

Industrial Price Statistics – data sources and methodologies

1. Introduction

UK industrial energy prices are an important part of the department's work. They are widely used within government - in briefing, to assist in developing and monitoring policies, to assess price trends, to highlight (and therefore help to prevent) price discrimination, and to monitor the effects of liberalising energy markets. They are also used extensively by industry, eg as price escalators in fuel purchasing contracts and as evidence in contract negotiations.

2. Publications

BEIS produces industrial energy price statistics tables on a quarterly and annual basis. Tables are published within Quarterly Energy Prices (QEP): <u>https://www.gov.uk/government/organisations/department-of-energy-climate-</u> <u>change/series/quarterly-energy-prices</u> and can also be found under 'Energy price statistics' on the BEIS statistics web page: <u>https://www.gov.uk/government/organisations/department-of-energy-climate-</u> <u>change/about/statistics</u>

Quarterly prices are published in Tables 3.1.1, 3.1.2 and 3.4.1/3.4.2. Annual prices are published in Tables 3.1.3 and 3.1.4 and are available as additional background data to Tables 3.4.1/3.4.2.

Some of the industrial price information is used to create quarterly and annual indices in Tables 3.3.1/3.3.2 of QEP. Other industrial price information published in QEP is used to create the Value Balance tables in the annual Digest of UK Energy Statistics (DUKES): https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/digest-of-uk-energy-statistics-dukes . Industrial price information from QEP is also used in the publications UK Energy in Brief and UK Energy Sector Indicators.

3. <u>Quarterly statistics</u>

Each quarter, two main surveys of industrial energy prices are conducted. Both collect volume and value data, which are used to calculate average prices, and both stratify the size of the end-user to provide prices split into average annual consumption sizebands. However, they collect from opposite ends of the energy supply chain (energy suppliers and end-users) and have different coverage (manufacturing industries and non-domestic consumers).

In addition, a monthly survey of industrial energy prices is conducted by BEIS as part of the Producer Price Index (PPI) data collection for the Office for National Statistics (ONS). The monthly gas data is used to create a quarterly index in Table 3.3.1/3.3.2, alongside coal and heavy fuel oil data from the Quarterly Fuels Inquiry (QFI) and electricity data from the monthly electricity survey (see separate fuel specific methodology notes).

Data Sources

1. Quarterly Fuels Inquiry (QFI)

The survey is formed from a panel of approximately 600 manufacturing industry sites. The panel consists of companies purchasing fuels in small and large quantities: to maximise the coverage of each fuel type, and minimise the burden on business, larger users are surveyed proportionally more than smaller users. The survey aims to provide representative market prices, which means trades that would produce an unrepresentative price because of their size or dominance of total consumption are excluded (eg coal purchased by the iron and steel sector, and gas purchased for electricity generation).

Data is collected from respondents on the volume and value of one or more of five major fuels (gas, electricity, gas oil, heavy fuel oil, and coal) purchased in a given quarter. The entire year's quarterly data is reviewed once annual data becomes available to ensure that each of the contributors who supply data have been placed in the correct size band based upon their actual annual consumption.

Coverage¹ varies by fuel from around 12% to around 25% of UK industrial sales. The response rate is generally above 85%.

2. Non-domestic Price Transparency (PT) Survey

The data collected from this survey is required by Eurostat under Regulation (EU) 2016/1952. The survey gathers data from 8 gas and 6 electricity suppliers in the UK.

Data is collected from respondents on the volume and value of gas and electricity sold to non-domestic consumers in a given quarter. The data is stratified by the annual consumption of the end users. The forms request 3 sets of value figures – excluding all taxes and levies, excluding VAT, and including all taxes – which allows BEIS to produce prices including and excluding the Climate Change Levy (CCL).

Coverage² is estimated at around 75% of industrial gas sales and around 60% of industrial electricity sales. The response rate is 100%.

Methodology and data quality:

1. QFI

The QFI quarterly survey forms (see Annex A) are sent out, collected, and initially processed by the Office for National Statistics (ONS) on behalf of the department. Data is checked against previous returns and 'gates' of acceptable values, and any irregularities

¹ Estimated from annual fuels volumes from QFI data compared against annual fuel volumes published in DUKES: <u>https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/digest-of-uk-energy-statistics-dukes</u>

² Estimated from annual fuels volumes from PT data compared against annual fuel volumes published in DUKES.

are queried with the data supplier. Missing data is imputed by ONS, based on data previously reported for that company and the average price change from companies that have reported that quarter.

Once the data for a quarter has been processed, it is sent to BEIS, where it is entered into a bespoke computer system which processes the data to produce average prices by sizeband for each of the five fuels. For each size of consumer, the average price for a fuel (exclusive of VAT) is calculated by dividing the total quantity of purchases into their total value. The "all consumers-average" price uses base weighting to weight the prices for each size band according to purchases by businesses in the size band recorded in the Purchases Inquiry. (For weights see Annex B)

Price data is extracted and compared against comparison series (eg wholesale prices), and any unusual prices are checked, with queries on individual company responses passed back to ONS for further investigation.

Sample size

	Extra large	Moderately large	Large	Medium	Small
Coal	n/a	n/a	6-10	n/a	n/a
HFO	n/a	n/a	3-5	6-10	11-50
Gasoil	n/a	n/a	11-50	11-50	11-50
Electricity	11-50	101-500	101-500	101-500	11-50
Gas	n/a	n/a	101-500	101-500	51-100

The table below details the average sample sizes in Q1 2015.

In general a larger sample size will result in a more accurate estimate. The sampling frame used for the survey is the Government's interdepartmental business register (IDBR). This has information on a firm's size, the nature of its business activity, employment levels, etc. This information is combined with that from the Purchasers Inquiry (PI) to enable identification of businesses likely to have a significant spend on energy. The ONS last ran the PI in 2006. As a result it has become more difficult to locate new businesses to recruit to the sample.

Data are presented as provisional 3 months after the end of the quarter and then finalised 3 months later when all of the expected forms have been returned. Typically 80 - 85% of forms are returned and processed and used to calculate the provisional estimates, with a further 5 - 10% received at a later stage. At the end of the year some amendments are made to the strata allocation, based on actual consumption within the year, and this leads to a further revision to the data.

Annex C provides an indication of the sample size by fuel and strata for each quarter 1 for the last 9 years. Estimates of the percentage standard error are also shown. The standard error is a measure of the error caused by observing a sample instead of the whole population.

2. Price Transparency

The Price Transparency forms (see Annex D) are sent out and collected by BEIS. The return forms provide some initial validation of the data, checking that the correct VAT rate has been applied and that the amount of CCL does not exceed the maximum rate. BEIS makes further checks, comparing prices against comparison series and previous returns, and checking volume data against survey responses provided to other sections of the department. Any queries are raised with the data provider. On the rare occasions when a company cannot report by the deadline, missing data is imputed using total volume and value data for that company for that quarter reported under an alternate survey, and splitting the volume and value across the sizebands based on previous returns.

The average price for each size of consumer is obtained by dividing the total quantity of purchases, for each fuel, into their total value. The size bands used are as specified in EU Council Regulation (EU) 2016/1952.

The sampling frame for the survey is a list of companies with supply licences. For the survey, large supply businesses are selected to reduce the general burden on business of BEIS's surveys. Typically, the firms surveyed cover over 60% of the market.

Annex E shows estimates of the percentage standard error for the Price Transparency.

3. Annual statistics

The annual statistics are created from quarterly data. For both surveys, the quarterly volume and value data is aggregated, and then combined to create average annual prices by consumption band.

For the QFI, the entire year's quarterly data is reviewed once final annual data becomes available, to ensure that each of the contributors who supply data have been placed in the correct size band based upon their actual annual consumption. This means that there can be revisions made to data from Q1 to Q4 of a given year once the final Q4 data has been processed.

4. Uses of the Statistics

The published industrial energy price statistics are used by a variety of groups for a variety of purposes, including:

- within BEIS and other Government departments (eg as base price assumptions used in modelling price projections, to analyse potential price impacts of future policy, especially for the more energy intensive users, or as background to tools such as the 2050 calculator);
- by academics and students (queries have included data for research looking into the effects of the Climate Change Levy);
- by industry (eg in cost escalation clauses as a measure of price inflation, in contract negotiations as an indication of current price levels, or as evidence in disputes over historic charges);

- by business consultants (eg when estimating potential savings to business from switching fuel, introducing efficiency measures, or installing renewable micro-generation).
- BEIS is obligated to submit data, including the price transparency and certain oil statistics, to Eurostat and the IEA which is then published by these organisations.

Annex A: Quarterly Fuels Inquiry survey form



Annex B: Weights (parts per 100) for Quarterly Fuels Inquiry

<u>Quarterly</u>				
	Extra large	Moderately large/ Large	Medium	Small
Coal	n/a	85.6	12.2	2.2
HFO	n/a	52.0	34.9	13.1
Gasoil	n/a	82.6	14.8	2.6
Electricity	30.1	38.9	25.2	5.8

For gas, there are different weights applied for each quarter (reflecting the more seasonal use of gas as a heating fuel for small purchasers):

<u>Q1</u>

		Large	Medium	Small
Gas Firm	Normal	71.2	20.2	8.6
	cross	40.3	92.6	1
Gas Interruptible	Normal	98.5	1.5	0
	cross	59.7	7.4	0
Gas Combined	Normal	83.4	12.2	4.4

<u>Q2</u>

		Large	Medium	Small
Gas Firm	Normal	78.6	15	6.5
	cross	41.5	93.2	1
Gas Interruptible	Normal	98.9	1.1	0
	Cross	58.5	6.8	0
Gas Combined	Normal	87.7	9.2	3.1

		Large	Medium	Small	
Gas Firm	Normal	83	12.9	4.1	
	cross	38.9	94.2	1	
Gas Interruptible	Normal	99.4	6	0	
	cross	60.2	5.8	0	
Gas Combined	Normal	92.1	6.1	1.8	

Q4

		Large	Medium	Small
Gas Firm	Normal	74.2	18.5	7.3
	cross	40.3	92.6	1
Gas Interruntible	Normal	98.8	1.2	0
	cross	59.5	6.9	0
Gas Combined	Normal	87.1	9.4	3.5

"Cross" weights are used to calculate average prices by size band for gas (combining the data for firm and interruptible prices). "Normal" weights are used to calculate averages by type of contract (combining the size bands together).

For example the Q1 2010 provisional data published in June 2010:

Average prices (p/kWh)	Large	medium	small	Calculated Average
Firm	1.631	2.392	2.724	1.879
Interruptible	1.725	2.250		1.733
Combined	1.687	2.381	2.724	1.817

<u>Q3</u>

Annex C: Sample sizes and standard errors for Quarterly Fuels Inquiry

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	6-10	3-5	3-5						
Medium	6-10	3-5	3-5						
Large	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10
Average	11-50	11-50	11-50	11-50	6-10	11-50	11-50	6-10	6-10

Coal sample sizes for quarter 1's

Coal standard errors (%) for quarter 1's

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	8.2	13.4	9.8						
Medium	8.7	11.6	12.1						
Large	6.4	9.4	11.1	15.8	13.8	13.6	9.7	8.3	9.7
Average	2.9	5.3	6.6	9.8	9.1	9.2	6.6	5.5	6.4

Gasoil sample sizes for quarter 1's

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	51-100	11-50	11-50	11-50	11-50	11-50	11-50	11-50	11-50
Medium	101-500	51-100	51-100	51-100	51-100	51-100	11-50	11-50	11-50
Large	101-500	51-100	51-100	51-100	51-100	51-100	51-100	51-100	11-50
Average	101-500	101-500	101-500	101-500	101-500	101-500	101-150	101-150	101-150
	I								

Gasoil standard errors (%) for quarter 1's

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	1.7	3.9	1.8	1.8	1.1	1.9	1.1	2.5	3.3
Medium	1.0	1.2	1.7	1.5	1.2	1.7	0.9	1.0	2.9
Large	0.7	1.5	2.2	1.5	1.3	1.5	1.6	1.7	2.6
Average	0.4	0.8	1.2	0.9	0.6	0.8	0.8	0.9	1.4

Heavy fuel oil sample sizes for quarter 1's

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	11-50	11-50	11-50	11-50	11-50	11-50	11-50	11-50	11-50
Medium	11-50	11-50	11-50	11-50	11-50	11-50	11-50	11-50	6-10
Large	6-10	6-10	6-10	3-5	3-5	3-5	3-5	3-5	3-5
Ex large	3-5	3-5							
Mod large	3-5	3-5							
Average	51-100	11-50	11-50	11-50	11-50	11-50	11-50	11-50	11-50

Heavy fuel oil standard errors (%) for quarter 1's

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	5.0	3.6	7.7	3.0	3.2	2.6	2.2	2.2	6.8
Medium	2.2	2.9	2.6	2.4	3.8	3.1	3.8	3.5	6.6
Large	0.6	3.3	4.3	4.0	1.3	1.6	2.0	2.1	8.2
Ex large	0.5	9.0							
Mod large	1.9	3.5							
Average	0.7	1.1	1.3	0.9	0.9	0.8	0.9	0.9	2.1

Gas sample sizes for quarter 1's

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	101-500	51-100	51-100	51-100	51-100	51-100	51-100	51-100	51-100
Medium	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500
Large	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500
Average	1,000- 5,000	501- 1,000	101-500	501- 1,000	501- 1,000	501- 1,000	101-500	101-500	101-500
Firm	501- 1.000	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500
Int	101-500	101-500	101-500	101-500	101-500	51-100	51-100	51-100	51-100

Gas standard errors (%) for quarter 1's

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	1.4	2.8	3.7	5.8	4.2	4.7	3.1	3.3	2.5
Medium	1.3	2.5	2.7	2.5	3.0	1.3	1.0	1.0	1.0
Large	1.2	0.5	0.9	1.1	0.5	0.4	0.2	0.3	0.4
Average	0.6	0.4	0.6	0.7	0.4	0.3	0.2	0.2	0.3
Firm	0.8	0.8	1.2	1.3	0.7	0.5	0.3	0.4	0.5
Int	2.3	0.7	1.6	2.1	0.9	0.9	0.5	0.8	0.8

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	101-500	51-100	51-100	51-100	11-50	11-50	11-50	11-50	11-50
Medium	501- 1,000	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500
Large	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500
Ex large	11-50	11-50	11-50	11-50	11-50	11-50	11-50	11-50	11-50
Mod large	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500	101-500
Average	1,000- 5,000	501- 1,000							

Electricity sample sizes for quarter 1's

Electricity standard errors (%) for quarter 1's

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Small	1.1	5.1	3.7	5.6	3.4	2.9	3.8	4.8	2.1
Medium	0.8	1.3	1.5	2.2	1.2	1.9	1.2	1.1	1.1
Large	0.9	0.9	1.4	1.1	0.7	0.6	0.5	0.7	0.8
Ex large	4.7	5.5	9.7	7.3	3.0	2.7	1.7	4.1	4.6
Mod large	1.2	1.1	1.6	1.5	1.0	0.9	0.8	1.0	1.0
Average	0.4	0.5	0.8	0.7	0.4	0.4	0.3	0.4	0.5

The above standard errors are indicative, and provide an indication of the relative precision of the estimates for different size bands.

From the data above a jump in the size of the standard errors, in particular for small gas and electricity consumers, can be seen between q1 2007 and q1 2008. This is a result of a cut being made to sample sizes, following consultation with users.

In general, there is slightly greater uncertainty attached to estimates based on smaller sample sizes, as would be expected. However, the extent to which there is price volatility within a size band, and contracts of different lengths, will also result in a larger variance for certain fuels.

Annex D: Price Transparency return forms

Company name Restricted Commercial (when completed)

DATA RELATING TO UK NON-DOMESTIC ELECTRICITY CONSUMERS Q1 2010

Click here for instructions

Size of consumer	Annual consumption MWh	Volume sold MWh	Value excluding all taxes £000	Value excluding VAT £000	Value including all taxes £000
Small business and					
professional activities	0 - 20				
Small enterprise	20 - 499				
Small/Medium enterprise	500 - 1,999				
Medium enterprise	2,000 - 19,999				
Large enterprise	20,000 - 69,999				
Very large enterprise	70,000 - 150,000				
Extra large enterprise	>150,000				

Size of consumer	Annual consumption	Unit price excluding all taxes	Unit price excluding VAT	Unit price including all taxes
	MWh	p/kWh	p/kWh	p/kWh
Small business and				
professional activities	0 - 20	#DIV/0!	#DIV/0!	#DIV/0!
Small enterprise	20 - 499	#DIV/0!	#DIV/0!	#DIV/0!
Small/Medium enterprise	500 - 1,999	#DIV/0!	#DIV/0!	#DIV/0!
Medium enterprise	2,000 - 19,999	#DIV/0!	#DIV/0!	#DIV/0!
Large enterprise	20,000 - 69,999	#DIV/0!	#DIV/0!	#DIV/0!
Very large enterprise	70,000 - 150,000	#DIV/0!	#DIV/0!	#DIV/0!
Extra large enterprise	>150,000	#DIV/0!	#DIV/0!	#DIV/0!

Validation check

Please review your data if there is any red text in the table below.

Size of consumer	Annual consumption MWh	Amount of CCL p/kWh	CCL validation	Amount of VAT p/kWh
Small business and				
professional activities	0 - 20	#DIV/0!	#DIV/0!	#DIV/0!
Small enterprise	20 - 499	#DIV/0!	#DIV/0!	#DIV/0!
Small/Medium enterprise	500 - 1,999	#DIV/0!	#DIV/0!	#DIV/0!
Medium enterprise	2,000 - 19,999	#DIV/0!	#DIV/0!	#DIV/0!
Large enterprise	20,000 - 69,999	#DIV/0!	#DIV/0!	#DIV/0!
Very large enterprise	70,000 - 150,000	#DIV/0!	#DIV/0!	#DIV/0!
Extra large enterprise	>150,000	#DIV/0!	#DIV/0!	#DIV/0!

Any additional comments

Company name Restricted Commercial (when completed)

DATA RELATING TO NON-DOMESTIC UK GAS CONSUMERS Q1 2010

Click here for instructions

Please enter "Y" in the cell next to your preferred units Therms Γ MWh

	•	-			
Size of consumer	Annual consumption MWh	Volume sold MWh	Value excluding all taxes £000	Value excluding VAT £000	Value including all taxes £000
Very small	<278				
Small	278 - 2,777				
Medium	2,778 - 27,777				
Large	27,778 - 277,777				
Very large	277,778 - 1,111,112				
Extra large	>1,111,112				

Size of			Unit price excluding	Unit price excluding	Unit price including
consumer	Annual consumption		all taxes	VAT	all taxes
	MWh		p/kWh	p/kWh	p/kWh
Very small	<278		#DIV/0!	#DIV/0!	#DIV/0!
Small	278 - 2,777		#DIV/0!	#DIV/0!	#DIV/0!
Medium	2,778 - 27,777		#DIV/0!	#DIV/0!	#DIV/0!
Large	27,778 - 277,777		#DIV/0!	#DIV/0!	#DIV/0!
Very large	277,778 - 1,111,112]	#DIV/0!	#DIV/0!	#DIV/0!
Extra large	>1,111,112		#DIV/0!	#DIV/0!	#DIV/0!

Validation check Please review your data if there is any red text in the table below.

Size of consumer	Annual consumption MWh	Amount of CCL p/kWh	CCL validation	Amount of VAT p/kWh
Very small	<278	#DIV/0!	#DIV/0!	#DIV/0!
Small	278 - 2,777	#DIV/0!	#DIV/0!	#DIV/0!
Medium	2,778 - 27,777	#DIV/0!	#DIV/0!	#DIV/0!
Large	27,778 - 277,777	#DIV/0!	#DIV/0!	#DIV/0!
Very large	277,778 - 1,111,112	#DIV/0!	#DIV/0!	#DIV/0!
Extra large	>1,111,112	#DIV/0!	#DIV/0!	#DIV/0!

Any additional comments

<u>Annex E</u>

Price Transparency standard errors

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Very small	0.8	1.5	1.3	1.5	1.9	2.7	2.6	2.8	2.6
Small	1.2	1.2	1.6	0.9	1.8	1.4	1.7	1.4	0.9
Small/medium	0.8	0.9	0.9	0.6	1.7	0.9	1.1	0.8	0.9
Medium	0.8	1.0	0.9	0.7	1.0	0.7	1.2	1.0	1.0
Large	1.2	1.5	1.5	1.8	2.8	2.0	2.0	1.4	1.8
Very large	2.0	1.9	1.9	1.6	2.7	4.7	1.9	0.9	1.8
Extra large	3.9	3.1	4.3	2.8	3.4	1.7	2.3	1.3	0.8
Average	1.7	1.7	1.6	1.4	1.6	1.3	1.4	1.2	1.2

Electricity standard errors (%) for quarter 1's

Gas standard errors (%) for quarter 1's

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Very small	3.1	2.6	2.4	3.4	4.8	2.6	2.8	2.6	3.0
Small	3.0	2.3	2.0	3.5	4.0	2.4	2.0	2.6	3.3
Medium	3.2	2.1	1.8	3.0	3.3	3.2	2.1	3.0	4.6
Large	4.8	4.1	2.8	2.9	2.4	2.2	0.5	0.9	1.9
Very large	7.9	2.2	4.2	3.2	0.4	1.9	2.5	2.0	0.6
Average	5.1	3.0	3.1	4.4	4.1	3.3	2.7	2.8	4.0

The above standard errors are indicative, and provide an indication of the relative precision of the estimates for different size bands.

Data for extra-large consumers commenced collection in Q4 2006. For electricity, this data was published from Q1 2007; for gas, only a few companies report in that sizeband and so the data is not published. The average figure for gas excludes the extra-large consumption.