State of the Market Assessment

Supplementary appendices

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Overview:

This document sets out four supplementary appendices to our joint assessment of the state of competition in the energy markets in Great Britain, and how well competition is serving the interests of households and small firms.

Associated documents

Letter from the OFT, Ofgem and CMA to the Secretary of State for Energy and Climate Change, 5 November 2013

https://www.ofgem.gov.uk/ofgem-publications/84642/ofgemoftandcmatosecretaryofstatecompetitioninenergymarkets.pdf

State of the market report, Assessment framework, 19 December 2013

https://www.ofgem.gov.uk/ofgem-publications/85260/assessmentframework18decfinal.pdf

State of the Market Assessment, 27 March 2014

https://www.ofgem.gov.uk/ofgem-publications/86804/assessmentdocumentpublished.pdf

Consultation on a proposal to make a market investigation reference in respect of the supply and acquisition of energy in Great Britain, 27 March 2014

https://www.ofgem.gov.uk/ofgem-publications/86807/consultationpublish.pdf

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Appendix 1 – Associated Ofgem documents

The Energy Supply Probe, 2008-2009, https://www.ofgem.gov.uk/electricity/retail-market/market-review-and-reform/retail-market-review/energy-supply-probe

Retail Market Review, from 2010, https://www.ofgem.gov.uk/electricity/retail-market/market-review-and-reform/retail-market-review

Ofgem liquidity reforms, 2009-2014, https://www.ofgem.gov.uk/electricity/wholesale-market/liquidity

State of the market assessment framework, December 2013, https://www.ofgem.gov.uk/ofgem-publications/85260/assessmentframework18decfinal.pdf

Consumer research

Ipsos MORI, Customer Engagement with the Energy Market Tracking Survey, 2013, https://www.ofgem.gov.uk/ofgem-publications/74756/customer-engagement-energy-market-tracking-survey-2013.pdf

Element Energy, Quantitative research into Non-Domestic Consumer Engagement in, and Experience of, the Energy Market, 2013, https://www.ofgem.gov.uk/publications-and-updates/quantitative-research-non-domestic-consumer-engagement-energy-market

Consumer research datasets (domestic and non-domestic), 2010-2013, https://www.ofgem.gov.uk/publications-and-updates/consumer-research-datasets

Domestic consumers

Guidelines on cost reflectivity between payment methods and the prohibition of undue discrimination in domestic gas and electricity supply contracts, August 2009, https://www.ofgem.gov.uk/ofgem-publications/85032/2-19-guidelinesoncostreflectivityandunduediscriminationinsupply.pdf

Decision on Standard Condition 25A in the Gas and Electricity Supply Licences, October 2012, https://www.ofgem.gov.uk/ofgem-publications/39471/decision-standard-condition-25a-gas-and-electricity-supply-licences.pdf

The Retail Market Review – Final Domestic proposals, March 2013, https://www.ofgem.gov.uk/ofgem-publications/39350/retail-market-review-final-domestic-proposals.pdf

The state of the market for customers with dynamically-teleswitched meters, July 2013, https://www.ofgem.gov.uk/ofgem-publications/82288/state-market-customers-dynamically-teleswitched-meters.pdf

Retail Market Review: monitoring and evaluating the impact of the new rules, January 2014, https://www.ofgem.gov.uk/publications-and-updates/retail-market-review-monitoring-and-evaluating-impact-new-rules

Non-domestic consumers

Accent, Quantitative Research into Non-domestic Customer Engagement and Experience of the Energy Market, December 2012, https://www.ofgem.gov.uk/ofgem-publications/39449/quantitative-research-non-domestic-customer-engagement-and-experience-energy-market.pdf

Opinion Leader, Research Findings on the Experiences of Non-Domestic Customers, December 2012, http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/Ofgem_Non%20Doms%20Research.pdf

Insight Exchange, Research into proposed Standards of Conduct: Non-domestic, December 2012, http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/Non-Domestic%20SOC%20report.pdf

The Retail Market Review – Final non-domestic proposals, May 2013, https://www.ofgem.gov.uk/ofgem-publications/39355/retail-market-review-final-non-domestic-proposals22-marchfinal.pdf

Collaborate Research, Non-domestic consumers and the Change of Supplier process – Qualitative research findings, December 2013, https://www.ofgem.gov.uk/ofgem-publications/84908/non-domcosreportfinal181013lastandfinalforpublication.pdf

Proposals for non-domestic automatic rollovers and contract renewals, February 2014, https://www.ofgem.gov.uk/ofgem-publications/86071/automaticrolloversconsultationfinal.pdf

Prices and profits

Ofgem supply market indicator, https://www.ofgem.gov.uk/gas/retail-market/monitoring-data-and-statistics/understanding-energy-prices-great-britain/supply-market-indicator

Understanding the profits of the big energy suppliers, https://www.ofgem.gov.uk/gas/retail-market/monitoring-data-and-statistics/understanding-profits-big-energy-suppliers

Do energy bills respond faster to rising costs than falling costs?, March 2011 www.ofgem.gov.uk/ofgem-publications/39712/priceasymmetry.pdf

BDO LLP Final Report, January 2012 https://www.ofgem.gov.uk/ofgem-publications/84249/bdo20report.pdf

The Revenues, costs and profits of the large energy companies in 2012, November 2013 https://www.ofgem.gov.uk/ofgem-publications/84640/css2012summarydocument.pdf

Actions to improve the transparency of energy company profits, February 2014, https://www.ofgem.gov.uk/publications-and-updates/actions-improve-transparency-energy-company-profits

Methodology for the Supply Market Indicator, March 2014 https://www.ofgem.gov.uk/publications-and-updates/methodology-supply-market-indicator

Appendix 2 – Rocket and Feather Analysis

Rocket and Feather Analysis

Summary

1.1. In this appendix we examine the evolution of retail prices in retail energy markets in response to changes in wholesale costs[1]. In particular, we are interested in whether firms adjust their prices more quickly in response to wholesale cost increases than in response to an equivalent decrease in wholesale cost.

1.2. First, we estimate the long run relationship between retail prices and suppliers' costs. Then, we test the speed of adjustment to this long run relationship in presence of short run changes in costs, and in particular whether adjustments to cost rises are faster than adjustments to cost decreases[2].

1.3. We find that there is an asymmetry in the response of prices and that the so called `rocket and feather' pattern of pricing does appear to be present in the energy market. In particular, our findings show that for a given change in wholesale costs, retail prices respond quicker when costs increase then when they fall. This could provide an indication that the market is not strongly competitive.

Data

1.4. The data used in our analysis is described below:

Retail Bill price

1.5. We use monthly pricing data[3] for a representative medium energy consumer[4] under the most common dual fuel tariff[5] from January 2004 to December 2013 for the six largest suppliers in the retail market. The price data is a national average of regional prices for the standard tariff and it has been weighted by the market shares of each company.

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[1] In this document we use the terms 'market' and 'markets' as shorthand for referring to different segments of the energy sector. For the avoidance of doubt, these terms are not intended to describe or otherwise suggest the approach that may be for the purposes of market definition in competition law investigations.
[2] Some of this literature has been concerned with amount asymmetry, defined as asymmetry in the new equilibrium values of upstream prices. The question does not arise in error correction models, because the results are forced to revert to the long run equilibrium values.
[3] Source: Energylinx
[4] A representative medium energy consumer is defined as a user requiring 3300 kWhs of electricity and 16500 kWhs of gas per year.
[5] Dual Fuel Standard tariff with a Direct Debit payment method.

Wholesale cost data

1.6. Monthly data on wholesale cost for electricity and gas was obtained from Ofgem's SMI Database for the period between January 2004 and November 2013. The data is calculated assuming a hedging strategy of 18 months[6] and it has been adapted to reflect the energy consumption for a medium user of dual fuel.

Other cost data

1.7. Monthly data on other relevant costs including both fixed and variable costs is compiled by Ofgem from a range of sources. Fixed costs include: environmental costs (CESP, Carbon Emissions Reduction Target/Energy Efficiency Commitment), meter costs and other direct costs including the social tariff. Variable costs include the network charges (both for transmission and distribution), environmental certificates (Renewable Obligation Certificates) and balancing costs (BSUoS).

Model

1.8. The model was estimated using the standard Error Correction Model (ECM) used in the rockets and feathers literature[7]. Following the two-step methodology proposed by Engle and Granger (1987), we first estimate the following long run equation:

$$(1) \quad Retail\ Bills_t = \phi_1 + \phi_2 Wholesale\ Cost_t + \phi_3 Other\ Costs_t + Z_t$$

1.9. Where Zt represents the difference between retail bills and suppliers' costs and therefore can be considered a measure of gross margin[8]. The estimated residuals Zt are then lagged and inserted directly[9] into model (2):

[6] The analysis is based on forward looking wholesale costs, it estimates the expected cost of supplying energy to a customer for the next year at each point in time, based on pricing information available at that time. Costs are based on buying seasonal and quarterly products on the OTC market in electricity and gas respectively. This cost data also assumes a constant rate of purchase. 18 months is the average Hedging Strategy according to both the Energy Supply Probe of 2008 and OFT analysis of the responses to the Ofgem/OFT Information Request.

[7] See Borenstein, Cameron and Gilbert (1997), `Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes?', *Quarterly Journal of Economics*, Vol 112, No 1 pp 305-339

[8] This follows from the fact that (1) can be rewritten as:
$Z_t = Retail\ Bills_t - \phi_1 - \phi_2 Wholesale\ Cost_t - \phi_3 Other\ Costs_t$, namely price minus costs.

[9] The residuals from equation (1) are found to be stationary. This implies that there exists a cointegration (or long-run) relationship between the series and that OLS regression produces super consistent estimates of the residuals. The residuals are then separated between a positive and a negative term to reflect the positive or negative gross margins with respect to the long run equilibrium.

$$(2)\ \Delta Retail_t = \sum_{i=1}^{k} \beta_i^{+} \Delta Retail_{t-1}^{+} + \sum_{i=1}^{k} \beta_i^{-} \Delta Retail_{t-1}^{-} + \sum_{i=1}^{k} \beta_i^{+} \Delta Wholesale_{t-1}^{+} + \sum_{i=1}^{k} \beta_i^{-} \Delta Wholesale_{t-1}^{-} + \sum_{i=1}^{k} \beta_i \Delta Other\ Costs_{t-1} + \delta^{+} Z_{t-1}^{+} + \delta^{-} Z_{t-1}^{-}$$

1.10. Evidence of asymmetry of pass-through (rockets and feather behaviour) can be found if the immediate response to an increase in cost is faster than the immediate response to decreases in costs (3) or if the speed of adjustment of prices to the long run equilibrium is slower when margins were higher than equilibrium[10] in the previous period (i.e. costs were falling) than when they were lower than equilibrium (i.e. costs were increasing) (4).

$$(3) \qquad \beta_1^{+} > \beta_1^{-}$$

$$(4) \qquad |\delta^{+}| < |\delta^{-}|$$

1.11. The coefficients δ can be interpreted as the speed at which the model returns to its equilibrium level. This coefficient should be negative and ranges between 0 (if the process never re-equilibrates) to -1 (if the process re-equilibrates after one period).

Methodology and Main Results

1.12. The following will present the methodology and the preliminary results of the analysis for the data described above. For the model in equation (1) and (2) to be valid, the retail price and cost variables need to be cointegrated. For this to be the case, two conditions need to hold[11]:

- The variables should be integrated of the same order; and
- The residuals of the cointegrated equation should be stationary.

1.13. We tested for the first condition and found that all three series are integrated of order one I(1), namely they become stationary after the first difference[12]. Then,

[10] Note that the positive Error Correction term implies that margins are positive because costs were falling. On the other hand, a negative Error Correction term implies that margins are negative because costs were increasing in the previous period. Also recall that the Error Correction terms are included in the model with a (t-1) lag as in Engle and Granger (1987).
[11] Enders W. (2009),"Applied Econometric Time Series", *Wiley Series in Probability and Statistics.*
[12] We performed both the Augmented Dickey Fuller tests and the Phillips Perron test, testing

we estimate equation (1) to find evidence of a cointegration relationship between the variables and test whether residuals are stationary.

1.14. We ran a Johansen's cointegration test allowing for different lags and different specifications of the trends and we found evidence of one cointegrating relationship, as reported in (1) above.

1.15. The results of the regression in Table 1 show the long run relationship between retail prices and suppliers' costs described in equation (1). The specification also includes yearly and quarterly dummies (not displayed in the table below). From this regression, we obtained the residuals Zt, which as discussed above are a measure of gross margins. We then checked that the estimated residuals were stationary and found that the series was stationary at 1 per cent significance level[13]. This fulfils the second condition for the existence of a cointegration relationship between our variables and allows us to proceed with the analysis.

Table 1: Long Run Relationship between Retail Prices and Suppliers' Costs[14]

ln_ retail_price	**Coefficient**	**Standard Errors**
ln_wholesale_cost	0.4628***	(0.0439)
ln_other_cost	-0.0245	(0.1569)
Constant	3.8651***	(0.8445)
Adjusted R-square	0.98	
N obs	119	

*** p<0.01, ** p<0.05, * p<0.01

1.16. The results reported in Table 1 indicate that a 10 per cent increase in wholesale costs will result with a 4.6 per cent increase in retail prices, implying a pass-through of about 46 per cent. On the other hand, after controlling for yearly and quarterly dummies, the "other cost" variable does not show a significant effect on prices. This is probably due to the fact that the effect of increases in environmental charges and other costs is picked up by the time controls that are all highly significant.

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the stationarity at different lags and all the tests found the series to have a unit root. Once we differentiate the series, the same tests report them to be stationary.

[13] We performed both the Augmented Dickey Fuller tests and the Phillips Perron test, testing the stationarity at different lags and all the tests found the series to be stationary.

[14] The regression includes also yearly and quarterly dummies, all significant at the 1 per cent level. The variable "Other Cost" is not significant anymore after controlling for time dummies. ADF test on residuals confirms that the estimated Z_t are stationary.

1.17. Table 2[15] below shows the regression results for the ECM model estimating short run positive and negative adjustments to wholesale cost changes as described in equation (2).

Table 2: Error Correction Model[16]

Dependent variable : Δ_ln_retail_price	**Model 1**	**Model 2**
Δ_ln_wholesale_cost_plus	0.1687 (0.2484)	0.1662 (0.2712)
Δ_ln_wholesale_cost_neg	0.2362 (0.3281)	0.2808 (0.3854)
Δ _ln_other_cost	-0.0422 (0.0956)	-0.0307 (0.0995)
Outlier Dummy	0.0999*** (0.0101)	0.0994*** (0.0125)
L.ec_plus	**0.0138** **(0.0948)**	**0.0231** **(0.1027)**
L.ec_neg	**-0.6523***** **(0.1897)**	**-0.6526***** **(0.2047)**
Δ_L1 ln_wholesale_cost_plus	-0.3225 (0.2471)	-0.3002 (0.3936)
Δ_L1 ln_wholesale_cost_neg	0.1400 (0.3382)	-0.0048 (0.6428)

[15] The choice of lags to be included was determined by minimizing the Bayesian Information Criterion (BIC). See for example Chesnes (2012), "Asymmetric pass-through in U.S. gasoline prices", Bureau of Economics Federal Trade Commission.
[16] The regression also includes an intercept correction dummy to control for the spike in prices in September 2008. We have run robustness checks excluding this dummy and the results do not change.

Dependent variable : Δ_ln_retail_price	**Model 1**	**Model 2**
Δ_L1 ln_retail_price_plus	0.2280** (0.0953)	0.2337** (0.1095)
Δ_L1 ln_retail_price_neg	0.1519 (0.1703)	0.1341 (0.2174)
Δ_L2 ln_wholesale_cost_plus		-0.0325 (0.3180)
Δ_L2 ln_wholesale_cost_neg		0.1154 (0.5360)
Δ_L2 ln_retail_price_plus		-0.0309 (0.0759)
Δ_L2 ln_retail_price_neg		0.1326 (0.3487)
Observations	117	116
Adjusted R- square	0.51	0.49

Bootstraped Standard Errors[17] in parentheses *** p<0.01, ** p<0.05, * p<0.1

1.18. In the results[18] displayed in Table 2 we have not found evidence of a larger immediate response to wholesale cost increases than to cost decreases, as set out in condition (3). In fact, the coefficients on the positive and negative changes of wholesale costs are not statistically significant. Nevertheless, condition (4) for asymmetry is satisfied for both the specifications detailed in Table 2. This implies that the mean reversion to the equilibrium is slower (i.e. closer to zero in absolute

[17] We have estimated the model bootstrapping standard errors, since the Error Correction term are estimated regressors, allowing for 400 iterations. Results are the same when estimating the model using robust standard errors.

[18] We have performed a series of diagnostic tests to check if the model was specified correctly. The short run model passes the Breusch-Godfrey test for serial correlation and its residuals are found to be white noise. In addition, all models pass the RESET test, implying that the model was not mis-specified. The model also includes a constant (not displayed)

value) when gross margins are above their long term levels (L.ec_plus) and faster when gross margins should be adjusting upwards to the long term level (L.ec_neg).

1.19. In particular, the results obtained on the EC term (Zt-1) imply the following:

- If margins were above the average because the wholesale cost fell in the previous month, there is no downward pressure on customer bills, as the positive EC term is not significantly different from zero

- If margins were below the average because the wholesale cost rose in the previous month, there is upward pressure on customer bills, as the negative EC term is significant at the 1 per cent level

1.20. In order to test whether the displayed asymmetry is statistically significant, we have conducted an F-test on the coefficients presented in Table 3 below. As one can see, there is a statistically significant asymmetry in the length of response to decreases of wholesale cost, as the coefficient on the negative Error Correction term is statistically larger than the positive one. This asymmetry is also robust to the inclusion of further lags[19] of wholesale costs or lags of the retail price in the model.

Table 3: Test if Error Correction Coefficients are different:

Lags	Test for asymmetry	F- Stat	Prob > F	Significant Difference
1	|L.ec_plus| < | L.ec_neg|	6.74**	0.0107	YES
2	|L.ec_plus| < |L.ec_neg|	6.81**	0.0104	YES

*** p<0.01, ** p<0.05, * p<0.1

Robustness Checks

Total Costs

1.21. We have run the same Error Correction model by aggregating wholesale costs and other costs into a "Total Cost" variable to measure responses of retail bills to

[19] Results are presented for 1 and 2 lags only as they were the best ones according to the Schwartz Bayesian Information Criterion (BIC). We have also estimated the model for 0 and 3 lags and found evidence of asymmetry.

changes in both wholesale costs and environmental charges or network and balancing costs. We have therefore estimated the following long run model:

$$(5) \quad Retail\ Bills_t = \phi_1 + \phi_2 Total\ Cost_t + U_t$$

1.22. Table 4 below reports the results from the model specified in equation (5), reporting that a 10 per cent increase in the total costs will entail an increase of 7.1 per cent of retail prices, or a pass through of 71 per cent.

Table 4: Long Run Relationship between retail price and Total Costs[20]

Dependent variable : ln_retail_price	**Coefficient**	**Standard Errors**
ln_total_cost	0.7103***	(0.0674)
Constant	1.9465***	(0.4093)
Adjusted R-square	0.98	
N obs	119	

*** p<0.01, ** p<0.05, * p<0.01

1.23. As before, we estimated the residuals U_t, verified that they are stationary, and then inserted their lag in the following short run relationship:

$$(6) \quad \Delta Retail_t = \sum_{i=1}^{k} \beta_1^+ \Delta Retail_{t-1}^+ + \sum_{i=1}^{k} \beta_i^- \Delta Retail_{t-1}^- + \sum_{i=1}^{k} \beta_i^+ \Delta Total\ Cost_{t-1}^+ + \sum_{i=1}^{k} \beta_i^- \Delta Total\ Cost_{t-1}^- + \delta^+ U_{t-1}^+ + \delta^- U_{t-1}^-$$

1.24. Results of model (6) are displayed in Table 5 below considering one or two lags of the dependent variable[21].

[20] The regression includes also yearly and quarterly dummies, all significant at the 1 per cent level.

[21] Results are presented for 1 and 2 lags only as they were the best ones according to the Schwartz Bayesian Information Criterion (BIC). We have also estimated the model for 0 and 3 lags and found evidence of asymmetry.

Table 5: Error Correction Model

Dependent variable : Δ_ln_retail_price	**Model 1**	**Model 2**
Δ_ln total_cost_plus	-0.0683 (0.1340)	-0.0605 (0.1498)
Δ_ln_total_cost_neg	0.5132 (0.4752)	0.6072 (0.5961)
Outlier Dummy	0.0981*** (0.0111)	0.0991*** (0.0124)
L.ec_plus	**-0.0305** **(0.1099)**	**-0.0240** **(0.0995)**
L.ec_neg	**-0.6081***** **(0.1849)**	**-0.6098***** **(0.1960)**
Δ_L1 ln_total_cost_plus	-0.0900 (0.1135)	-0.0504 (0.1439)
Δ_L1 ln_total_cost_neg	0.0383 (0.4696)	-0.2930 (0.8029)
Δ_L1 ln_retail_price_plus	0.2174** (0.1072)	0.2136* (0.1158)
Δ_L1 ln_retail_price_neg	0.1557 (0.1389)	0.1507 (0.1763)
Δ_L2 ln_total_cost_plus		-0.0955 (0.1208)
Δ_L2 ln_total_cost_neg		0.2918 (0.6713)
Δ_L2 ln_retail_price_plus		-0.0113 (0.0619)
Δ_L2 ln_retail_price_neg		0.1716 (0.3312)
Observations	117	116

Dependent variable : Δ_ln_retail_price	Model 1	Model 2
Adjusted R- square	0.49	0.47

Bootstraped[22] Standard Errors in parentheses - *** p<0.01, ** p<0.05, * p<0.1

1.25. The results for these regressions are very similar to the main specifications, and while there is no clear evidence of a significant difference in the immediate response to positive and negative cost changes[23], they do report a significant difference in the speed of adjustments to equilibrium.

1.26. Results for the F- test on the significance of the asymmetry are displayed in Table 6 below. Also in this case, there is an asymmetry in the speed of adjustment to equilibrium significant at the 5 per cent significance level.

Table 6: F-Test for significance of the asymmetry

Lags	Test for asymmetry	F- Stat	Prob > F	Significant Difference
1	|L.ec_plus| < | L.ec_neg|	4.87**	0.0295	YES
2	|L.ec_plus| < |L.ec_neg|	4.83**	0.0302	YES

*** p<0.01, ** p<0.05, * p<0.01

Other robustness checks

1.27. As an additional robustness check, we ran the analysis using quarterly rather than monthly lags of the variables, similarly to what Ofgem did in the previous discussion paper[24]. This implied estimating the following model in (5):

[22] We have estimated the model bootstrapping standard errors, since the Error Correction term are estimated regressors, allowing for 400 iterations. Results are the same when estimating the model using robust standard errors.

[23] The coefficients on the negative changes of total costs (Δ_ln_total_cost_neg) is significant, implying that there is an effect of decreases in costs in retail bills. Still, this effect is only statistically significant at the 10 per cent level and there is no evidence of statistical asymmetry between short run negative and positive changes in costs as detailed in equation (3).

[24] Ofgem reported that "the variables are lagged one quarter, as wholesale cost data is

$$(5)\ \Delta Retail_t = \sum_{i=1}^{k} \beta_i^{+} \Delta Retail_{t-3}^{+} + \sum_{i=1}^{k} \beta_i^{-} \Delta Retail_{t-3}^{-} + \sum_{i=1}^{k} \beta_i^{+} \Delta Wholesale_{t-3}^{+} + \sum_{i=1}^{k} \beta_i^{-} \Delta Wholesale_{t-3}^{-} + \sum_{i=1}^{k} \beta_i \Delta Other\ Costs_{t-3} + \delta^{+} Z_{(t-3)-1}^{+} + \delta^{-} Z_{(t-3)-1}^{-}$$

1.28. We found consistent results with the one-month lag both on the level of pass-through of the long run equation and on the presence of asymmetry in the speed of adjustment to the long run equilibrium.

1.29. Due to time constraints we did not calculate impulse response functions which could show us graphically the process of adjustment to equilibrium over time, given a certain change in the wholesale cost.

calculated on a quarterly basis", see page 3 footnote 1 of the discussion paper. https://www.ofgem.gov.uk/ofgem-publications/39712/priceasymmetry.pdf

Appendix 3 – Analysis of revenues and costs

Introduction

1.1. This appendix contains detailed analysis of supply volumes, revenues and costs of the six largest suppliers. This analysis contains supporting detail to Chapter 6 (Profitability) of the State of the Market Assessment published on 27 March 2014.

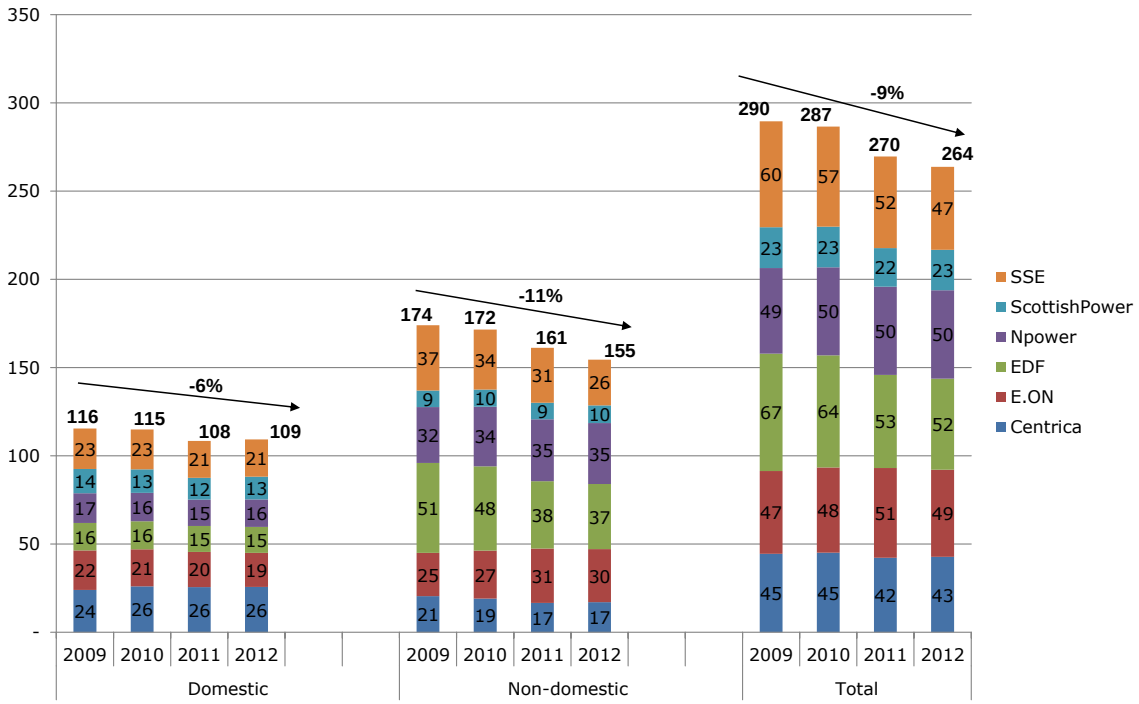
1.2. In this appendix:

- Unit ratios were calculated by dividing the relevant financial figure by volumes measured in TWh. To convert gas volumes (MThms) to TWh, we multiplied MThms by a factor of 0.0293017.
- Combined unit ratio for the six largest suppliers was calculated by taking the sum of the relevant financial figures of the six largest suppliers and dividing this by total volumes.
- Period average unit ratios were calculated by taking a simple average of the unit ratios over the period 2009 to 2012.
- Where calculated, the 'range' shows the difference between the highest and lowest values in a given year, as well as their percentage difference.

Supply volume trends

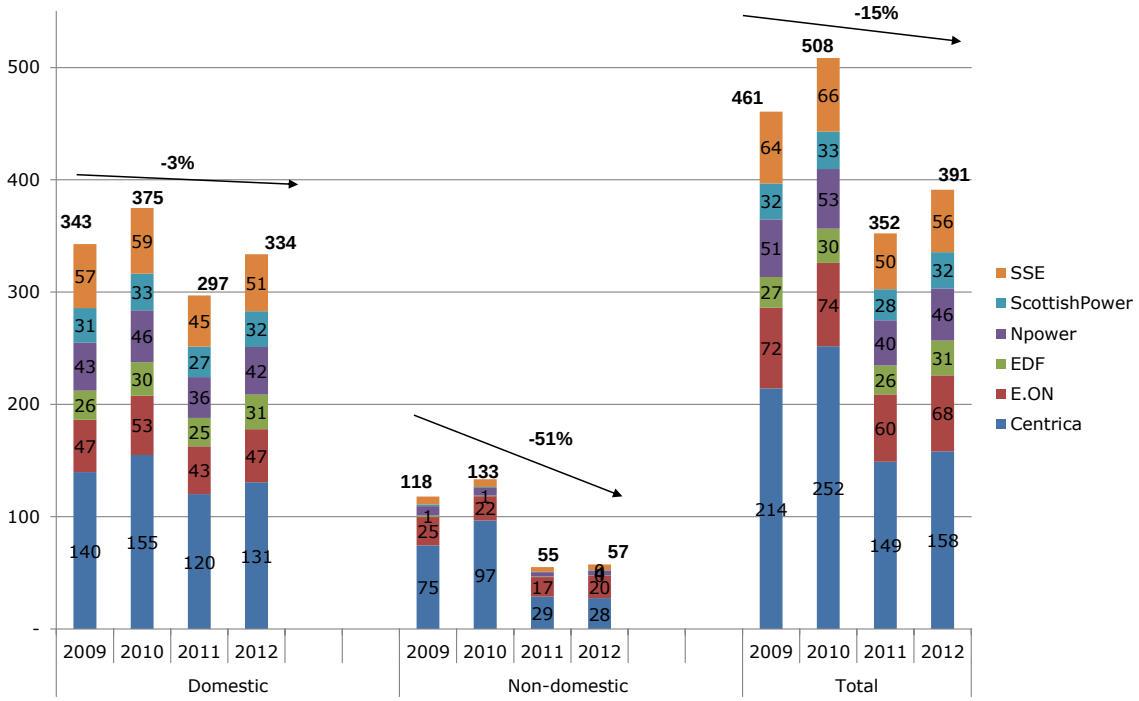
1.3. We considered total electricity and gas volumes supplied by the six largest suppliers over the period 2009 to 2012 (see Figures 1 and 2 below).

Figure 1: Six largest suppliers: electricity supply volumes (2009-2012) (in TWh)



Source: Consolidated Segmental Statements. Figures in bold represent totals for each column.

Figure 2: Six largest suppliers: gas supply volumes (2009-2012) (in TWh)



Source: Analysis of Consolidated Segmental Statements. Figures in bold represent totals for each column.

Supply revenue trends

1.4. Against a backdrop of falling supply volumes, total revenues in both gas and electricity supply were broadly flat between 2009 and 2012, although this masks a pattern of increasing domestic revenues and decreasing non-domestic revenues in both electricity and gas.

1.5. Figure 3 below sets out the revenue per MWh (Unit Revenue) in electricity supply for each of the six largest suppliers, split by domestic and non-domestic supply.

Figure 3: Six largest suppliers: electricity supply Unit Revenues (Domestic and Non-domestic) (£ per MWh)

	Domestic Electricity					*Non-domestic Electricity*					*Total Electricity*				
	2009	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***
Centrica	109	107	118	126	115	105	97	114	108	106	107	103	116	119	111
E.ON	102	109	121	129	115	88	80	82	88	85	95	93	98	104	97
EDF	106	104	114	125	112	86	78	82	87	83	91	84	91	98	91
RWE	112	110	118	129	117	91	81	82	88	86	98	90	93	100	95
SP	112	109	120	125	116	95	88	90	95	92	105	100	107	112	106
SSE	113	112	120	133	120	86	82	85	91	86	96	94	99	110	100
Combined	**109**	**108**	**119**	**128**	**116**	**90**	**82**	**86**	**91**	**87**	**97**	**93**	**99**	**106**	**99**

Source: Analysis of Consolidated Segmental Statement

1.6. Figure 4 below sets out the Unit Revenues for gas supply for each of the six largest suppliers, split between domestic and non-domestic supply, over the period 2009 to 2012.

Figure 4: Six largest suppliers: gas supply Unit Revenues (Domestic and Non-domestic) (£ per MWh)

	Domestic Gas					*Non-domestic Gas*					*Total Gas*				
	2009	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***
Centrica	37	36	41	45	40	34	22	32	37	31	36	30	39	44	37
E.ON	33	32	35	39	35	28	25	28	30	28	31	30	33	36	33
EDF	32	32	35	38	34	32	28	48	52	40	32	32	35	38	34
RWE	36	33	37	39	36	28	28	33	36	31	35	33	37	38	36
SP	37	34	38	39	37	39	39	41	41	40	37	34	38	39	37
SSE	33	33	40	43	37	26	26	31	33	29	32	33	39	42	37
Combined	**35**	**34**	**39**	**42**	**38**	**32**	**23**	**31**	**34**	**30**	**34**	**31**	**37**	**41**	**36**

Source: Analysis of Consolidated Segmental Statements

The weighted average cost of electricity/gas

Cost of electricity (WACOE) – domestic and non-domestic supply

1.7. Figure 5 below sets out the WACOE for each of the six largest suppliers' electricity supply business split by domestic and non-domestic supply.

Figure 5: Six largest suppliers: electricity supply (Domestic and Non-domestic) WACOE (£/MWh)

	Domestic Electricity					*Non-domestic Electricity*					*Total Electricity*				
	2009	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***
Centrica	58	54	59	64	59	70	55	55	61	60	64	54	57	63	59
E.ON	61	58	62	59	60	66	51	54	57	57	64	54	57	58	58
EDF	61	58	58	61	59	62	52	54	55	56	62	54	55	56	57
RWE	69	59	57	58	61	68	52	53	54	57	68	54	54	56	58
SP	61	68	78	59	67	60	53	57	56	56	61	62	69	58	62
SSE	64	61	66	67	65	61	55	58	60	58	62	57	62	63	61
Combined	**62**	**59**	**63**	**62**	**61**	**64**	**53**	**55**	**57**	**57**	**63**	**55**	**58**	**59**	**59**
Range	***11***	***15***	***21***	***9***	***8***	***10***	***4***	***6***	***7***	***5***	***7***	***8***	***15***	***8***	***6***
Range	***18%***	***27%***	***36%***	***15%***	***14%***	***16%***	***7%***	***11%***	***13%***	***8%***	***12%***	***15%***	***28%***	***14%***	***10%***

Source: Analysis of Consolidated Segmental Statements

Cost of gas (WACOG) – domestic and non-domestic supply

1.8. Figure 6 below sets out the WACOG (converted to £ per MWh) for each of the six largest suppliers' gas supply business (including both domestic and non-domestic supply). We found that for the six largest suppliers combined, WACOG for total gas supply in 2012 was in line with 2009 levels.

Figure 6: Six largest suppliers: gas supply (Domestic and Non-domestic) WACOG (£/MWh)

	Domestic Gas					Non-domestic Gas					Total Gas				
	2009	2010	2011	2012	Avg	2009	2010	2011	2012	Avg	2009	2010	2011	2012	Avg
Centrica	20	19	21	24	21	29	16	20	22	22	24	18	21	24	22
E.ON	21	20	22	24	21	21	17	19	22	20	21	19	21	23	21
EDF	21	18	20	23	20	21	10	26	26	21	21	17	21	23	20
RWE	24	18	20	22	21	22	18	20	23	20	24	18	20	22	21
SP	24	20	18	21	21	24	21	12	23	20	24	20	18	21	21
SSE	22	20	22	23	22	18	19	22	23	20	22	20	22	23	22
Combined	**22**	**19**	**21**	**23**	**21**	**26**	**17**	**20**	**22**	**21**	**23**	**18**	**21**	**23**	**21**
Range	***4***	***3***	***4***	***3***	***1***	***11***	***11***	***15***	***4***	***2***	***3***	***3***	***4***	***2***	***1***
Range	***18%***	***15%***	***20%***	***12%***	***7%***	***59%***	***103%***	***124%***	***17%***	***9%***	***16%***	***16%***	***21%***	***11%***	***6%***

Source: Analysis of Consolidated Segmental Statements.

Other direct costs – network/social & environmental

1.9. Other direct costs include the costs of delivering energy to end customers (including network costs and balancing costs) and environmental and social obligations stemming from carbon reduction targets. Network costs are price-regulated based on parameters set by Ofgem and suppliers therefore have little control over them. They may vary depending on geography. The balancing activity is administered by National Grid and suppliers have limited control over balancing costs. Variations between suppliers may occur depending on exposure to the balancing market. They also have limited control over the cost of social and environmental policies; however the companies control the delivery method of some measures (such as CERT and CESP).

Electricity supply: Unit Other Direct Costs

1.10. In Figure 7 below, we set out the Unit Other Direct Costs for the six largest suppliers' electricity supply.

Figure 7: Six largest suppliers: electricity supply Unit Other Direct Costs (£/MWh)

	Domestic Electricity					Non-domestic Electricity					Total Electricity				
	2009	2010	2011	2012	Avg	2009	2010	2011	2012	Avg	2009	2010	2011	2012	Avg
Centrica	32	33	39	48	38	22	24	37	31	28	28	29	38	41	34
E.ON	22	30	34	44	33	14	20	21	27	20	18	25	26	34	26
EDF	29	30	36	44	35	18	19	22	27	22	21	22	26	32	25
RWE	27	34	37	41	35	18	23	23	28	23	21	27	27	32	27
SP	30	32	35	47	36	23	24	27	31	27	27	29	32	40	32
SSE	31	33	38	50	38	20	22	25	30	24	24	27	30	39	30
Combined	**29**	**32**	**37**	**46**	**36**	**19**	**22**	**24**	**28**	**23**	**23**	**26**	**29**	**36**	**28**
Range	***10***	***3***	***5***	***9***	***5***	***10***	***5***	***15***	***4***	***8***	***10***	***7***	***12***	***9***	***9***
Range	***47%***	***11%***	***15%***	***21%***	***17%***	***74%***	***25%***	***71%***	***17%***	***39%***	***58%***	***33%***	***48%***	***28%***	***36%***

Source: Analysis of Consolidated Segmental Statements.

1.11. Figure 7 above shows that Other Direct Costs were significantly higher for domestic electricity customers than for non-domestic. Costs rose over the period in both segments and by 56 per cent as a whole.

Gas supply: Unit Other Direct Costs

1.12. In Figure 8 below, we set out the Unit Other Direct Costs for the six largest suppliers' gas supply.

Figure 8: Six largest suppliers: gas supply Unit Other Direct Costs (£/MWh)

	Domestic Gas					*Non-domestic Gas*					*Total Gas*				
	2009	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***
Centrica	11	8	11	10	10	3	2	6	6	4	8	6	10	10	8
E.ON	8	7	10	11	9	4	4	5	4	4	7	6	8	9	8
EDF	8	8	10	10	9	8		8	5	5	8	8	10	10	9
RWE	8	8	10	9	9	4	5	5	5	5	8	8	9	9	8
SP	8	7	9	10	9	5	6	7	8	6	8	7	9	10	9
SSE	8	8	10	11	9	5	4	6	5	5	8	8	10	11	9
Combined	**9**	**8**	**10**	**10**	**9**	**4**	**3**	**5**	**5**	**4**	**8**	**7**	**9**	**10**	**8**
Range	***3***	***1***	***1***	***2***	***1***	***4***	***6***	***3***	***3***	***2***	***2***	***2***	***2***	***2***	***1***
Range	***35%***	***13%***	***16%***	***22%***	***16%***	***131%***	***N/M***	***65%***	***74%***	***47%***	***22%***	***34%***	***24%***	***22%***	***20%***

Source: Analysis of Consolidated Segmental Statements. The 'N/M' for EDF arises because its 'Other Direct Costs' in 'non-domestic gas' was presented in its 2010 CSS as nil.

1.13. Based on Figure 8 above, we found that variations in Unit Other Direct Costs for gas supply were smaller in £ per MWh terms when compared with electricity supply. However, these variations had a significant impact on unit margins. Smaller differences in unit ratios in gas supply can have a significant impact on Unit Margins in gas supply given its lower Unit Revenues compared with electricity supply.

Gross Margins (%)

Electricity supply: Gross Margins

1.14. Figure 9 below shows Gross Margins for each of the six largest suppliers between 2009 and 2012 in relation to their electricity supply.

Figure 9: Six largest suppliers: electricity supply Gross Margin (% of revenues)

	Domestic Electricity					*Non-domestic Electricity*					*Total Electricity*				
	2009	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***
Centrica	17%	19%	18%	12%	16%	12%	18%	19%	15%	16%	15%	19%	18%	13%	16%
E.ON	18%	19%	21%	19%	20%	10%	11%	8%	6%	8%	14%	15%	14%	12%	14%
EDF	15%	14%	18%	17%	16%	7%	8%	8%	6%	7%	9%	10%	11%	10%	10%
RWE	15%	15%	19%	22%	18%	6%	7%	8%	6%	7%	9%	10%	13%	13%	11%
SP	18%	8%	5%	16%	12%	12%	13%	6%	8%	10%	16%	10%	6%	13%	11%
SSE	16%	15%	13%	12%	14%	6%	6%	3%	2%	4%	10%	10%	8%	7%	9%
Combined	**17%**	**16%**	**16%**	**16%**	**16%**	**8%**	**10%**	**8%**	**7%**	**8%**	**12%**	**13%**	**12%**	**11%**	**12%**
Range	***4***	***11***	***16***	***11***	***8***	***7***	***12***	***16***	***13***	***12***	***7***	***9***	***12***	***6***	***7***

Source: Analysis of Consolidated Segmental Statements.

1.15. Gross Margins in electricity, both on a combined basis and in domestic and non-domestic segments were relatively stable for the six largest suppliers as a

whole. However there were variations in Gross Margins between suppliers, and between domestic and non-domestic supply.

1.16. Gross Margins were materially higher in domestic electricity supply than in non-domestic supply, reflecting proportionately higher Unit Revenues, even after taking into account higher WACOE and Unit Direct Costs in the domestic segment.

1.17. In relation to total electricity supply, Centrica consistently generated the highest Gross Margins, largely driven by its higher Unit Revenues compared with the other major suppliers. EDF and SSE generated the lowest Gross Margins. In EDF's case, this was driven largely by its low Unit Revenues, whilst in SSE's case, this was due to its higher WACOE.

Gas supply: Gross Margins

1.18. Figure 10 below shows Gross Margins for each of the six largest suppliers between 2009 and FY12 in relation to their gas supply.

Figure 10: Six largest suppliers: gas supply Gross Margin (% of revenues)

	Domestic Gas					*Non-domestic Gas*					*Total Gas*				
	2009	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***
Centrica	16%	23%	21%	24%	21%	4%	13%	21%	23%	15%	12%	20%	21%	24%	19%
E.ON	10%	14%	12%	13%	12%	10%	17%	12%	11%	12%	10%	14%	12%	12%	12%
EDF	9%	19%	14%	14%	14%	10%	63%	28%	40%	35%	9%	20%	14%	15%	14%
RWE	10%	22%	21%	19%	18%	8%	20%	26%	22%	19%	10%	22%	22%	19%	18%
SP	13%	19%	27%	20%	20%	25%	30%	54%	24%	33%	13%	20%	27%	20%	20%
SSE	8%	17%	19%	21%	16%	10%	13%	11%	14%	12%	8%	17%	19%	20%	16%
Combined	**13%**	**20%**	**20%**	**20%**	**18%**	**6%**	**15%**	**18%**	**19%**	**14%**	**11%**	**19%**	**20%**	**20%**	**17%**
Range	***8***	***10***	***15***	***11***	***9***	***22***	***50***	***43***	***29***	***23***	***5***	***8***	***15***	***11***	***8***

Source: Analysis of Consolidated Segmental Statements.

1.19. Gross margins were higher in domestic gas supply than non-domestic, and the overall margin of 17 per cent was higher than the average for electricity supply of 12 per cent. Gross Margins in gas supply increased over the period from 11 per cent to 20 per cent. We also noted that Gross Margins in non-domestic gas had increased at a faster rate than in domestic.

1.20. Period average Gross Margins for E.ON and EDF were lower than the average for the six largest suppliers combined; this was largely driven by the lower Unit Revenues in total gas supply for E.ON and EDF over this period.

Indirect costs

1.21. In general, suppliers exert the highest degree of control over these costs. They include marketing and sales, costs to serve and acquire customers, IT and other central function activities.

Electricity supply: Unit Indirect Costs

1.22. In Figure 11 below, we set out the Unit Indirect Costs for the six largest suppliers' electricity supply.

Figure 11: Six largest suppliers: electricity supply Unit Indirect Costs (£/MWh)

	Domestic Electricity					*Non-domestic Electricity*					*Total Electricity*				
	2009	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***
Centrica	10	15	15	17	14	6	12	14	12	11	8	13	15	15	13
E.ON	18	19	18	18	18	4	3	3	3	3	11	10	9	9	9
EDF	21	22	23	24	23	3	3	5	5	4	7	8	10	10	9
RWE	22	26	25	22	24	5	4	4	4	4	11	11	10	9	10
SP	16	14	17	16	16	3	3	5	4	4	11	10	12	11	11
SSE	11	11	12	13	12	2	2	2	2	2	6	6	6	7	6
Combined	**16**	**17**	**18**	**18**	**17**	**4**	**4**	**4**	**4**	**4**	**9**	**9**	**10**	**10**	**9**
Range	***12***	***15***	***14***	***11***	***12***	***4***	***10***	***12***	***10***	***9***	***6***	***8***	***9***	***8***	***7***
Range	***127%***	***137%***	***117%***	***89%***	***105%***	***213%***	***N/M***	***530%***	***581%***	***448%***	***102%***	***141%***	***146%***	***124%***	***115%***

Source: Analysis of Consolidated Segmental Statements

Gas supply: Unit Indirect Costs

1.23. In Figure 12 below, we set out the Unit Indirect Costs for the six largest suppliers' gas supply.

Figure 12: Six largest suppliers: gas supply Unit Indirect Costs (£/MWh)

	Domestic Gas					*Non-domestic Gas*					*Total Gas*				
	2009	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***	***2009***	***2010***	***2011***	***2012***	***Avg***
Centrica	3	5	5	6	5	2	2	5	4	3	3	3	5	5	4
E.ON	6	5	6	6	6	2	1	2	2	2	4	4	5	4	4
EDF	7	7	8	7	7	2	2		5	2	7	7	8	7	7
RWE	7	8	9	7	7	4	5	7	7	6	6	7	8	7	7
SP	5	4	6	5	5	4	3	7	5	2	5	4	6	5	5
SSE	4	4	4	4	4	2	2	3	1	2	4	3	4	4	4
Combined	**5**	**5**	**6**	**6**	**5**	**2**	**2**	**4**	**3**	**3**	**4**	**4**	**6**	**5**	**5**
Range	***4***	***4***	***4***	***3***	***4***	***3***	***4***	***7***	***12***	***4***	***4***	***4***	***4***	***3***	***3***
Range	***120%***	***111%***	***98%***	***72%***	***90%***	***148%***	***288%***	***N/M***	***231%***	***258%***	***152%***	***108%***	***101%***	***84%***	***92%***

Source: Analysis of Consolidated Segmental Statements

Appendix 4 – Stakeholder engagement

1.1. Throughout the review we met with a number of interested parties. These include:

Businesses/Organisations

Bes
Centrica
Consumer Futures
Consumer Futures Scotland
Consumer Futures Wales
Cooperative Energy
Cornwall Energy
DECC
DONG Energy
Drax Power
E.On
EDF Energy
First Utility
Fuel Poverty Advisory Group
Good Energy
M&S
Macquarie Bank
Morgan Stanley
N2EX
Opus Energy
Ovo Energy
Renewable Energy Systems
RWE Npower Group plc
RWE Npower plc
Sainsbury's
Scottish Power
SSE
Telecom Plus
Tesco
Utilita
Virgin
Which?

Individuals

Catherine Waddams - University of East Anglia
David Newbury - University of Cambridge
Dieter Helm - University of Oxford
George Yarrow - University of Oxford
Michael Pollit - University of Cambridge
Min Lim - University of East Anglia
Philip Lowe - European Commission
Stephen Littlechild - University of Cambridge
Steven Davies - University of East Anglia