



**Consumer
Focus**
Campaigning for a fair deal

Fuelling homes

Gas and electricity costs to householders

April 2010

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About Consumer Focus

Consumer Focus is the independent champion for consumers across England, Wales, Scotland and (for postal consumers) in Northern Ireland. We operate across the whole of the economy, persuading businesses and public services to put consumers at the heart of what they do.

Consumer Focus was formed through the merger of three organisations – energywatch, Postwatch and the National Consumer Council (including the Scottish and Welsh Consumer Councils). We have the power to take action where markets are failing consumers and to ensure a fair deal for all - especially the vulnerable and disadvantaged.

1. Executive summary and conclusions

Key Findings

- In 2008 households spent £11.61 billion more on their electricity and gas than they did in 2003. This was equivalent to an increase of 81 per cent to £25.87 billion from £14.26 billion.
- During the same five-year period the costs of fuel and other services faced by the energy suppliers rose to £24.13 billion from £12.15 billion, equivalent to an increase of 83 per cent. Of this £11.98 billion increase, the majority (52 per cent/£6.28 billion) was due to higher fuel costs, nearly a third (29 per cent/£3.51 billion) from increased non-fuel costs such as networks, energy efficiency and renewables support schemes and Value Added Tax (VAT), but nearly a fifth (18 per cent/£21.8 billion) came from greater upstream power production profits.
- The margin between household expenditure and our estimate of supply chain costs was around £2 billion in both 2003 and 2008. Using independent assessments from regulator Ofgem, we think suppliers' own downstream profits were equivalent to this margin in 2003. But by 2008 this source suggests that suppliers' profits had declined to less than £500 million, yielding a £1.25 billion gap in households' expenditure that we were unable to account for.
- This situation indicates that the energy industry in the round in 2008 was able to pass through to households all the cost increases it had incurred since 2003, earn significantly greater profits from power generation and earn a further incremental margin equivalent to 5 per cent of household expenditure.
- We believe we have accounted for all the main costs incurred by the energy supply industry in meeting the gas and electricity needs of British householders. There may be other costs related to elements such as marketing, customer acquisition and generators' non-fuel costs. However these are likely to be relatively small.
- Our analysis suggests that the costs incurred by **electricity** suppliers may have increased by more than the expenditure rise for householders for that fuel during 2003 to 2008. But a portion of these extra costs will have been higher generation profits earned by upstream affiliates.
- For **gas** the reverse appears to be the case. Traded wholesale gas prices were often in excess of average revenues earned by gas importers and UK producers during 2003 to 2008. This may be an important reason for the gap, if prices to consumers were based on traded market prices rather than the actual payments received by producers.

1.1. Brief

Consumer Focus asked Cornwall Energy in late 2009 to update a review originally undertaken in 2007/08 for the National Right to Fuel Campaign (NRTF) (referred to in this document as the ‘first report’) of recent trends in the expenditure made by household consumers on electricity and gas.

Using public domain sources and desk research, we were asked to consider trends in:

- aggregate levels of expenditure between 2003, 2006 and 2008
- key drivers of costs in the supply chains for these fuels, including:
 - wholesale energy prices, including gas storage and carbon
 - wire and pipeline network charges
 - profits of producers and suppliers
 - taxes, levies and obligations

We were asked to review the data and findings from our first report and also update them for more recent developments. The approach we have taken is substantively the same as the first report, although there are some method enhancements. The most notable are the assessments of downstream supply margins and improvements to the estimates of imported gas and power costs.

The first report was originally designed to assist understanding of how much of the increases in costs to household consumers that occurred during the period 2003 to 2006 could be attributed to changes in supply chain costs and profits, through reviewing public domain information. This analysis updates it and outlines what we think the latest information says about how household spend has changed. As before we have included an explanation of why we have chosen to review particular sources and our treatment of them. We also differentiate where we have used third party, independently derived data and where we have used information published by sector participants.

We make extensive use of information from various public domain sources. These sources include the very comprehensive statistics on consumption, spend and unit costs from the Department for Energy and Climate Change (DECC, formerly the Department for Business, Enterprise and Regulatory Reform or BERR) and published use of system charges from the various network operators. This time we have also used information from Ofgem’s *Energy supply probe – initial findings report*¹ for downstream profits from supplying gas and electricity in combination, although not for each fuel separately.

Where possible we have presented the information on a GB – rather than UK-wide – basis, and we have consequently highlighted any changes that we have made to UK-baseline data.

1.2. About Cornwall Energy

The Cornwall Energy team are independent energy market specialists who have experience of liberalised energy markets since their inception in GB and elsewhere in the late 1980s. Specific areas of our expertise include:

- regulation and public policy within both electricity and gas sectors
- electricity and gas market design, operation, governance and business processes
- energy trading and supply

¹ <http://bit.ly/aVoHuD> (PDF 3.97MB)

1.3. Key findings – overall spend

Gas and electricity expenditure by household consumers increased by £11.61 billion (81 per cent) between 2003 and 2008, from £14.26 billion to £25.87 billion. The majority of that increase (59 per cent/£6.85 billion) occurred between 2003 and 2006.

The costs of fuel to suppliers rose by £6.28 billion (155 per cent) between 2003 and 2008 from £4.06 billion to £10.34 billion. The majority of the increase (58 per cent/£3.63 billion) occurred between 2003 and 2006.

Non-fuel costs – including the costs of taxes, network and mandated policy programmes – to suppliers increased by £3.51 billion (45 per cent) between 2003 and 2008 from £7.73 billion to £11.24 billion. Unlike fuel costs, the majority of the increase (65 per cent/£2.27 billion) occurred between 2006 and 2008. Table 1:1 illustrates further.

Profits earned by upstream producers – as opposed to downstream suppliers – rose by £2.18 billion (603 per cent) from £0.36 billion in 2003 to £2.55 billion in 2008. The vast majority of this increase 95 per cent (£2.06 billion) occurred between 2003 and 2006. In our first report we ascribed the vast majority of the increase in energy industry profits between 2003 and 2006 to the power generation sector, noting that it had earned very low returns in 2003.

Overall the costs to suppliers we have been able to assess increased by £12.0 billion in total between 2003 and 2008. The majority of that increase (£6.94 billion/58 per cent) occurred between 2003 and 2006.

Information from Ofgem's *Energy supply probe – initial findings report* means that for this report we have been able to assess profits from downstream energy supply. From this information we estimate aggregate downstream supply margins from serving British households with energy reduced by four-fifths from 2003 to 2008 from £2.0 billion (2003) to £0.4 billion (2006) and £0.49 billion (2008).

Overall, as Table 1:1 illustrates, our high-level assessments have been able to account for between 92-99 per cent in any one year of consumer's expenditure in each of 2003, 2006 and 2008, with 2003 representing the lowest proportion. These assessments accounted for 90 per cent of the expenditure increase between 2003 and 2008, but more than 100 per cent (108 per cent) of the rise taken over a two-year horizon to 2008.

Further, Table 1:1 appears to show that during 2006 to 2008 supply chain costs increased by slightly more than consumers' expenditure on gas and electricity. But, by reviewing the residual or 'gap' amount that we are unable to account for, taken over a five-year horizon there has been an increase of more than £1 billion in the amount of expenditure by consumers that could not be attributed to particular cost or profit elements.

Table 1:2: Householders' expenditure on electricity and gas, 2003, 2006 and 2008

(£bn)	2008	2006	2003	08 on 06	08 on 03
Reported expenditure	25.87	21.11	14.26	4.76	11.61
Fuel costs	10.34	7.69	4.06	2.65	6.28
Non-fuel costs	11.24	8.97	7.73	2.27	3.51
Producer (upstream) profits	2.55	2.43	0.36	0.12	2.18
Supply chain costs	<u>24.13</u>	<u>19.09</u>	<u>12.15</u>	<u>5.04</u>	<u>11.98</u>
Gap between expenditure & supply chain costs	1.74	2.02	2.11	-0.28	-0.37
Supplier (downstream) profits	0.49	0.40	2.04	0.09	-1.55
Gap less supplier profits	1.25	1.62	0.07	-0.37	1.17

1.4. Key findings – gas

Using official figures we estimate that householders spent £12.27 billion on gas in 2008, up 22 per cent from the £10.04 billion for 2006 and 88 per cent on the £6.53 billion recorded for 2003. The commentary in Section 3 of this report estimates how we believe drivers such as fuel, storage, regulated network charges and industry obligations and taxes may have accounted for this increase. But, in headline terms, as Table 1:2 shows the increase can be attributed to:

- an extra £2.23 billion costs between 2006 and 2008, of which half (£1.12 billion/50 per cent) was accounted for by costs other than fuel, a little under a third by fuel including upstream profits (£0.70 billion/31 per cent) with the balance (£0.29 billion/15 per cent) being a residual amount – or gap – that we were unable to account for; or
- an extra £5.73 billion between 2003 and 2008, of which nearly two thirds (£3.71 billion/65 per cent) was accounted for by higher fuel costs, around a quarter by increases (£1.35 billion/24 per cent) in non-fuel costs with the balance (£0.41 billion/11 per cent) being a residual amount that we were unable to account for but which probably included downstream profits amongst other elements

Our assessments appear to show that while higher fuel costs accounted for the majority of increases in household gas bills between 2003 and 2008, for the two years from 2006 to 2008 other non-fuel chain costs were the dominant driver of increases. During this latter period there were notable increases in the costs to consumers of network charges, government-mandated energy efficiency programmes and VAT.

Table 3:2: Householders' expenditure on gas: 2003, 2006 and 2008

(£bn)	2008	2006	2003	08 on 06	08 on 03
Fuel costs including producer (upstream) profits	6.00	5.30	2.29	0.70	3.71
Non-fuel costs	4.86	3.73	3.51	1.12	1.35
Gap including supply (downstream) profits	1.41	1.00	0.45	0.41	0.96
Reported expenditure	12.27	10.04	6.53	2.23	5.73

1.5. Key findings – electricity

For electricity using official figures we estimate the amount householders spent in 2008 compared with 2006 rose by a similar proportion (23 per cent) to that for gas, to £13.60 billion from the £11.07 billion. From 2003 to 2006 there was a 43 per cent increase in household spend on electricity from £7.73 billion to £11.07 billion. Over the five years to 2008 household spend on electricity rose by just over three-quarters (76 per cent). The commentary set out in Section 4 estimates how we believe profit and cost drivers such as fuel, regulated network charges and industry obligations and taxes may have accounted for this increase.

But, in headline terms, as Table 1:3 shows the increase was attributed to:

- an extra £2.54 billion between 2006 and 2008 of which a little over half (£1.41 billion/55 per cent) was accounted for by fuel and a little under half (45 per cent) by increases in other supply chain costs. The residual gap amount that we were unable to account for was around £0.4 billion in both 2008 and 2006, around a third of the £1.26 billion gap in 2003; or
- an extra £5.87 billion between 2003 and 2008 of which the largest part (£2.57 billion) was accounted for by higher fuel costs, then producer profits (£2.18 billion) and then non-fuel costs (£1.28 billion). In total increases in these three cost elements of £6.7 billion exceed the increase in expenditure by £0.93 billion and is evidenced by a decline in the gap from £1.26 billion in 2003 to £0.33 billion in 2008. We suspect this reduction in the gap between 2003 and 2008 of £0.93 billion effectively shows a reduction in downstream margins earned by suppliers during this period and underlines how profits moved upstream

Table 1:3: Householders' expenditure on electricity: 2003, 2006 and 2008

(£bn)	2008	2006	2003	08 on 06	08 on 03
Fuel costs	4.34	2.93	1.77	1.41	2.57
Non-fuel costs	6.39	5.24	4.34	1.15	2.05
Producer (upstream) profits	2.55	2.43	0.36	0.12	2.18
Gap including supply (downstream) profits	0.33	0.48	1.26	-0.15	-0.93
Reported expenditure	13.60	11.07	7.73	2.54	5.87

1.6. Key findings – comment

It appears that increases in particular costs faced by suppliers – including producer (upstream) profits – broadly match the increase in consumers' expenditure on electricity and gas of £12 billion between 2003 and 2008. In each of the three years that we have analysed we have been unable to allocate an amount of around £2 billion of consumers' expenditure to particular supply chain costs or producer (upstream) profits. This gap amount was broadly matched for 2003 by estimates of supplier (downstream) profits drawn from Ofgem's probe. But for 2006 and 2008, while the gap fell from £2 billion to £1.7 billion, the supplier (downstream) profit assessments dropped by a fifth to less than £0.5 billion, meaning around £1 billion emerged in consumers' energy expenditure that we were unable to allocate.

This commentary suggests that recent increases in energy industry profitability:

- were particularly concentrated on the period 2003 to 2006
- were centred on power generation as was highlighted in our first report. For this sector 2000-04 was a time of very low profitability

- has remained at least stable since 2006, meaning that the energy industry in the round maintained its profitability in absolute terms during 2006 to 2008. Its margins may even have widened if it has priced gas to household consumers at traded market rates some way above average producer receipts

Although our analysis may not have taken in to account all costs, such as those other than fuel for generation, these are likely to have been small in the round. And in some cases, for example gas storage, our estimates of the cost increases have been generous. Costs for which we have not accounted specifically include generators' other and non-fossil fuel costs and any costs of competition and marketing that may be incurred by suppliers.

In our first report we concluded that £2 billion of the extra spend by consumers between 2003 and 2006 had probably accrued to power generators in extra profits. After adjusting for the supplier (downstream) profit assessments included in this report, this analysis confirms that finding and suggests generators were able to maintain their level of profitability and pass through in entirety any increases in fuel purchase costs that they faced at a time when international energy markets surged to record highs. It also appears that suppliers have been able to pass through in full the extra costs of network charges, taxation and mandated government policy programmes for energy efficiency and renewables.

It is worth noting that this report comments on sector-level developments, and there will have been significant differences in the impact of the changes in energy prices between 2003, 2006 and 2008 on the profit situation of individual companies.

We received a little comment on our first report and are not aware of any fundamental concerns from market participants about the approach we adopted at that time. Where relevant we have incorporated feedback into our approach for this analysis. As before we would be very interested in receiving feedback and comment from readers on our findings, particularly where enhancements and improvements can be suggested.

1.7. New information sources since 2008

For this analysis we have reviewed all data accessed for our first report and made updates as appropriate. We have also reviewed third-party information on energy supply markets that has emerged recently. Since our first report issued in January 2008 there has been considerable political and regulatory focus on household energy markets.

In particular there are three specific reports that we have drawn from in preparing this update:

- Ofgem's Energy supply probe – initial findings report² and follow-up Quarterly price reports³
- the House of Commons Business and Enterprise Committee's Energy Prices, fuel poverty and Ofgem report from July 2008⁴
- NERA Economic Consulting's Analysis of energy supplier margins⁵ from December 2009, which was commissioned by Energy UK, the communications unit that represents the 'Big Six' gas and electricity suppliers⁶

² <http://bit.ly/aVoHuD> (PDF 3.97MB)

³ <http://bit.ly/agOBnv>

⁴ <http://bit.ly/dcMy4a>

⁵ <http://bit.ly/aUHei3>

⁶ British Gas, E.ON UK, EDF Energy, RWE npower, Scottish and Southern Energy and Scottish Power

1.8. Updates to analysis method

We have made a small number of enhancements to our methodology for this analysis and updated our first report assessments for 2003 and 2006 to ensure consistency. The most notable changes are:

- incorporating estimates of the costs to suppliers of voluntary social measures for 2008 as a result of the agreement on that issue between them and the Government
- assessing the cost of gas imports using data on actual spend recorded by HM Revenue and Customs rather than notional values from the traded market
- assessing the cost of electricity imports using data from DECC on volumes and actual costs. We did not separately assess power import costs in our first report
- upgrading our assumptions on gas storage costs as a result of new information available from National Grid on input flows to the national gas pipeline network

Additionally we have made an important technical change to the DECC data source we have used for consumers' expenditure. As is discussed in more detail at Section 7.2.2, had we adopted the same data source for expenditure for this analysis as our first report, our assessment of household gas expenditure would have been £2.8 billion higher for 2008 than is presented here. With the methodology we use, all of that amount would have formed part of the gap or unaccounted for element.

2. Costs to consumers

In this section we briefly compare information on the amounts spent by British householders on their electricity and gas bills in 2003, 2006 and 2008.

2.1. Total cost to consumers

In 2003, British householders spent £6.2 billion on gas and £7.4 billion on electricity, yielding a total of £13.7 billion on energy as Table 2:1 shows. Thereafter their costs increased significantly so that against the 2003 baseline they had risen:

- by 49 per cent in 2006 (£3.6 billion) to £11.1 billion for electricity, 61 per cent (£3.8 billion) to £10.0 billion for gas and 54 per cent (£7.4 billion) to £21.1 billion for total energy
- by 83 per cent in 2008 (£6.2 billion) to £13.6 billion for electricity, 97 per cent (£6.0 billion) to £12.3 billion for gas and 89 per cent (£12.2 billion) to £25.9 billion for total energy

Table 2:1: Annual expenditure by British household consumers on gas and electricity

(£mn)	Expenditure			Year change		
	Electricity	Gas	Total	Electricity	Gas	Total
2003	7,445	6,231	13,676			
2004	8,892	8,247	17,140	1,447	2,016	3,464
2005	9,423	8,167	17,590	531	-81	450
2006	11,069	10,039	21,108	1,645	1,872	3,517
2007	11,483	9,893	21,376	414	-146	268
2008	13,604	12,266	25,870	2,121	2,373	4,494

Source: Digest of UK Energy Statistics Table 1.1.6, DECC, with further adjustments and calculations by Cornwall Energy. Figures include VAT.

On a per unit basis, the increases are also significant. Table 2:2 shows that the average cost per unit (kilowatt hour) of gas paid by British households more than doubled – up 108 per cent – between 2003 and 2008 from 1.61p per kilowatt hour (kWh) to 3.35p/kWh. The rise in unit expenditure was proportionately higher than aggregate expenditure for gas because volume consumed by about 5 per cent over the five-year period.

For electricity, the five-year increase in unit expenditure was 80 per cent from 6.60p/kWh to 11.86p/kWh.

Table 2:2: Unit expenditure by British household consumers on gas and electricity

(p/kWh)	Electricity	Gas
2003	6.60	1.61
2004	7.91	2.08
2005	8.19	2.10
2006	9.64	2.68
2007	10.25	2.82
2008	11.86	3.35

Source: Cornwall Energy calculations from DECC figures. Figures include VAT.

2.2. Average net values accruing to suppliers

By way of cross-referencing these calculations, we have also reviewed information produced by DECC on per unit revenues to suppliers from domestic consumers. Similar proportionate increases in gas and electricity values are visible, noting that these figures exclude VAT. Table 2:3 shows that the average selling value of electricity to UK domestic consumers increased by 79 per cent between 2003 and 2008 from 6.30p/kWh to 11.27p/kWh. The average selling value of gas increased by 110 per cent to 3.24p/kWh from 1.54p/kWh over the same period. These figures from DECC are UK-wide and exclude VAT.

Table 2:3: Average net selling value per kWh sold

(p/kWh)	Electricity	Gas
2003	6.30	1.54
2004	7.33	1.66
2005	7.88	2.04
2006	9.27	2.63
2007	9.73	2.69
2008	11.27	3.24

Source: Digest of UK Energy Statistics Table 1.7, DECC, Figures exclude VAT.

3. Supply chain costs: gas

In this section we attempt to quantify the proportion of the extra paid by household consumers for their gas in 2008 that can be accounted for by changes in supply chain costs compared with 2006 and our original baseline of 2003. Wherever possible we have based the assessments on independently published information, particularly that produced by the DECC.

3.1. Method

This Section considers trends in supply chain costs of gas to household consumers between 2003 and 2008. These costs are:

- fuel costs, covering wholesale gas and storage costs
- non-fuel costs, covering:
 - metering costs
 - network costs for use of the pipeline and wires systems
 - suppliers' cost to serve
 - taxes, obligations and levies

Wherever possible, in developing the assessments we have referenced independently published information or information sourced from third parties not directly involved in the sale of gas and electricity to household consumers.

3.2. Fuel costs

Our analysis suggests that the costs of fuel necessary to meet the demands of household gas consumers rose by £0.70 billion (14 per cent) between 2006 and 2008 from £5.30 billion to £6.00 billion. This contributed to a total five-year increase of £3.71 billion from £2.29 billion in 2003, or a rise of 162 per cent as Table 3:1 shows.

Of the increase between 2006 and 2008, the gas purchase cost accounted for £0.58 billion (86 per cent of the increase) with the balance from higher storage costs of £0.12 billion (14 per cent of the increase). Over the five-year period to 2008, gas purchase costs rose by £3.18 billion (148 per cent) with storage costs £0.53 billion (441 per cent) higher.

Fuel costs accounted for 49 per cent of the £12.27 billion spent by household consumers on gas in 2008, 53 per cent of the £10.04 billion spent in 2006 and 37 per cent of the £6.23 billion in 2003. They accounted for a little under two-thirds (62 per cent) of the £6.03 billion extra spent by consumers over the five-years to 2008 or a little under a third (31 per cent) of the £2.23 billion extra spent by householders between 2006 and 2008.

Table 3:1: Assessments of fuel costs to suppliers serving domestic gas consumers

(£bn)	2008	2006	2003	08 on 06	08 on 03
Household expenditure	12.27	10.04	6.23	2.23	6.03
<i>Supply chain fuel costs</i>					
Storage	0.65	0.54	0.12	0.12	0.53
Gas purchase	5.35	4.76	2.16	0.58	3.18
Total fuel	6.00	5.30	2.29	0.70	3.71
Residual	6.92	5.28	4.07	1.64	2.85

Below we outline in more detail the derivation of the figures in Table 3:1.

3.2.1. Wholesale energy

In order to assess changes in gas wholesale costs to suppliers, it is necessary to reach a view on the sources of that gas and typical prices charged for it by producers. After a review of the information sources available, we decided:

- DECC information on average prices received by producers from the UK Continental Shelf (UKCS) gas sales would be the most useful measure of the costs to suppliers of sourcing volumes from indigenous sources. This information is published every six months commencing 1 January and 1 July
- the best way to assess spend on imported gas volumes would be through a combination of HM Revenue & Customs (HMRC) information on the financial value of gas imports from liquefied natural gas (LNG) and pipelines sources and DECC information on their volumes⁷. Both information sources are available monthly, but we have aggregated them to a quarterly level to remove some volatility from individual figures while maintaining a seasonal pattern

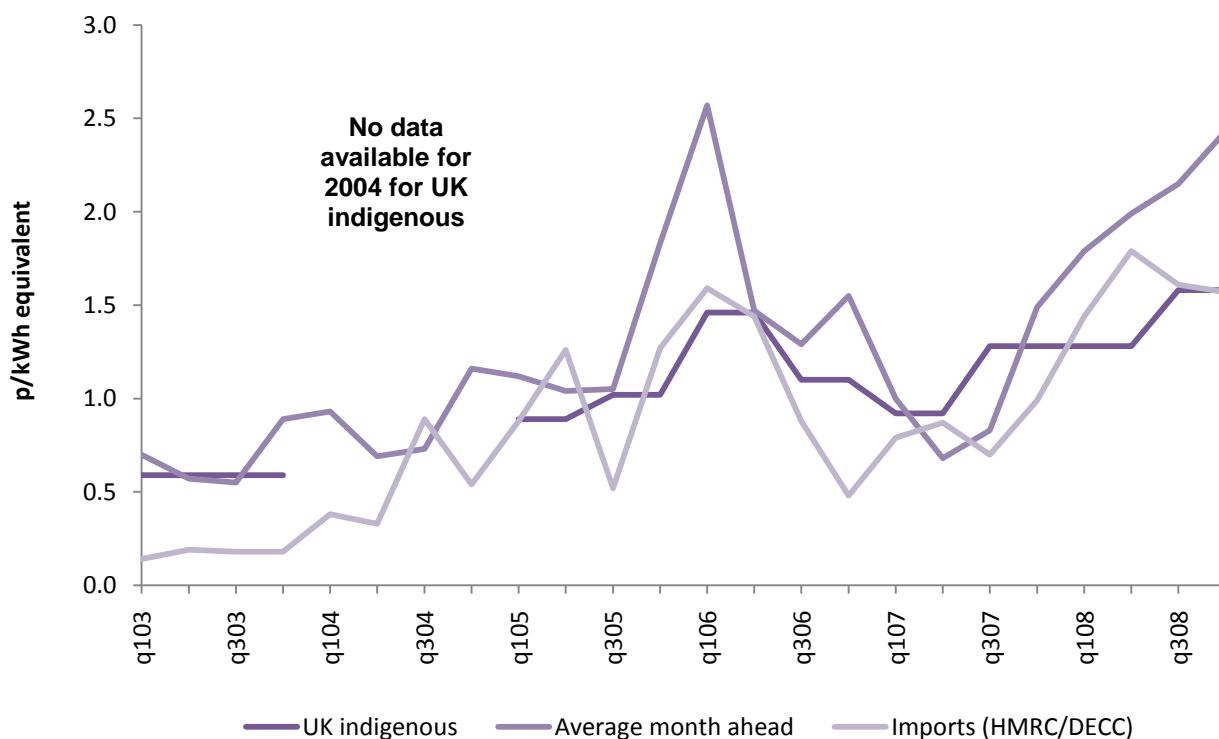
We recognise that there are issues around the comparability of these two price indicators, particularly on seasonality against domestic load. Further, some UKCS producer prices are recorded by DECC net of transportation system entry charges and others are gross. In addition, some UKCS prices will relate to production that is exported and cannot be separately assessed. Nevertheless we believe— given our focus is in relative cost changes – the approach we have taken is the most suited despite these complications.

There has been a notable increase in the share of gas demand met by imports since 2003. In that year gross imports as a share of total supply stood at 8 per cent. By 2006 the proportion had risen to 23 per cent, with 37 per cent recorded in 2008. We have assumed that domestic demand has been met proportionately by the share of gross imports to total demand because exports tend to occur in the summer months when household demand is at its lowest.

Figure 3:1 compares trends in the two chosen indicators of gas costs on a quarterly basis between 2003 and 2008 with average month-ahead prices. It can be seen that for the majority of the period costs paid to gas importers and revenues earned by UK producers were lower than traded month-ahead prices.

⁷ <http://bit.ly/960amS> (XLS 58KB)

Figure 3:1: Quarterly trends in assessed costs to suppliers of imported and indigenous produced gas



Combining the assumptions on prices and volumes yields estimates of suppliers' aggregate wholesale costs for gas for household consumers. As Table 3:2 shows, this estimate stands at £5.35 billion (1.46p/kWh) for 2008, up 12 per cent on the £4.76 billion (1.27p/kWh) assessed for 2006 and up 147 per cent on the £2.16 billion (0.56p/kWh) for 2003.

Table 3:2: Suppliers' aggregate wholesale costs of gas for domestic consumers

(£bn)	(£mn)	p/kWh equivalent
2003	2,163	0.56
2006	4,764	1.27
2008	5,346	1.46
08 on 06	582	0.19
08 on 03	3,183	0.90

3.2.2. Storage costs

We have adapted the turnover-based assumption for assessing aggregate annual storage costs used in our first report. Last time we inflated the turnover of Centrica Storage, the main provider of such services, by what we believed to be a very generous 50 per cent to account for the revenues of other operators. For this survey, having referenced the entry to the market by new facilities including Aldbrough, Hatfield Moor, Hole House Farm and Humbly Grove, we have decided to upgrade our inflation factor applied to Centrica Storage revenues for 2007 and 2008 to 100 per cent from the 50 per cent applied for 2006.

This approach yields assessments of costs of storage for suppliers of £123 million, £537 million and £654 million for 2003, 2006 and 2008 respectively. The 2008 figure is 22 per cent higher than the 2006 figure and 432 per cent higher than the 2003 figure. Table 3:3 provides more detail.

Table 3:3: Assessments of suppliers' costs for gas storage

(£mn)	Centrica Storage turnover	Uplift (50%)	Assessed total cost of storage to suppliers
2003	82	41	123
2004	164	82	246
2005	253	127	380
2006	358	179	537
2007	280	280	560
2008	327	327	654

3.3. Non-fuel costs

Our analysis suggests that the non-fuel costs of supplying household gas consumers rose by £1.47 billion (43 per cent) between 2003 and 2008, from £3.39 billion to £4.86 billion. Of this increase, £1.12 billion (76 per cent) occurred between 2006 and 2008. The biggest single contributor over the five-year period to 2008 was higher network costs (£0.54 billion/37 per cent), followed by VAT (£0.29 billion/20 per cent) and the costs of mandated energy efficiency programmes (£0.28 billion/19 per cent).

None of the six individually assessed components of the costs was ascribed a lower value in 2008 against either 2006 or 2003. The significant majority of the increases over the five years to 2008 in network (94 per cent) and energy efficiency costs (76 per cent) occurred after 2006.

Table 3:4: Assessments of other (non-fuel) costs to serve domestic gas consumers

(£bn)	2008	2006	2003	08 on 06	08 on 03
Household expenditure	12.27	10.04	6.23	2.23	6.03
Network	2.28	1.78	1.74	0.51	0.54
Metering	0.65	0.57	0.55	0.08	0.10
Suppliers' cost to serve	0.88	0.75	0.72	0.13	0.16
Energy efficiency (CERT/EEC)	0.36	0.15	0.08	0.21	0.28
Social tariffs	0.10	0.00	0.00	0.10	0.10
VAT	0.58	0.48	0.30	0.11	0.29
Total Non-fuel supply	4.86	3.73	3.39	1.12	1.47

Below we discuss in more detail the derivation of the figures in Table 3:4.

3.3.1. Network costs for use of the pipeline system

The gas transmission and distribution network operators levy their own charges for the use made by end-user consumers of their pipeline systems. The summary in Table 3:5 shows combined average gas transmission and distribution charges on an annual basis according to an equal weighting to each transmission exit charging region. The calculations are based on an annual consumption of 18,000kWh⁸ as indicative of a typical domestic consumption level.

On both per unit and aggregate measures, household consumers' transportation costs were very similar in 2006 to 2003 levels. But notable increases in average costs occurred between 2006 and 2008 with charging schedules incorporating notably higher rates from 1 October 2007.

Our aggregate assessment is that the cost of gas network services for household consumers in 2008 was £2.28 billion, some 31 per cent higher than 2003's £1.74 billion and 28 per cent up on 2006's £1.78 billion.

⁸ We are aware of a decline during 2003 to 2008 in average household gas consumption from 18 megawatt hour (MWh) to around 16MWh, but also note that the key variable for average transportation costs is the load factor (relationship between peak day and total use). To gain a consistent view of trends in charges we believe it is best to hold the load factor assumption unchanged. We have chosen a load factor of 34%. In any case our assessments account for the overall decline on consumption because the total spend on network costs is derived by multiplying an average cost assessment by an overall assessment of household consumption for each year derived from DECC figures.

Table 3:5: Estimated annual transportation costs paid by domestic gas consumers in GB

	Cost (p/kWh)	GB domestic gas consumption (TWh)	Cost to consumers (£bn)
2003	0.45	386.5	1.74
2004	0.46	396.4	1.81
2005	0.46	389.3	1.77
2006	0.47	373.9	1.78
2007	0.53	350.8	1.85
2008	0.62	365.7	2.28
08 on 06	0.15	-8.2	0.51
08 on 03	0.17	-20.8	0.54

Source: Charges from gas network operators. Mathematical average of the rates in force during the year in each National Transmission System (NTS) gas exit zone in GB based on a notional consumption of 18MWh and daily load factor of 34 per cent. Calculations by Cornwall Energy.

3.3.2. Metering

We have upgraded our 2006 cost assumptions to suppliers for meter asset provision and management by 6 per cent for Retail Price Index (RPI) inflation as outlined at Section 7.5.2. This approach means in 2008 suppliers paid £9 per year per meter for reading services against £8 per year per meter for 2006 and 2003. It also means they paid a £14 per year per meter charge for standard asset provision in 2008 against £12.50 per year per meter in 2006 and 2003, with the equivalent figures for prepayment meters being £75 (2008) and £70 (2006). Table 3:6 shows that costs to suppliers for metering for domestic gas consumers totalled nearly £575 million in 2006 compared with a little over £650 million two years later. The latter figure represents a 19 per cent increase on the figure for 2003 of just over £550 million due to a combination of the RPI related increase in costs plus higher numbers of meters.

Table 3:6: Assessments of gas metering costs borne by suppliers serving household consumers

2006	Per unit (£/meter)			Cost (£mn)		
	No. of meters	Asset	Reading	Asset	Reading	Total
Standard	19,267,261	12.5	8	241	154	395
Prepayment	2,300,000	70.0	8	161	18	179
Total	21,567,261			402	173	574

2008	Per unit (£/meter)			Cost (£mn)		
	No. of meters	Asset	Reading	Asset	Reading	Total
Standard	19,615,000	14	9	275	177	451
Prepayment	2,400,000	75	9	180	22	202
Total	22,015,000			455	198	653

Sources: Total meter numbers from Ofgem's Domestic retail market report March 2007 and Initial supply market probe report for 2008. Prepayment meter numbers from Ofgem's quarterly monitoring reports on suppliers' social obligations.

3.3.3. Suppliers' cost to serve

Using an indicative cost of £35 per account for 2003 and 2006 and upgraded to £40 per account for 2008 – as outlined in Section 7.5.1 – and figures for meter numbers on a one-for-one ratio for consumers, yields estimates of the total costs borne by suppliers in serving household gas users in 2003, 2006 and 2008 as shown in Table 3:7. It shows an increase of 22 per cent from £724 million in 2003 to £881 million in 2008, with the majority of the increase occurring between 2006 and 2008 due to the higher unit cost assumption.

Table 3:7: Assessments of suppliers' costs to serve domestic gas consumers

Costs to serve	2003	2006	2008
Number of accounts (million)	20.7	21.6	22.0
Cost per meter	35	35	40
Total cost (£ million)	724	755	881

3.3.4. Taxes, obligations and levies

Costs that are relevant here cover:

- energy savings programmes that suppliers are mandated to deliver
- social tariffs and bill rebates for vulnerable consumers
- VAT

3.3.4.1. Energy efficiency schemes

During 2003–08 suppliers with more than 50,000 household gas customers have faced additional overheads from having to deliver two separate regulated schemes intended to encourage domestic energy efficiency. The Energy Efficiency Commitment (EEC) applied for the period until 31 March 2008 when it was succeeded by the Carbon Emissions Reduction Target (CERT) – see Section 7.6.2.2.

We assessed the cost of compliance to suppliers at £3.80 per gas account for the first phase of the EEC (covering 2003–05) and £7 per gas account (covering 2006-07) for its second phase when increased targets applied.

We have assessed the cost of the CERT at £16.20 per gas account for 2008. As Table 3:8 shows these assumptions mean the costs borne by householders in their gas bills for funding energy savings measures rose to £357 million in 2008 from £78 million (a rise of 359 per cent) in 2003 and from £151 million (a rise of 136 per cent) in 2006.

Table 3:8: Estimated costs of energy and carbon savings schemes for domestic gas customers

	Accounts (mn)	Cost per account (£)	Total cost (£mn)	Scheme
2003	21	4	78	EEC
2004	21	4	78	EEC
2005	22	7	151	EEC
2006	22	7	151	EEC
2007	22	7	151	EEC
2008	22	16	357	CERT
08 on 06		9	206	
08 on 03		12	279	

3.3.4.2. Voluntary social measures

As outlined in Section 7.6.2.3 we have assumed a £100 million cost borne by household consumers in their gas bills due to the agreement with the Government for suppliers to fund voluntary social measures for vulnerable consumers in 2008. We have assumed no costs for this in either 2006 or 2003.

3.3.4.3. VAT

VAT has been levied at a constant 5 per cent on household gas bills throughout the period from 2003. The increases in gas costs levied by suppliers on consumers have therefore been magnified by this tax. VAT taken from domestic gas is estimated to have been £297 million in 2003, £478 million in 2006 and £584 million in 2008 as Table 3:9 shows. VAT on their gas bills cost consumers £287 million (97 per cent) more in 2008 than 2003 and £106 million (22 per cent) more in 2008 than 2006.

Table 3:9: Annual cost of VAT to on household gas bills

(£mn)	Reported spend	VAT	Pre-VAT
2003	6,231	297	5,934
2004	8,247	393	7,855
2005	8,167	389	7,778
2006	10,039	478	9,561
2007	9,893	471	9,422
2008	12,266	584	11,682
08 on 06	2,227	106	2,121
08 on 03	6,035	287	5,747

3.4. Conclusions on gas supply chain costs

In total, our estimates of the supply chain costs faced by suppliers serving household gas consumers were £1.82 billion (20 per cent) higher for 2008 than 2006 and £5.18 billion (91 per cent) higher for 2008 than 2003. As Table 3:10 shows they increased from £5.67 billion to £10.86 billion over that period.

Higher fuel costs contributed to nearly three-quarters (72 per cent) of the five-year increase in supply chain costs. But over the two years from 2006 to 2008 they accounted for a minority (38 per cent) of the total £1.82 billion rise. Non-fuel costs accounted for 28 per cent of the increase over five-years to 2008, but a majority (62 per cent) of the increase from 2006 to 2008.

At £5.18 billion our assessments of supply chain cost changes accounted for 86 per cent of the £6.03 billion increase in consumers' expenditure between 2003 and 2008 and £1.82 billion (82 per cent) of the £2.23 billion increase between 2006 and 2008.

Table 3:4: Supply chain costs for household gas, 2003, 2006 and 2008

(£bn)	2008	2006	2003	08 on 06	08 on 03
Household expenditure	12.27	10.04	6.23	2.23	6.03
Fuel costs	6.00	5.30	2.29	0.70	3.71
Non-fuel costs	4.86	3.73	3.39	1.12	1.47
Producer (upstream) profits	<i>included in fuel costs</i>			-	-
Supply chain costs	10.86	9.04	5.67	1.82	5.18

4. Supply chain costs: electricity

We have adopted the same approach for electricity as that applied to gas above of separating supply chain costs and profits. We define electricity supply chain costs as including:

- fuel costs covering feedstock costs to generators at the power station and their costs of carbon; and
- non-fuel costs covering:
 - metering costs
 - network charges for use of the wires system
 - suppliers' cost to serve
 - taxes, obligations and levies

4.1. Fuel

Our analysis suggests that the cost of fuel burned to meet the demands of household electricity consumers rose by £2.57 billion between 2003 and 2008, from £1.77 billion to £4.34 billion. Of this £2.57 billion increase over five years, increases in gas costs accounted for nearly half (£1.25 billion/49 per cent), followed by coal with 19 per cent (£0.48 billion) and carbon with 15 per cent (£0.38 billion).

Higher gas costs of £0.71 billion also accounted for 50 per cent of the increase in fuel costs seen over the two years to 2008. Higher coal (£0.27 billion) and carbon costs (£0.26 billion) each accounted for a further 19 per cent of the 2006–08 increase.

In contrast to household gas bills, fuel costs accounted for a consistently growing portion of household power bills during 2003 and 2008. They rose from 23 per cent (£1.77 billion) of a total £7.73 billion spend in 2003 to 26 per cent (£2.93 billion) of 2006's £11.07 billion and 32 per cent (£4.3 billion) of 2008's £13.6 billion as Table 4:1 shows.

Table 4:1 Assessments of generation fuel costs to serve domestic electricity consumers

(£bn)	2008	2006	2003	08 on 06	08 on 03
Total spend by households	13.60	11.07	7.73	2.54	5.87
Supply chain costs - fuel					
Gas	1.89	1.18	0.64	0.71	1.25
Coal	0.90	0.63	0.42	0.27	0.48
Oil	0.11	0.09	0.03	0.03	0.08
Nuclear-operating	0.64	0.55	0.49	0.09	0.15
Imports	0.16	0.14	0.06	0.02	0.11
Carbon	0.38	0.12	0.00	0.26	0.38
Balancing services	0.26	0.23	0.14	0.03	0.12
Total fuel costs	4.34	2.93	1.77	1.41	2.57

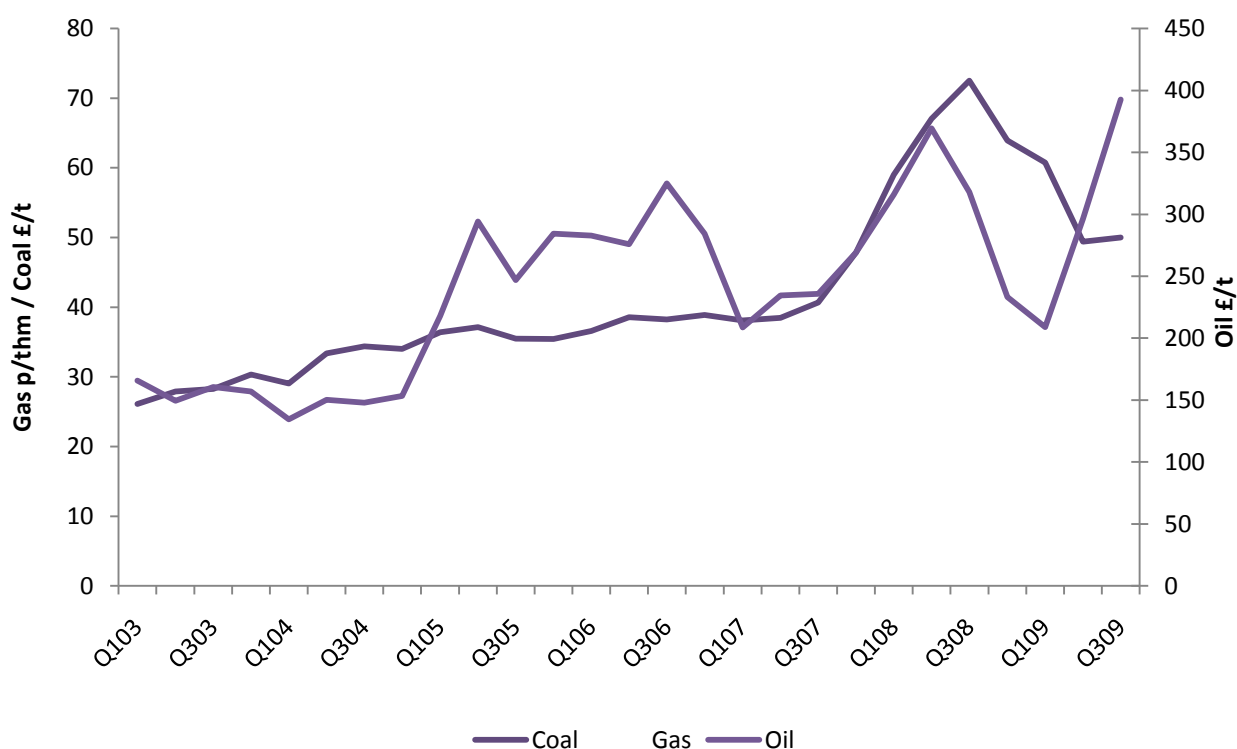
Below we outline in more detail the derivation of the figures in Table 4:1.

4.1.1. Feedstock costs to generators

DECC produces quarterly indicators of the input costs of fossil fuels to generators for feedstock use, shown in Figure 4:1. During the period 2003–08, key changes in these indicators included:

- a generally rising trend in the input costs to generators of all three fossil fuels, with times of particularly high rates during 2005–06 and 2008
- lulls in gas and oil input costs occurred during 2003–04 and 2007. But until the latter part of 2008, coal costs were on a sustained and accelerating long-term rising trend
- at 48p per therm (thm) average gas input costs to generators in 2008 were 142 per cent above the 20p/thm recorded for 2003 and 28 per cent above the 38p/thm recorded for 2006
- at £66 per tonne (t) average coal input costs to generators in 2008 were 133 per cent above the £28/t recorded for 2003 and 72 per cent above the £38/t recorded for 2006
- at £309/t average oil input costs to generators in 2008 were 96 per cent above the £158/t recorded for 2003 and 27 per cent above the £243/t recorded for 2006

Figure 4:1: Trends in input fossil fuel costs to generators



Source: Energy Prices, DECC, Table 3.2.1 Average prices of fuels purchased by the major UK power producers and of gas at UK delivery points.

We have combined these figures with data on fuel used by major power station capacity fired by each fuel to estimate annual spends by generators.

Table 4:2 shows the results of these calculations. The key points are:

- at £2.68 billion coal costs paid by generators are estimated to be £1.41 billion (111 per cent) higher in 2008 than 2003 and £0.78 billion (41 per cent) higher than in 2006

- at £0.34 billion oil costs paid by generators are estimated to be £0.23 billion (223 per cent) higher in 2008 than 2003 and £0.08 billion (31 per cent) higher than in 2006
- at £5.65 billion gas costs paid by generators are estimated to be £3.71 billion (191 per cent) higher in 2008 than 2003 and £2.09 billion (59 per cent) higher than in 2006

Overall fossil fuel costs to generators in 2008 are assessed at £8.67 billion, some 52 per cent more than the £5.71 billion estimated for 2006 and 161 per cent more than 2003's £3.32 billion.

Table 4:2: Assessment of costs of fuel for major power generators

(£mn)	Coal	Oil	Gas	Total
2003	1,270	104	1,940	3,315
2004	1,406	84	2,317	3,806
2005	1,632	203	2,951	4,786
2006	1,897	257	3,557	5,711
2007	1,910	182	3,931	6,022
2008	2,679	336	5,650	8,665
08 on 06	782	79	2,093	2,954
08 on 03	1,409	232	3,710	5,350

Source: Calculations by Cornwall Energy based on quarterly data from DECC's Digest of UK Energy Statistics (Table 5.3 Fuel used in electricity generation by major producers) and Energy Prices (Table 3.2.1 Average prices of fuels purchased by the major UK power producers and of gas at UK delivery points).

We note that DECC records total gas costs borne by all generators as opposed to major producers only in 2008 at £6.30 billion, 2006 at £3.97 billion and 2003 at £2.21 billion in the *2009 Digest of UK Energy Statistics* (Table 1.7), which supports the cost trend we have estimated for this fuel.

As we outline in Section 7.2.1, we believe households account for around a third of British power demand. Therefore applying annual ratios of domestic to total British consumption derived from Table 7:1 to the calculations in Table 4:2 suggests that in 2008 household consumers paid:

- £478 million (114 per cent up) of the extra coal costs faced by generators in comparison with 2003 and £269 million (43 per cent up) against a 2006 baseline
- £78 million (227 per cent up) of the extra oil costs faced by generators in comparison with 2003 and £27 million (32 per cent up) against a 2006 baseline
- £1.25 billion (195 per cent up) of the extra gas costs faced by generators in comparison with 2003 and £713 million (61 per cent up) against a 2006 baseline

This totals £1.81 billion more in 2008 against 2003 and £1.01 billion more in 2008 against 2006.

Table 4:3: Assessment of costs of fossil fuel for major power generators for electricity supplied to household consumers

(£mn)	Coal	Oil	Gas	Total
2003	419	34	640	1,094
2004	462	28	762	1,252
2005	538	67	973	1,578
2006	628	85	1,178	1,892
2007	622	59	1,280	1,961
2008	897	113	1,892	2,901
08 on 06	269	27	713	1,009
08 on 03	478	78	1,251	1,807

We have taken a different approach to reviewing changes in cost for nuclear generation, which over the 2003–08 period accounted for a declining proportion of UK power generation from around a quarter to around a sixth. We have reviewed financial reports from British Energy that set out its average cost of production on an annual basis, although we note that this information ceased to be published after 30 September 2008 because of its takeover by EDF⁹.

The British Energy accounting statements suggest operating costs for that company (including its coal and nuclear interests) of around £16.50 per megawatt hour (MWh) in 2003, £27/MWh in 2006, £30/MWh for the year ending 31 March 2008 and £41/MWh for the six months commencing 1 April 2008. As nuclear plant accounted for 83 per cent (9.6 of 11.5GW) of British Energy’s capacity, we have assumed nuclear generation costs formed the majority determinant of these figures and used them as representative for the technology as a whole.

We also note a Nuclear Decommissioning Agency report – *Implications of extending operational lifetime of Wylfa* – that suggested power stations’ operating costs at 2006 were equivalent to £24.20/MWh produced¹⁰.

Therefore we estimate indicative unit operating costs for nuclear power generation as set out in Table 4:4. These assumptions combined with DECC information on aggregate nuclear production suggest nuclear generation costs of £1.35 billion in 2003, £1.66 billion in 2006 and £1.91 billion in 2008. Scaling back these amounts to the share of demand represented by householders implies nuclear generation costs for domestic consumers at £638 million in 2008, up 16 per cent on the £596 million for 2006, and 43 per cent on the £446 million for 2003. These figures assume household consumers used nuclear-generated power proportionate to the technology’s overall contribution to the British electricity mix.

⁹ <http://bit.ly/aMtcyU>

¹⁰ <http://bit.ly/9cqD5Z> (PDF 172KB)

Table 4:5: Assessments of costs in supplying households with power from nuclear generators

	Output (TWh)	Average cost £/MWh	Total cost (£mn)	Domestic share (£mn)
2003	82	17	1,351	446
2006	61	27	1,659	549
2007	57	30	1,717	559
2008	48	40	1,907	638
08 on 06	-14	13	249	89
08 on 03	-34	24	556	193

4.1.2. Power imports

Indicative costs for imports have been derived from annualised DECC data on total spend and volumes for power from this source. Table 4:5 shows how the total cost of imports rose from £170 million in 2003 to £485 million (up 85 per cent) in 2008. Over the two years from 2006 to 2008 the increase was 15 per cent from £420 million to £485 million. Proportionate by market volume, the cost to households was £56 million in 2003, £139 million in 2006 and £162 million in 2008 as Table 4:5 shows.

Table 4:5: Assessments of costs in supplying households with power from nuclear generators

	Value (£mn)	Volume (TWh)	Unit value (£/MWh)	Domestic share (£mn)
2003	170	5.1	33.2	56
2004	345	9.8	35.3	114
2005	440	11.2	39.4	145
2006	420	10.3	40.9	139
2007	240	8.6	27.8	78
2008	485	12.3	39.5	162
08 on 06	65	2.0	-1.4	23
08 on 03	315	7.2	6.2	106

4.1.3. Carbon

Since its inception in 2005 fossil fuel generators have had to redeem permits for the EU Emissions Trading Scheme (ETS) equivalent to their calculated emissions of carbon. The majority of these permits were issued for free in both 2006 and 2008. In 2006 – the second of three years in the scheme’s introductory phase – this was equivalent to 72 per cent of their output for major coal, oil and gas generators. By 2008 – the first year of the scheme’s five-year second phase – that proportion had declined to 40 per cent.

We have referenced market carbon prices and information reported by generators in assessing the amount spent by the wider power generation sector on EU ETS carbon allowances in both 2008 and 2006. We have assessed a typical cost for fossil fuel power generators in 2008 of £18 per allowance and for 2006 of £9 per allowance as Section 7.4.3 outlines.

This cost equates to total costs for all demand:

- for 2008 of £1.11 billion, given a requirement to buy 61.9 million allowances at an average cost of £18 per allowance. Apportioned on a pro-rata volume basis to domestic consumers, this equates to £383 million
- for 2006 of £365 million, given a requirement to buy 40.7 million allowances at an average cost of £9 per allowance. Apportioned on a pro-rata volume basis to domestic consumers, this equates to £131 million

The increase in carbon costs pro-rated to domestic users between 2006 and 2008 is 222 per cent.

4.1.3.1. Balancing services costs

Balancing services costs – outlined in Section 7.4.4 – incurred by domestic consumers are estimated as rising from £138 million in 2003 to £227 million in 2006 and £256 million in 2008, a two-year rise of 13 per cent (£29 million) and a five-year-rise of 86 per cent (£118 million). These figures are based on a share of total balancing services costs incurred in those years that reflects the household proportion of overall electricity demand.

4.2. Non-fuel costs

Our analysis suggests that the non-fuel costs of supplying household electricity consumers rose by £2.05 billion (47 per cent) between 2003 and 2008 from £4.34 billion to £6.39 billion. Over the two years to 2008 the increase was 22 per cent (£1.15 billion) from £5.23 billion to £6.39 billion.

Over the five years to 2008, system losses – which we have estimated by a difference sum related to final prices – accounted for the largest single share at 23 per cent (£470 million), with the costs of energy savings measures the next highest at 17 per cent (£344 million). In total non-fuel costs accounted for 56 per cent of the £7.73 billion spent by household consumers on electricity in 2003, 47 per cent of the £11.07 billion spent in 2006 and 47 per cent of the £13.6 billion spent two years later. They therefore accounted for 35 per cent of the £5.87 billion extra spent by consumers on electricity in 2008 compared with 2003 as Table 4:6 shows. Over a two-year time frame to 2008, they accounted for 45 per cent of the £2.54 billion increase in consumers' expenditure.

Table 4:6: Assessments of non-fuel costs to serve domestic electricity consumers

(£bn)	2008	2006	2003	08 on 06	08 on 03
Transmission network use of system	0.37	0.31	0.19	0.06	0.18
Distribution network use of system	1.86	1.74	1.61	0.12	0.25
Metering	0.62	0.54	0.53	0.08	0.09
Network losses	0.97	0.78	0.50	0.19	0.47
Social tariffs	0.03	0.00	0.00	0.03	0.03
Suppliers' cost to serve	1.09	0.91	0.90	0.18	0.19
Renewables Obligation	0.37	0.26	0.15	0.12	0.23
Energy savings (CERT/EEC)	0.44	0.18	0.10	0.26	0.34
VAT	0.65	0.53	0.37	0.12	0.28
Total non-fuel supply costs	6.39	5.24	4.34	1.15	2.05

Below we discuss in more detail the derivation of the figures in Table 4:6.

4.2.1. Network charges

We consider transmission and distribution network use of system charges separately, but use the same basic approach. This approach derives an indicative annual unit cost for each year on a GB-wide basis from published schedules effective at each 1 April, and multiplies it by an appropriate assessment of the volume requirement to derive an estimate of total costs to household consumers.

4.2.1.1. Transmission

Transmission network use of system charges (TNUoS) for small users have been stable across GB since April 2005. For our calculations, the charging structure outlined in Section 7.6.1.1 has been applied consistently across a sample profile from each of the charging regions in GB and we have then derived an average figure. This average figure is shown in Table 4:7. It is assumed that electricity equivalent to 14.3 per cent—the proportion of all electricity take from the National Grid in 2006/07 during the three-hour charging period used by network operator—of domestic consumption attracts this charge. For the years prior to 2005, the average charge has been calculated on an England and Wales basis only as Scottish charges were not separately itemised for these users before that date.

It can be seen that transmission network use of system costs that can be allocated to domestic consumers increased by 94 per cent (£177 million) between 2003 and 2008 and 20 per cent (£61 million) between 2006 and 2008. It is estimated that households paid £366 million in transmission network use of system charges in 2008, up from £189 million in 2003 and £305 million in 2006.

Table 4:7: Estimated annual transmission network use of system costs for domestic electricity users in GB

	GB average charge (p/kWh)	Assumed charging volume (TWh)	Cost to consumers (£mn)
2003	1.17	16.1	189
2004	1.61	16.1	259
2005	1.71	16.5	281
2006	1.86	16.4	305
2007	2.00	16.0	320
2008	2.23	16.4	366
08 on 06	0.37		61
08 on 03	1.06		177

4.2.2. Distribution

As noted in Section 7.6.1.2, distribution use of system (Duos) charges vary according to region and the supply terms under which a consumer is served. In the domestic sector the key distinction is between unrestricted terms where the consumption unit rate is the same regardless of the time of use and Economy 7 or Off-peak (from now described as 'Economy 7') terms where a lower rate applies for use in a defined time period. The effect on Duos charges is for lower average costs for Economy 7 users compared with unrestricted users. With approximately one-third of household electricity consumed on

Economy 7 terms, it is an important distinction to incorporate into estimates of total use of system charges paid by households.

Table 4:8 shows the annual indicators of distribution use of system costs faced by unrestricted and Economy 7 domestic consumers in GB.

Table 4:8: Estimated annual distribution costs for an unrestricted domestic electricity user

(p/kWh)	Unrestricted (single rate)	Economy 7 (two rate)
2003	1.63	1.02
2004	1.55	0.97
2005	1.66	1.05
2006	1.71	1.12
2007	1.78	1.17
2008	1.80	1.20
08 on 06	0.10	0.08
08 on 03	0.17	0.18

Source: Charges from electricity DNOs. Mathematical average of the rates in force at 1 April each year for all 14 electricity distributors in GB based on a consumption of 3.3MWh for standard/single rate and for Economy 7/two rate, 6.6MWh of which 54 per cent is off-peak. Calculations by Cornwall Energy.

The ratio of domestic electricity consumed in GB on standard terms and that consumed on Economy 7 or other off-peak terms has been around 2:1 over the period 2003-08, although the share allocatable to standard terms has been increasing slightly. Applying the annual ratios to aggregate domestic consumption and the average cost indicators derived above yields the values shown in Table 4:9.

Table 4:9: Estimated annual distribution costs paid by domestic electricity consumers in GB

	Average distribution cost (p/kWh)	GB domestic consumption (TWh)	Cost to households (£mn)
2003	1.43	112.7	1,611
2004	1.36	112.4	1,527
2005	1.46	115.1	1,681
2006	1.51	114.8	1,738
2007	1.59	112.0	1,786
2008	1.62	114.7	1,855
08 on 06	0.10	-0.1	117
08 on 03	0.19	2.0	244

Source: calculations by Cornwall Energy.

It can be seen that distribution use of system costs borne by household consumers in 2008 were around 7 per cent higher – £117 million – than 2006 and 15 per cent higher – £244 million – than 2003.

4.2.3. Metering

We have assumed typical costs for asset provision and meter reading in the midpoint of the ranges we have researched (and set out in Section 7.5.2) for standard credit and prepayment meters. Table 4:10 shows these assumptions and the assessed aggregate costs to suppliers rising by 15 per cent between 2006 and 2008 to £620 million from £539 million. The 2008 figure is 18 per cent higher than the £526 million calculated for 2003 in our first report. The increases are due to higher meter numbers and the RPI-related increase we have applied for the 2008 costs compared with 2006.

Table 4:10: Assessments of electricity metering costs borne by suppliers serving household consumers

2006	Per unit			Total (£mn)		
	No. of meters	Asset	Reading	Asset	Reading	Total
Standard	22,330,000	10	8	223	179	402
Prepayment	3,600,000	30	8	108	29	137
Total	25,930,000			331	207	539

2008	Per unit			Total (£mn)		
	No. of meters	Asset	Reading	Asset	Reading	Total
Standard	23,600,000	11	9	260	212	472
Prepayment	3,600,000	32	9	115	32	148
Total	27,200,000			375	245	620

4.2.4. Network losses

We have assumed an aggregate figure of 12 per cent for electrical losses consisting of an average 2 per cent for losses from the transmission system and an average 10 per cent for losses from the distribution system. We have applied this percentage to the residual cost figure yielded from deducting our assessments of aggregate VAT, networks, balancing services use of system, metering, Renewables Obligation, energy efficiency and social tariff costs from total consumer expenditure.

This calculation has been undertaken for 2003, 2006 and 2008 and yielded assessments for the cost of system losses of £499 million, £782 million and £969 million respectively. These figures represent a five-year increase (2003 to 2008) of 94 per cent and a two-year increase (2006 to 2008) of 24 per cent.

4.2.5. Suppliers' cost to serve

Using the £35 per account indicator for 2003 and 2006 and £30 per account for 2008 – their derivation is explained in Section 7.5.2 – and the figures for meter numbers on a one-for-one ratio with consumers, yields the estimates of the total costs borne by suppliers in serving household electricity users in 2003, 2006 and 2008 shown in Table 4:11. The increase from £903 million in 2003 to £908 million in 2006 is driven by the increase in the assessed number of meters between the two years. The increase to £1.09 billion in 2008 is driven by a combination of increasing meter numbers and the higher cost assessment. Overall suppliers' cost to serve electricity customers rose 20 per cent between 2003–06 and 2008

Table 4:11: Assessments of suppliers' costs to serve domestic electricity consumers

Costs to serve	2003	2006	2008
Number of accounts	25,814	25,930	27,200
Cost per meter	35	35	40
Total cost (£mn)	903	908	1,088

4.2.6. Taxes, obligations and levies

Charges that are relevant here arise from:

- the Renewables Obligation
- energy efficiency measures mandated on suppliers
- social tariffs
- VAT

4.2.6.1. The Renewables Obligation

The Renewables Obligation (RO) (see Section 7.6.2.1) has been in force since April 2002 and applies on a financial year basis. In 2003 – its second year of operation – the interaction of the buyout price and the obligation percentage capped the cost to domestic consumers in GB at an estimated £148 million. Subsequent increases in both the buyout price, which is tied to inflation, but in particular the obligation percentage which is set to increase by almost 1 percentage point steps each year, meant that for the 12 months commencing 1 April 2006 it rose to £256 million and to £373 million for the year commencing 1 April 2008. As Table 4:12 shows we have applied these figures on a calendar year basis in this analysis, and our assessment of RO costs for 2008 is 46 per cent above that for 2006 and 152 per cent above that for 2003.

These calculations assume the costs of the RO are shared proportionately by suppliers across their domestic and non-domestic consumer bases.

Table 4:12: Estimated annual costs of the RO to British householders

Year from	Obligation proportion	Buyout £/MWh	Buy out equivalent (p/kWh)	Domestic TWh	Maximum cost to domestic GB consumers (£mn)
01/04/2003	4.3%	30.51	0.13	112.7	148
01/04/2004	4.9%	31.39	0.15	112.4	173
01/04/2005	5.5%	32.33	0.18	115.1	205
01/04/2006	6.7%	33.24	0.22	114.8	256
01/04/2007	7.9%	34.30	0.27	112.0	303
01/04/2008	9.1%	35.71	0.32	114.7	373
08 on 06	2.4%	2.47	0.10	-0.1	117
08 on 03	4.8%	5.20	0.19	2.0	225

Sources: Renewables Obligation (proportions) – Renewables Order 2002, Ofgem (Buyout values). Calculation of cost to GB consumers by Cornwall Energy.

4.2.6.2. Energy efficiency schemes

We believe, as outlined in Section 7.6.2.2, the Energy Efficiency Commitment was delivered by suppliers at a cost of £3.80 per electricity account in 2003 and £7 per electricity account in 2006. We have assessed the cost of the CERT at £16.20 per electricity account for 2008. These assumptions yield a total cost to household electricity consumers shown in Table 4:13. In total terms, this assessment means an increase of £85 million in 2006 to £182 million from £97 million in 2003 in the amount paid by household electricity consumers, and a further £259 million for 2008 on 2006. The cost to consumers of mandated measures for energy efficiency in 2008 was 143 per cent higher than in 2006 and 354 per cent higher than in 2003.

This assumes that there is one electricity meter per household account, a slight overestimate.

Table 4:13: Estimated annual costs of mandated energy efficiency measures to British householders

	Electricity meters (mn)	EEC per household	Cost of electricity EEC (£mn)
2003	25.8	3.76	97
2004	25.9	3.76	97
2005	25.9	7.00	182
2006	25.9	7.00	182
2007	25.9	7.00	182
2008	27.2	16.20	441
08 on 06	1.27	9.2	259
08 on 03	1.39	12.4	344

4.2.6.3. Voluntary social measures

As explained in Section 7.6.2.3 we have assumed a £30 million cost borne by household consumers in their electricity bills¹¹ due to the agreement with the Government for suppliers to fund voluntary social measures for vulnerable consumers in 2008. We have assumed no costs for this in either 2006 or 2003.

4.2.6.4. VAT

VAT has been levied at a constant 5 per cent on household electricity bills throughout the period from 2003. The increases in electricity costs to consumers have therefore been magnified by this tax. VAT taken from domestic electricity is estimated to have been £355 million in 2003, £527 million in 2006 and £648 million in 2008 as Table 4:14 shows. These figures represent a five-year (2003 to 2008) increase of 83 per cent and a two-year increase of 23 per cent.

¹¹ As we explain in section 4.3, the bulk of the actual cost incurred by suppliers has been on gas customers.

Table 4:14: Annual cost of VAT to on household electricity bills

(£mn)	Reported spend	VAT	Pre-VAT
2003	7,445	355	7,091
2004	8,892	423	8,469
2005	9,423	449	8,975
2006	11,069	527	10,542
2007	11,483	547	10,936
2008	13,604	648	12,956
08 on 06	2,535	121	2,415
08 on 03	6,159	293	5,866

4.3. Conclusions on electricity supply chain costs

In total our estimates of the supply chain costs faced by suppliers serving household electricity consumers were £2.69 billion (31 per cent) higher for 2008 than 2006 and £4.62 billion (75 per cent) higher for 2008 than 2003. They accounted for 79 per cent of spend in 2008, 74 per cent in 2006 and 79 per cent in 2003.

Increases in supply chain costs account for 79 per cent of consumer expenditure increases during 2003 to 2008 and more than 100 per cent of that between 2006 and 2008.

Table 4:15: Supply chain costs for household electricity – 2003, 2006 and 2008

(£bn)	2008	2006	2003	08 on 06	08 on 03
Household expenditure	13.60	11.07	7.73	2.54	5.87
Fuel costs	4.34	2.93	1.77	1.41	2.57
Non-fuel costs	6.39	5.24	4.34	1.15	2.05
Supply chain costs	13.28	10.59	6.48	2.69	6.80

5. Producer profits

In this section we assess information available on the profits made from producing electricity and gas upstream for ultimate consumption by British household consumers during 2003 to 2008.

5.1. Method

We first set out trends in profits in the producer (upstream) chain providing gas and electricity to British household consumers between 2003, 2006 and 2008. These profits are derived from gas production and power generation.

Downstream profits are considered in Section 6.5.

5.2. Gas

The approach we have taken means that effectively upstream gas sector profits are treated as part of the cost of gas to suppliers as outlined in Section 7.4.1. We acknowledge this area of the market is very opaque limiting the scope for our assessments.

5.3. Electricity

In total our estimates of the upstream profits made from meeting the needs of household consumers are £2.18 billion higher for 2008 than 2003 – £2.55 billion against £0.36 billion – and £0.12 billion higher for 2008 than 2006, when an amount of £2.43 billion was assessed. Capacity fired by fossil fuels became considerably more profitable during 2003 to 2006, albeit starting from a very low baseline. Profits on gas generation continued to widen thereafter, but those on oil and coal slid away as international energy markets raced to record highs. Nuclear profits dipped between 2008 and 2006 after rising between 2003 and 2006.

As Table 5:1 shows, electricity producer profits accounted for 5 per cent of the £7.73 billion spent by households on electricity in 2003, 22 per cent of the £11.07 billion spent three years later and 19 per cent of the £13.6 billion spent in 2008. Thus they accounted for 37 per cent of the £5.87 billion expenditure increase between 2003 and 2006 and 5 per cent of the £2.54 billion increase between 2006 and 2008.

Table 5:1 Upstream profits from producing electricity for domestic consumers 2003, 2006 and 2008

(£bn)	2008	2006	2003	08 on 06	08 on 03
Producer margins – gas	1.59	0.82	0.16	0.77	1.44
Producer margins – coal & oil	0.79	1.40	0.20	-0.61	0.59
Producer margins – nuclear	0.16	0.20	0.00	-0.04	0.16
Total profits	2.55	2.43	0.36	0.12	2.18

5.3.1. Producer margins

There is relatively little consistent, regularly published information on the profits made by power generators on a stand-alone basis from producing electricity in GB. To obtain a view of generator profits across a meaningful portion of the market, it is necessary to read across from an assessment of margins, net of carbon costs, made by individual operators – sometimes with a small market share – for the main technologies: coal, gas and nuclear.

As discussed in Section 7.7, two sources of information on power producer profits are regularly available from listed fossil-fuel generation companies—International Power and Drax Group. However, this information does not cover the full period from 2003 to 2008, commencing at 2005 and 2004 respectively. We have also reviewed accounting information from British Energy as representative of the profits earnable by nuclear producers.

Based on this information we estimate that profit margins net of carbon costs made by generators between 2003, 2006 and 2008:

- increased from £5/MWh (2003) to £20/MWh (2006) and then £30/MWh (2008) for gas-fired plant
- increased from £7/MWh (2003) to £30/MWh (2006), but then dipped back to £20/MWh (2008) for coal- and oil fired plant
- increased from zero in 2003 to £10/MWh for both 2006 and 2008 for nuclear capacity

These figures have been multiplied by production volumes in each of the two years to derive the total gross profit assessments shown in Table 5:2.

Table 5:2: Generator profit indicators and volumes 2003, 2006 and 2008

Year	Profit indicator (£/MWh)			Volume to domestics (TWh)		
	Gas	Coal and oil	Nuclear	Gas	Coal and oil	Nuclear
2003	5	7	0	42.3	42.8	27.0
2006	20	30	10	41.1	46.8	20.3
2008	30	20	10	53.2	39.5	16.0

Source: Profit figures assessed by Cornwall Energy. Volume produced from DECC, Digest of UK Energy Statistics Table 5.1.3. Figures for production from conventional thermal generation used as indicative of coal and oil production. Profit assessments are net of carbon costs.

We have allocated a share of the assessed profits as earned from domestic consumers according to the share of national demand these users represent. This proportion was in the range 32-33 per cent in 2003, 2006 and 2008. This suggests the indicators of gross sector profit shown in Table 5.3 totalling £2.55 billion in 2008, 5 per cent up on 2006's £2.43 billion and 400 per cent up on 2003's £0.51 billion. Gas generation profits in 2008 at £1.59 billion were 94 per cent higher than the £0.82 billion from 2006 and 657 per cent higher than 2003's £0.21 billion. Coal and oil generation profits in contrast fell from 2006 to 2008 by 44 per cent to £0.79 billion from £1.40 billion. But they were still 163 per cent higher than the £0.30 billion seen in 2003.

Nuclear generators earned profits of £160–200 million in 2006 and 2008 compared with zero in 2003.

It is worth noting that the level of profits made from power generation around the 2003 period which was coincident with a collapse in wholesale power prices was seen by many observers as extremely – if not unsustainably – low.

Table 5:5: Generator profit indicators 2003, 2006 and 2008

From domestic users

(£bn)	Gas	Coal and oil	Nuclear	All
2003	0.21	0.30	0.00	0.51
2006	0.82	1.40	0.20	2.43
2008	1.59	0.79	0.16	2.55
08 on 06	0.77	-0.61	-0.04	0.12
08 on 03	1.38	0.49	0.16	2.03

Source: Cornwall Energy assessment.

6. Adding it all up

In this section, we draw together the separate analyses of changes to supply chain costs and profits, and householders' electricity and gas bills between 2003, 2006 and 2008. We then briefly discuss how much of the difference our analysis has been able to explain and where the gaps might be. In particular we consider the downstream profits from supplying households with gas and power.

6.1. Gas

Household expenditure on gas increased from £6.23 billion in 2003 to £10.04 billion in 2006 and £12.27 billion in 2008. Over the same period our assessments of total supply chain costs increased from £5.67 billion (2003) to £9.04 billion (2006) and £10.86 billion (2008), as Table 6:1 shows. Supply chain costs accounted for 94–96 per cent of expenditure in each of the three years, with the fuel costs increasing as a proportion of expenditure from 37 per cent to 49 per cent between 2003 and 2008, but peaking at 53 per cent in 2006.

Table 6:1: Trends in supply chain costs of gas to householders 2003, 2006 and 2008

(£bn)	2008	2006	2003	08 on 06	08 on 03
Household expenditure	12.27	10.04	6.23	2.23	6.03
Fuel costs	6.00	5.30	2.29	0.70	3.71
Non-fuel costs	4.86	3.73	3.39	1.12	1.47
Producer profits	<i>included in fuel costs</i>			-	-
Supply chain costs	10.86	9.04	5.67	1.82	5.18
Gap	1.41	1.00	0.56	0.41	0.85

6.2. Electricity

Household expenditure on electricity increased from £7.73 billion in 2003 to £11.07 billion in 2006 and £13.6 billion in 2008. Over the same period our assessments of total supply chain costs including producer profits increased from £6.48 billion (2003) to £10.59 billion (2006) and £13.28 billion (2008), as Table 6:2 shows. Supply chain costs accounted for 84–98 per cent of expenditure in each of the three years. Non-fuel costs were the biggest single component in each of the three years. But their share declined from 56 per cent in 2003 to 47 per cent in 2006 and 2008. Producer profits accounted for 5 per cent of household expenditure in 2003, rising to 22 per cent in 2006 and 19 per cent in 2008, while fuel costs increased to 32 per cent (2008) from 26 per cent (2006) and 23 per cent (2003).

Table 6:2: Trends in supply chain costs of electricity to householders 2003, 2006 and 2008

(£bn)	2008	2006	2003	08 on 06	08 on 03
Household expenditure	13.60	11.07	7.73	2.54	5.87
Fuel costs	4.34	2.93	1.77	1.41	2.57
Non-fuel costs	6.39	5.24	4.34	1.15	2.05
Producer profits	2.55	2.43	0.36	0.12	2.18
Supply chain costs	13.28	10.59	6.48	2.69	6.80
Gap	0.33	0.48	1.26	-0.15	-0.93

6.3. Gas and electricity

Household expenditure on gas and electricity increased from £13.96 billion in 2003 to £21.11 billion in 2006 and £25.87 billion in 2008. Over the same five-year period our assessments of total supply chain costs increased from £12.15 billion (2003) to £19.63 billion (2006) and then to £24.13 billion (2008), as Table 6:3 shows. Supply chain costs accounted for between 87–93 per cent of expenditure in each of the three years. Non-fuel costs were the biggest single component in each of 2003, 2006 and 2008, but their share declined from 55 per cent to 42 per cent in 2006 before rising slightly to 43 per cent in 2008. On the other hand fuel costs rose from 29 per cent (2003) to 39 per cent (2006) and 40 per cent (2008), while producer (upstream) profits to 10 per cent in 2008 from 3 per cent in 2003 via 12 per cent in 2006. The gap we have identified by implication was at 7 per cent in 2006 and 2008 compared with 13 per cent in 2003.

Table 6:3: Trends in supply chain costs of gas and electricity to householders 2003, 2006 and 2008

(£bn)	2008	2006	2003	08 on 06	08 on 03
Household expenditure	25.87	21.11	13.96	4.76	11.91
Fuel costs	10.34	8.23	4.06	2.11	6.28
Non-fuel costs	11.24	8.97	7.73	2.27	3.51
Producer (upstream) profits	2.55	2.43	0.36	0.12	2.18
Supply chain costs	24.13	19.63	12.15	4.51	11.98
Gap	1.74	1.48	1.81	0.26	-0.07

6.4. The 'Gap'

As with our first report, we think our high-level approach has been able to account for a surprisingly high proportion of the supply chain costs and producer profits of electricity and gas to households.

The methodology has not been able to account for all of the drivers with the residual, or 'gap' as we have termed it, accounting for £1.48 billion–£1.81 billion (7–13 per cent) of total spend on gas and electricity, with the proportion narrower in 2006 and 2008 than 2003. There has also been a shift in the proportion of the gap contributed by the two fuels over the five years to 2008. In 2003, at 70 per cent, electricity contributed the majority of the gap. But in 2006 (32 per cent) and 2008 (19 per cent) it contributed the minority.

If our methodology is robust, this amount should be accounted for by factors that we have not yet considered. One of these factors may be downstream profits from supplying gas and electricity to British households, as we consider below.

6.5. Downstream supply profits

In our first report we did not make estimates of profits earned downstream by suppliers selling gas and power to households. This was because we did not feel there was enough consistent information available.

Subsequently, however, Ofgem has issued a very detailed analysis of supply chain costs and profits in its 2008 *Energy supply probe – initial findings report*. As explained further in Section 7.6 we have used information from this report to assess aggregate margins from supplying gas and electricity to household consumers at 2 per cent of pre-VAT expenditure for 2006 and 2008 and 15 per cent for 2003 when traded wholesale prices were very low.

Table 6:4 shows aggregate margins at £2.04 billion in 2003, then falling 80 per cent to £0.4 billion in 2006, before rebounding a little to £0.49 billion in 2008.

Table 6:4: Assessments of profits from the downstream supply of gas and electricity to households in GB

(£bn)	2008	2006	2003	08 on 06	08 on 03
Pre-VAT expenditure	24.64	20.10	13.59	4.54	11.05
Indicative supply margin rate	2%	2%	15%		
Aggregate supply (downstream) margins	0.49	0.40	2.04	0.09	-1.55

Source: Cornwall Energy assessments based on margin rates quoted by Ofgem.

Deducting the profit estimates from the gap assessments shown in Table 6:3 reduces the residual gap figures for each of the three years so that they all fall in a range of -£0.2 million to +£1.3 million, as Table 6:5 illustrates. Therefore the amount of consumer expenditure on energy that our approach has been unable to account for has increased by £1.5 billion between 2003 and 2008. Given the high-level approach that we have taken, we believe these outcomes are robust, although we also recognise that there are some costs which we list below that we have not explicitly included.

Table 6:5: Expenditure 'gap' after adjusting for assessed downstream profits

(£bn)	2008	2006	2003	08 on 06	08 on 03
Gap expenditure	1.74	1.48	1.81	0.26	-0.07
Indicative supply margin	0.49	0.40	2.04	0.09	-1.55
Gap residual	1.25	1.08	-0.23	0.17	1.47

Costs that we have not separately assessed may include:

- fossil fuel and nuclear electricity generators' non-fuel costs
- costs incurred by producers inputting gas to the national pipeline network
- all the costs incurred by other generators that provide the residual element of electricity beyond those covered by balancing services arrangements
- profits and losses made by traders of wholesale energy
- suppliers' costs of consumer acquisition and marketing

Although they may have been omitted, we believe that in aggregate they are likely to have been relatively small. On the other side generous estimates of the cost increases have been used in some cases, such as gas storage, carbon costs, metering and suppliers' costs to serve.

7. Methodology

This section details the building blocks we have used to assess how the drivers on household consumers' spend on electricity and gas changed during 2003 to 2008.

7.1. Our methodology

The approach we have adopted is to assess the components of household spend on gas and electricity during the period 2003 to 2008 with the use – wherever possible – of independently published information. We have started from base information from DECC on household consumers' aggregate requirements for gas and electricity during that period on both a volume and financial basis. We have then estimated the share of that spend accounted for by different cost and profit elements, including, for example, fuel, metering, network charges and levies and taxes.

7.2. Household consumers requirements for electricity and gas in GB

Information on aggregate spend on and consumption of electricity and gas by UK householders is published regularly by the DECC, most notably in its annual Digest of United Kingdom energy statistics (Dukes)¹². We have reviewed three types of information from DECC:

- aggregate quantities of energy used by domestic consumers of gas and electricity
- aggregate spend by domestic consumers on gas and electricity
- average net values accruing to suppliers from sale of gas and electricity to household consumers

Our primary reference points are the volume and expenditure information.

The remit of this review is to consider GB rather than the UK (which also includes Northern Ireland). As appropriate we have adjusted DECC's UK-based figures to account for household electricity and gas consumption and spend in the Province.

7.2.1. Volume

Annual consumption information from DECC for UK household use of electricity and gas during 2003 to 2008 records households requirements for electricity ranging around 115–118TWh, reaching a peak in 2005. For gas, a peak of nearly 400TWh is reached in 2004, with lower levels recorded thereafter.

Deducting the assessments for Northern Ireland householders' energy requirements from the UK figures yields the figures shown in Table 7:1. British householders consumed 112–115TWh of electricity and 350–395TWh of gas annually between 2003, 2006 and 2008. Household requirements account for a little over a third of British electricity and gas demand from final users.

¹² <http://bit.ly/cgpKX1>

Table 7.1: GB electricity and gas consumption by household consumers

	GB Electricity		GB Gas	
	Domestic	All	Domestic	All
2003	112.7	341.6	386.5	1,033.8
2004	112.4	341.6	396.4	1,053.4
2005	115.1	349.0	389.3	1,025.8
2006	114.8	346.7	373.9	967.4
2007	112.0	343.9	350.8	983.4
2008	114.7	342.6	365.7	1,015.9
08 on 06	-0.1	-4.1	-8.2	48.5
08 on 03	2.0	1.0	-20.8	-17.9

Source: Digest of UK energy statistics tables, DECC Table 5.4 (electricity) and Table 4.1(gas). UK data adjusted to GB equivalent by Cornwall Energy.

7.2.2. Spend

We have reviewed three particular sources of information on expenditure by UK households on electricity and gas that are issued by DECC. They are recorded in the following tables from Dukes:

- *Table 1.7 Sales of electricity and gas by sector*¹³ records the total selling value of gas and electricity for use by households each year alongside an average selling value. It is our understanding that these figures exclude VAT
- *Table 1.1.6 Expenditure on energy by final user*¹⁴ records annual expenditure by consumer groups including households on all fuels including gas and electricity. It is our understanding that these figures include VAT
- *Table 2.6.1 Total household expenditure on energy* records annual expenditure by consumers groups including households on all fuels including gas and electricity use. It also is our understanding that these figures include VAT. The data in Table 2.6.1 forms part of a wider official survey by the Office for National Statistics (ONS) of consumer expenditure used to calculate inflation and price indices

Table 1.7 and Table 1.1.6 appear to be drawn from the same source as there is a consistent margin between them equivalent to the 5 per cent rate of VAT levied on household electricity and gas supplies. Data in Table 2.6.1 is drawn from the Consumer Trends report published by the ONS¹⁵. DECC reports that information in all the tables is based on information on average selling values obtained from suppliers.

Tables 7.2 and 7.3 show that while, once VAT has been allowed for, there is broad consistency in the data for electricity between all three DECC information tables, a differential has emerged between the Table 2.6.1 data and that from Table 1.1.7 for gas. In our first report we referenced data from Table 2.6.1 as our prime source for expenditure because of its wider use, but have decided to switch to Table 1.7 for this update given the emergence of the discrepancy between the two sources. Were we not to have made this adjustment, the amount in the gap element of our analysis would have been £1.4 billion greater for 2006 and £2.8 billion greater for 2010.

¹³ <http://bit.ly/cP6C3K> (XLS 47KB)

¹⁴ <http://bit.ly/abl3Db> (XLS 51KB) Data also included in Table 1.4

¹⁵ <http://bit.ly/brsW47>

Table 7.2: Measures of expenditure on gas by UK households issued by DECC

Year (£mn)	Gas			Difference	
	(A) Table 1.1.7	(B) Table 1.7	(C) Table 2.6	B on A	C on A
2003	6,260	5,964	6,323	-296	63
2004	8,285	7,889	7,249	-396	-1,036
2005	8,215	7,822	8,540	-393	325
2006	10,100	9,618	11,500	-482	1,400
2007	9,950	9,477	12,591	-473	2,641
2008	12,345	11,759	15,173	-586	2,828
08 on 06	2,245	2,141	3,673	-104	1,428
08 on 03	6,085	5,795	8,850	-290	2,765

Table 7.3: Measures of expenditure on electricity by UK households issued by DECC

Year (£mn)	Electricity			Difference	
	(A) Table 1.1.7	(B) Table 1.7	(C) Table 2.6	B on A	C on A
2003	7,660	7,295	7,572	-365	-88
2004	9,120	8,688	8,581	-432	-539
2005	9,665	9,205	9,590	-460	-75
2006	11,340	10,799	11,572	-541	232
2007	11,755	11,193	11,703	-562	-52
2008	13,940	13,278	14,084	-662	144
08 on 06	2,600	2,479	2,512	-121	-88
08 on 03	6,280	5,983	6,512	-297	232

Our primary reference point is therefore the expenditure information drawn from DECC's Table 1.7, which includes both price and volume elements. We have also considered the net selling value information as it highlights the price component and cross-references with our own estimates of unit expenditure whose derivation is outlined below.

After adjusting for Northern Ireland, we estimate that British household consumers spent £13.6 billion on electricity and £12.2 billion on gas in 2008. This total of £25.9 billion is some £4.8 billion more than for 2006 and £12.2 billion more than they spent on these two fuels in 2003.

Table 7.4: GB electricity and gas expenditure by households (including VAT)

(£mn)	Expenditure			Year change		
	Electricity	Gas	Total	Electricity	Gas	Total
2003	7,445	6,231	13,676			
2004	8,892	8,247	17,140	1,447	2,016	3,464
2005	9,423	8,167	17,590	531	-81	450
2006	11,069	10,039	21,108	1,645	1,872	3,517
2007	11,483	9,893	21,376	414	-146	268
2008	13,604	12,266	25,870	2,121	2,373	4,494

Source: Cornwall Energy estimates derived from DECC data.

7.3. The electricity and gas cost chains

Below we outline what we believe to be the main factors that need to be considered in analysing the drivers of household gas and electricity bills.

There has been competition in the supply of gas and electricity to British householders since before the turn of the decade. Irrespective of the operator and terms by which householders are supplied with gas and electricity, in preparing their bills, suppliers will assess separately the different costs in their respective supply chains. These costs include the costs of:

- fuel including:
 - wholesale volumes
 - producer profits
 - carbon permits for power generators
 - gas storage
- non-fuel costs of:
 - customer service, management and administration
 - metering and meter reading
 - using the delivery networks, from production facilities to the consumer's meter
 - the supplier's profit margin
 - taxes and other overheads

We have attempted to assess changes in these costs between 2003, 2006 and 2008. In the paragraphs below we summarise the information sources we have referenced in doing this and how we have utilised the data sources.

7.4. Fuel costs

Suppliers secure bulk volumes of fuel for their consumers' requirements. The wholesale cost they pay will be determined by the arrangements they have in place to secure that energy. These arrangements may involve:

- production from assets owned by upstream affiliates. This option is a particularly important one in electricity where six major integrated companies own three-quarters of British generating capacity as well as supplying the vast majority of household consumers

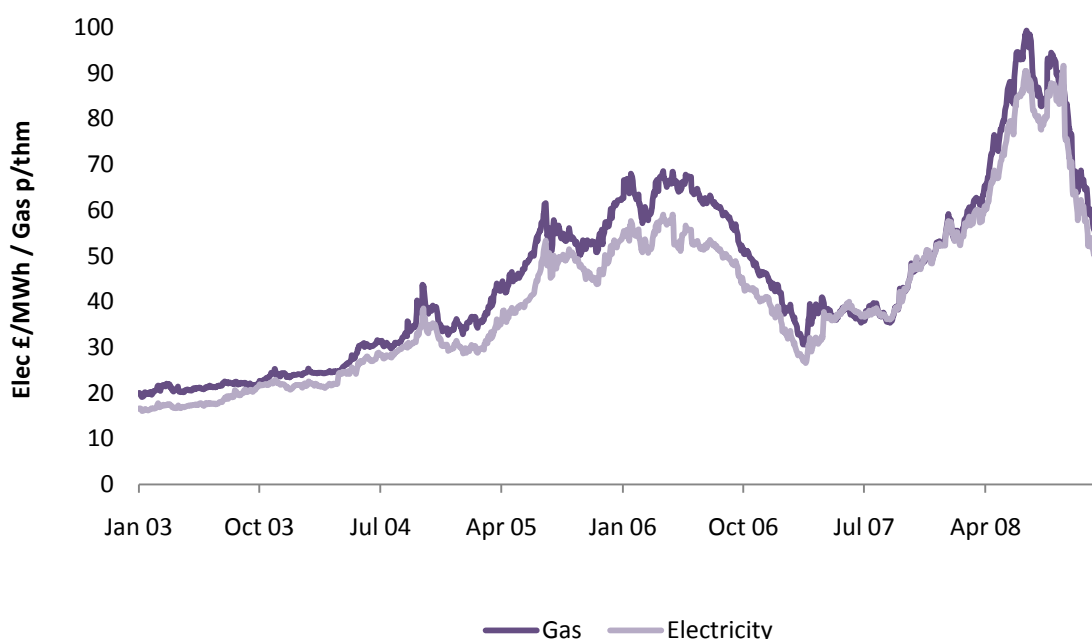
- long-term contracts with producers. Many gas fields have been developed as a result of 'life-of-field' contracts with suppliers. These arrangements typically pre-date the liberalised era when it was customary for bulk gas prices to be linked to changes in other indicators such as oil prices. Other contracts for gas and electricity – especially the most recent and those for imported gas – may include rates linked to published wholesale market indicators. In electricity some long-term 'tolling' arrangements are in place where the supplier pays the generator an operating fee plus separately itemised fuel and, as necessary, carbon costs
- shorter-term purchases – for periods running from days to low numbers of years – of energy at rates linked to published wholesale market or exchange indicators

7.4.1. Wholesale energy

Wholesale electricity and gas prices reported on British forward markets have cycled vigorously since the turn of the decade as the country has become more dependent on imported fuels. As a pre-eminent fuel for power generation, the wholesale market for gas has become a key driver of that for power. Wholesale electricity prices have also been influenced by the value of carbon since the EU Emissions Trading Scheme (ETS) became established in 2005.

The 'year-ahead' baseload wholesale price-marker has emerged to become a key market indicator for both gas and power, with trends often being referenced by major suppliers in their announcements of price increases. Figure 7:1 plots trends in year-ahead baseload gas and power prices.

Figure 7:1: Trends in year-ahead wholesale gas and power prices 2003 to 2008



Source: Heren

From a low point in early 2003, prices more than tripled to reach their peaks in the summer of 2006 before dropping back sharply. But the lull was short-lived as by mid 2008 they had raced to record highs at the same time that world commodity prices also surged to peak levels. Later in that year rates fell away again as fast as they had risen, to close 2008 very near the levels at which they had started it.

Although the forward wholesale market indicators are high profile, given the extent of integration of production and supply in both the gas and power industries, we believe it is more important to focus on input fuel costs for generators and average revenues received by UK gas producers and importers. We believe both these indicators are important because integrated supply and production companies often have the flexibility of buying from the relevant wholesale markets or sourcing from their own production capability. This argument is particularly strong in electricity given the scale of production and supply integration that exists in the British market, but it is also relevant in gas. Effectively it means that for the major players, the forward curve is likely to represent a transfer pricing mechanism between upstream and downstream affiliates, whereas the indicators of generator fuel costs and gas producers' average revenues will represent amounts they have paid to third parties and thus represent the real external cost drivers on their businesses as a whole.

There is a further issue of specific relevance to gas. Until very recently the UK has been self-sufficient in the supply of gas from the very significant resources located offshore. That self-sufficiency ended in 2005, when net imports (the excess of gas imports over gas exports) accounted for the equivalent of 4.9 per cent of demand. UK exports of gas tend to peak during the summer, while imports are at their highest during the winter when demand reaches maximum levels.

We believe considering import figures on a net basis – the difference between imports and exports – underestimates the impact of this change, because all volumes shipped in to the country are destined for use here regardless of whether there is a corresponding export quantity. Figure 7:2 provides a graphic of this trend on a quarterly basis.

Figure 7:2: Quarterly trends in assessed supply sources of gas



7.4.2. Gas storage

We have adapted the assumption for assessing aggregate annual storage costs used in our first report. On that occasion we inflated the turnover of Centrica Storage, the main provider of such services, by what we believed to be a very generous 50 per cent to account for the revenues of other operators. This assumption was generous for two reasons: firstly it assumed all storage was required for domestic consumers and none by other users; and secondly the 50 per cent uplift was selected even though Centrica Storage's share of the storage market was at the time near 80 per cent by capacity.

Information is now available from National Grid¹⁶ showing volumes input to the national gas network from terminals and storage facilities on a daily basis dating back to late January 2008. This source shows that, with new capacity from facilities like Aldbrough, Hatfield Moor, Hole House Farm and Humbly Grove, in 2008 around 60 per cent of the gas input to the national pipeline system from storage facilities was from Rough. Other facilities are therefore becoming more important in providing storage service, so we have decided to upgrade our inflation factor applied to Centrica Storage revenues for 2007 and 2008 to 100 per cent from the 50 per cent applied for 2006.

7.4.3. Carbon

The first phase of the EU ETS commenced on 1 January 2005. It is a 'cap-and-trade' scheme designed to reduce carbon dioxide emissions from major producers, including power generators. Producers must present enough scheme allowances every year to match their emissions of carbon dioxide. The first phase of the scheme ran for the three years ending 31 December 2007, with a second phase running until the end of 2012. Scheme participants, including fossil fuel generators, have received an allocation of allowances for each phase at no cost. The allocations for the power generation sector cover the majority of expected emissions, meaning individual generators must purchase extra permits at market rates to ensure their overall holdings match their emissions.

We have reviewed official data for emissions produced and permit allocations for British fossil fuel generators for 2008 and summarised our findings in Table 7:5. It shows that generators produced emissions equivalent to 154.4 million allowances (on a one allowance for one tonne basis) in 2008. They had to purchase 61.9 million allowances to top up their free allocations, equivalent to 40 per cent of their total requirements. For our first report we concluded that in 2006 coal, oil and gas generators had a requirement to purchase 28 per cent of their total EU carbon allowances.

Table 7:5: Fossil fuel generators free permit allocations for the EU Emissions Trading Scheme and actual requirements 2008 and 2006

(mn allowances)	Free allocation	Surrendered	2008 market purchase	2008 market purchase (%)	2006 market purchase (%)
Coal	55.43	97.34	41.92	43%	39%
Gas	36.19	56.11	19.92	36%	-7%
Oil	0.91	0.96	0.05	5%	35%
Overall	92.52	154.41	61.89	40%	28%

Source: base figures from EU emissions trading registry with calculations by Cornwall Energy.

¹⁶ For the year commencing 25 January 2008, the closest match we could obtain to calendar year 2008, and from: <http://bit.ly/cqbKTG>

Several companies have commented on the costs they incurred buying extra carbon permits and suggested they were paying in the range £15–20 per allowance in 2008: For example:

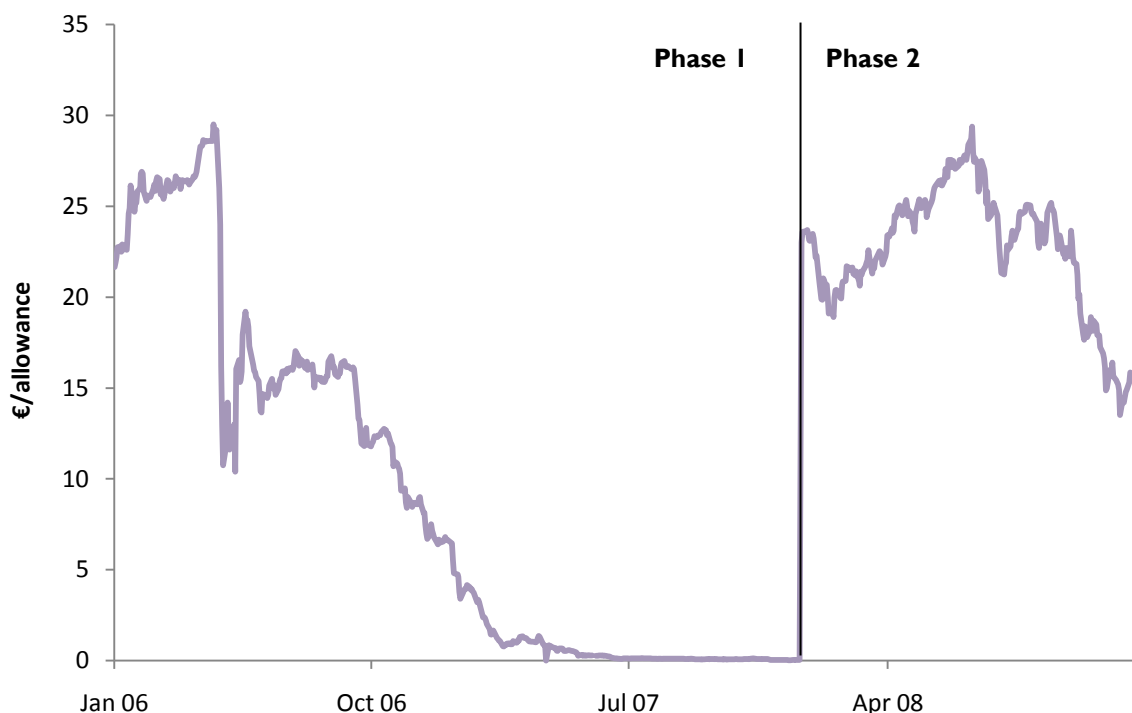
- Iberdrola reported that its Scottish Power subsidiary had to purchase 5.1 million allowances at a cost of €134 million – or approximately £21/t (assuming an exchange rate for that year of £1:€1.26). Scottish Power operates significant gas and coal-fired generating capacity
- RWE reported that its UK RWE npower subsidiary had to purchase 9.9 million allowances at a cost of €194 million – or approximately £16/t. RWE npower operates significant gas, oil and coal-fired generating capacity
- EDF reported group spend on carbon permits of €397 million for 17 million allowances – or approximately £19/t. UK subsidiary EDF Energy operates significant gas, and coal-fired generating capacity
- coal generator Drax reported an average purchase cost of £17.4 per allowance

For 2006 two generators – British Energy and Drax – disclosed useful information on their costs of carbon specific to coal generating plant:

- In its 2006/07 annual results statement, British Energy said that it had purchased carbon allowances at a cost of £22 million for its Eggborough power station. It was required to purchase around 3.1 million allowances meaning it incurred an average £7.09 per allowance
- Drax reported carbon purchase costs of £14.30 per allowance in 2006

As Figure 7:3 shows, carbon prices for phase 1 of the ETS (2005-07) have ranged between €0 and €30 per allowance, with a slump occurring midway through 2006 after it became clear that there had been significant over-allocation of free permits to non-power station participants in the scheme's first phase.

Figure 7:3: Trends in current year EU carbon prices in 2006–2008



Source: Point Carbon

Using this information, we have assumed generators purchased all shortfall permits at an average cost of £18 per allowance in 2008 (compared to £9 per allowance in 2006).

7.4.4. Electricity balancing services

In addition, in both the gas and electricity markets, a balancing mechanism run by the respective transmission network operators is used to ensure that the many trading positions taken at any one time translate to gas and power flowing to consumers within specified technical limits. This balancing activity incurs costs, which are recharged to grid users. In electricity these charges are known as balancing services use of system (BSUoS) charges and are levied equally by National Grid as electricity transmission system operator on both generators and suppliers of power. Suppliers tend to pass these costs through to consumers, while generators include them as part of their selling prices. Given that this analysis focuses on costs to generators and suppliers, we have assumed BSUoS costs levied on both generators and suppliers are ultimately borne in full by consumers.

Table 7:6 has been derived from data produced by the National Grid Electricity Transmission for its charging years commencing each 1 April compared with the calendar year basis of this analysis. It shows that BSUoS costs have increased notably since 2003 through reasons including:

- the incorporation of costs previously incurred separately by the Scottish market after the introduction of GB-wide wholesale power trading in 2005
- higher and more volatile commodity costs to generators and growing interactions between gas and power markets
- a more congested system in places that has given rise to constraint costs
- more unpredictable flows on the power system as a result of increasing flows of more unpredictable renewables technologies

Until the introduction of the British Electricity Trading and Transmission Arrangements (BETTA) in 2005, balancing services costs in Scotland were excluded from BSUoS costs. We have not attempted to assess balancing services costs north of the border before 2005 but assumed costs at the same level as south of the border.

Table 7:6: Annual average BSUoS costs

(£/MWh)	Cost to suppliers	Cost to generators	Cost borne by consumers
2003	0.61	0.61	1.22
2004	0.61	0.61	1.22
2005	0.92	0.92	1.84
2006	0.99	0.99	1.98
2007	1.03	1.03	2.06
2008	1.12	1.12	2.23
08 on 06	0.13	0.13	0.25
08 on 03	0.51	0.51	1.01

Source: National Grid

7.5. Non-fuel costs

7.5.1. Suppliers' costs to serve

At the time we produced our first report there was relatively little information available on suppliers' costs of serving their consumers, including their own administrative and service functions. We assumed a cost of £35 an account for both 2003 and 2006 for these. Subsequently both the industry regulator (Ofgem – the Office of Gas and Electricity Markets) and consultants NERA have set out views on suppliers' cost to serve.

In its *Energy supply probe – initial findings report*¹⁷, Ofgem reported data from the Big Six that showed an 11 per cent increase in cost to serve between 2005 and 2007 to an aggregate level a little over £1.5 billion. The probe also reported that there were 49.2 million household energy meters, implying an average cost to serve of around £30 a meter (regardless of whether it measured gas or electricity).

NERA's December 2009 *Energy supply margins at current prices* analysis¹⁸ reported that there was a 'cost to serve premium of supplying gas of around £6' compared with electricity. Citing input from major suppliers, it also reported that there was a 25 per cent saving for suppliers serving households on a dual fuel rather than single fuel basis. It reported that cost to serve in 2009 values for household energy accounts were:

- £40 for a household electricity account
- £46 for a household gas account
- £64 for a household dual fuel account

With 14.9 million dual fuel households reported by Ofgem in its probe, from a total pool of 27.2 million household electricity meters and 22.0 million household gas meters, these per account figures imply an aggregate cost to serve across all suppliers averaging about £36 across all 49.2 million household electricity and gas accounts. This level is very similar to the £35 an account average we assumed for 2003 and 2006, although we note Ofgem's comments about rising costs.

Our £35 an account assessment for 2006 and 2003 did not include an explicit allowance for bad debts. NERA estimated bad debt costs faced by suppliers at £3 for a household electricity account, £5 for a household gas account and £14 for a dual fuel account. These per account figures imply an aggregate bad debt across all suppliers of about £280 million or around £6 an account.

Given the above information we have decided to upgrade our assessments for suppliers' costs to serve from an average £35 for every electricity and gas account at 2003 and 2006 to £40 at 2008. This increase is applied despite the expectation in our first report that increasing dual fuel penetration and new IT systems should lead to a fall in suppliers' cost to serve. We still believe this dynamic should take effect but it may not have occurred quite yet.

NERA and Ofgem highlighted the administrative costs of the competitive market as well as marketing, and NERA also ascribed costs to providing discounted rates to savvy customers. We did not assess these costs specifically in our first report and have applied a similar approach in this update.

¹⁷ Figure 7:10 on page 89 of <http://www.bit.ly/aVoHuD> (PDF 3.97MB)

¹⁸ <http://bit.ly/c1erN2>

7.5.2. Metering

These services encompass the provision and maintenance of meters at consumer premises and their reading. Their costs are not typically published, as there is a market in the provision of such services to suppliers. They consist of two distinct elements: those for meter reading and those for providing and managing the meter itself. For 2008 we have updated our original assessments of these costs for 2006 and 2003 with RPI inflation at 6 per cent and rounded up the nearest £1.

The 2008 (2006 and 2003) assessments are:

- for electricity:
 - £11 (£10) per year per meter for asset provision and management for a credit meter
 - £32 (£30) per year per meter for asset provision and management for a prepayment meter
- for gas:
 - £14 (£12.50) per year per meter for asset provision and management for a credit meter
 - £75 (£70) per year per meter for asset provision and management for a prepayment meter
 - £9 (£8) per year meter reading based on two reads, although as for our first report we continue to note significant economies of scale and expect that the larger suppliers will be paying much less than this

7.6. Network use of system costs

The delivery of energy through the monopoly networks to consumer meters is not competitive, and a number of companies operate regional monopoly services transmitting and distributing energy around the country. One company, the National Grid, operates both the national electricity and gas transmission grids. Additionally, there are 14 regional electricity distribution networks in GB operated by seven companies. There are eight regional gas distribution networks in GB operated by four different companies.

Network use by producers and suppliers is provided on an open access basis. This means that network operators cannot deny a reasonable request from a licensed supplier for access and must offer fair and transparent terms. Transmission and distribution network use of system charges are published and based on principles approved by Ofgem.

7.6.1. Electricity

Electricity network charges accrue for the use of the transmission network, the use of the distribution network, energy losses from both types of network and balancing use of system costs.

7.6.1.1. Transmission network use of system charges

National Grid levies transmission network use of system (TNUoS) charges for the high voltage transmission system in GB on a regional basis on both generators and suppliers. Typically generators treat these costs as a fixed cost of doing business, while suppliers apportion their share to their consumers. The charging mechanism for small consumers including households references the aggregate demand of all such users served by a supplier from 4pm to 7pm every day of the year.

The revenues that can be collected for TNUoS charges are regulated by Ofgem normally on a five-year cycle. The current price control took effect from 1 April 2007, meaning that this analysis overlaps two price control periods.

7.6.1.2. Distribution network use of system charges

Distribution use of system (Duos) charges are applied to cover the costs of moving power from the national transmission system to the consumer's meter through the local distribution networks. Distribution charges vary regionally reflecting the different cost structures of the distribution companies, and also according to the voltage level at which the consumer is connected. The structure of Duos charges varies according to the metering configuration at the site and tend to closely resemble the supply tariff structure. Typically, Duos charges for household consumers consist of a standing charge and a consumption charge. The consumption charge may consist of more than one unit rate where metering records data for more than one time block.

Distribution charges are regulated through price reviews carried out concurrently for all distribution network operators by Ofgem. There have been two price controls in force during the 2003 to 2008 period. Most recently regulated price increases have been allowed to fund increased investment in electricity distribution networks. Like transmission, the price controls are complex but based on the RPI-X incentive-based model.

7.6.1.3. Network losses

Consumers are charged for the thermal losses that occur as power is moved across both the national transmission and the local distribution networks. These costs are recovered from network users (who pass them onto consumers) and charges are levied according to assessed loss factors. Transmission losses average 1.5–2 per cent to all volumes injected onto, or taken off, this network and the associated costs are shared between generators and suppliers sectors on a ratio of 45:55.

Distribution loss assessments are published annually by the distribution network operators and are percentage factors which vary by time-of-day and connection voltage. These can account for as much as 15 per cent of produced energy by the time it reaches the consumer.

A consumer's metered energy consumption is inflated by these loss factors by suppliers in their price setting and billing processes to reflect the cost of losses incurred in delivering power. In our first report we assumed aggregate losses for household consumers from the transmission and distribution systems of 12 per cent. We note NERA's use of 6 per cent in its analysis based on aggregated Ofgem figures for all power lost through the distribution network. This appears to be based on average figures from Ofgem of losses across all distribution network users. Our assessment is based on a review of published loss factors applied to the low voltage (LV) tier of distribution networks to which all householders are connected.

7.6.1.4. Gas

Gas network charges also accrue for the use of the transmission network and the use of the distribution network. During the 2003 to 2006 period, significant changes to the regulation of gas network charges occurred. These were driven by the establishment of separate transmission and distribution businesses within the previously integrated transportation operator, National Grid. From mid 2005, four of these eight distribution network operators were sold by that company.

The period from 2006 to 2008 also saw further structural changes to gas network charges including:

- the extension of the 2002–07 gas distribution price controls for a year to 31 March 2008¹⁹. The introduction of a new five-year control from 1 April 2008 allows the regulated companies an average 2 per cent a year real increase in revenues
- a new transmission price control taking effect for five years from 1 April 2007²⁰ incorporating a one-off 17 per cent upgrading in annual revenues effective from that date
- a rebalancing from commodity (volume-related) to capacity (fixed) charges in the distribution charging schedules applied from October 2008

We have adopted the same approach as for electricity of calculating an indicative GB-wide average cost from published charges and aggregating it to a total spend level by referencing total domestic consumption.

7.6.2. Taxes, obligations and levies

Suppliers face two additional overheads when they choose to service the domestic market:

- the Renewables Obligation
- schemes to encourage household energy efficiency
- social tariffs

Additionally electricity and gas consumption by household consumers attracts VAT.

7.6.2.1. The Renewables Obligation

The Renewables Obligation (RO) obliges suppliers to buy a certain amount of the electricity they sell on to consumers from qualifying renewable power sources or pay a buyout charge. This proportion of electricity increases every year in line with national targets to increase the share of electricity generated by renewables, as Table 7:7 shows. The buyout value is index linked to £30/MWh (3p/kWh) in 2002 prices.

Suppliers endeavour to pass on to consumers their costs in meeting the RO, although there is no legal obligation on them to do so. We have applied the per unit buyout equivalent costs for each year commencing April on a calendar year basis to secure as much consistency as possible with our wider calculations.

¹⁹ <http://bit.ly/98uTqf>

²⁰ <http://bit.ly/dgWugP>

Table 7.7: The RO: qualifying supply proportions and buyout values 2003 to 2006

Year from	Obligation proportion	Buyout £/MWh	Buyout equivalent (p/kWh)
01/04/2003	4.3%	30.51	0.13
01/04/2004	4.9%	31.39	0.15
01/04/2005	5.5%	32.33	0.18
01/04/2006	6.7%	33.24	0.22
01/04/2007	7.9%	34.30	0.27
01/04/2008	9.1%	35.71	0.32

7.6.2.2. Energy efficiency schemes

Mandated schemes on suppliers to deliver savings measures to consumers have become an important part of the policy approach to household energy efficiency since 2003. These schemes represent an obligation on energy suppliers with more than 50,000 consumers to save energy – expressed since 2008 in terms of avoided carbon emissions – at home through funding specified measures. They are not an explicit levy but costs suppliers incur when doing business. Over time different proportions of these savings have been targeted from different consumer groups.

Two distinct schemes were in force during 2003–08. The Energy Efficiency Commitment (EEC) applied for the period until 31 March 2008 when it was succeeded by the Carbon Emissions Reduction Target (CERT).

Defra's 2006 *Assessment of the Energy Efficiency Commitment 2002–05 carbon, energy and cost savings*²¹, reported that the commitment had a nominal cost per account during that period of £3.76 before VAT. It also estimated the cost of the second Energy Efficiency Commitment, covering 2006 to 2008, to be around £18 per household, assuming both gas and electricity are consumed²². This was equivalent to £9 for each of electricity and gas per year effective for the three years starting 1 April 2005. In the out-turn we believe suppliers were able to deliver the second phase at a cost of £7 per consumer per fuel account per year in 2006, and we have used this figure in our analysis.

DECC's May 2007 *Carbon emissions reduction target April 2008 to March 2011 consultation proposals* stated that the scheme's 'potential non-ongoing costs to consumers (if passed on in full by energy suppliers) are estimated to be no more than around £97 over the three-year period'²³. Assuming each consumer uses electricity and gas, this figure equates to an annual £16.20 per single fuel account. We have used this figure in our assessments for 2008, noting that the decision to extend the scheme by 20 per cent²⁴ post-dates this point. We also note NERA's forward-looking assessment of £24 per single fuel account for 2009 using data derived from Ofgem's November 2009 Quarterly Price Report²⁵.

²¹ <http://bit.ly/bxOvgM> (PDF 477KB)

²² <http://bit.ly/dA291o>

²³ <http://bit.ly/ckFzt7> (PDF 436KB)

²⁴ <http://bit.ly/a28IFZ> (PDF 595KB)

²⁵ <http://bit.ly/am0uYE> (PDF 3.7MB)

The Community Energy Savings Programme was introduced from 1 October 2009 and is payable by upstream producers. It falls outside the timescales considered in this analysis²⁶.

7.6.2.3. Voluntary social measures

As household energy prices rose during the years after 2003, there became an increasing level of concern from consumer groups and politicians about the consequences for low-income and vulnerable consumers. During 2007 Big Six suppliers began voluntarily following pressure from the Government to introduce tariffs and offerings for these users incorporating rates lower than standard levels, more generous payments terms and sometimes, links in to other services. These offerings were added to more established support schemes including bill rebates and trust funds.

In his Budget speech on 12 March 2008, the Chancellor of the Exchequer Alistair Darling said the Government wanted to see the Big Six spending around £150 million a year on social tariffs compared to an estimated £50 million at that time. A series of agreements were put in place to deliver that objective with Ofgem taking an overseeing and reporting role.

Both Ofgem and Cornwall Energy (for Consumer Focus) have separately assessed the contributions made by the Big Six to their social tariffs, using slightly different baselines. Both Ofgem and Cornwall Energy assessed the contribution to what we describe as voluntary 'social packages' was in the range £130–£140 million for 2008–09 covering:

- social tariffs – defined at the time as arrangements targeted specifically at vulnerable consumers regardless of payment method and where rates were at least as good as the supplier's standard Direct Debit tariff plus the social element of the *StayWarm* tariff offered by E.ON UK
- standard price increases from 2008 that were waived for social tariff customers by two suppliers – British Gas and Scottish and Southern Energy
- bill rebates

Suppliers were increasing their commitments to their voluntary social measures during 2008. An earlier analysis we undertook for Energywatch (Consumer Focus's predecessor) suggested this commitment was worth around £28 million in annualised terms at autumn 2007²⁷.

Recognising the low-end 2007 baseline, the escalating commitments through 2008 and that Ofgem's definition of measures acceptable under the agreement is broader than that we used for Consumer Focus (Ofgem allowed trust fund donations for example), we have assumed a total £130 million commitment for voluntary social measures in 2008. This is split £100 million for gas and £30 million for electricity.

7.6.2.4. VAT

VAT has been levied at a constant 5 per cent on electricity and gas bills throughout the period 2003 to 2008. Gas and electricity costs to consumers have therefore been magnified by this tax.

²⁶ <http://bit.ly/cLGMZ6>

²⁷ <http://bit.ly/9PYLr2> (PDF 260KB)

7.7. Producer (upstream) profits

The available data from DECC on upstream revenues earned by gas producers and upstream fuel costs for power generators means, for consistency, consideration needs to be given to generator margins. We have estimated profit margins for nuclear, gas and coal-fired power stations for 2006 on a stand-alone basis and using, where necessary, 2004 data as being representative of returns in 2003. We recognise the limitations of this process, but believe we have utilised the best available information in an opaque area.

The majority of non-nuclear generating capacity in GB is owned by or contracted on a long-term basis to the major integrated suppliers to the household electricity sector. Consequently little information on the stand-alone financial position of generation is available. As far as we are aware International Power and Drax Group are the only sources of regular information on margins earned by major, stand-alone power production businesses in GB. International Power reports margins earned by its coal plant at Rugeley and gas station at Deeside, while Drax operates 4GW of coal capacity. These figures equate to approximately 2 per cent of total CCGT capacity and 19 per cent of coal capacity. The returns earned by these operations will depend on their strategies at any one time. A little can be gleaned on this issue from their public statements.

Table 7:8 shows that the margins earned by International Power measured as spark spreads (for margins at its Deeside gas station) and dark spreads (for margins at its Rugeley coal station). It operates both of these power stations as merchant plant, selling their output to the wholesale market usually without long-term contracts.

If we assume that this company's market approach has yielded returns typical for generators as a whole, we deduce that:

- spark spreads have increased from £5/MWh to nearer £20/MWh between 2004 and 2006 and on towards £30/MWh by 2008
- dark spreads have increased from £7/MWh to over £20/MWh between 2004 and 2006 but falling sharply from 2007 in to 2008
- dark spreads have been consistently higher than spark spreads

Table 7:8: Spark and dark spreads reported by International Power for its merchant power plant

(£/MWh)	Dark spread (Rugeley, coal)	Spark spread (Deeside, gas)
Q104	9	4
H104	8	4
9M04	7	5
FY04	9	5
Q105	14	9
H105	13	8
9M05	13	8
FY05	15	12
Q106	19	17
H106	20	18
9M06	19	18
FY06	28	22
Q107	37	26
H107	34	25
9M07	32	28
FY07	34	23
H108	22	25
H208	9	30

Source: Information reported by International Power.

A review of gross revenue and fuel cost information published by the operators of the Drax power station on a volume-related basis appears to show a similar trend for dark spreads, as Table 7:9 shows.

2008 was a problematic year for coal generators, including the Rugeley station, as several experienced delays in installing and commissioning flue-gas desulphurisation equipment to comply with the EU large combustion plant directive. This resulted in these stations operating less than expected, cutting their profitability and increasing the market opportunity for other generators, especially gas, at a time of generally very high market fuel prices.

Table 7:9: Revenues, fuel costs and gross margins reported by Drax

£/MWh)	Revenue	Fuel costs	Gross margin
Q104	22.7	11.7	10.9
Q204	24.8	17.6	7.2
Q304	17.6	7.9	9.7
Q404	39.7	26.5	13.2
Q105	29.9	18.1	11.9
Q205	40.9	28.7	12.2
Q305	26.0	11.5	14.5
Q405	56.4	30.7	25.6
H106	48.6	26.6	25.8
H206	61.3	24.3	33.3
H107	51.2	21.5	29.7
H207	45.7	22.3	23.4
H108	59.8	38.1	21.7
H208	78.7	46.4	32.3

Source: Calculations by Cornwall Energy on information reported by Drax Group plc and its predecessor.

Based on this information we estimate that profit margins, net of carbon costs, made by generators between 2003, 2006 and 2008:

- increased from £5/MWh (2003) to £20/MWh (2006) and then £30/MWh (2008) for gas-fired plant
- increased from £7/MWh (2003) to £30/MWh (2006) but then dipped back to £20/MWh (2008) for coal- and oil fired plant

We have assumed that equivalent returns to those from coal were earned by oil-fired generation.

British Energy reported that it earned a gross margin of £13.75/MWh on its electricity production in the year ending 31 March 2007. In that year 51.2TWh was produced from its nuclear fleet, and 7.2TWh from its coal station at Eggborough. If we assume that Eggborough earned £30/MWh gross margin in 2006, in line with our assessment for wider coal generation sector yields an estimate of £10.32/MWh gross margin for nuclear in that year. We have rounded this figure to £10/MWh and held this assumption for 2008 after reviewing the partial financial information available for this period from British Energy.

In the year ending 31 March 2004, British Energy made a margin of 40p/MWh on its electricity sales, 90 per cent of which were generated by its nuclear fleet. We have assumed this near zero level of margin extended also to the rest of the UK nuclear fleet. Table 7:10 shows our assumptions on margins earned by the nuclear generation sector in 2003, 2006 and 2008.

Table 7:10: Nuclear generator profit indicators 2003, 2006 and 2008

	Gross profit (£/MWh)	Volume supplied (Gross, TWh)	Profit (£mn)
2003	0	82	-
2006	10	61	612
2008	10	48	480

Source: Cornwall Energy assessment.

7.8. Supplier (downstream) profits

Until Ofgem issued a detailed analysis in October 2008 of supply chain costs and profitability in its *Energy supply probe – initial findings report*²⁸ there had been very little information on the stand-alone profitability of businesses supplying gas and electricity to household consumers in GB. Only Centrica publishes segmented accounting information regularly for its British Gas residential supply operation. With only this information available for our first report, we felt unable to make specific allowance for profits earned from the downstream business of supply electricity and gas to household consumers.

By referencing Ofgem’s probe we have been able to make allowance for downstream supply profits in this update. In its probe, Ofgem reported that:

- supply margins had averaged around 15 per cent of sales during 2000 to 2004 when wholesale prices were low in historic terms
- based on information from the Big Six, average pre-tax margins between 2005 and 2007 (inclusive) – when wholesale prices had risen significantly – were around 2 per cent
- supply margins were volatile and inverse to upstream margins. Over a ‘cycle’ margins the Big Six expected margins to be around 5 per cent of sales

Ofgem’s analysis argued that the household energy market was segmented with different levels of margin earned by suppliers from different customer groups. The lowest margins were earned from dual fuel and online customers with higher margins from single fuel electricity customers, especially those that had not switched away from their local supplier.

The regulator has subsequently produced more detailed information on profitability in its *Quarterly price reports*²⁹. The November 2009 issue of this report suggested net margins may have been as high as 7 per cent for a dual fuel customer at that time. Information also in this report showed supply margins had risen to this level during 2009 after having fluctuated around 0 per cent – at times being negative – during 2004 to 2008.

Ofgem’s assessments of margin are based on analysis of what it describes as ‘hedging strategies’. This term is used to describe mechanisms for assessing suppliers’ wholesale purchase costs according to movements in traded energy prices over the forward curves. As far as possible in our analysis we have focused on achieved selling prices or actual purchase costs faced by energy producers and these values can be expected to be different from forward curve assessments. Therefore we believe that the comments on average margins as a share of overall revenues – 15 per cent during 2004 and 2 per cent for 2005 to 2007 – are the most relevant for our analysis.

²⁸ Figure 7:10 on page 89 of <http://bit.ly/aVoHuD> (PDF 3.97MB)

²⁹ <http://www.bit.ly/am0uYE> (PDF 3.7MB)

We have therefore assessed supply margins for gas and power at 15 per cent for 2003 and 2 per cent for 2006 and 2008, extending Ofgem's latter period 2 per cent assessment by a year. We suspect that margins have been different for gas and power, but given the market is dual fuel led and with major participants active in both gas and power sectors, we have applied a common percentage factor for gas and electricity in total for each year.



Fuelling homes Gas and electricity costs to householders

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