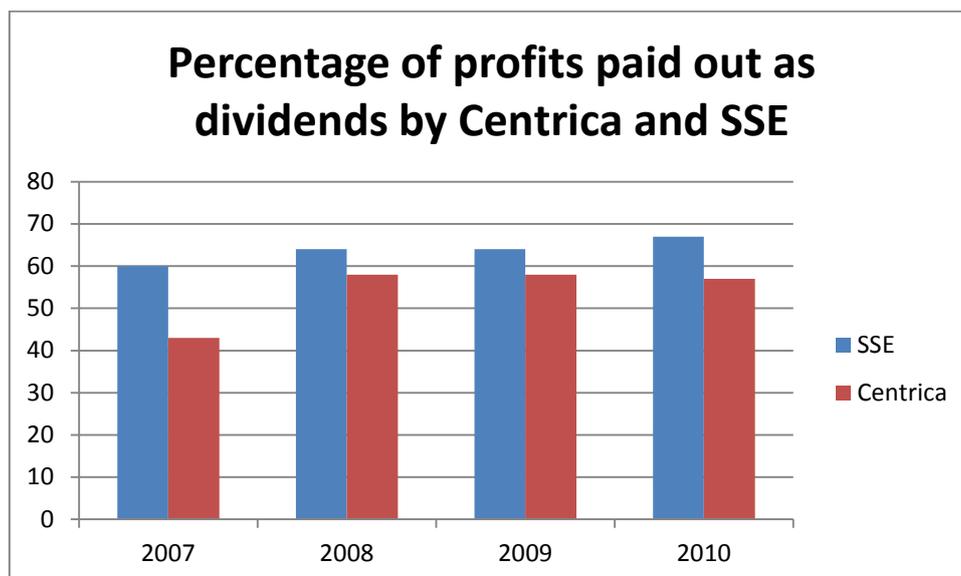
**Graph: E.ON dividend payments in euros, 2003-2010 (nominal figures, not adjusted for inflation):<sup>77</sup>**



Significant as these increases in dividend payments are, they don't tell the full story in themselves.

Also important is the fact that the proportion of profits that are paid to shareholders as dividends has also increased substantially.<sup>78</sup> The London Stock Exchange has calculated the proportion of profits paid out to shareholders as

dividends by the two Big Six energy companies that are listed in the FTSE 100, Centrica (parent company of British Gas) and SSE:



Centrica (parent company of British Gas) has increased the share of its earnings paid to shareholders from 43% in 2007 to 57% in 2010.<sup>79</sup>

SSE have increased the share of profits paid out to shareholders every year, and in 2010 more than two thirds (67%) of earnings were returned to shareholders as dividends.<sup>80</sup>

By comparison, the average share of profits of FTSE100 companies paid out to shareholders as dividends was 47% in 2010. This of course doesn't give a full picture as the figure will vary from industry to industry – but it's a useful guideline as to the level of earnings that multi-national, mature businesses are prepared to pay out to shareholders in a given year. And both Centrica and SSE paid out comfortably more than that.

If SSE had just paid the FTSE100 average instead of 67%, that would have been £200m lower. This could have cut its electricity customers' bills by £40. In July SSE announced that 2011/2012's dividend will be 2% more than inflation<sup>81</sup> – ie: a further 7% increase in its dividend. It could have brought its dividend to the FTSE average. Instead it has announced a 10% increase in electricity bills – on average £50 per customer.

## **7.2: Executive pay**

At the same time as paying huge dividends to shareholders, the Big Six have come under fire for the levels of pay received by their Chief Executives, particularly as many of them received hefty pay increases at the same time as customer bill hikes were announced in summer 2011.<sup>82</sup>

<b>Bosses' basic salaries</b>		
<b>RWE npower<sup>83</sup></b>	Volker Beckers	£1m
<b>EDF Energy<sup>84</sup></b>	Vincent de Rivaz	£1.3m
<b>Scottish Power<sup>85</sup></b>	Nick Horler	£1.3m
<b>British Gas<sup>86</sup></b>	Phil Bentley	£1.3m
<b>SSE<sup>87</sup></b>	Ian Marchant	£1.2m
<b>E.ON UK<sup>88</sup></b>	Paul Golby	£1.2m

(Nick Horler stepped down in Oct 2010; Keith Anderson is now the group's Chief Corporate Officer)

The figures above are also just a small proportion of these executives' pay. At Centrica/British Gas, the addition of the "annual incentive scheme", "deferred and matching share scheme" and "long term incentive scheme" quintupled these basic salaries – the five top executives at Centrica took home more than £15m between them in 2010.<sup>89</sup>

### **7.3: Investing in new plant and R&D**

The Big Six are investing in new power plants, and have projects at all stages – from pre-application to construction. The picture is far from uniform, but overall they are investing far more in the short-term in fossil fuel projects. Many of them are part of ambitious consortia to build major new renewables capacity, but at the moment it is only far smaller schemes which are being built – there is still great uncertainty about whether they will genuinely invest in major schemes like Round 3 offshore wind farms.

**Table: Big Six – Projects proposed or in construction:**

	<b>Gas</b>	<b>Nuclear</b>	<b>Renewables</b>
<b>RWE npower</b>	6 GW of new gas planned or in construction	5 GW nuclear planned with E.On	Major proposals for offshore wind (Dogger Bank, Triton Knoll, Atlantic Array); 1 GW of onshore wind
<b>E.ON UK</b>	1.3 GW of gas CHP being commissioned; <i>(also have 6 GW of fossil fuel projects currently on hold)</i>	5 GW nuclear planned with RWE	Building the 1.2 GW London array; around 1 GW of other wind proposed
<b>EDF Energy</b>	1 GW of new gas planned	Proposals for 12 GW nuclear	Negligible
<b>Scottish Power</b>	3.4 GW gas planned, +0.6 GW CCS project	Part of 3.5 GW Sellafield consortium	1/3 stake in East Anglia offshore wind proposal; around 2 GW of other wind proposed
<b>SSE</b>	3 GW of gas proposals	None	Major proposals for offshore wind (Atlantic, Firth of Forth, Supergrid), 2.4 GW of hydro, around 3 GW of other wind
<b>Centrica</b>	1 GW of gas proposed	Potential for one new station, decision in 2012	Major proposal for offshore wind (Irish Sea), 1.4 GW of other offshore wind
<b>Big Six total</b>	16 GW	20 GW	11 GW + uncertain amounts from major offshore wind proposals

(Note: many of these are solely proposals, and some, particularly smaller onshore wind projects, are unlikely to get planning permission).

The Big Six's new gas projects are a major threat to producing more of the UK's energy from green sources. The Government estimates that we will need just 11 GW of new gas but 30 GW of new renewables by 2020. However, there are close to 30 GW of new gas proposals on the table – 16 GW from the Big Six, and a further 13 GW from smaller operators. These smaller operators do not have the option of building other types of power station, they tend to specialise in one type of power station – but the Big Six have expertise across technologies. If both big and small operators persist with their gas plans, the UK will be faced with a massive over-reliance on gas, and it is renewables development which would fall short.

**Table: Government’s projection of the cumulative new capacity needed compatible with UK climate change targets and keeping the lights on<sup>90</sup>, GW:**

	2015	2020	2025
<b>Coal</b>	1	2	2
<b>Gas</b>	7	11	11
<b>Renewable</b>	15	30	32
<b>Nuclear</b>	0	0	4

(These projections assume “central” projections for fossil fuel prices. The results are also very similar if assuming either low or high prices – gas, coal and renewable figures are essentially unchanged; nuclear would take 7 GW in 2025 under high prices, and 0 GW in 2025 under low price assumptions.)

But with current policies it is gas which will come forward. ENDS report that “The National Grid expects the capacity of gas-fired generation, which already supplies half of Britain’s electricity, to almost double from 27 GW in 2010 to 45 GW in 2018 in excess of 8 GW over National Grid’s 2018 projection, even without new applications.”<sup>91</sup>

Overall, the Big Six’s plans for gas will keep the UK hooked on fossil fuels. There would be big costs of doing this – dropping the UK’s renewables target, which would be the implication of building all this gas, would mean vastly increased imports of fossil fuels, at major cost to the UK economy.

Friends of the Earth has analysed the impact of not investing in renewables, but instead meeting the UK’s need for new power stations through gas. Assuming that prices continue to increase at the average rate of the last 10 years would mean the UK having to spend an extra £8bn on gas and coal every year by 2020 - an increase of more than £300 for every household compared with a scenario where the UK meets its renewables targets. This price assumption is more cautious than DECC’s ‘high’ projections.

## **New investment - company snapshots:**

### **RWE npower**

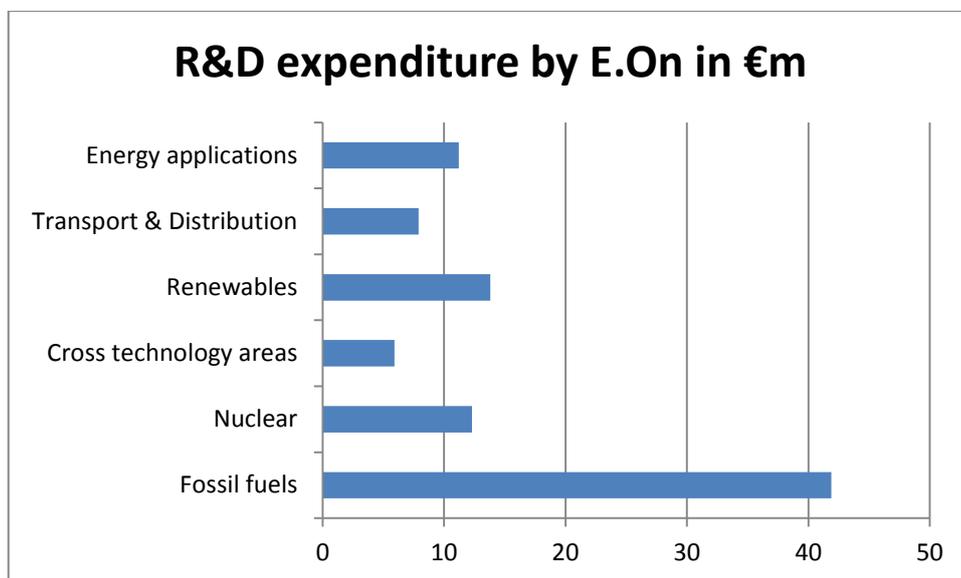
Have the largest set of plans for new gas power stations. There have been very recent reports that they may drop their plans to build new nuclear stations in the UK.<sup>92</sup> They are building the Gwynt-y-Mor offshore wind farm and have three other possible offshore wind projects.

RWE, parent company of RWE npower, has major fossil fuel plans for the future - RWE spends €149m a year on R&D. More than €100m is earmarked for its “coal innovation centre” near Cologne.<sup>93</sup> Another subsidiary company of npower’s parent company RWE, RWE DEA, plans to invest €507m in further oil and gas exploration.<sup>94</sup> And the company plans to convince a whole generation of youngsters that sticking with fossil fuels really is the best way forward: the company is sponsoring a project to “foster students’ interest in professions and studies centred on hydrocarbon exploration and production.”<sup>95</sup>

### **E.ON UK**

Has one gas Combined Heat and Power (CHP) project being commissioned. Has a joint stake with RWE npower in new nuclear power plants at Wylfa and Oldbury. Has a one third stake in the London Array offshore wind farm being constructed, and a variety of other on and offshore wind projects proposed. Has interests in six other major fossil fuel projects, such as Kingsnorth, which is currently on hold.

In 2010, E.ON (parent company of E.ON UK) spent a total of €93m on research and development. €54.2m of this went into fossil fuel or nuclear research (58%), compared with just €13.8m on renewables (15%).<sup>96</sup>



#### **Iberdrola/Scottish Power**

Have three major new gas power plants planned. West Duddon offshore wind farm is starting construction in 2012. Have a one third stake in the major East Anglia offshore wind proposal and are planning many smaller onshore wind projects. Now have a 50% stake in developing the Sellafield nuclear site, following the withdrawal of SSE from the NuGeneration consortium. They are developing a Carbon Capture and Storage (CCS) plant at Longannet, but there have been rumours recently that they are on the verge of dropping these plans<sup>97</sup>.

Parent company Iberdrola has a majority of its investment and R&D going into renewables.

#### **SSE**

Have four major new gas power plants planned. SSE are building the Greater Gabbard offshore wind farm. They have major stakes in three other major offshore wind plants, and are also planning expansions in hydro and onshore wind. Capital expenditure on renewable energy has increased from £93m in 2007 to £784m in 2011.

They recently pulled out of the Nugeneration nuclear consortium at Sellafield.

#### **Centrica/British Gas**

Have the smallest set of new plant investment plans. They have approval for a new Combined Cycle Gas Turbine (CCGT) power plant at Kings Lynn, and are building a 270 MW wind farm off Lincolnshire. They have a joint stake in the proposal for offshore wind in the Irish Sea, and another proposal at Race Bank.

In 2012 they will be making a final investment decision on whether to build any new nuclear power stations (they have a 20% stake in British Energy).

#### **EDF energy**

Have a major set of plans for nuclear power stations, and also are constructing the West Burton gas fired power plant.

New renewables account for just 1% of their investment plans – 90 MW each of onshore and offshore wind.

## **Section 8: Lobbying Government**

Amid rocketing consumer energy bills, investigations from the regulator Ofgem and mounting public anger, politicians have finally started to talk tough about the Big Six energy companies.

At the 2011 Liberal Democrat Autumn Conference in Birmingham, Energy Secretary Chris Huhne said in his speech that: “We are determined to get tough with the big six energy companies to ensure that the consumer gets the best possible deal.”<sup>98</sup> Previously, Mr Huhne has said “we’ve got to get off that oil and gas fuel hook”<sup>99</sup> and argues that “our energy market has been too cosy for too long. [...] The current market simply can't deliver, so we need more companies and more competition to keep price rises as low as possible.”<sup>100</sup>

At Labour Party Conference in Liverpool, leader Ed Miliband argued that: “Big vested interests like the energy companies have gone unchallenged, while you’re being ripped off” and called for the “dominance of the big energy companies” to be broken up.<sup>101</sup>

And former shadow energy secretary Meg Hillier also spoke of the need to “break up [the] stranglehold” of the Big Six at a time when “Increasingly, people think the Big Six energy companies are behaving unfairly.”<sup>102</sup>

These criticisms come at a crucial time when key decisions are being made by the Government that will determine the shape of our energy system for a generation.

But the Treasury’s energy meetings are dominated by the Big Six. Between May 2010 and March 2011, Treasury Ministers had 24 meetings with energy companies, and just two of them were with green businesses, while 15 were with the Big Six and all but one of the remainder were with oil and gas companies.<sup>103</sup>

Mr Osborne’s tone on climate change generally has changed dramatically in the last year:

*November 2009:*

“If I become Chancellor, the Treasury will become a green ally, not a foe...The Treasury has often been at best indifferent [on the environment], and at worst obstructive...All this has got to change.”

*September 2011:*

“Now we know that a decade of environmental laws and regulations are piling costs on the energy bills of households and companies. Yes, climate change is a man-made disaster...But Britain makes up less than 2% of the world's carbon emissions to China and America's 40%...We're not going to save the planet by putting our country out of business.”<sup>104</sup>

It’s a great pity that Mr Osborne has bought the line that it is environmental policy that has put energy bills up, when it is fossil fuel prices which are overwhelmingly the cause, and climate change policy is suffering as a result.

The Prime Minister David Cameron has also made time in his busy diary to chat with Centrica and EDF – but not with new independent energy businesses.<sup>105</sup>

The Government are paying a lot of attention to the views of the Big Six. But are the Big Six’s interests in line with Britain’s best interests? It seems as though they want to keep Britain on its fossil fuel hook. They do not want to see curbs on their ability to build new fossil fuel power stations. For example, the Government issued a consultation on Emissions Performance Standards (EPS) regulations to limit the pollution from power stations – the Big Six’s official responses were:

- Four say don’t bring in an EPS at all
- Of these, three say if you do bring it in, bring it in over 600gCO<sub>2</sub>/kWh (a level which doesn’t affect new gas stations)

- Of these, the other one explicitly says if you do bring it in “it is workable so long as the EPS limits do not prevent the generation of new gas fired generation)
- One who says yes to EPS say bring it in at 450gCO<sub>2</sub>/kWh (a level which doesn’t affect new gas stations)
- One who says yes to EPS says it is “premature” to set detailed rules for how it would operate

The proposal which came out was an EPS at 450gCO<sub>2</sub>/kWh – allowing new gas – a sign that they’re not just lobbying; they’re succeeding.

In recent years EDF has also lobbied strongly against renewable energy in the UK. In 2009 in response to the Department of Energy and Climate Change’s draft renewable energy target, EDF called for the Government to lower its proposed renewable electricity target from 35% to 20% by 2020, stating that building sufficient renewable energy to reach the higher target was “not realistic or indeed desirable.”

Meanwhile, the Government is planning to roll back a scheme to support new clean British energy being generated by small companies, as well as by homes, businesses and communities. People using less energy and generating their own is a threat to Big Six profits – some of the Big Six lobbied for the scheme (known as the feed-in tariff) to be much more limited when it was first introduced, E.ON saying “we do not support the introduction of feed-in tariffs for small-scale electricity generation”. Britain’s growing community electricity generation industry has already been hit hard once this year with the “fast-track” feed-in-tariff review, slashing tariffs, and the industry looks set to receive another hammer blow with the imminent comprehensive review.

## **Conclusion**

The UK’s electricity system is hooked on fossil fuels and the Big Six are not doing enough to break this addiction. It is British households and businesses who are paying the price, as fossil fuel prices have spiralled.

The Government is currently reviewing its electricity and energy policy. This is a once-in-a-generation opportunity to fix our broken energy system, but the terms of the review are too narrow and the policies proposed are not up to the job.

Friends of the Earth is calling on the Government to urgently set up a public inquiry which aims to:

- Get the UK off the fossil fuel hook
- Deliver fair, affordable energy for all people
- Stop the Government killing off our clean British energy industry

Because the Big Six are such a dominant force in the UK’s energy system, the inquiry needs to look into the Big Six’s role in the energy system, particularly:

- What do the Big Six’s plans for a slew of new dirty gas-fired power stations mean for affordable, secure, and carbon-free energy in the long term?
- How much power do the Big Six have over both Government policy and keeping out the competition?
- How can the UK’s energy system be reformed so that people get fairly priced affordable electricity and energy?

## Appendix: How much will coal and gas for electricity be costing us in 2020?

How much will coal and gas for electricity be costing us in 2020 if existing plant closes as expected, we don't build any more renewables and we fill the gap with gas? UK consumers and businesses could face an annual £16bn bill for the coal and gas used to generate electricity by 2020, if the price rises for gas and coal experienced by power generators seen over the last decade are replicated over the next ten years. This is an increase of £8bn a year on the current figure – an increase of more than £300 for every household.

Energy companies and dubious 'think tanks' have increasingly been pointing to 'green policies' as the cause of recent energy bill rises. For example:

“Sir Roger Carr, the chairman of Centrica, which owns British Gas... admitted that a reason for the rise was the Government's 'decarbonisation' agenda, which is forcing householders to pay more for 'green' energy.”<sup>106</sup>

Yet energy companies have proposals to build way more new gas power than we need, keeping us hooked on gas. At the same time as passing the buck for bill rises onto 'green' policies, an assortment of think tanks have been claiming that decarbonisation will be ruinously expensive, and planting stories in the media. They have advocated abandoning the legally binding 2020 renewables target. They always neglect to mention that their preferred alternative to going green by cutting demand and building new renewables is to build lots more gas.

But becoming even more dependent on gas is not a cost-free option. In fact, our new analysis suggests that the costs are potentially very high.

Scenario	Assumption about fossil fuel prices paid by power producers in 2020	Total cost of coal and gas used to produce electricity in 2020	Increase on current annual bill	Equivalent amount per household
1	DECC central projections	£12.1bn	£4bn	£154
2	Prices rise over the next 10 years as they did over the last decade	£16.1bn	£8bn	£308
3	DECC high projections	£17.1bn	£9bn	£346
4	DECC high-high projections	£21.1bn	£13bn	£500

UK power companies could face an annual bill of between £12bn and £21bn for the coal and gas used to generate electricity by 2020, if existing plant closes as expected, we don't build any more renewables and a dash for gas means that more than half our electricity is provided by gas in 2020. The wide range of prices reflects the considerable uncertainty about the future price of gas and other fossil fuels.

Power companies generally pass on the cost of fuels to consumers and businesses in their electricity bills. These figures represent an increase of between £4bn and £13bn on the current cost of coal and gas. These sums are equivalent to a rise of around £154 to £500 per household, although in practice some of the costs would be borne by industry (and potentially passed on to consumers).

These figures do not include the cost of building the new gas power stations, nor do they make allowance for the additional cost of fitting gas-fired power plants with carbon capture and storage technology (which is not yet commercially available) during the 2020s in order for the UK to meet legally binding carbon reduction targets.

Gas price increases would also significantly increase heating bills which are by far the largest component of people's total energy bills.

Friends of the Earth believes the highest priority should be on energy saving measures (including product standards) to reduce heating and electricity consumption. An aggressive energy efficiency programme, alongside British renewable power, could lead to lower bills in the future and would increase the country's energy security.

### The detailed analysis

The following section outlines the calculations underpinning our figures in a transparent, step-by-step manner.

In June 2010 DECC published its updated Energy and Emissions Projections.<sup>107</sup> Annex E provides projections for the electricity generation mix for each year out to 2025 under different prices assumptions. Our calculations, looking ahead to the end of this decade, are based on DECC's projections for 2020 under the (relatively conservative) 'central prices' assumptions.

Projection of Electricity generation by source, TWh	2010 projection*	2010 actual	2020 projection
<b>Coal (without Carbon Capture &amp; Storage)</b>	114	108	79
<b>Coal (with Carbon Capture &amp; Storage)</b>	0	0	10
<b>Oil</b>	3	5	3
<b>Gas</b>	139	175	121
<b>Nuclear</b>	65	62	25
<b>Renewables</b>	28	27	115
<b>Imports</b>	6	3	13
<b>Storage</b>	4	3	4
<b>Other</b>	4	2	6
<b>TOTAL</b>	364	384	376

The table above sets out DECC's projected 'central prices' fuel mixes for electricity generation in 2010 and 2020, as well as the actual data recorded in 2010. The 2020 projection assumes that a significant proportion of existing plant closes within the next decade (especially coal and nuclear) and that there is a significant expansion of renewables.

\*To provide the most realistic comparison, the calculations which follow use the actual recorded data for 2010 from the Digest of UK Energy Statistics (DUKES) 2011<sup>108</sup>, rather than DECC's prior projection. We include the 2010 projection figures above, because they illustrate how we are *already* accelerating towards higher demand for electricity and a greater proportion of gas in the supply mix than DECC previously assumed. Without significant effort on demand management, it looks likely that total demand in 2020 will be higher than DECC's projection.

DECC's 2020 projection assumes that gas will still be producing more electricity than any other source, but less than at present, while the level of renewables ramps up sharply. The Government estimates that we will need just 11 GW of new gas, but 30 GW of new renewables by 2020.<sup>109</sup> However, there are close to 30 GW of new gas proposals on the table – 16 GW from the Big Six, and a further 13 GW from smaller operators. A 'dash for gas' could starve renewables of capital investment – and more significantly reduce the incentive to build renewables.

And indeed this is broadly what a number of libertarian think tanks and pressure groups argue we should do, abandoning the legally binding 2020 renewables target, which requires the UK to get 30% of its electricity from renewables by that date, and building gas-fired plants instead. They argue that going for renewables is too costly, because the capital costs of renewables are much higher than those of gas. But what they neglect to mention is that the fuel costs for gas (and coal) are considerably higher than for wind, wave, tidal etc, where the inputs are free.

If we assume that we abandon deploying any more renewables and hold renewables at the 2010 figures, filling the 'gap' with gas, and holding everything else constant, instead we have:

Projection of Electricity generation by source, TWh	2010 projection	2010 actual	2020 projection with more gas instead of increased renewables
Coal (without Carbon Capture & Storage)	114	108	79
Coal (with Carbon Capture & Storage)	0	0	10
Oil	3	5	3
Gas	139	175	209
Nuclear	65	62	25
Renewables	28	27	27
Imports	6	3	13
Storage	4	3	4
Other	4	2	6
<b>TOTAL</b>	<b>364</b>	<b>384</b>	<b>376</b>

Under these assumptions, in 2020 coal is used to produce 89TWh of electricity (79TWh without CCS, 10TWh with CCS) and gas is used to produce 209TWh (an increase of 34TWh compared with the actual figures for 2010).

According to DUKES 2011, in 2010:

- 372TWh of gas was used to produce 175TWh of electricity, implying that 2.1TWh of gas is needed to produce 1TWh of electricity.
- 297TWh of coal was used to produce 108TWh of electricity, implying that 2.8TWh of coal is needed to produce 1TWh of electricity.

Applying these conversion rates to our modified DECC projections for 2020:

In 2020:

- 209TWh of electricity from gas requires 444TWh of gas
- 89TWh of electricity from coal requires 246TWh of coal

According to DECC Quarterly Energy Prices September 2011,<sup>110</sup> in 2010 power producers paid:

1.461p/kWh for gas  
0.901p/kWh for coal

1TWh = 1,000,000,000kWh

So, in 2010, the annual cost for:

- gas was  $0.01461 \times 372 \times 1,000,000,000 = \text{£}5,434,920,000$
- coal was  $0.00901 \times 297 \times 1,000,000,000 = \text{£}2,675,97,0000$

The total cost of coal and gas for electricity in 2010 was £8.1 billion.

### Future Scenarios

There is great uncertainty about the future of gas (and to a lesser extent) coal prices. It is therefore appropriate to provide a range of scenarios for the costs of gas and coal used to generate electricity in 2020, based on different price assumptions: three from the Department for Energy and Climate Change's current projections, and one assuming that fossil fuel prices change over the next ten years as they have over the last ten.

### Scenario 1: Prices paid by power producers rise to the wholesale levels set out in DECC's 'central prices' projections

In Scenario 1 we assume that power producers in 2020 pay the wholesale prices given in DECC's 'central prices' projections.<sup>111</sup>

Under DECC's central assumptions, in 2020:

- the gas wholesale price is 68.5p/therm
- the coal wholesale price is £51.1/tonne

The Carbon Trust provides the following conversion factors:<sup>112</sup>

1 kWh = 29.31 therms

1 tonne of coal produces 7,167 kWh

So under DECC's central assumptions, in 2020:

- the gas wholesale price is 68.5p/therm =  $68.5 / 29.31 = 2.337\text{p/kWh}$
- the coal wholesale price is £51.1/tonne =  $51.1 / 7167 = 0.713\text{p/kWh}$

If power producers actually paid these wholesale prices, then in 2020, the annual cost for:

- gas would be  $0.02337 \times 444 \times 1,000,000,000 = £10,376,280,000$
- coal would be  $0.00713 \times 246 \times 1,000,000,000 = £1,753,980,000$

Total cost of coal and gas for electricity in 2020 would be £12.1bn.

So, if we accept the Government's assumptions about the massive expansion in gas to deal with increased demand and closing plant, and in addition we abandon building new renewables and use gas instead, and we'll be paying *an additional* £4bn every year on fossil fuels.

### **Scenario 2: Prices rise over the next decade as they have over the last**

In Scenario 2 we leave current projections aside for a moment. Prices paid by power producers for gas and coal have not stayed constant over the last 10 years: they have increased in real terms by 90% and 71% respectively<sup>113</sup>.

If we assumed that they did the same again over the *next* 10 years, then in 2020, the annual cost for:

- gas would be  $0.01461 \times 1.90 \times 444 \times 1,000,000,000 = £12,324,996,000$
- coal would be  $0.00901 \times 1.71 \times 246 \times 1,000,000,000 = £3,792,363,060$

Total cost of coal and gas for electricity in 2020 would be £16.1bn.

### **Scenario 3: Prices paid by power producers rise to the wholesale levels set out in DECC's high projections**

Scenario 3 uses the same methodology as Scenario 1, but using DECC's *high* price projections.

Under DECC's high assumptions, in 2020:

- the gas wholesale price is 98.7p/therm =  $98.7 / 29.31 = 3.367\text{p/kWh}$
- the coal wholesale price is £63.9/tonne =  $63.9 / 7167 = 0.892\text{p/kWh}$

If power producers paid these wholesale prices, then in 2020, the annual cost for:

- gas would be  $0.03367 \times 444 \times 1,000,000,000 = £14,949,480,000$
- coal would be  $0.00892 \times 246 \times 1,000,000,000 = £2,194,320,000$

Total cost of coal and gas for electricity in 2020 would be £17.1bn.

#### Scenario 4: Prices paid by power producers rise to the wholesale levels from DECC's high-high assumptions

Scenario 4 uses the same methodology as Scenarios 1 and 3, but using DECC's *high-high* price projections.

Under DECC's high assumptions, in 2020:

- the gas wholesale price is  $121.3/\text{therm} = 121.3 / 29.31 = 4.139\text{p/kWh}$
- the coal wholesale price is  $\text{£}83.1/\text{tonne} = 83.1 / 7167 = 1.159\text{p/kWh}$

If power producers paid these wholesale prices, then in 2020, the annual cost for:

- gas would be  $0.04139 \times 444 \times 1,000,000,000 = \text{£}18,377,160,000$
- coal would be  $0.01159 \times 246 \times 1,000,000,000 = \text{£}2,851,140,000$

Total cost of coal and gas for electricity in 2020 would be  $\text{£}21.2\text{bn}$ .

#### Are these scenarios plausible?

Given genuine uncertainty around the future price of gas, it is impossible to say which one is the most likely, but all are within the range of figures provided by DECC's current projections. It is notable that previous projections by the Government have been wildly conservative about the scale of energy price rises. Oxford University's Brenda Boardman notes:

"The government has long recognized that 'international oil and gas markets...are extremely hard to predict', but appears to have erred on the cautious, minimalist side. For instance, in 2001, the government considered a 'reasonable range' of residential price movements from 1999 up to 2010 would be from +15 per cent to -10 per cent for gas and +5 per cent to -2 per cent for electricity, both in real terms. It has subsequently become clear that those estimates were far too optimistic as energy prices have risen considerably more than the top of the 'reasonable range': ... fuel prices had already risen by over 60 per cent by 2008, let alone 2010."<sup>114</sup>

The International Energy Agency (IEA)'s WEO-2010 scenario suggested a European 2020 wholesale gas price of around  $\text{\$}11.7/\text{MBtu}$ , equivalent to around  $\text{£}0.0249/\text{kWh}$ , which is higher than DECC's central projection (in Scenario 1 above) and only a little lower than that projected in Scenario 2. And even their extremely optimistic 'Golden Age of Gas' (GAS) scenario, about which analysts have been sceptical,<sup>115</sup> projects European wholesale gas prices to reach  $\text{\$}9.5/\text{MBtu}$  in 2020, equivalent to around  $\text{£}0.0205/\text{kWh}$ .

#### What do these figures tell us?

The scenarios give a range of evidence-based estimates for the bill for coal and gas likely to be faced by power producers in 2020, if we accept the Government's reasonable assumptions about power plants likely to closing over the next decade, and if we abandon building new renewables and meet demand using gas instead. If anything, the estimates are conservative, since the 2010 figures suggest that, without a major increase in energy efficiency and demand management, overall demand is likely to be higher than DECC projected, requiring yet more gas.

In addition, we have not calculated the capital cost of building any additional gas-fired power stations (or of retrofitting Carbon Capture and Storage (CCS) to fossil-fuel power stations, which will be necessary if we are to meet the Committee on Climate's recommendations on decarbonising power). But nor have we calculated how much less power companies will pay given the avoided capital costs for building the renewables foregone.

For these reasons, and because the immediate costs are borne by power companies, and the power they produce is consumed by businesses and the public sector,<sup>116</sup> as well as domestic customers, the figures do not translate directly into increases in household energy bills.

However, it is plausible that power companies would pass on these increased costs to domestic and business consumers, and that households would therefore experience increases in their own energy bills, and in the cost of UK produced-products.

It is therefore reasonable to illustrate the scale of these increased fossil fuel bills by expressing the figures in terms of pounds per household equivalent, as in the table below:<sup>17</sup>

Scenario	Assumption about fossil fuel prices paid by power producers in 2020	Total cost of coal and gas used to produce electricity in 2020	Increase on current annual bill	Equivalent amount per household
1	DECC central projections	£12.1bn	£4bn	£154
2	Prices rise over the next 10 years as they did over the last decade	£16.1bn	£8bn	£308
3	DECC high projections	£17.1bn	£9bn	£346
4	DECC high-high projections	£21.1bn	£13bn	£500

What these figures make clear is that dumping our aspirations (and legally binding commitments) is not a zero cost option – and certainly not a route to energy we can all afford. We need to get off the fossil fuel hook, cut demand and invest in renewables.

## Contact:

[info@foe.co.uk](mailto:info@foe.co.uk)

Friends of the Earth media team: 020 7566 1649

## References:

<sup>1</sup> [http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/RMR\\_FINAL.pdf](http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/RMR_FINAL.pdf), p5

<sup>2</sup> DECC, Quarterly Energy Prices, table 3.2.1: [http://www.decc.gov.uk/en/content/cms/statistics/energy\\_stats/prices/prices.aspx](http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/prices/prices.aspx)

<sup>3</sup> See for example Mott McDonald, 2011.

<http://hmccc.s3.amazonaws.com/Renewables%20Review/MML%20final%20report%20for%20CCC%209%20may%202011.pdf>, costs of solar are falling rapidly. Although costs for offshore wind have been flat in very recent years, eg due to the lack of a UK supply chain, they too are predicted by Mott McDonald to fall rapidly in future years.

<sup>4</sup> [http://www.ofgem.gov.uk/Media/FactSheets/Documents1/RMRfactsheet\\_energy%20prices%20update%20FS.pdf](http://www.ofgem.gov.uk/Media/FactSheets/Documents1/RMRfactsheet_energy%20prices%20update%20FS.pdf)

<sup>5</sup> [http://www.decc.gov.uk/assets/decc/1\\_20100324143202\\_e\\_@@\\_budget2010energymarket.pdf](http://www.decc.gov.uk/assets/decc/1_20100324143202_e_@@_budget2010energymarket.pdf)

<sup>6</sup> [www.rwe.com/web/cms/mediablob/en/655928/data/111486/2/rwe/rwe-group/group-structure/download-MTL.pdf](http://www.rwe.com/web/cms/mediablob/en/655928/data/111486/2/rwe/rwe-group/group-structure/download-MTL.pdf)

<sup>7</sup> <http://www.centrica.com/index.asp?pageid=118>

<sup>8</sup> <http://www.centrica.com/index.asp?pageid=924>

<sup>9</sup> <http://www.centrica.com/index.asp?pageid=39&newsid=1783>

<sup>10</sup> <http://www.centrica.com/index.asp?pageid=130&Flash=Businesses>

<sup>11</sup> <http://www.edfenergy.com/about-us/about-edf-energy/>

<sup>12</sup> <http://www.eon-uk.com/about/250.aspx>

<sup>13</sup> <http://www.horizonnuclearpower.com/about-us>

<sup>14</sup> [http://www.rwe.com/app/Mediencenter/Detailansicht.aspx?Mandant=rwe\\_holding&mID=1908&catID=112](http://www.rwe.com/app/Mediencenter/Detailansicht.aspx?Mandant=rwe_holding&mID=1908&catID=112)

<sup>15</sup> <http://www.scottishpower.com/AboutUs.htm>

<sup>16</sup> [http://www.spenergywholesale.com/pages/our\\_sites.asp](http://www.spenergywholesale.com/pages/our_sites.asp)

<sup>17</sup> [http://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENMODPRENNAC11&URLPAG=/gc/prod/en/comunicacion/notasprensa/110923\\_NP\\_01\\_NuGen.html](http://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENMODPRENNAC11&URLPAG=/gc/prod/en/comunicacion/notasprensa/110923_NP_01_NuGen.html)

<sup>18</sup> [http://www.scottishpowerrenewables.com/pages/ob\\_onshore\\_wind.asp](http://www.scottishpowerrenewables.com/pages/ob_onshore_wind.asp)

<sup>19</sup> <http://www.sse.com/OurBusiness/Supply/>

<sup>20</sup> <http://www.sse.com/PressReleases2011/DisposalOfStakeInNugenerationLtd/>

<sup>21</sup> [www.decc.gov.uk/en/content/cms/statistics/energy\\_stats/fuel\\_mix/fuel\\_mix.aspx](http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/fuel_mix/fuel_mix.aspx)

<sup>22</sup> April 2010 – March 2011: [www.britishgas.co.uk/business/what-we-do/green-performance/fuel-mix.html](http://www.britishgas.co.uk/business/what-we-do/green-performance/fuel-mix.html)

<sup>23</sup> April 2010 – March 2011: [www.edfenergy.com/products-services/fuel-mix.shtml](http://www.edfenergy.com/products-services/fuel-mix.shtml)

<sup>24</sup> April 2010 – March 2011: [www.eonenergy.com/About-Us/Fuel+Mix/](http://www.eonenergy.com/About-Us/Fuel+Mix/)

<sup>25</sup> April 2010 – March 2011: [www.npower.com/Home/About-npower/Our-responsibility/How-we-source-our-fuels/](http://www.npower.com/Home/About-npower/Our-responsibility/How-we-source-our-fuels/)

<sup>26</sup> 2010 – 2011: [www.scottishpower.co.uk/support-centre/service-and-standards/where-we-get-our-energy.aspx](http://www.scottishpower.co.uk/support-centre/service-and-standards/where-we-get-our-energy.aspx)

<sup>27</sup> April 2010 – March 2011: [www.sse.com/OurBusiness/Supply/OurFuelSources/](http://www.sse.com/OurBusiness/Supply/OurFuelSources/)

<sup>28</sup> [http://www.decc.gov.uk/en/content/cms/statistics/energy\\_stats/fuel\\_mix/fuel\\_mix.aspx](http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/fuel_mix/fuel_mix.aspx)

<sup>29</sup> Ibid.

<sup>30</sup> Ibid.

<sup>31</sup> All figures are in 2005 prices. Source for all figures: DECC Energy Price Statistics: [http://www.decc.gov.uk/en/content/cms/statistics/energy\\_stats/prices/prices.aspx](http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/prices/prices.aspx)

<sup>32</sup> <http://www.telegraph.co.uk/earth/greenpolitics/8741779/Advisers-letter-to-David-Cameron-on-energy-and-climate-policies.html>

<sup>33</sup> <http://www.consumerfocus.org.uk/news/massive-energy-price-rise-a-body-blow-for-consumers-%e2%80%93-says-consumer-focus>

<sup>34</sup> <http://www.consumerfocus.org.uk/news/british-gas-price-rise-a-shockwave-for-consumers>

<sup>35</sup> [http://www.edfenergy.com/media-centre/press-news/PRESS\\_RELEASE\\_-\\_EDF\\_Energy\\_150911\\_FINAL.pdf](http://www.edfenergy.com/media-centre/press-news/PRESS_RELEASE_-_EDF_Energy_150911_FINAL.pdf)

<sup>36</sup> <http://www.consumerfocus.org.uk/news/huge-energy-price-hike-puts-more-pressure-on-cash-strapped-consumers>

<sup>37</sup> <http://www.consumerfocus.org.uk/news/price-rises-will-leave-consumers-worried-about-heating-their-homes-this-winter>

<sup>38</sup> <http://www.npowermediacentre.com/Press-Releases/npower-to-increase-standard-dual-fuel-prices-by-12-2-1060.aspx>

<sup>39</sup> Effect of energy and climate change policies taken from DECC 2010, Estimated impacts of energy and climate change policies on energy prices and bills. Effect of individual company prices assumes an average 2010 electricity bill of £382 and gas bill of £597. The DECC research is clear that there is not a major change in these figures in 2011 – see table E1 and table E2 of <http://www.decc.gov.uk/assets/decc/what%20we%20do/uk%20energy%20supply/236-impacts-energy-climate-change-policies.pdf>

<sup>40</sup> <http://www.consumerfocus.org.uk/news/last-energy-price-rise-will-leave-consumers-worried-ahead-of-winter>

<sup>41</sup> <http://www.publications.parliament.uk/pa/cm200910/cmselect/cmenergy/memo/fuel/ucm3302.pdf>

<sup>42</sup> <http://www.publications.parliament.uk/pa/cm200809/cmselect/cmworpen/memo/fuel/uc1102.htm>

<sup>43</sup> [www.npower.com/rwenpowercr/key\\_performance\\_data.html](http://www.npower.com/rwenpowercr/key_performance_data.html)

<sup>44</sup> <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/1046/1046we10.htm>

<sup>45</sup> <http://www.centrica.co.uk/index.asp?pageid=39&newsid=2110>

<sup>46</sup> <http://www.publications.parliament.uk/pa/cm200910/cmselect/cmenergy/424/424we12.htm>

<sup>47</sup> Joint Parliamentary Inquiry, May 2011, PRASEG and APEEG.

<sup>48</sup> 1 in 8 households have pre-payment meters. <http://conversation.which.co.uk/energy-home/prepayment-meters-still-stuck-in-the-dark-ages/> They pay on average £81 for Gas+elec than direct debit people says DECC quarterly energy prices Sept 2011 tables 2.2.1 and 2.3.1. 1 in 8 households = 3.5 million households so total =280 million

<sup>49</sup> *The figures in this section are based on the EBITDA (earnings before interest, taxes, depreciation and amortisation) figures provided by the Big Six companies (or their parent companies) for operations in the UK, or in the case of SSE and Centrica they are adjusted operating profit or adjusted profit before tax. Figures for EDF, E.ON, Scottish Power and Npower were reported by their parent companies in euros, and converted to pounds using the average interbank rates for the relevant calendar years.*

<sup>50</sup> Based on nominal figures, not adjusted for inflation

<sup>51</sup> <http://www.consumerfocus.org.uk/files/2011/07/Big-Six-profits-2006-2010-Excel.xlsx>

<sup>52</sup> Figures shown are both nominal prices and real prices after adjusting for inflation (RPI) using figures from the Office for National Statistics

<sup>53</sup> <http://www.telegraph.co.uk/earth/greenpolitics/8741779/Advisers-letter-to-David-Cameron-on-energy-and-climate-policies.html>

<sup>54</sup> [http://www.ofgem.gov.uk/Media/FactSheets/Documents1/RMRfactsheet\\_energy%20prices%20update%20FS.pdf](http://www.ofgem.gov.uk/Media/FactSheets/Documents1/RMRfactsheet_energy%20prices%20update%20FS.pdf)

<sup>55</sup> [http://www.ofgem.gov.uk/Media/FactSheets/Documents1/RMRfactsheet\\_energy%20prices%20update%20FS.pdf](http://www.ofgem.gov.uk/Media/FactSheets/Documents1/RMRfactsheet_energy%20prices%20update%20FS.pdf), and <http://www.thesun.co.uk/sol/homepage/news/money/3482696/The-big-winter-energy-rip-off.html>

<sup>56</sup> Ibid.

<sup>57</sup> <http://www.bbc.co.uk/news/business-14608341>

<sup>58</sup> Ibid.

<sup>59</sup> [http://www.ofgem.gov.uk/Media/FactSheets/Documents1/RMRfactsheet\\_energy%20prices%20update%20FS.pdf](http://www.ofgem.gov.uk/Media/FactSheets/Documents1/RMRfactsheet_energy%20prices%20update%20FS.pdf)

<sup>60</sup> <http://www.eon.com/en/investors/974.jsp>

<sup>61</sup> <http://www.rwe.com/web/cms/en/109064/rwe/investor-relations/dividend/>

<sup>62</sup> SSE Annual Report 2011.

<sup>63</sup> <http://www.centrica.com/index.asp?pageid=251>

<sup>64</sup> <http://news.bbc.co.uk/1/hi/business/7599503.stm>

<sup>65</sup> [http://www.sse.com/uploadedFiles/Controls/Lists/Reports\\_and\\_Results/SSE\\_AnnualReport2011.pdf](http://www.sse.com/uploadedFiles/Controls/Lists/Reports_and_Results/SSE_AnnualReport2011.pdf)

<sup>66</sup> [http://www.centrica.com/files/reports/2010ar/files/pdf/centrica\\_annual\\_report\\_2010.pdf](http://www.centrica.com/files/reports/2010ar/files/pdf/centrica_annual_report_2010.pdf)

<sup>67</sup> [http://www.iberdrolainforme2010.com/UK/pdf/ctas\\_0\\_consolidatedfinancial.pdf](http://www.iberdrolainforme2010.com/UK/pdf/ctas_0_consolidatedfinancial.pdf)

<sup>68</sup> <http://www.rwe.com/web/cms/mediablob/en/543512/data/110822/4/rwe/investor-relations/financial-reports/Annual-report-2010-PDF-Download-.pdf>

<sup>69</sup> [http://www.edf.com/html/RA2010/en/pdf/EDF2010\\_fin\\_full\\_va.pdf](http://www.edf.com/html/RA2010/en/pdf/EDF2010_fin_full_va.pdf)

70 [http://www.eon.com/en/downloads/2010\\_E.ON\\_Annual\\_Report\\_.pdf](http://www.eon.com/en/downloads/2010_E.ON_Annual_Report_.pdf)

71 [http://www.sse.com/uploadedFiles/Controls/Lists/Reports\\_and\\_Results/2002AnnualReportAndAccounts.pdf](http://www.sse.com/uploadedFiles/Controls/Lists/Reports_and_Results/2002AnnualReportAndAccounts.pdf)

72 [http://www.sse.com/uploadedFiles/Controls/Lists/Reports\\_and\\_Results/SSE\\_AnnualReport2011.pdf](http://www.sse.com/uploadedFiles/Controls/Lists/Reports_and_Results/SSE_AnnualReport2011.pdf)

73 [http://www.centrica.com/files/reports/1999\\_annual\\_report.pdf](http://www.centrica.com/files/reports/1999_annual_report.pdf)

74 [http://www.centrica.com/files/reports/2010ar/files/pdf/centrica\\_annual\\_report\\_2010.pdf](http://www.centrica.com/files/reports/2010ar/files/pdf/centrica_annual_report_2010.pdf)

75 <http://www.sse.com/Investors/DividendInformation/>

76 <http://www.centrica.com/index.asp?pageid=251>

77 <http://www.eon.com/en/investors/974.jsp>

78 The figures in this section for percentage of profits returned to shareholders have been calculated using the “dividend cover”. The dividend cover reflects the number of times a company’s profits can cover the dividend paid to shareholders and is calculated by dividing earnings per share by the dividend per share. Converting this to a percentage gives the “Dividend Payout Ratio”, expressing the dividends paid out as a percentage of the company’s earnings.

79 [www.londonstockexchange.com/exchange/prices/stocks/summary/fundamentals.html?fourWayKey=GB00B033F229GBGBXSET1](http://www.londonstockexchange.com/exchange/prices/stocks/summary/fundamentals.html?fourWayKey=GB00B033F229GBGBXSET1)

80 <http://www.londonstockexchange.com/exchange/news/market-news/market-news-detail.html?announcementId=10870973>

81 <http://money.uk.msn.com/your-financial-life/bills/energy-bills/articles.aspx?cp-documentid=158628742>

82 [www.telegraph.co.uk/finance/newsbysector/energy/8713686/Ofgem-to-investigate-energy-giants-profits.html](http://www.telegraph.co.uk/finance/newsbysector/energy/8713686/Ofgem-to-investigate-energy-giants-profits.html)

83 <http://www.telegraph.co.uk/finance/newsbysector/energy/8713686/Ofgem-to-investigate-energy-giants-profits.html>

84 [http://www.edfenergy.com/about-us/shareholder-information/documents/EDF\\_Energy\\_plc\\_2010\\_-\\_Financial\\_Statements.pdf](http://www.edfenergy.com/about-us/shareholder-information/documents/EDF_Energy_plc_2010_-_Financial_Statements.pdf)

85 <http://www.telegraph.co.uk/finance/newsbysector/energy/8713686/Ofgem-to-investigate-energy-giants-profits.html>

86 [http://www.centrica.com/files/reports/2010ar/files/pdf/centrica\\_annual\\_report\\_2010.pdf](http://www.centrica.com/files/reports/2010ar/files/pdf/centrica_annual_report_2010.pdf)

87 [http://www.sse.com/uploadedFiles/Controls/Lists/Reports\\_and\\_Results/SSE\\_AnnualReport2011.pdf](http://www.sse.com/uploadedFiles/Controls/Lists/Reports_and_Results/SSE_AnnualReport2011.pdf)

88 [http://www.eon-uk.com/downloads/E\\_ON\\_UK\\_plc\\_statutory\\_accounts\\_2010.pdf](http://www.eon-uk.com/downloads/E_ON_UK_plc_statutory_accounts_2010.pdf)

89 [http://www.centrica.com/files/reports/2010ar/files/pdf/centrica\\_annual\\_report\\_2010.pdf](http://www.centrica.com/files/reports/2010ar/files/pdf/centrica_annual_report_2010.pdf), pp56 and 62

90 [http://www.decc.gov.uk/en/content/cms/about/ec\\_social\\_res/analytic\\_projs/en\\_emis\\_projs/en\\_emis\\_projs.aspx](http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx), annex I

91 <http://www.allbusiness.com/energy-utilities/utilities-industry-electric-power/16654711-1.html>

92 <http://www.guardian.co.uk/environment/2011/oct/07/rwe-uk-nuclear-power?intcmp=122>

93 [www.rwe.com/web/cms/mediablob/en/543512/data/110822/4/rwe/investor-relations/financial-reports/Annual-report-2010-PDF-Download-.pdf](http://www.rwe.com/web/cms/mediablob/en/543512/data/110822/4/rwe/investor-relations/financial-reports/Annual-report-2010-PDF-Download-.pdf)

94 [www.rwe.com/web/cms/mediablob/en/601340/data/55070/2/rwe-dea/company/strategy/RWE-Dea-Annual-Report-2010.pdf](http://www.rwe.com/web/cms/mediablob/en/601340/data/55070/2/rwe-dea/company/strategy/RWE-Dea-Annual-Report-2010.pdf)

95 [www.rwe.com/web/cms/en/431360/rwe-dea/company/social-responsibility/](http://www.rwe.com/web/cms/en/431360/rwe-dea/company/social-responsibility/)

96 [www.eon.com/en/corporate/13811.jsp](http://www.eon.com/en/corporate/13811.jsp)

97 <http://www.guardian.co.uk/environment/2011/oct/06/carbon-energy-green-agenda>

98 [http://www.libdems.org.uk/speeches\\_detail.aspx?title=Chris\\_Huhne\\_speech\\_to\\_Liberal\\_Democrat\\_Conference&pPK=38ac734a-814e-4587-972c-ebdfae757c5c](http://www.libdems.org.uk/speeches_detail.aspx?title=Chris_Huhne_speech_to_Liberal_Democrat_Conference&pPK=38ac734a-814e-4587-972c-ebdfae757c5c)

99 <http://www.bbc.co.uk/news/uk-politics-14097567>

100 [http://www.decc.gov.uk/en/content/cms/news/pn11\\_060/pn11\\_060.aspx](http://www.decc.gov.uk/en/content/cms/news/pn11_060/pn11_060.aspx)

101 <http://www.labour.org.uk/ed-milibands-speech-to-labour-party-conference>

102 <http://www.labour.org.uk/meg-hilliers-speech-to-labour-party-conference>

103 [www.hm-treasury.gov.uk/minister\\_hospitality.htm](http://www.hm-treasury.gov.uk/minister_hospitality.htm), the other one was with UK Power Networks

104 <http://www.newstatesman.com/uk-politics/2011/10/britain-british-world-business>

105 [www.cabinetoffice.gov.uk/resource-library/ministerial-gifts-hospitality-travel-and-meetings-external-organisations](http://www.cabinetoffice.gov.uk/resource-library/ministerial-gifts-hospitality-travel-and-meetings-external-organisations)

106 [www.thisismoney.co.uk/money/bills/article-1726590/Bills-to-climb-British-Gas-customers-told.html](http://www.thisismoney.co.uk/money/bills/article-1726590/Bills-to-climb-British-Gas-customers-told.html)

107 [www.decc.gov.uk/en/content/cms/about/ec\\_social\\_res/analytic\\_projs/en\\_emis\\_projs/en\\_emis\\_projs.aspx](http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx)

108 [www.decc.gov.uk/media/viewfile.ashx?filetype=4&filepath=11/stats/publications/dukes/2307-dukes-2011-chapter-5-electricity.pdf](http://www.decc.gov.uk/media/viewfile.ashx?filetype=4&filepath=11/stats/publications/dukes/2307-dukes-2011-chapter-5-electricity.pdf)

109 [http://www.decc.gov.uk/en/content/cms/about/ec\\_social\\_res/analytic\\_projs/en\\_emis\\_projs/en\\_emis\\_projs.aspx](http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx), annex I

110 [www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/source/prices/qep321.xls](http://www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/source/prices/qep321.xls)

111 [www.decc.gov.uk/media/viewfile.ashx?filetype=4&filepath=Statistics/Projections/69-annex-f--fossil-fuel-and-retail-price-assumptions.xlsx](http://www.decc.gov.uk/media/viewfile.ashx?filetype=4&filepath=Statistics/Projections/69-annex-f--fossil-fuel-and-retail-price-assumptions.xlsx)

112 [www.carbontrust.co.uk/cut-carbon-reduce-costs/calculate/carbon-footprinting/pages/conversion-factors.aspx](http://www.carbontrust.co.uk/cut-carbon-reduce-costs/calculate/carbon-footprinting/pages/conversion-factors.aspx)

113 [www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/source/prices/qep321.xls](http://www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/source/prices/qep321.xls)

114 Boardman, B. (2010) *Fixing Fuel Poverty: Challenges and solutions*. Earthscan

115 e.g. [www.ft.com/cms/s/0/dce4843c-90ce-11e0-acfd-00144feab49a.html#axzz1aVIVLceZ](http://www.ft.com/cms/s/0/dce4843c-90ce-11e0-acfd-00144feab49a.html#axzz1aVIVLceZ)

116 Households are directly responsible for around a third (31 per cent) of electricity use.

117 Based on 26 million households.