



Warwickshire County Council

Building Energy Consumption Review

April 2016 to March 2017

Report prepared by WCC Resources Directorate: Property Services, Construction Services / Energy Team

<http://www.warwickshire.gov.uk/energyperformance>

<http://www.warwickshire.gov.uk/energyandwater>

Version History

Date	Document Version	Document Revision History	Document Author / Reviser / Approver
Oct 2017	0	Basis of report prepared and sent out as draft for consultation.	Dr Jacky Lawrence, Energy Manager; Adam Wilkinson / Mathilde Robert, Energy Data Analysts
Nov 2017	1-2	Updated data links to this year's source doc	AW
Mar 2018	3	Updated with resolved source data Case Study & Looking Forward	AW MR
July 2018	4	Reviewed and updated bubble charts	JL

Table of Contents

Summary	4
Introduction	4
Commentary	5
CO ₂ Emissions	6
Introduction	6
Carbon Dioxide Emissions Data 2016/17	8
Carbon Dioxide Emission Factors	9
Carbon Dioxide Equivalents	9
Carbon Dioxide Tonnes per £million of Gross Revenue Expenditure	10
Combined Energy Consumption (Electricity & Gas)	11
Introduction	11
Combined Energy Consumption Data 2016/17	12
Combined Consumption Detail - 2016/17	13
Gas Consumption	15
Introduction	15
Gas Consumption Data 2016/17	16
Gas Consumption Detail 2016/17	17
Electricity Consumption	20
Introduction	20
Electricity Consumption Data 2016/17	21
Electricity Consumption Detail 2016/17	22
Water Consumption	25
Introduction	25
Water Metered Consumption Data 2016/17	26
Water Consumption Detail 2016/17	27
Notes On Analysis	29
Introduction	29
Energy Benchmarking	30
Year On Year Changes	32
WCC Building Performance vs Standard Benchmarks	33
Degree Day Summary 2016/17	39
Low & Zero Carbon	40
Introduction	40
Renewable Energy Generation	41
Outlook	42
Display Energy Certificates (DECs) & Advisory Reports (ARs) 2016/17	43
Introduction	43
DEC/AR Background & Procurement	44
DEC Corporate Profile & Performance	46
Energy Saving Improvements – Case Study	49
County Records Office	49
Utility Costs	52
Calculating Representative Average Utility Costs per Unit	52
Looking Forward	53
Appendix	61
Appendix 1: Combined Electricity & Gas Consumption 2016/17(Corporate Buildings Only) .	61

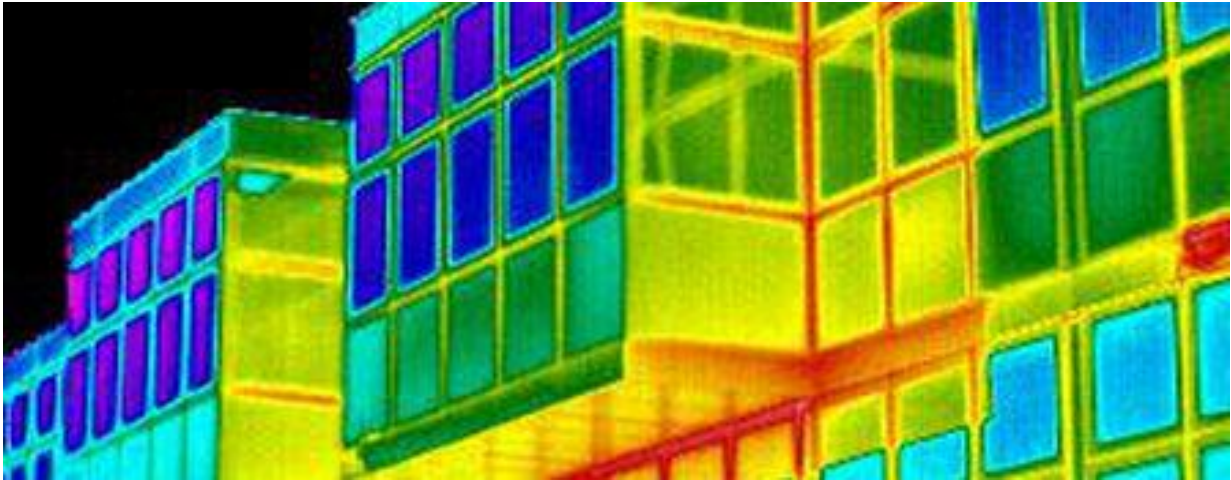
Appendix 2 - WCC Corporate Property Display Energy Certificate Profile 63

Appendix 3 - Links 64

 Historic Building Energy Review Reports 64

 Energy Web Pages 64

Summary



Introduction

This publication gives information about energy consumption (combined, then separate by utility) for buildings in the Warwickshire County Council (WCC) property portfolio for the financial year 2016/17 and compares it to data from previous years. (For property specific details - see Appendix).

Similar reports for previous years can be found on the internet on the WCC Energy Performance web page:
<http://www.warwickshire.gov.uk/energyperformance>

Summary

Commentary

2017 is the seventh year WCC has undertaken annual building energy consumption reporting and benchmarking.

Since 15/16 schools and academies can no longer subscribe to an Energy Traded Service with WCC. As such, from 15/16 onwards WCC no longer has access the school's energy consumption data as granted by this relationship and therefore the scope of this report is limited to Corporate buildings only.

For the purposes of this report, "Corporate buildings" are defined as those from which WCC operates its services. Therefore it does not include estate that is under WCC's demise but non-operational or let for 3rd party operation.

Headline Overview: Change This Year vs Previous		
↓	CO ₂	Total Carbon Emissions in tonnes (t CO ₂)
↑	Energy	Total Energy Consumption (kWh)
↓	Gas	Average cost per square metre (£/m ²)
↓	Electricity	Average cost per square metre (£/m ²)
↓	Water	Average cost per square metre (£/m ²)
→	Renewables	Zero Carbon Generation - Installed capacity (kWp)

With electronic invoice data, direct meter readings and voluntary automatic meter reading (AMR) installed and invoice validation, the data continues to improve. Even so, the data quality and accuracy can still be improved upon year on year. Common potential sources of data inaccuracy include:

- Meter read errors or meter faults.
- Paying invoices based on estimated readings.
- Uncorrected billing errors.
- Submission of customer reads in the wrong unit of measure (e.g. confusing m³ with kWh).

The data in this report provides a basis for further more detailed investigations wherever it provokes questions about unexpected patterns of energy consumption. Both higher than average and lower than average energy consumption need to be investigated to:

- Find out why this is the case,
- Better understand energy consumption and cost in WCC properties,
- Gather more accurate data where necessary,
- Detect avoidable energy wastage that otherwise may remain hidden,
- Learn from best practice in order to know what to do to reduce costs where energy performance can be improved,
- Identify areas for investment,
- Quantify potential savings from energy saving projects,
- Improve budget forecasting,
- Develop up to date Warwickshire specific benchmarks, and
- Set targets.

CO₂ Emissions



Introduction

The UK is committed to reducing its greenhouse gas emissions relative to 1990 levels, by at least 80% by 2050.

WCC's corporate energy target is to achieve at least an average annual 2.5% reduction in total CO₂ emissions from the corporate property estate per £million gross revenue expenditure.

WCC maintains a robust energy, cost and CO₂ reporting system for the WCC estate to assess actions and progress towards meeting targets.

In this section:

- 1. Reporting on Carbon Emissions**
Information on the UK Carbon Reduction Commitment CRC Energy Efficiency Scheme
- 2. Carbon Dioxide Emissions Data**
Year on Year comparison table showing total tonnes of CO₂, floor area and property numbers for each utility.
- 3. Emission Factors**
Details on how CO₂ is calculated.
- 4. CO₂ Equivalents**
Giving our emissions context.
- 5. CO₂ Tonnes per £million of Gross Revenue Expenditure**
Our annual CO₂ emissions expressed in terms of the CRC reporting metric.

CO₂ Emissions

Reporting on Carbon Emissions

The Carbon Reduction Commitment CRC Energy Efficiency Scheme (also referred to as the 'CRC scheme' or 'CRC') is a mandatory carbon emissions reporting and pricing scheme designed to improve energy efficiency and cut carbon dioxide (CO₂) emissions in private and public sector organisations in the UK that are high energy users.

Participants in the CRC need to measure and report on their electricity and gas supplies annually from which CRC emissions are calculated, measured in tonnes of CO₂. Participants are required to buy allowances for every tonne of CO₂ they emit relating to electricity and gas reported under the scheme.

The scheme is divided into a number of phases, with each phase lasting five years. Currently, the scheme is in its second phase running from April 2014 to March 2019. The UK government announced in 2016 that the CRC energy efficiency scheme will be abolished following the 2018-19 compliance year.

WCC was a participant in phase 1, but is not a participant in Phase 2 as it did not meet the qualification threshold in this period. As such it is no longer required to purchase CO₂ allowances.

Whilst not a participant in Phase 2, the 16/17 energy data was collected the same as if formed part of the required CRC Evidence Pack. We maintain this structure as it provides a useful management tool for energy efficiency and also ensures continuity of reporting.

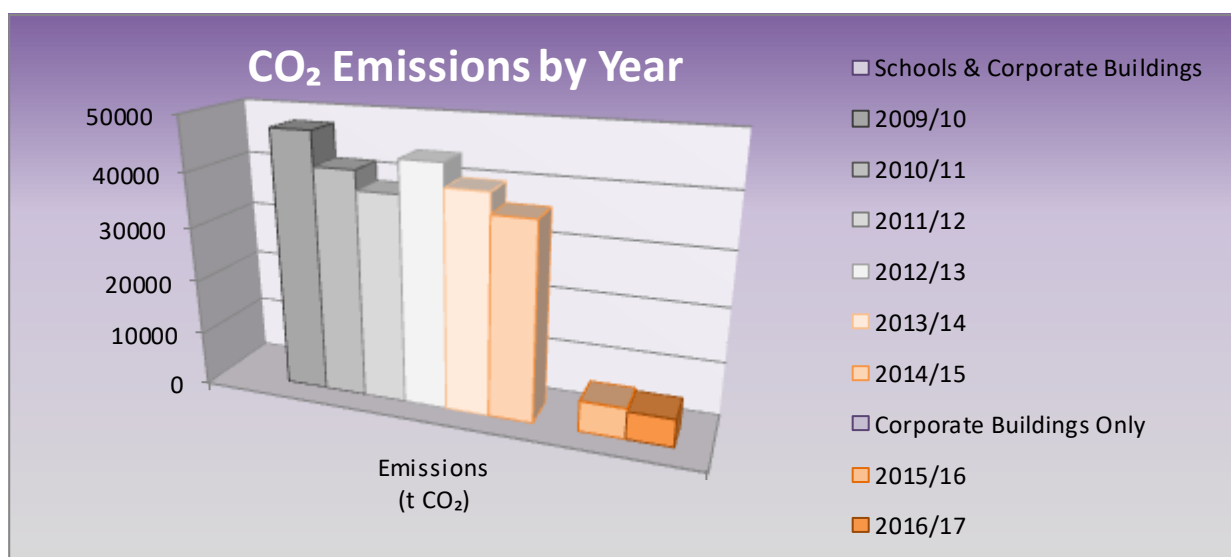
Carbon Dioxide Emissions Data 2016/17

Includes:	Year	Fuel kWh	No of properties	GIA (m ²)	Emissions (t CO ₂)
Corporate Buildings Only	2016/17				5,073
		Gas	67	93,196	1,935
		Electricity	87	101,458	3,138
	2015/16				5,604 *
		Gas	64	90,119	1,969
		Electricity	84	103,024	3,635
Schools & Corporate Buildings	2014/15				36,026
		Gas	286	739,087	14,735
		Electricity	334	779,409	21,291
	2013/14				39,763
		Gas	287	759,663	16,832
		Electricity	454	904,584	22,930
	2012/13				43,902 *
		Gas	307	794,049	19,668
		Electricity	412	842,899	24,234
	2011/12				37,978
		Gas	289	716,196	15,819
		Electricity	378	763,179	22,159
	2010/11				41,472 *
	2009/10				47,600

* 55,541 Total including street lighting

* Including additional corporate emissions identified and CRC report corrected in 13/14, previously the figure was 43,030 tonnes carbon dioxide.

* Corporate Buildings only, operational for whole reporting period



Carbon Dioxide Emission Factors

Emission Factors:

To convert kilowatt hours of Gas & Electricity into CO₂, the following CRC Phase 2 Conversion Factors v7 are used, published 21st June 2017:

Natural Gas: 0.18365 kg CO₂ / kWh

Electricity: 0.44662 kg CO₂ / kWh (including transmission and distribution losses)

Carbon Dioxide Equivalents

Equivalents:

What does 5073 tonnes of carbon dioxide actually mean?

The graphics below give context by illustrating equivalents for 5073 tonnes of CO₂.

More information about these equivalents, how they are calculated and what assumptions are made, are available here: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Equivalency Results

[How are they calculated?](#)

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

5,073 Metric Tons

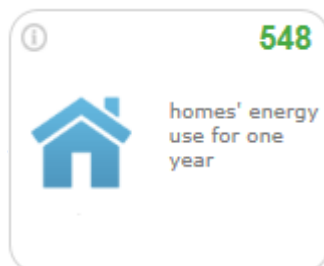
Greenhouse gas emissions from



Carbon sequestered by



CO₂ emissions from



Carbon Dioxide Tonnes per £million of Gross Revenue Expenditure

Tonnes of carbon dioxide per £million of gross revenue expenditure

The CRC reporting metric is tonnes of carbon dioxide per £million pounds of gross revenue expenditure. On this metric the lower the CO₂/£million value, the better the performance. WCC will continue to report on this metric even though not a participant in Phase 2 of the CRC.

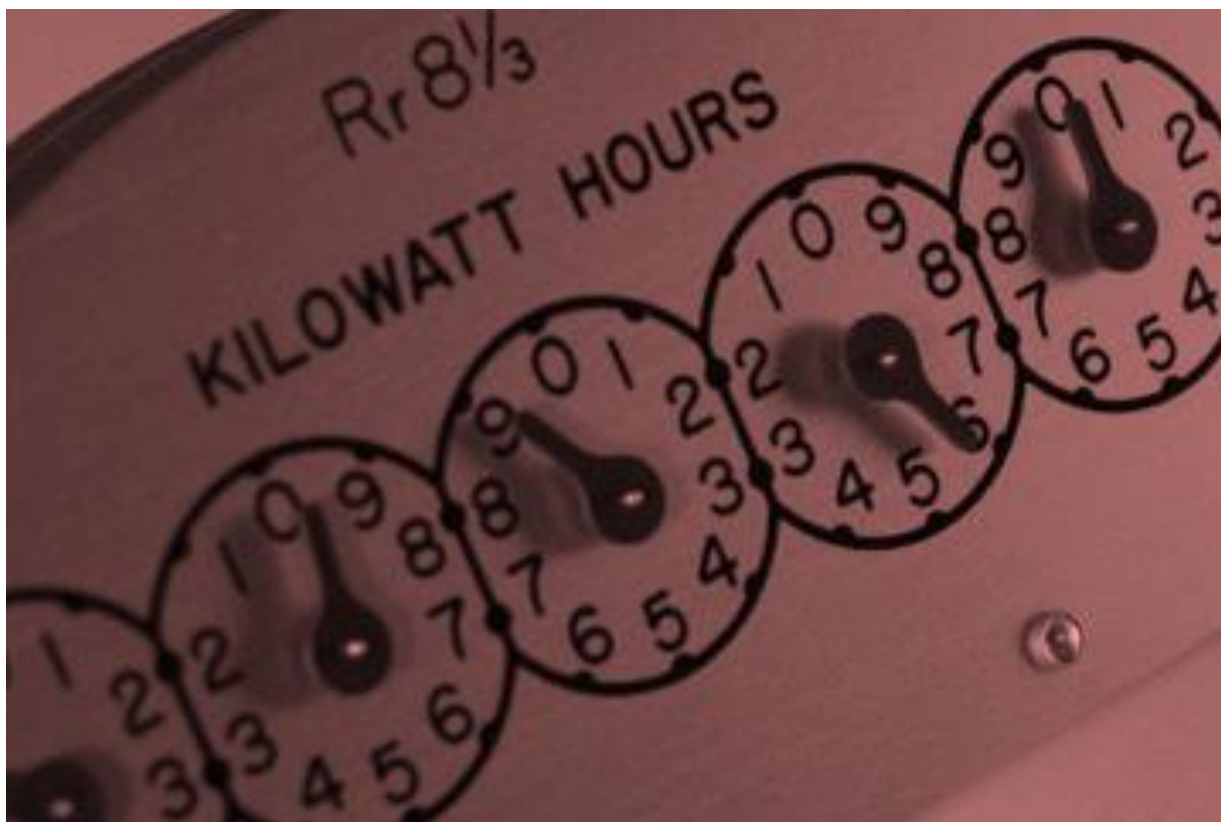
For financial year 2016/17 WCC's Gross Revenue Expenditure was:	£595	(£millions)
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Year	tonnes CO ₂ /£million Gross Revenue Expenditure	% change:
Schools & Corporate Buildings		since 2010/11
2010/11	63.01	
2011/12	44.96	↑ -29%
2012/13	57.47	↓ -9%
2013/14	51.48	→ -18%
2014/15	48.16	↗ -24%
Corporate Buildings Only		since 2014/15
2014/15	13.21	
2015/16	9.60	↓ -27%
2016/17	8.52	↑ -35%

Why the tonnes CO₂/£million Gross Revenue Expenditure metric drops significantly without schools

Public services delivered from Corporate buildings, such as Safeguarding, Fire & Rescue and Adult Social Care; account for approximately 60% of the total Gross Revenue Expenditure, but only around 25% of the total WCC buildings and 15% of the total CO₂ emissions.

Combined Energy Consumption (Electricity & Gas)



Introduction

This section details the combined electricity & gas consumption in kWh for WCC's buildings. It also identifies the largest contributing properties to the headline CO₂ figures from the previous section.

What's in this section:

- 1. Combined Consumption Data**
Year on Year comparison table showing total kilowatt hours, floor area, property numbers and a weighted average cost per m² for each utility.
- 2. Highest Consumers**
Chart showing the 20 highest consuming properties for the current year expressed in tonnes of CO₂.
- 3. Proportional Split**
Chart showing the proportional contribution of gas & electricity towards our total combined consumption.
- 4. Weighted average cost per metre squared of floor area**
Explanation for how this metric is calculated

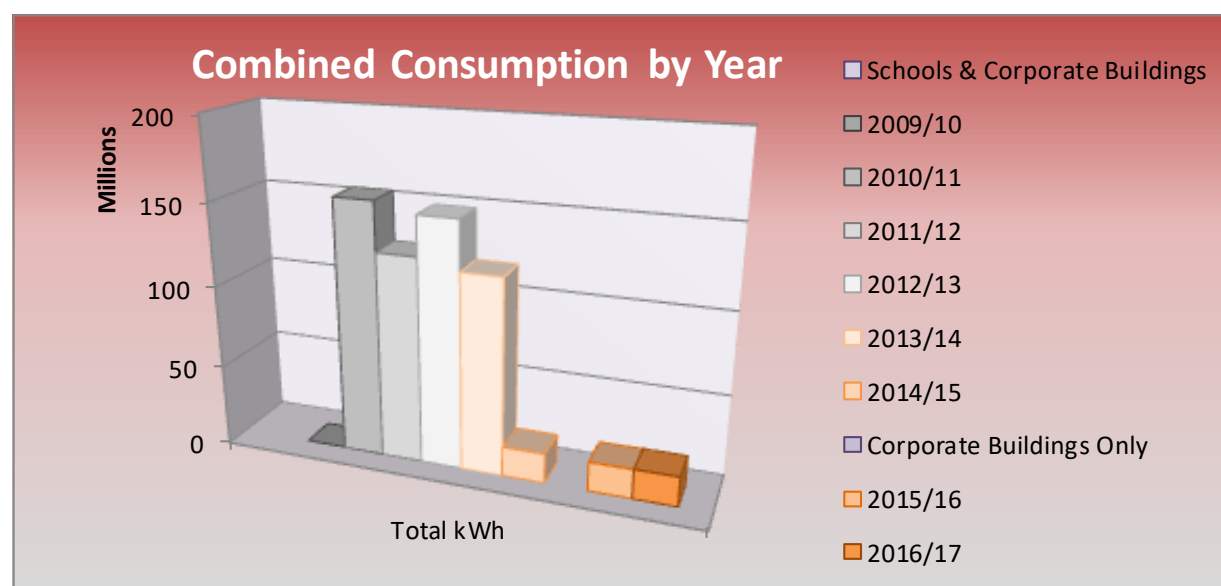
Combined Energy Consumption Data 2016/17

Includes:	Year	No of properties	wgt'd Av £/m ²	GIA (m ²)	Total kWh
Corporate Buildings Only	2016/17	89	£9.22	107,428	18,162,905
	2015/16	88	£10.03	105,307	18,021,835
	2014/15	94	£10.50	110,431	18,207,278
Schools & Corporate Buildings	2013/14	-	-	-	119,396,522
	2012/13	-	-	-	149,055,878
	2011/12	-	-	-	125,306,374
	2010/11				154,939,304
	2009/10				-

* No Data

* Annual Review Weighted Average £/m² data not available pre 2014/5

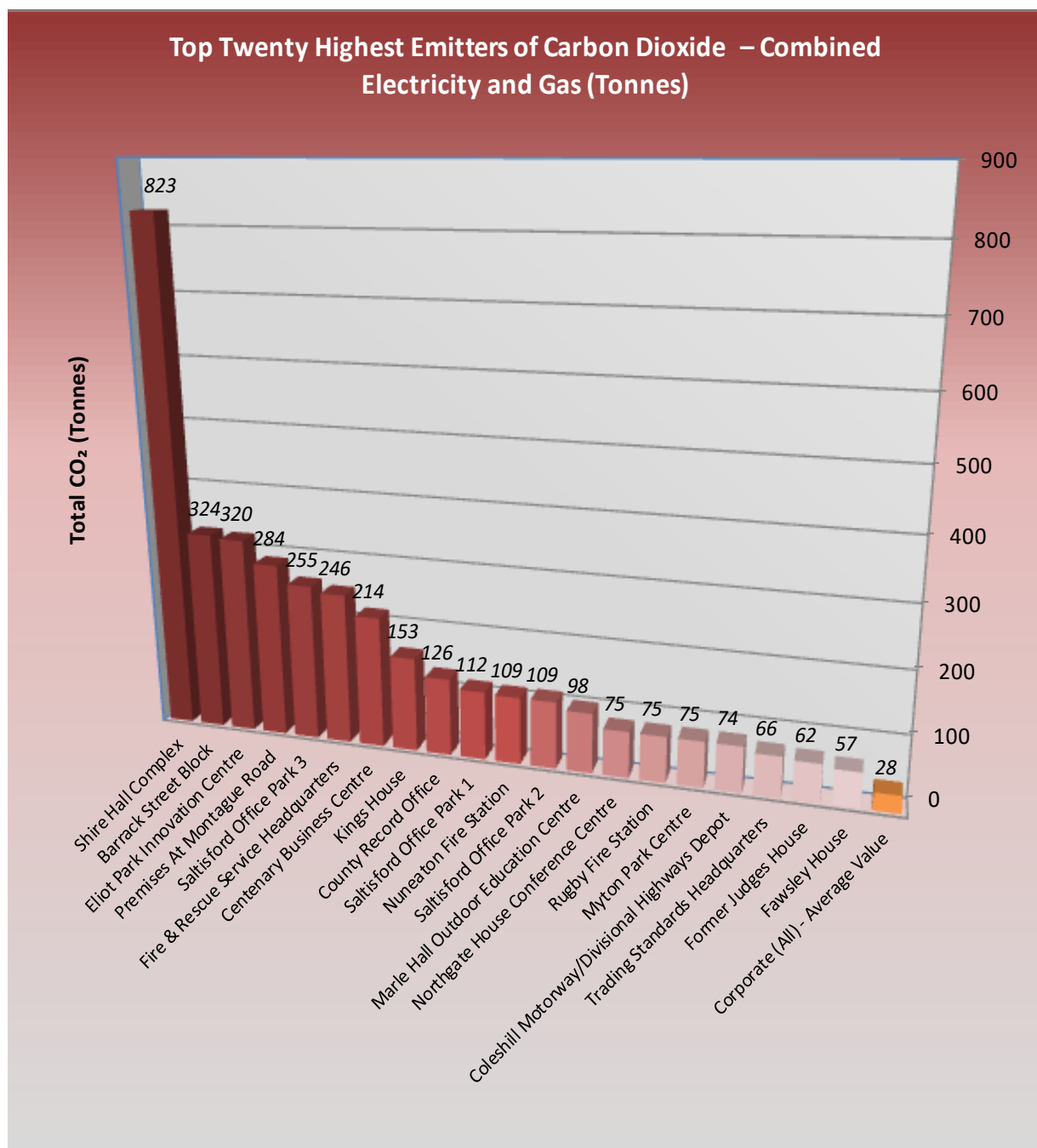
* Corporate Buildings only, operational for whole reporting period



Combined Consumption Detail - 2016/17

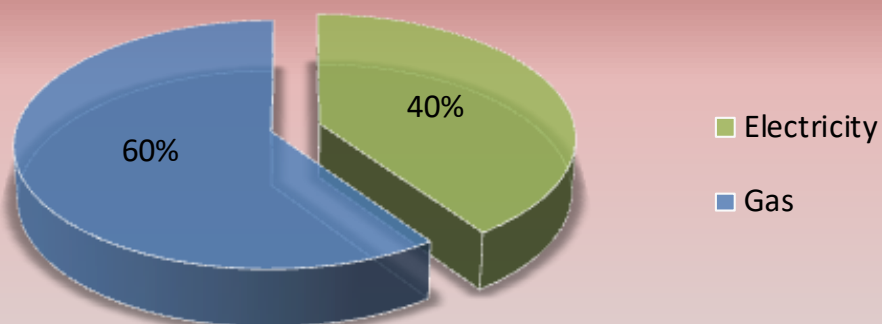
Current Year Highest Consumers Overall:

The graph below shows the 20 highest emitters of Carbon Dioxide (in tonnes) for WCC's Corporate Portfolio. To give context to these values, the average across all properties is shown in orange (far right).



Combined Consumption Detail - 2016/17

Combined Consumption - Split by Utility



Weighted average cost per square metre (£/m²)

WCC pays a range of tariff rates for gas and electricity across its portfolio relevant to the annual quantities supplied to each meter point.

In general terms, the cost per unit for gas is cheaper than the cost per unit of electricity, also the larger the annual quantity supply, the more preferential the unit rate.

To take account of these variances when generating a singular average cost value, a weighted average is used. The weighted average is calculated by dividing the total cost for the annual quantity of each gas and electricity supply by the gross internal area (GIA) in metres squared:

$$\text{£/m}^2 \text{ per utility} = \frac{\text{Total of annual costs per supply (£)}}{\text{Total floor area supplied (m}^2\text{)}}$$

As some properties are not connected to both utilities, (e.g. electrically or oil heated), the combined GIA is not the same as the individual GIA's for gas and electricity. As such the combined £/m² is not the same as simply adding the average costs for gas plus the average cost for electricity, and is calculated as:

$$\text{Combined £/m}^2 = \frac{(\text{Total £ Gas}) + (\text{Total £ Electricity})}{\text{Combined Floor area supplied (m}^2\text{)}}$$

Gas Consumption



Introduction

This section provides a more detailed insight for the gas consumption figures measured in kilowatt hours, (kWh) that comprise the headline CO₂ and combined consumption data above.

What's in this section:

- 1. Gas Consumption Data**
Year on Year comparison table showing total kilowatt hours, floor area, property numbers and a weighted average cost per m² for gas.
- 2. Meter Statistics & Methodology**
Details on the gas meters included in our analysis and data preparation.
- 3. Where We Use Our Gas**
Illustration of the relationship between gas consumption and floor area served for each benchmark property type.
- 4. Quartile Distribution**
Illustration of the ranges of gas consumption observed within each benchmark property classification.
- 5. Top Tens**
This year's highest and lowest gas consuming properties per unit of floor area.

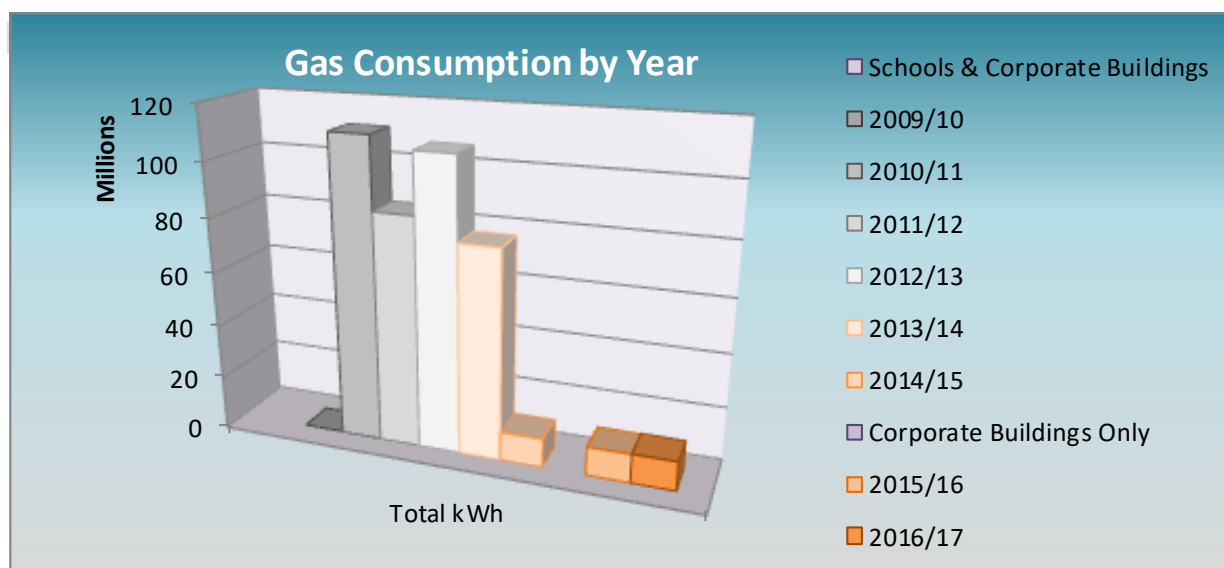
Gas Consumption Data 2016/17

Includes:	Year	No of properties	wgt'd Av £/m ²	GIA (m ²)	Total kWh
Corporate Buildings Only	2016/17	67	£2.56	95,802	10,858,983
	2015/16	64	£3.45	90,062	10,698,020
	2014/15	68	£3.78	94,934	10,784,233
Schools & Corporate Buildings	2013/14	287	-	759,663	77,265,868
	2012/13	307	-	794,049	106,880,545
	2011/12	289	-	716,196	85,119,147
	2010/11				111,122,081
	2009/10				-

* No Data

* Annual Review Weighted Average £/m² data not available pre 2014/5

* Corporate Buildings only, operational for whole reporting period



Gas Consumption Detail 2016/17

Meter statistics and methodology

Gas Meter Statistics

70	Total number of Meter Point Reference Numbers (MPRNs) included in our analysis.
1	Exclusions (Non-WCC responsibility Disposal Less than 12 months operation)

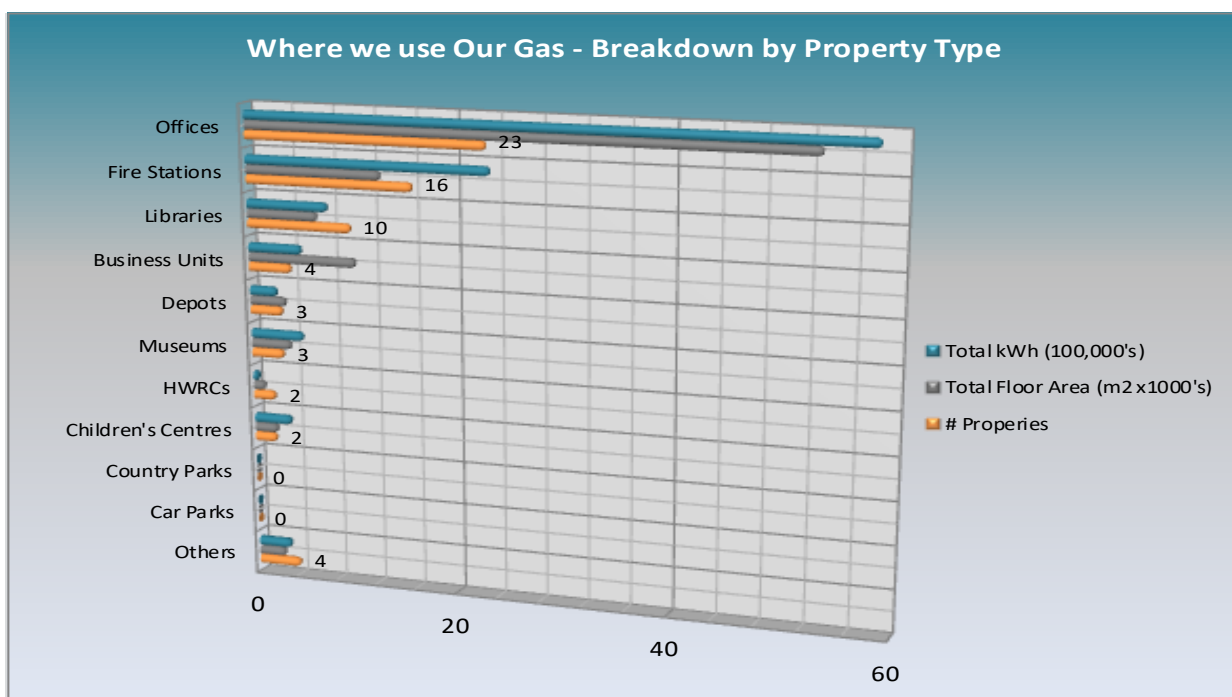
Gas Data Validation - Methodology

- Annual supply summaries are compiled using a Date Range apportionment of invoices per meter and per property supplied.
- Where meters serve more than one property the consumption is apportioned between the properties based on floor area.
- Where the meters serve a property that is partially tenanted, the consumption is apportioned based on floor area occupied by WCC.
- Properties grouped by operational type for comparative performance
- Cleansing, validation & cross checks for anomalies against invoice data held in WCC Energy Database based on:
 - Exclusions (as above)
 - Quartile outliers (Highest & Lowest) by Comparative Property Type/Group
 - Top 10 properties with largest year on year increase in consumption
 - Top 10 properties with the largest year on year reduction in consumption

Gas consumption by type of property and floor area

Where We Use Our Gas

The graph below shows comparative totals for the consumption (kWh) and the total floor areas (m²) for the different property types WCC operates. The data labels on the chart show the number of properties in each group.



Gas Consumption Detail 2016/17

Distribution of Gas Consumption per m² by property type

Quartiles by Property Type :

The quartiles chart below shows the expected ranges of consumption for each property type as a box & whisker plot.

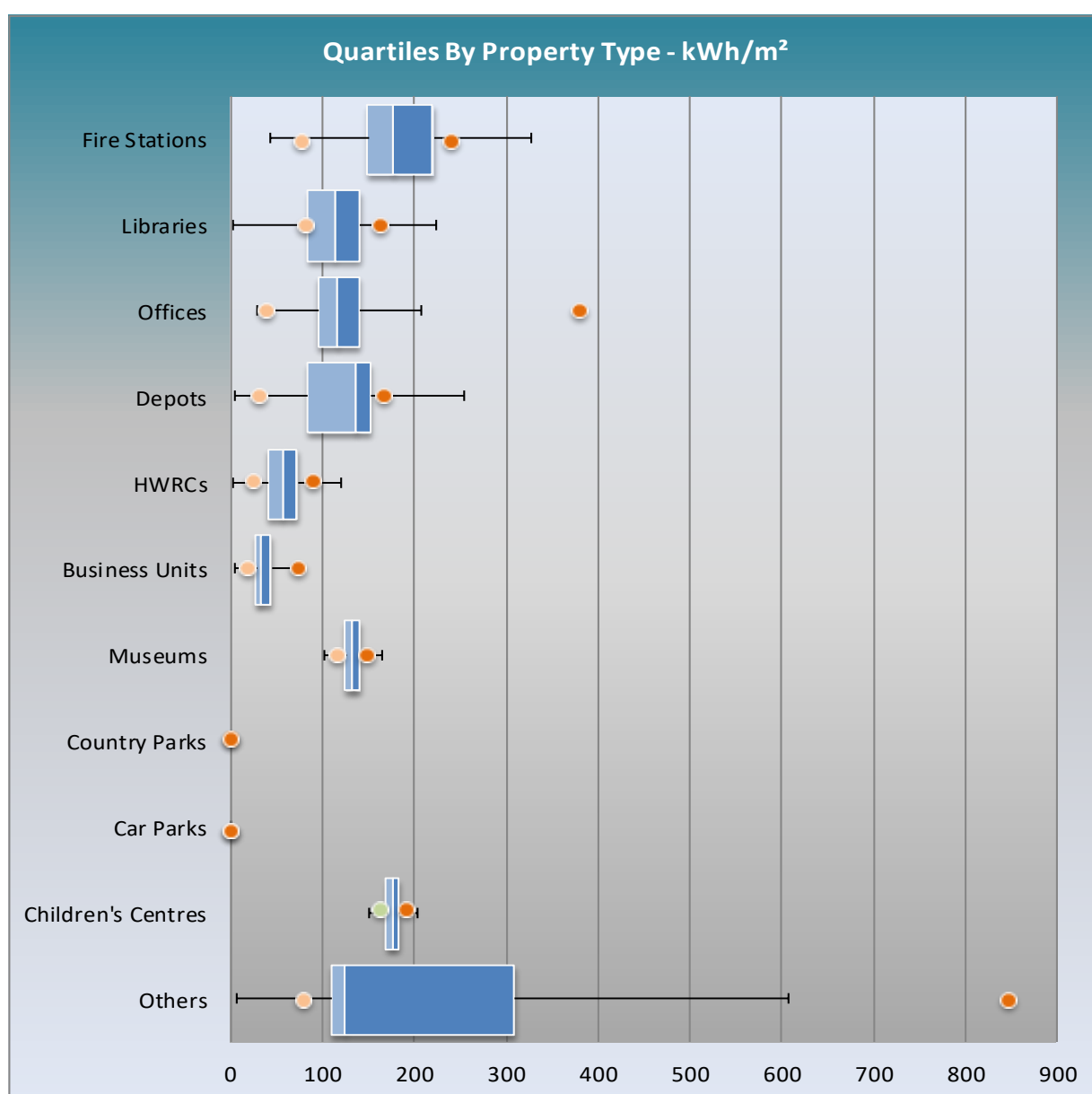
The most frequently occurring range is represented by the two coloured boxes.

The Median Value for each group occurs on the division line between the two colours.

The lines (whiskers) show the deviation range for the sample.

The coloured dots show the "Highest" and "Lowest" value for each group.

"Outliers" are defined as values that are outside the range of the "whiskers" for each group.



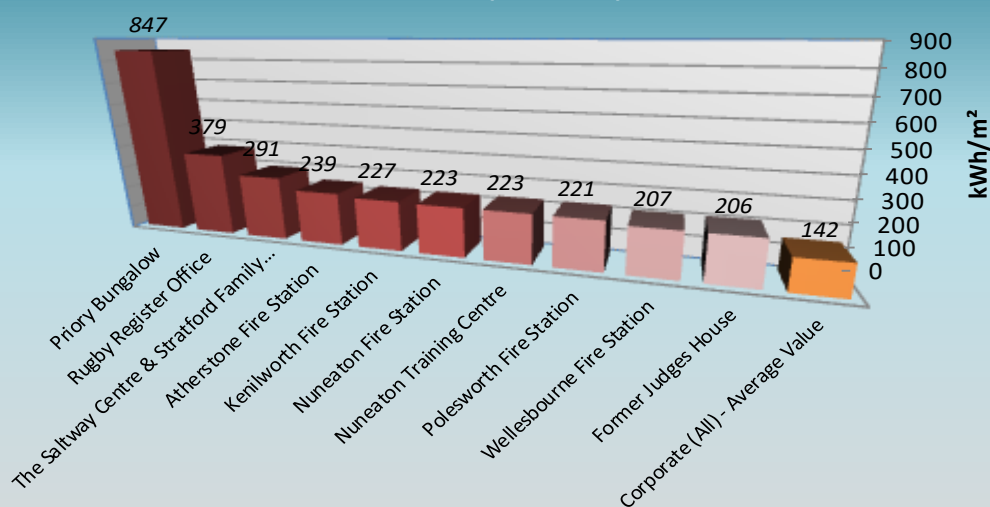
Gas Consumption Detail 2016/17

Top Ten Highest & Lowest Gas Consumers Per m²

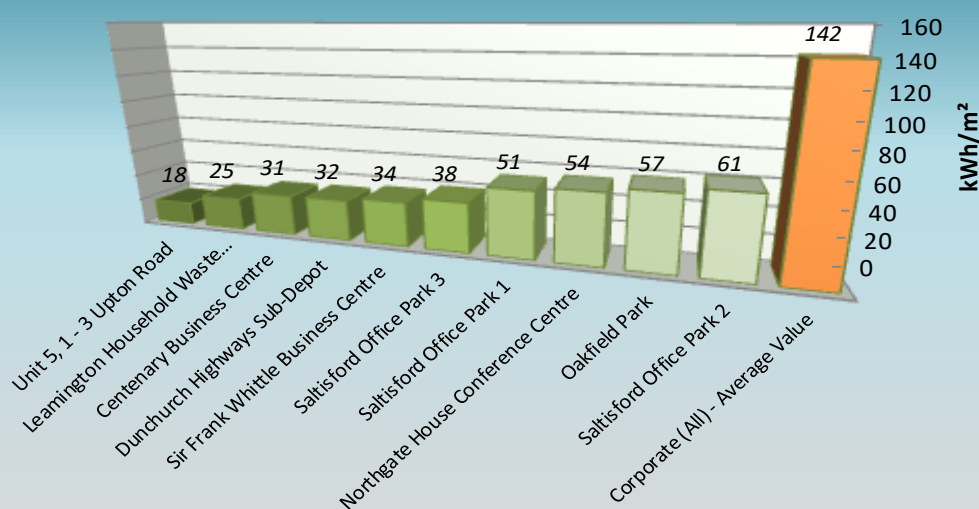
Current Year Highest & Lowest Consumers Overall

The graphs below show the 10 highest and 10 lowest consumers of gas per unit of floor area (kWh/m²). To give context to these values, the average across all properties is shown in orange (far right).

Current Year Top Ten Highest Gas Consumers Per Unit of Floor Area – (kWh/m²)



Current Year Top Ten Lowest Gas Consumers Per Unit of Floor Area – (kWh/m²)



Electricity Consumption



Introduction

This section provides a more detailed breakdown for electricity consumption figures measured in kilowatt hours, (kWh) that comprise the headline CO₂ and combined consumption data above.

What's in this section:

- 1. Electricity Consumption Data**
Year on Year comparison table showing total kilowatt hours, floor area, property numbers and a weighted average cost per m².
- 2. Meter Statistics & Methodology**
Details on the electricity meters included in our analysis and data preparation.
- 3. Where We Use Our Electricity**
Illustration of the relationship between gas consumption and floor area served for each benchmark property type.
- 4. Quartile Distribution**
Illustration of the ranges of electricity consumption observed within each benchmark property classification.
- 5. Top Tens**
This year's highest and lowest electricity consuming properties per unit of floor area.

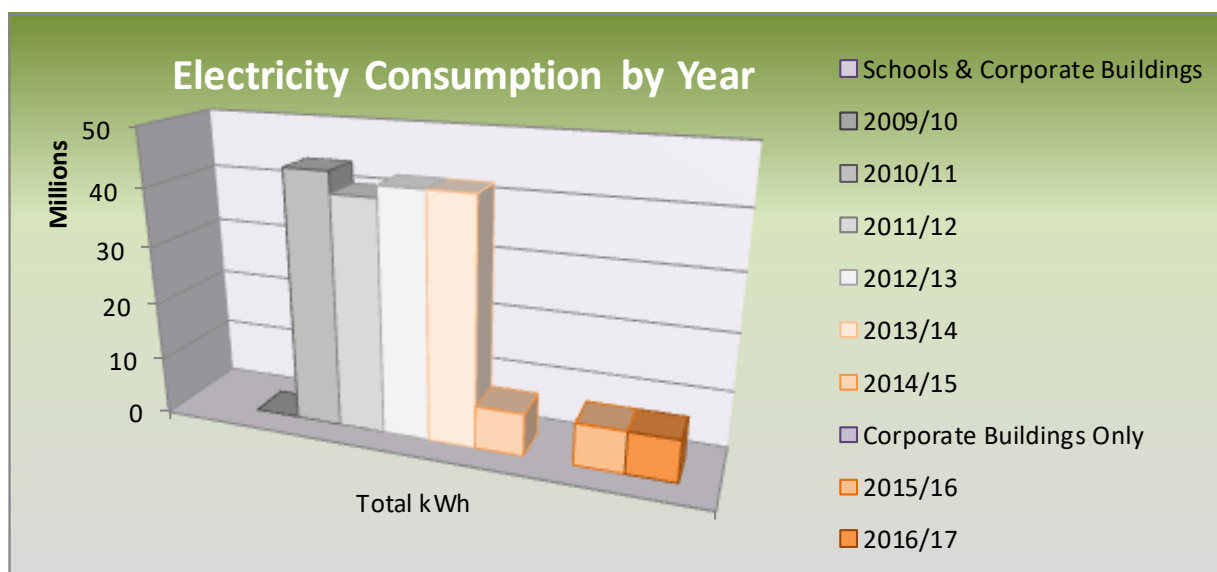
Electricity Consumption Data 2016/17

Includes:	Year	No of properties	wgt'd Av £/m ²	GIA (m ²)	Total kWh
Corporate Buildings Only	2016/17	87	£7.00	106,257	7,303,922
	2015/16	84	£7.23	102,967	7,323,814
	2014/15	87	7	108,187	7,423,045
Schools & Corporate Buildings	2013/14	454	-	904,584	42,130,654
	2012/13	412	-	842,899	42,175,333
	2011/12	378	-	763,179	40,187,227
	2010/11				43,817,223
	2009/10				-

* Annual Review Weighted Average £/m² data not available pre 2014/5

* Corporate Buildings only, operational for whole reporting period

* Corporate Buildings only, operational for whole reporting period



Electricity Consumption Detail 2016/17

Meter statistics and methodology

Electricity Meter Statistics:

106	Total number of Meter Point Administration Numbers (MPANs) included in our analysis.
1	Exclusions (Non-WCC responsibility Disposal Less than 12 months operation)

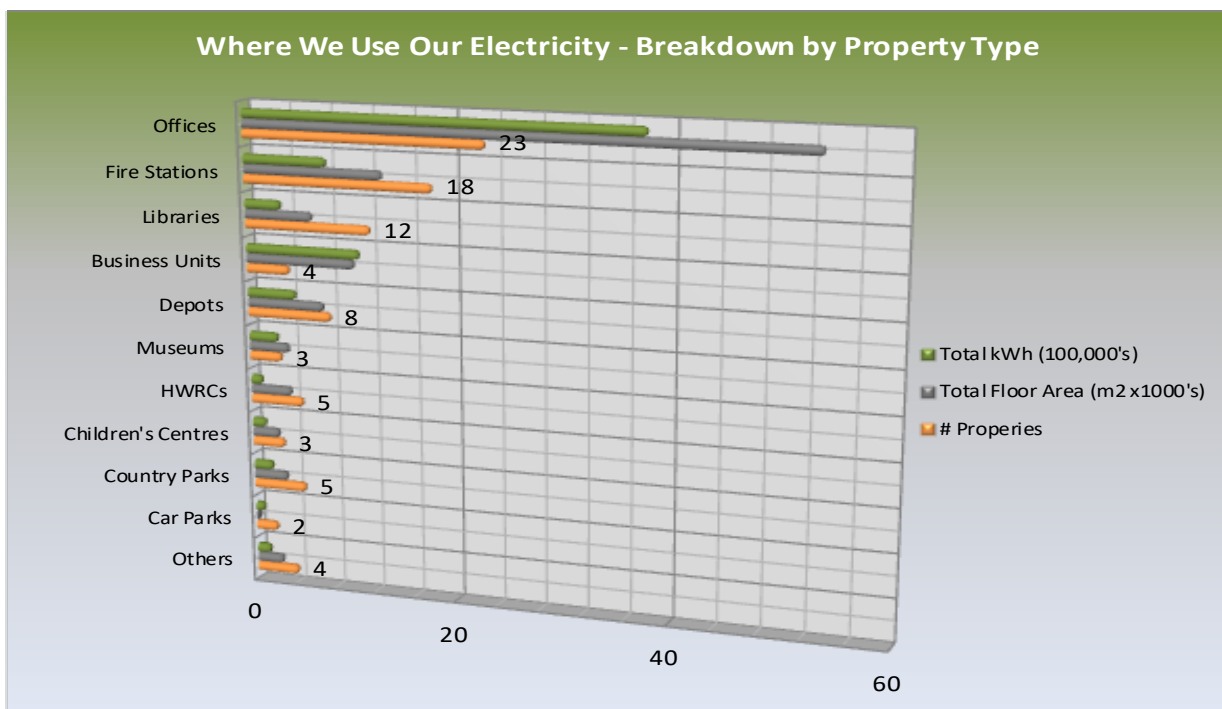
Electricity Data Validation - Methodology:

- Annual supply summaries are compiled using a Date Range apportionment of invoices per meter and per property supplied.
- Where meters serve more than one property the consumption is apportioned between the properties based on floor area.
- Where the meters serve a property that is partially tenanted, the consumption is apportioned based on floor area occupied by WCC.
- Properties grouped by operational type for comparative performance
- Cleansing, validation & cross checks for anomalies against invoice data held in WCC Energy Database based on:
 - Exclusions (as above)
 - Quartile outliers (Highest & Lowest) by Comparative Property Type/Group
 - Top 10 properties with largest year on year increase in consumption
 - Top 10 properties with the largest year on year reduction in consumption

Electricity consumption by type of property and floor area

Where We Use Our Electricity:

The graph below shows comparative totals for the consumption (kWh) and the total floor areas (m²) for the different property types WCC operates. The data labels on the chart show the number of properties in each group.



Electricity Consumption Detail 2016/17

Distribution of Electricity Consumption per m² by property type

Quartiles by Property Type :

The quartiles chart below shows the expected ranges of consumption for each property type as a box & whisker plot.

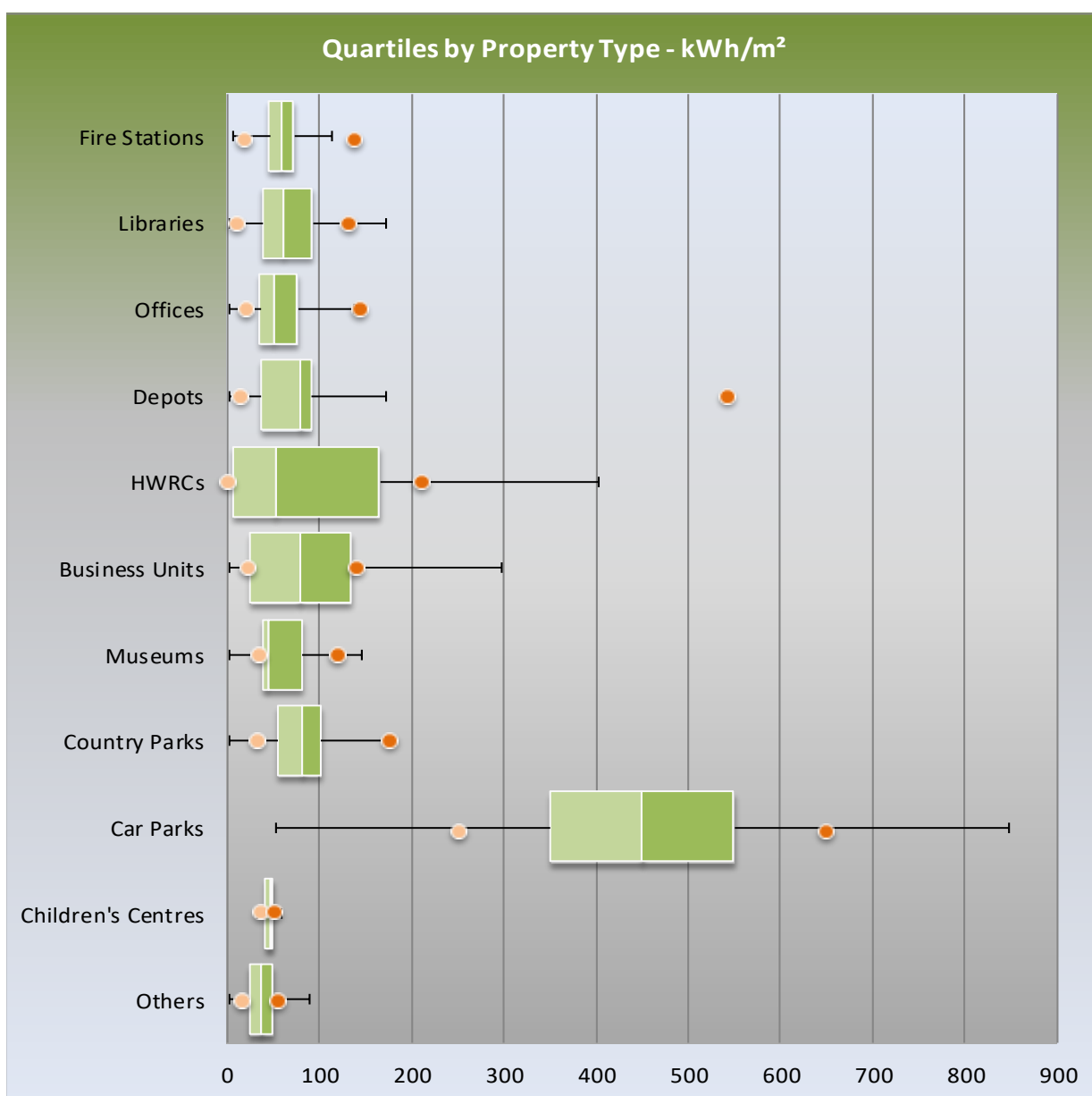
The most frequently occurring range is represented by the two coloured boxes.

The Median Value for each group occurs on the division line between the two colours.

The lines (whiskers) show the deviation range for the sample.

The coloured dots show the "Highest" and "Lowest" value for each group.

"Outliers" are defined as values that are outside the range of the "whiskers" for each group.



Electricity Consumption Detail 2016/17

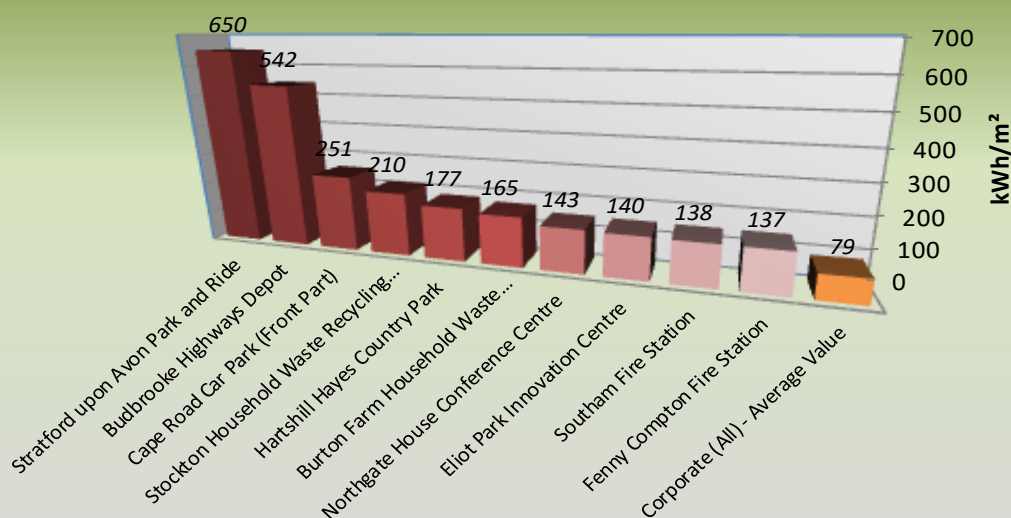
Top Ten Highest & Lowest Electricity Consumers Per m²

Current Year Highest & Lowest Consumers Overall:

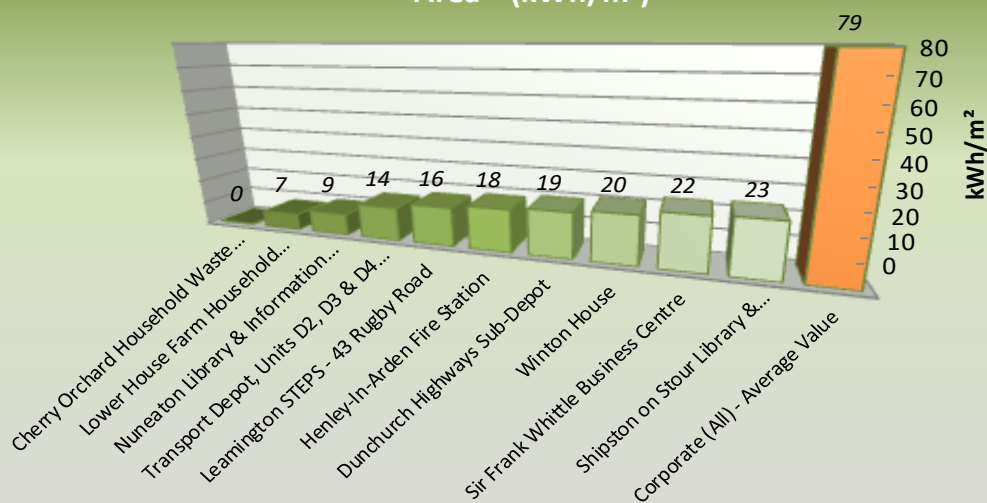
The graphs below show the 10 highest and 10 lowest consumers of electricity per unit of floor area (kWh/m²).

To give context to these values, the average across all properties is shown in orange (far right).

Current Year Top Ten Highest Electricity Consumers Per Unit of Floor Area – (kWh/m²)



Current Year Top Ten Lowest Electricity Consumers Per Unit of Floor Area – (kWh/m²)



Water Consumption



Introduction

Commercial water use is measured in litres and is split into three main elements; the fresh water consumed, sewerage and surface water drainage. This section provides a breakdown for the metered water consumption for the buildings WCC operates.

What's in this section:

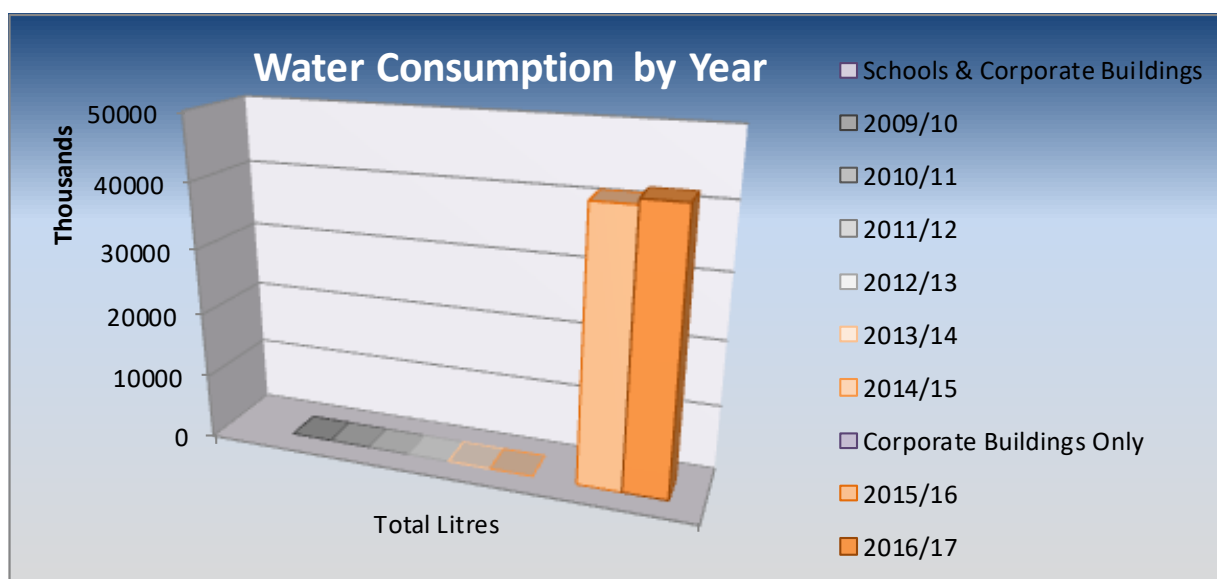
- 1. Water Consumption Data**
Year on Year comparison table showing total cubic litres, floor area, property numbers and a weighted average cost per m².
- 2. Meter Statistics & Methodology**
Details on the water meters included in our analysis and data preparation.
- 3. Where We Use Our Water**
Illustration of the relationship between water consumption and floor area served for each benchmark property type.
- 4. Quartile Distribution**
Illustration of the ranges of water consumption observed within each benchmark property classification.

Water Metered Consumption Data 2016/17

Includes:	Year	No of properties	wgt'd Av £/m ²	GIA (m ²)	Total Litres
Corporate Buildings Only	2016/17	65	£1.71	89,332	41,790,289
	2015/16	65	£1.76	87,203	40,976,566
Schools & Corporate Buildings	2014/15	-	-	-	-
	2013/14	-	-	-	-
	2012/13	-	-	-	-
	2011/12	-	-	-	-
	2010/11	-	-	-	-
	2009/10	-	-	-	-

* No data available pre 2015/16

* Corporate Buildings only, operational for whole reporting period



Water Consumption Detail 2016/17

Meter statistics and methodology

Water Meter Statistics:

107	Total number of Meters at properties included in our analysis.
33	Exclusions: (Non-Metered Non-WCC responsibility Disposal Less than 12 months operation)

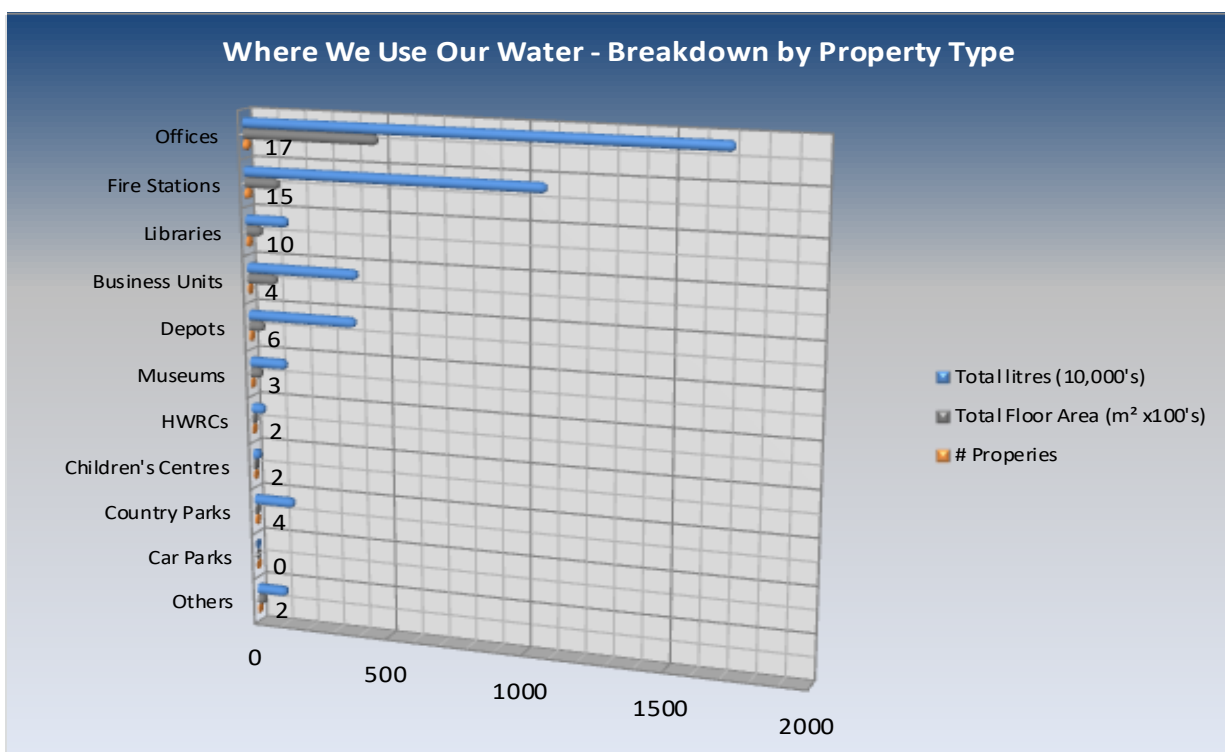
Water Data Validation - Methodology:

- Annual supply statements requested from provider.
- Where meters serve more than one property the consumption is apportioned between the properties based on floor area.
- Where the meters serve a property that is partially tenanted, the consumption is apportioned based on floor area occupied by WCC.
- Properties grouped by operational type for comparative performance
- Cleansing & validation based on:
 - Exclusions (as above)
 - Quartile outliers (Highest & Lowest) by Comparative Property Type/Group

Water consumption by type of property and floor area

Where We Use Our Water:

The graph below shows comparative totals for the consumption (Litres) and the total floor areas (m²) for the different property types WCC operates. The data labels on the chart show the number of properties in each group.



Water Consumption Detail 2016/17

Distribution of Water Consumption per m² by property type

Quartiles by Property Type :

The quartiles chart below shows the expected ranges of consumption for each property type as a box & whisker plot.

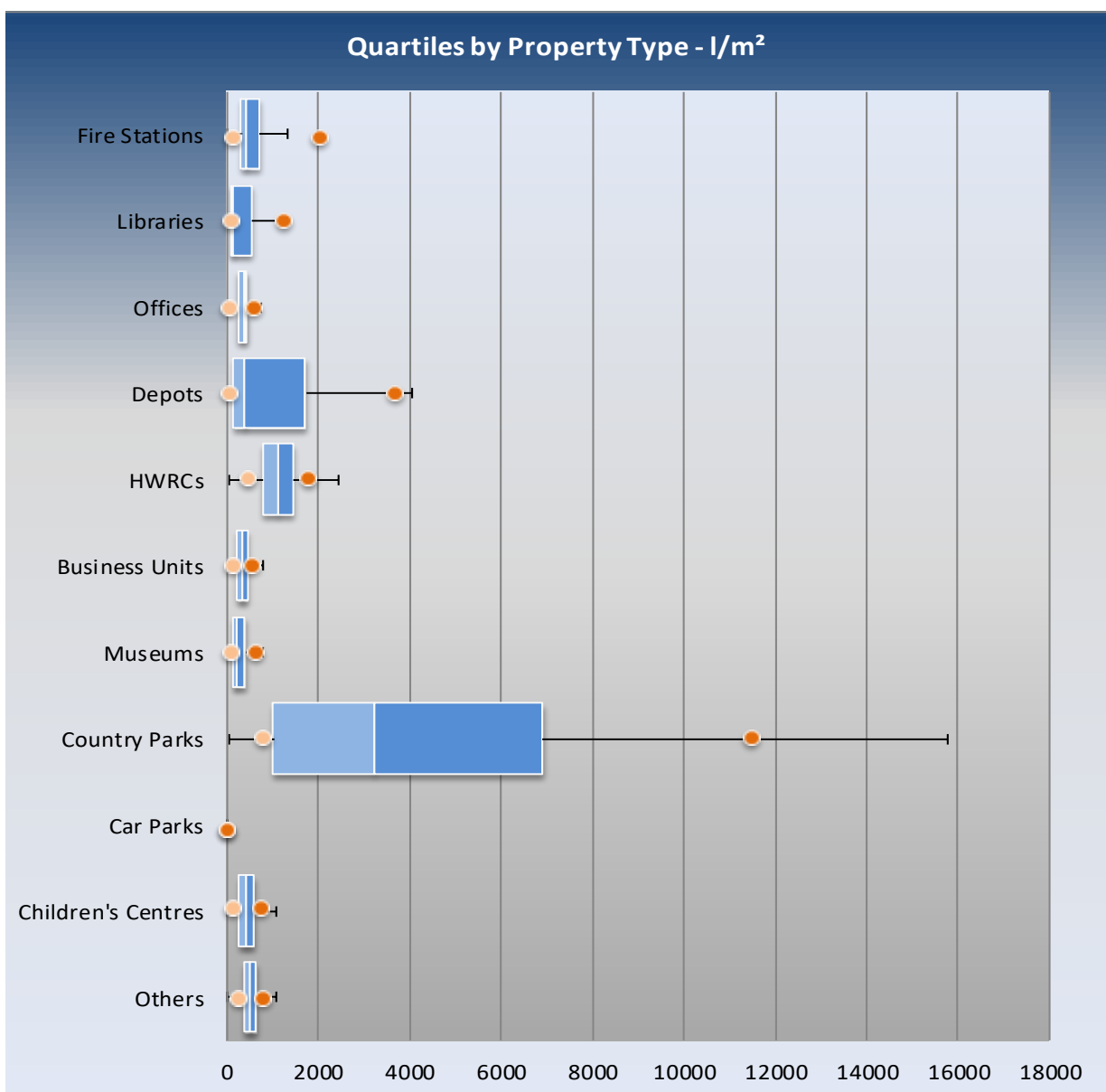
The most frequently occurring range is represented by the two coloured boxes.

The Median Value for each group occurs on the division line between the two colours.

The lines (whiskers) show the deviation range for the sample.

The coloured dots show the "Highest" and "Lowest" value for each group.

"Outliers" are defined as values that are outside the range of the "whiskers" for each group.



Notes On Analysis



Introduction

Here we provide more background information for some of the overarching concepts that relate to the preparation of the figures for this annual building energy consumption review.

In this section...

- 1. Energy Benchmarking**
Information on why we split our portfolio into different property type categories for comparative analysis.
- 2. Year on Year Changes**
Contributory factors that influence the differences in consumption values reported year on year.
- 3. WCC Building Performance vs Standard Benchmarks**
Categorised illustrations of building performance against Standard Energy Benchmarks.
- 4. Degree Day Summary**
An explanation of what degree days are and how they can be used.

Energy Benchmarking

What are Energy Benchmarks?

The utility consumption sections of this report make reference to Energy benchmarking categories. Energy benchmarking means tracking a building's energy use and using a standard metric to compare the building's performance against past performance.

WCC conducts a range of public services from its corporate portfolio, and logically, any comparison between properties with different functions; such a household waste recycling centre and library, wouldn't be particularly meaningful.

Therefore, the buildings are split into categories based on their mode of operation, generating a standard metric for each type, so that meaningful comparisons between buildings can be made.

These comparisons can be used to drive energy efficiency upgrades, increase occupancy rates or improve property values. Benchmarks for smaller buildings may not necessarily be the same as for large buildings, even though they may be used for the same purpose.

Benchmarks are only a guide to help more fully understand energy performance of a building – not an exact indication of either good or poor performance.

The lowest and highest outliers in each WCC category were investigated (for missing data, billing on estimates and consumption versus previous years) and excluded from developing these benchmarks if there were obvious reasons to do so.

WCC's Energy Benchmarks Categories

The Operational Categories used for Benchmarking WCCs Corporate Portfolio are:

- Fire Stations
- Libraries
- Offices
- Depots
- Household Waste Recycling Centres
- Business Units
- Museums
- Country Parks
- Car Parks
- Children's Centres
- Others

Energy Benchmarking

Energy Benchmark Values

The benchmark for each operational category is the median value identified in the quartiles chart within each utility section.

When interpreting these benchmarks consideration needs to be given to:

- The number of samples on which they are based (Benchmark values based on categories with fewer properties will be less robust)
- How closely comparable the operational parameters of the buildings within each category are likely to be (e.g. buildings within the “Libraries” group are more likely to have common function and hours of operation than those within the, “Depots” or “Others” categories.
- Buildings used for the same purpose vary in age and construction type and therefore energy performance.
- Buildings used for the same purpose may be open plan or cellular.
- WCC are only responsible for reporting energy consumption in communal areas of business centres, not units used by private businesses.
- Building user behaviour varies considerably from, highly motivated to be energy efficient, to very wasteful, depending on the social norms within the building and leadership from above.
- Hours of use for buildings used for the same purpose may vary widely. For instance, some may be open for clubs at night time or for community purposes at weekends and holiday periods.
- Some buildings used for the same purpose may be fully air conditioned; others may only have natural ventilation, others a combination.
- Some buildings in the south of the county where there is no gas network may have only electric heating or oil heating or a combination of oil and electricity etc.

WCC Energy Benchmarks

Operational Category	Utility Value (Year on Year Difference)		
	Gas (kWh/m ²)	Electricity (kWh/m ²)	Water (l/m ²)
Fire Stations	↓ 178 (-21)	↑ 59 (+3)	→ 435 (0)
Libraries	↑ 114 (+9)	↑ 62 (+6)	↑ 159 (+2)
Offices	↑ 117 (+2)	↓ 51 (-13)	↑ 376 (+21)
Depots	↓ 137 (-26)	↓ 80 (-5)	↓ 413 (-75)
Household Waste Recycling Centres	↓ 57 (-39)	↑ 53 (+21)	→ 1126 (0)
Business Units	↓ 33 (-5)	↑ 80 (+37)	→ 347 (0)
Museums	↓ 134 (-33)	↑ 45 (+11)	↑ 216 (+66)
Country Parks	→ - (n/a)	↑ 83 (+19)	↑ 3239 (+214)
Car Parks	→ - (n/a)	↓ 450 (-398)	→ - (n/a)
Children's Centres	↓ 177 (-22)	↑ 48 (+10)	→ 442 (0)
Others	↓ 125 (-22)	↓ 38 (-8)	↑ 525 (+5)
Range	33 to 178	38 to 450	159 to 3239

Year On Year Changes

Reasons for the Range of Values and Year on Year Changes in Energy Consumption and Cost

Factors for consideration on the wide range of Year on Year values include:

Practical:

- Exclusion of schools due to cessation of the Energy Traded Service.

Invoicing:

- There may be billing issues such as corrections, overcharges and refunds between years.
- There could be a high number of under-estimates or over-estimates on which invoices were paid rather than being based on customer reads where an actual read was not taken.

Physical:

- Corporate emissions will change due to property disposal and acquisition; the property rationalisation programme; works to improve the building fabric, insulation, heating, lighting and controls; increased use of IT etc.
- The property may have been vacated during the year resulting in low consumption.

Data:

- The meter may supply more properties than the supply address (e.g. Shire Hall supplies Barrack St). Where the buildings are not of similar construction and operation, the apportioning by m² methodology may not accurately reflect consumption for each building.
- The data sets that have been made available to us may be incomplete.
- Partial data availability due to property sale, purchase or change of supplier during the year.
- Meters accidentally read or reported in the wrong units (e.g. confusing gas ft³ & m³ units).

Legislative:

- In 10/11 and 11/12 WCC was allowed to report on a total of only 93% of its total CO₂ emissions from electricity, gas and heating oil consumption. WCC were permitted to exclude some residual CO₂ emissions.
- Properties that were excluded in the 7% of emissions classed as residual and not reported. These were properties on the sensitive property list (to make future years more comparable as properties were disposed of) and all the ones with oil fired heating (due to difficulties in obtaining robust and accurate oil consumption data).
- Estimated supplies had to have a 10% uplift on reported emissions for the CRC Phase 1. In 13/14 - 4.6% of school electricity consumption and 6% of school gas consumption was from estimated readings.
- In 13/14 – 11.6% of non-school electricity consumption and 14.7% of non-school gas consumption was from estimated readings. Estimated readings artificially inflate reported emissions.
- In 12/13 the CRC rules changed and WCC had to report on 100% of its total CO₂ emissions, but from only electricity and gas rather than all fuels. This resulted in having to report on electricity and gas consumption for an extra 8% of property by floor area, an extra 38 corporate properties and 7 academies.

Environmental:

- The winter of 12/13 was the second worst winter in 20 years. (*note - See Degree Days*)
- The rules about CRC reporting allowed for no weather correction of consumption data for heating purposes.

WCC Building Performance vs Standard Benchmarks

Bubble Graph Performance against Standard Energy Benchmarks

The Guide F: Energy Efficiency in Buildings, from the Chartered Institution Of Building Services Engineers (CIBSE) outlines a set of values in kWh/m² for, “Typical”, and “Good” practice energy efficiency benchmarks for an array of different building classifications.

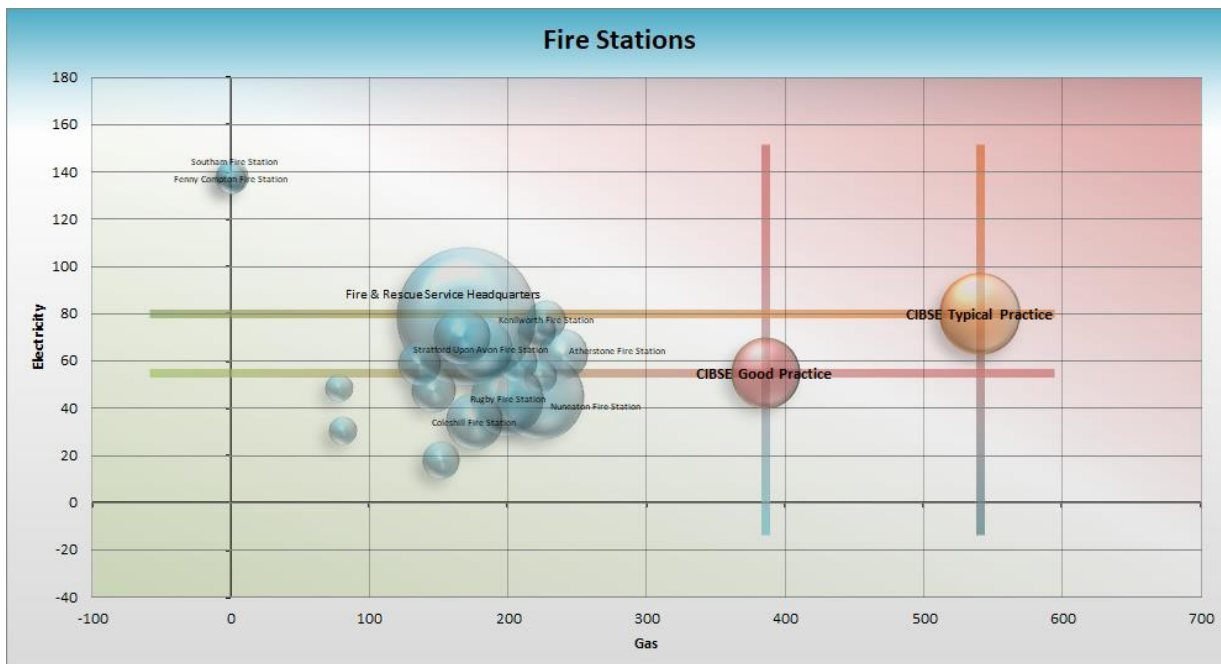
Where an appropriate classification comparator exists, the charts that follow have been created to map individual WCC buildings performance set against these benchmarks in the form of a bubble chart.

How to interpret these charts:

- Property bubbles closer to the top right hand (Red) section of the plot area are associated with poorer performance and those closer to bottom left (Green) perform more efficiently.
- CIBSE Benchmark values for “Typical” and “Good” practice performance (kWh/m²) are displayed as vertical bars for gas and horizontal bars for electricity.
- The box formed by the intersection of the ‘Typical and Good’ lines provides a “target” range for performance for that building type.
- The total annual cost (£) of gas and electricity for each individual site is represented visually by the size of the bubble. Therefore, the larger the bubble, the greater the cost.
- Average values for comparison have been created using the CIBSE “Typical” and “Good” practice benchmarks based on the formula:

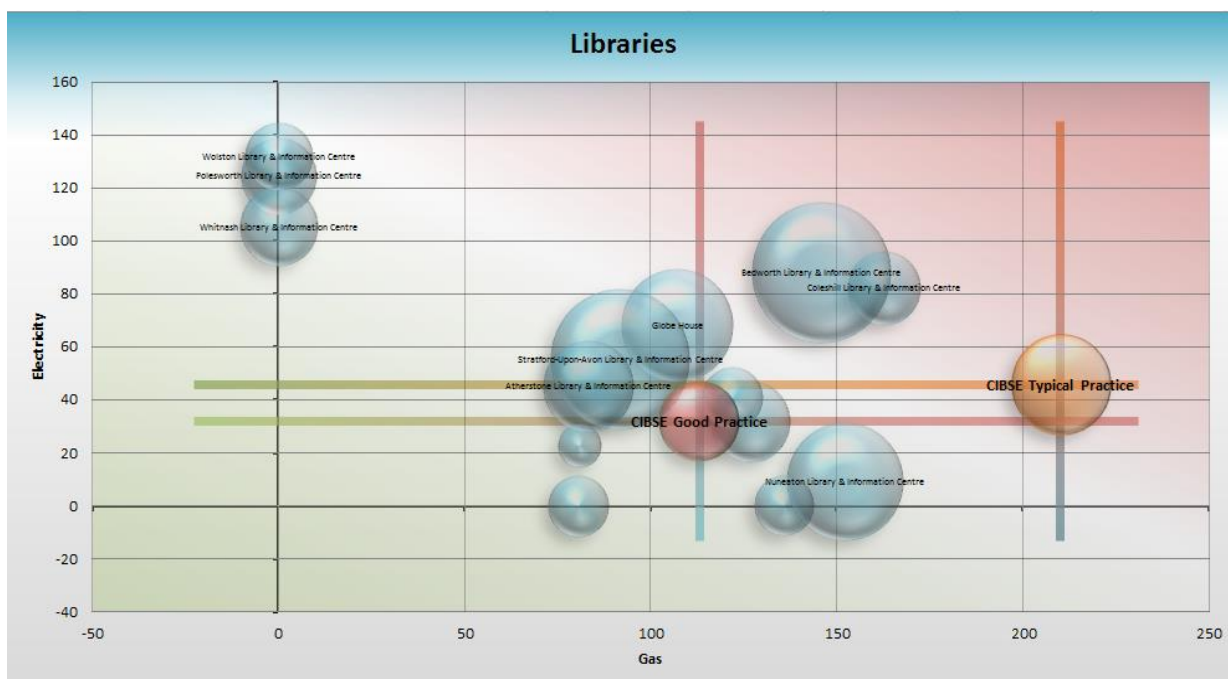
$$\begin{aligned} &= \\ &(\text{CIBSE kWh/m}^2) \times (\text{Category average m}^2 \text{ WCC portfolio}) \times (\text{WCC average utility cost/kWh Electricity}) \\ &+ \\ &(\text{CIBSE kWh/m}^2) \times (\text{Category average m}^2 \text{ WCC portfolio}) \times (\text{WCC average utility cost/kWh Gas}) \end{aligned}$$

WCC Building Performance vs Standard Benchmarks

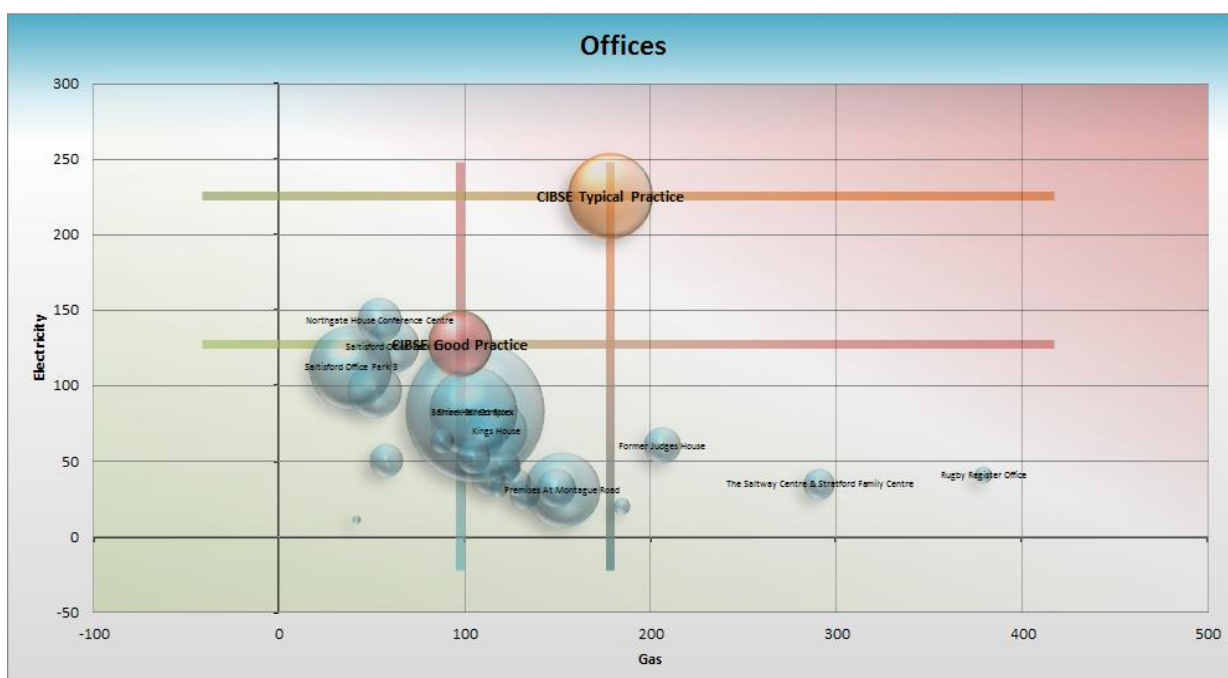


- Southam and Fenny Compton Fire Stations have no gas for heating or hot water; subsequently they show high consumption for electricity.
- Electricity consumption at all Fire & Rescue properties is between typical and better than good practice consumption levels.
- Gas consumption at all fire stations is better than good practice.

WCC Building Performance vs Standard Benchmarks

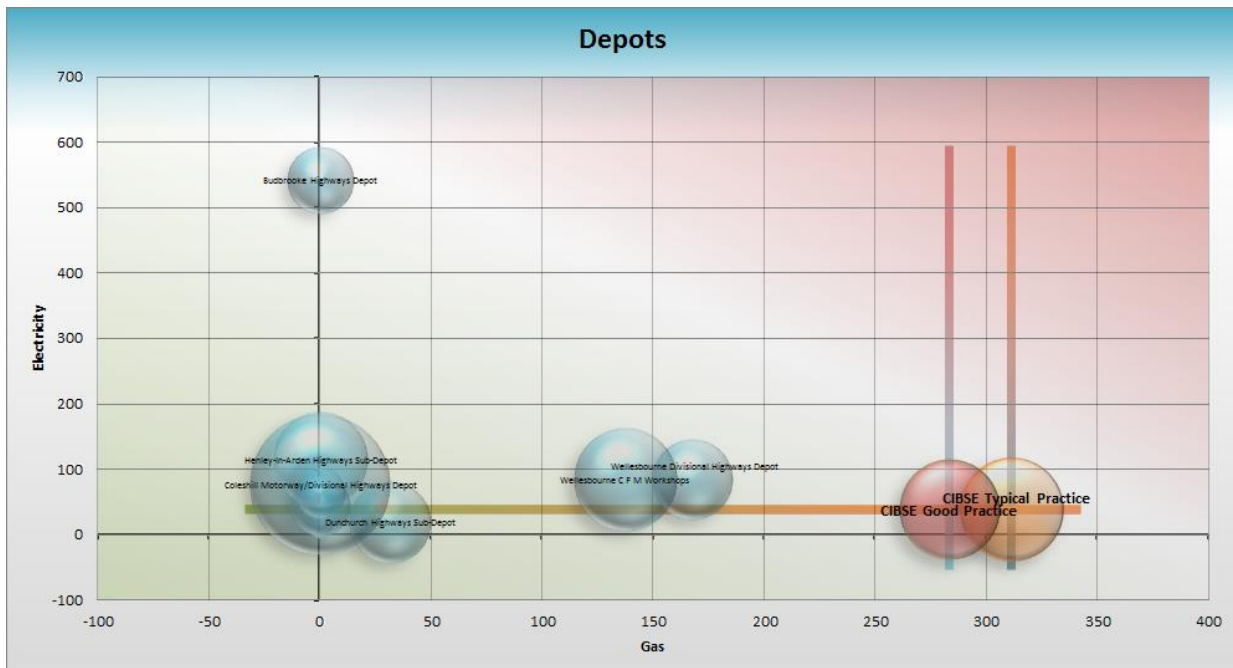


- Wolston, Polesworth and Whitnash libraries have no gas for heating or hot water; subsequently they show high consumption for electricity.
- Electricity consumption at Globe House, Bedworth, Coleshill and Stratford-upon-Avon libraries is higher than typical practice and ways to improve performance need to be investigated.
- Gas consumption at all libraries is better than typical practice.

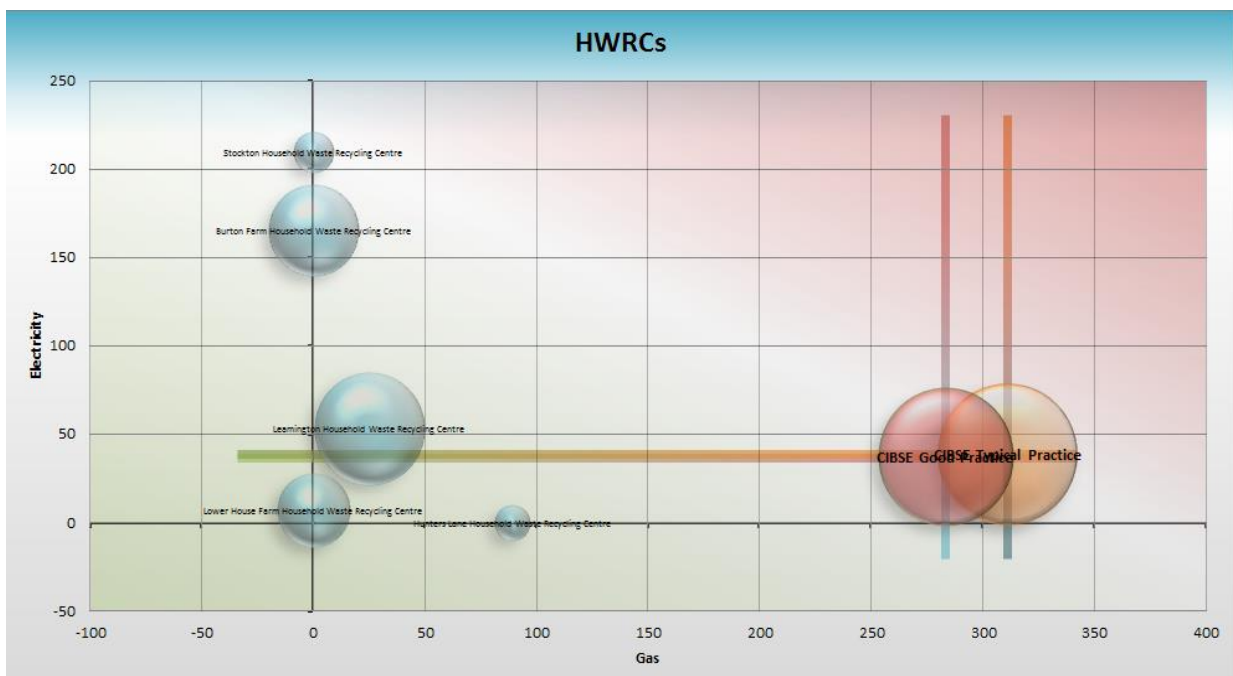


- Gas consumption at Rugby Register Office, The Saltway Centre and the Former Judges House is worse than typical practice and ways to improve performance need to be investigated.

WCC Building Performance vs Standard Benchmarks

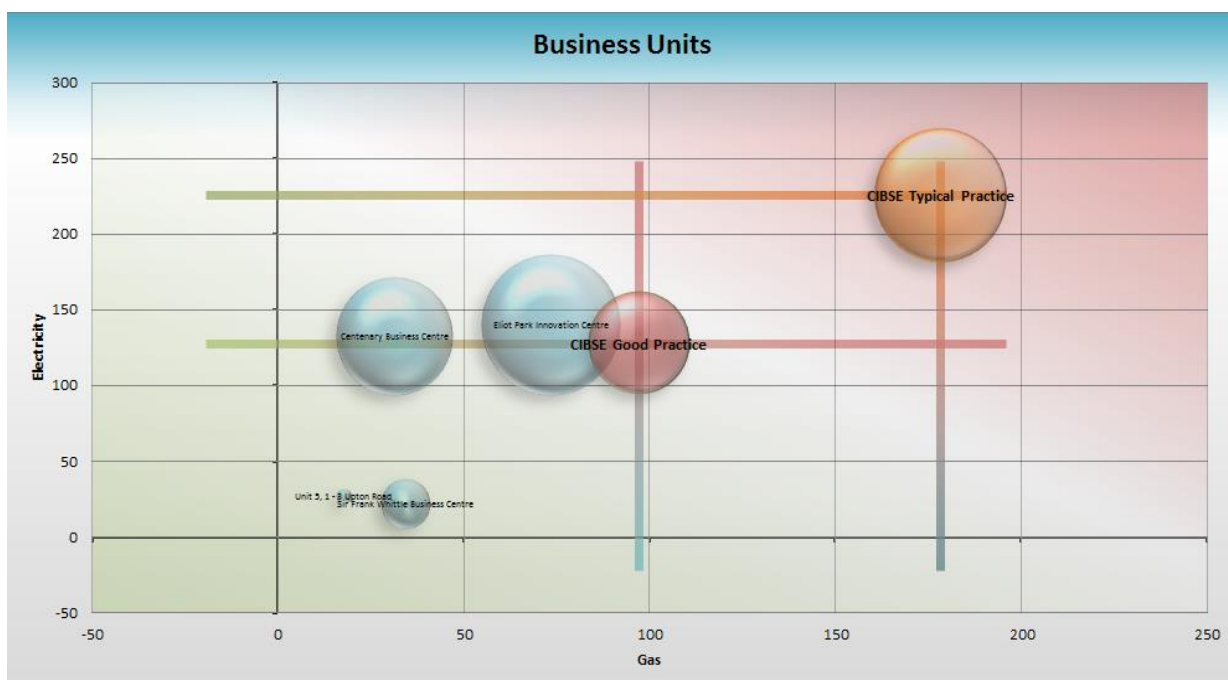


- Budbrooke, Henley-in-Arden and Coleshill Motorway Depots have no gas for heating or hot water; subsequently they show high consumption for electricity.
- Electricity consumption at Wellesbourne Highways Depot and workshop are worse than typical practice and ways to improve performance need to be investigated.

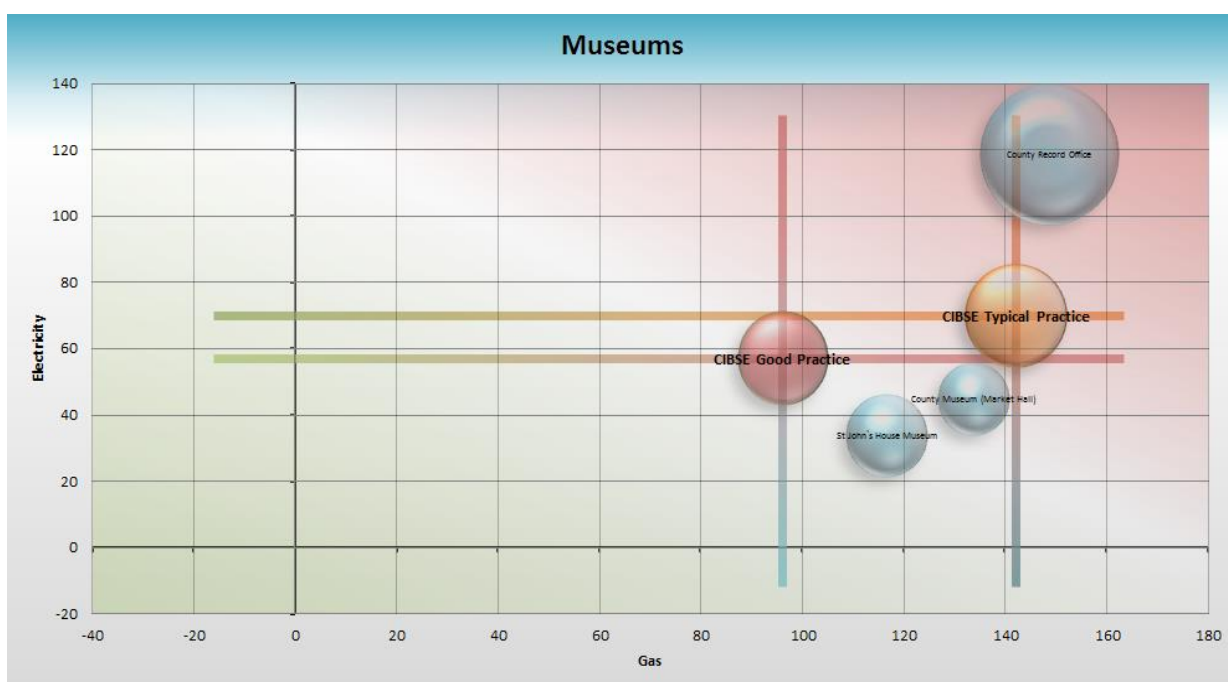


- Stockton, Burton Farm and Lower House Farm HWRC have no gas for heating or hot water, subsequently they show high consumption for electricity.
- Electricity consumption at Leamington HWRC is worse than typical practice and ways to improve performance need to be investigated.

WCC Building Performance vs Standard Benchmarks

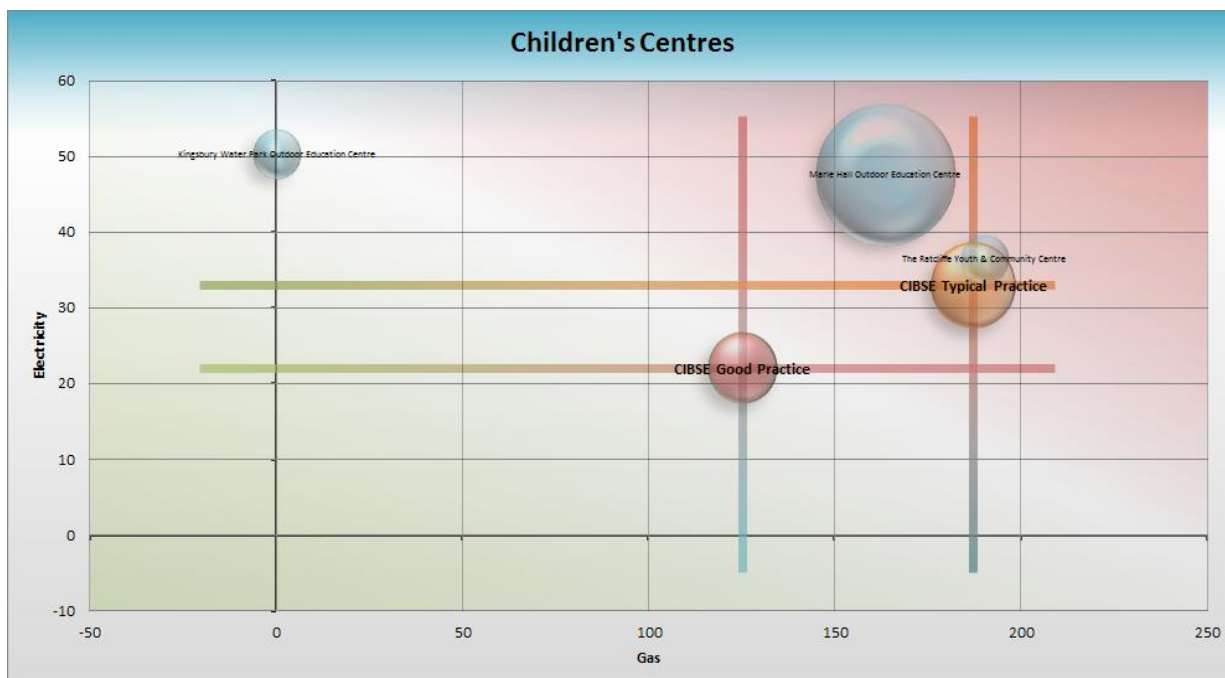


- Electricity and gas consumption at Business Centres is between typical and better than good practice.



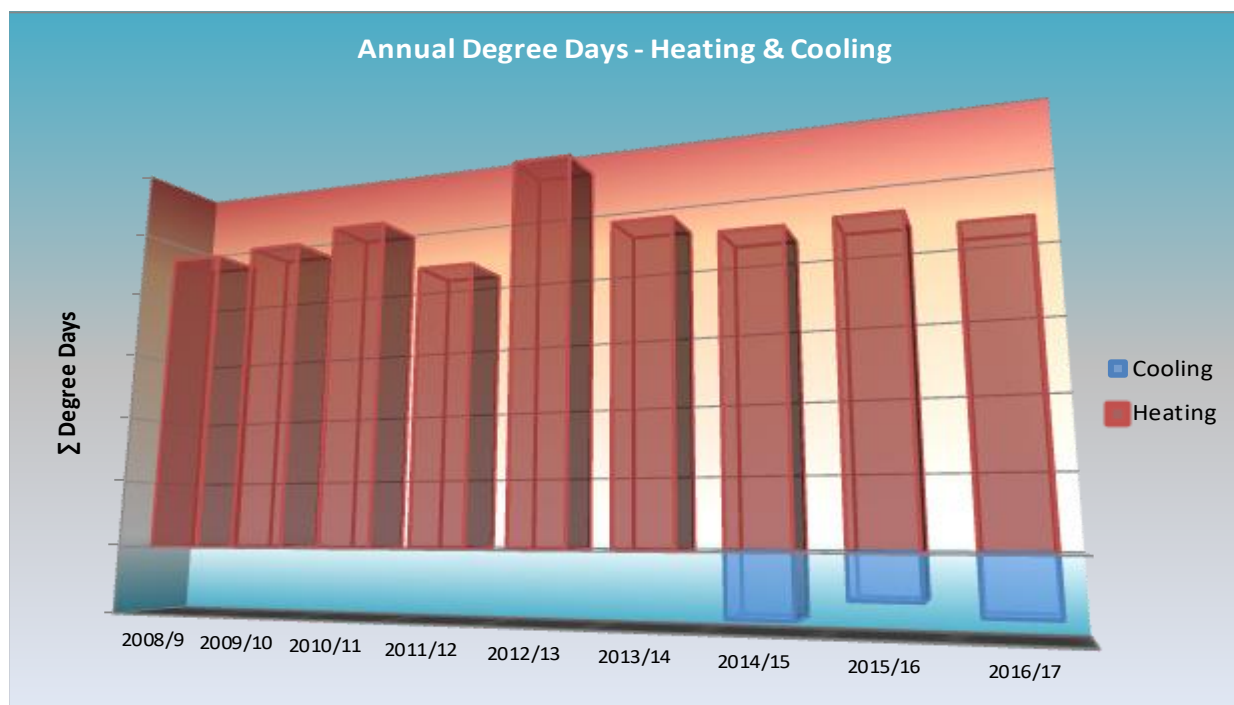
- Gas and electricity consumption at the County Record Office is higher than typical practice and ways to improve performance have been investigated – see Energy Saving Improvements - Case Study.

WCC Building Performance vs Standard Benchmarks



- Kingsbury Water Park OEC has no gas for heating or hot water; subsequently it shows high consumption for electricity.
- Electricity consumption at Marle Hall OEC and the Ratcliffe Youth and Community Centre is worse than typical practice and ways to improve efficiency need to be investigated.

Degree Day Summary 2016/17



What Are Degree Days & What Does This Graph Mean?:

- Put simply, Colder temperatures require Heating & Warmer temperatures, Cooling.
- Degree Days are used to give an index of how hot or cold the local weather is relative to a UK baseline of 15.5°Celsius.
- The chart above shows the total degree days in each year.
- The Red Bars show Heating degree days and the the Blue Bars, Cooling. *[note - Only Heating data is shown pre 2014/15]*
- As both space heating and cooling require energy, we can infer a relationship between the total size of the Degree Day bars in the graph and the demand for energy used in Heating and Cooling Year on Year.
- In the commentary for factors affecting the year on year energy consumption; we noted that the winter of 12/13 was the second worst on record for 20 years. This is reflected in the height of the 12/13 heating bar in the graph above being largest of those shown.

Thus, with no other variables, you would expect the total energy consumption to be higher in years with larger bars and potentially a different mix of energy types consumed depending on the systems used for space heating & cooling (Electricity or Gas).

Low & Zero Carbon



Introduction

Renewable energy refers to energy generated by sustainable means, i.e. from resources that are naturally replenished on a human timescale, such as sunlight, wind, bio and hydro rather than fossil fuels.

The UK is committed to reducing its greenhouse gas emissions by at least 80% by 2050 relative to 1990 levels.

The key EU targets for 2020 are:

- 20% cut in greenhouse gas emissions compared with 1990.
- 20% of total energy consumption to come from renewable sources.
- 20% increase in efficiency.

In this section...

1. Renewable Energy Generation

Information on WCC's current investment in renewable technologies.

2. Outlook

A look at what WCC is planning for renewables and how capacity might change.

Renewable Energy Generation

What we're doing and why

WCC's Energy Policy is to increase the use of low and zero carbon technologies.

Alongside the non-polluting environmental benefits renewables offer, generating sustainable energy locally has additional potential benefits in terms of:

- Energy security (reducing our dependence on finite resources of fossil fuel);
- Economic benefits:
 - Protection against energy market volatility;
 - Reduction in carbon tariffs;
 - Local economic infrastructure and job creation borne of generating the energy we consume, rather than importing it via traditional means.

Since 2010/11 WCC has invested in a series of renewable energy technologies at a number of sites, including building integrated photovoltaic solar panels, wind turbine and biomass, generating some 200,000kWh annually.

In financial year 2015/16 WCC added another building integrated photovoltaic solar panel array, adding a further 10% (19,984 kWh), annually to its suite of renewable energy installations.

Set against the energy consumed annually within WCC's corporate building portfolio for 16/17, WCC's current generation from renewable sources is less than 5% of the total electrical energy and around 1% of combined consumption (electricity and gas); meaning there is still ground to cover relative to the key EU target of 20% of total energy by 2020.

In line with its commitment to reduce carbon emissions, central government created a number of incentives to encourage the adoption of renewable technologies, such as the Feed in Tariff (FiT).

As the industry surrounding renewables matures and the available technologies evolve, central government has been progressively reducing the value of these incentives schemes for new installations.

The withdrawal of these financial incentives has had a negative impact on the viability and approval of small scale renewable projects within WCC's estate in the short term.

Outlook

Looking forward

There are several market led factors that determine scale and timeline for WCC's developing its commitment to renewable energy generation.

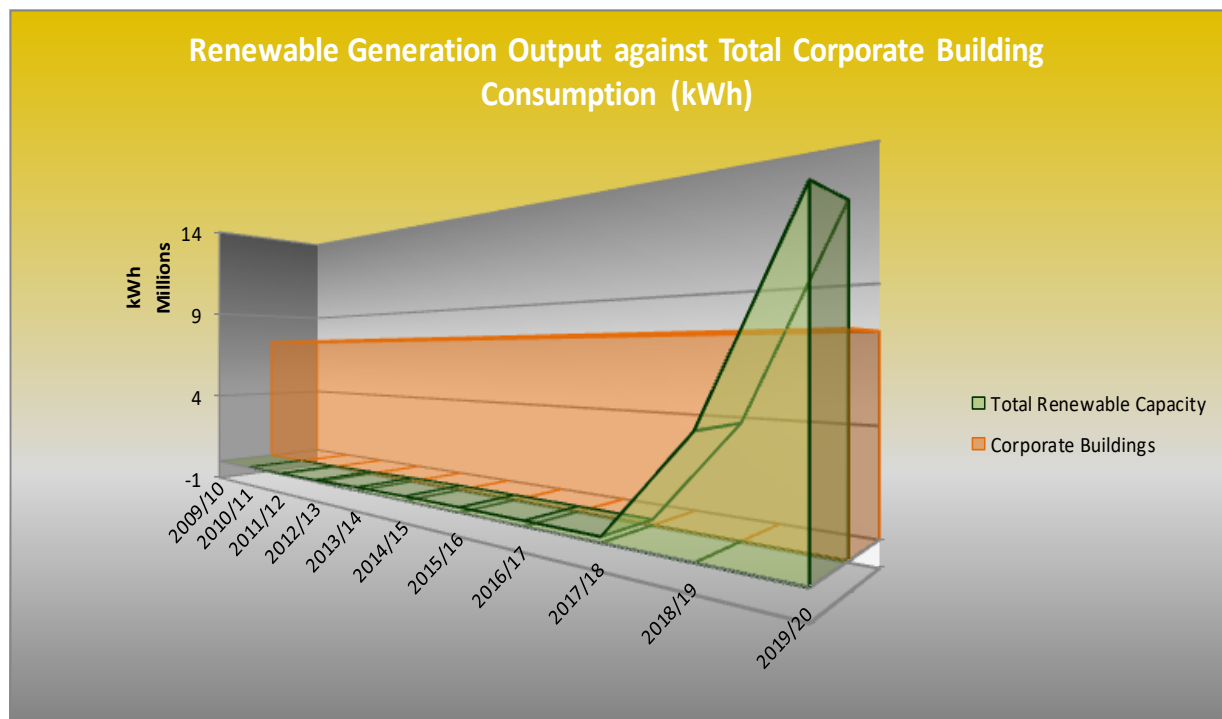
Looking forward, WCC is working towards increasing its renewable generation capacity (kW) by investing in some larger scale Ground Mounted Solar (GMS) installations at sites across the county with planning applications due to be submitted for two of those in Q1 of 2018. With rapid advances being made in battery technology, WCC is also investigating the financial viability of 5 sites for use as grid connected battery storage.

The graph below shows WCC's historical output (kWh) from renewable energy generation and its projection in the years ahead based on the GMS projects currently under consideration coming to fruition.

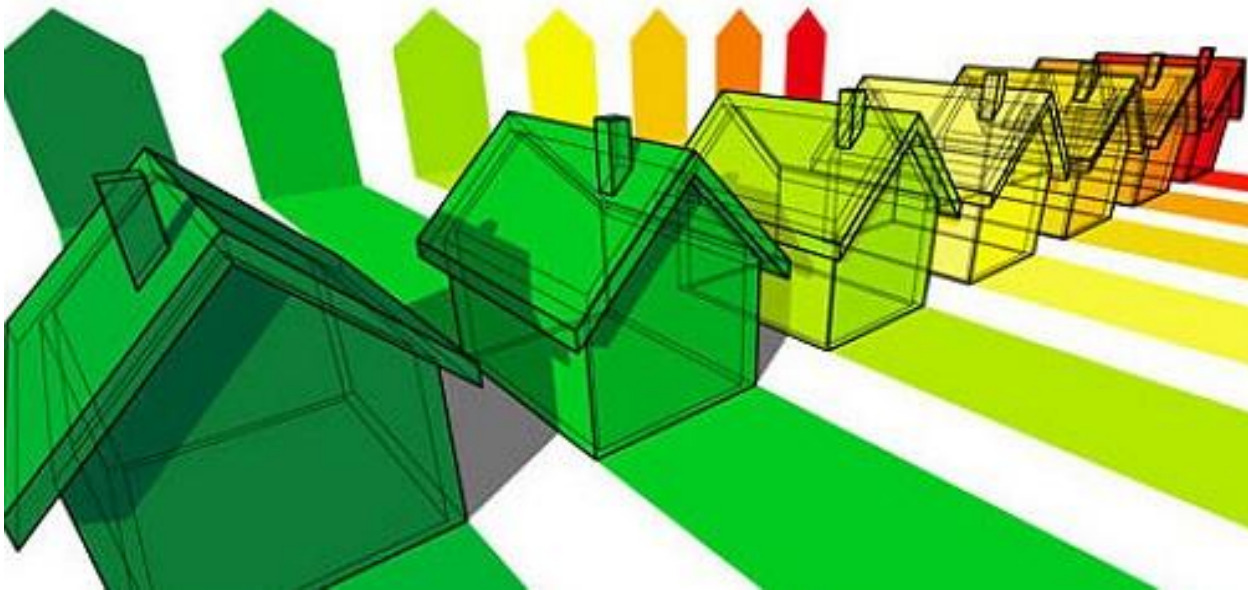
For context this projection of total annual generation (in Green) is set against a backdrop of the total annual consumption (kWh) for electricity in WCC's corporate buildings for FY 16/17 (in Orange).

Currently WCC generates less than 5% of the total electrical energy it consumes in its corporate building portfolio locally from renewables.

Projecting forward, we hope to have increased that figure to over 55% by 2018/19 and further to over 150% by 2019/20, or enough to cover the equivalent of all our corporate building electricity consumption and over 20% of current county street lighting demand.



Display Energy Certificates (DECs) & Advisory Reports (ARs) 2016/17



Introduction

In order to comply with the Energy Performance of Buildings Directive 2007 (EPBD), all buildings occupied by a public authority, with a useful floor area of over 250 m² and frequently visited by the public (i.e. every week they are open) are required to have a Display Energy Certificate (DEC).

In this section:

- 1. What are DECs & ARs?**
Background information on content, legal requirements and production
- 2. Production Procurement & Statistics**
Information on how our DECs & ARs are produced.
- 3. Corporate Property Profile**
Statistics on the ratings achieved by WCC Corporate Buildings
- 4. Performance Measuring**
How we measure the performance of our buildings
- 5. Improving DEC Ratings of Corporate Properties**
Methods for improving the energy performance of our building stock

DEC/AR Background & Procurement

What are DEC's & ARs?

A Display Energy Certificate (DEC), provides an overview of the energy performance of a building based upon its actual recorded energy consumption (electricity, gas, heating oil, biomass, solid fuel) and the CO₂ emissions that result from that energy use.

This is shown as a banded performance rating on the certificate from A to G, where A has the lowest CO₂ emissions (best) and G the highest CO₂ emissions (worst).

The rating is also shown as a number. A typical building of its type would have a rating of 100.

A building with twice the typical CO₂ emissions would have a rating of 200 (or G).



The DEC must be displayed in colour at A3 size in a prominent place, usually the main entrance area.

- Those buildings with a floor area of 1,000 m² + need a DEC every year
- Those buildings with a floor area of between 250 m² and 1,000 m² require a DEC every ten years.

The Advisory Report accompanies the DEC and highlights recommendations to improve the energy performance of the building categorised by their potential short, medium and long term payback periods.

Advisory Reports issued for a building over 1000m² are valid for a period of 7 years. Other Advisory Reports are valid for 10 years.

Energy assessors must be a member of an approved accreditation scheme. Energy assessors are responsible for conducting an energy assessment, producing a DEC and AR and lodging the DEC and AR with their accreditation scheme. The accreditation scheme is responsible for checking and lodging certificates on the national register. Accreditation schemes are also responsible for monitoring the quality of the certificates energy assessors produce.

DEC/AR Background & Procurement

WCC DEC & AR Procurement

Following decommissioning of the WES traded energy efficiency service to schools in early 2015; WCC is no longer able to produce its own DEC/ARs but commissions them through the ESPO framework 343.

<https://www.espo.org/Frameworks/Energy/343-Energy-Performance-of-Buildings-Surveying,-Ass>

ESPO is a public sector owned professional buying organisation committed to pursuing best practice in procurement, sourcing, supply chain partner support and management, contract management and ensuring EU compliance.

ESPO was established in 1981 and is jointly owned by the following member authorities:

1. Leicestershire County Council
2. Lincolnshire County Council
3. Cambridgeshire County Council
4. Norfolk County Council
5. Warwickshire County Council
6. Peterborough City Council

From September 2015 onwards WCC will only be commissioning DEC / ARs for its own corporate property stock. Schools and academies will be responsible for commissioning their own DEC / ARs.

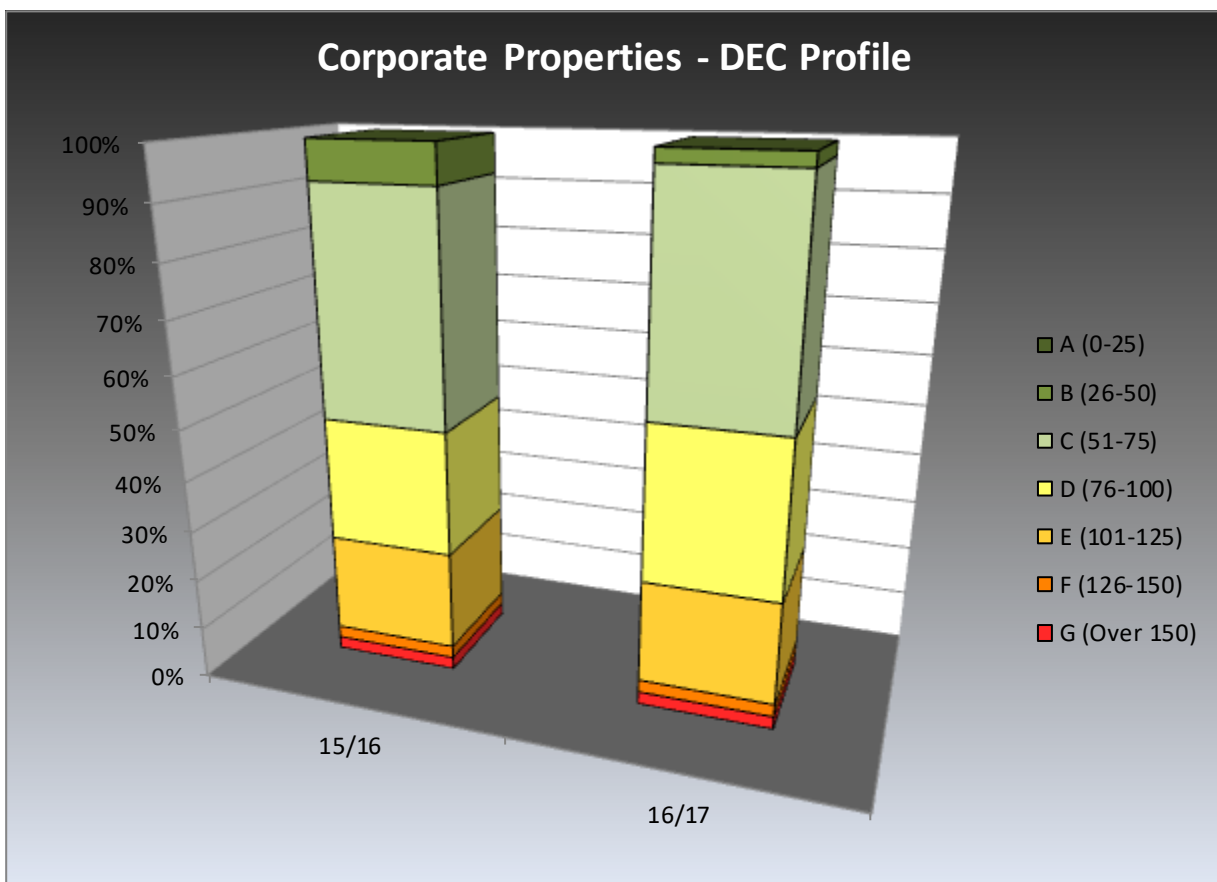
WCC DEC & AR Production Statistics

Property Type:	15/16		16/17	
	DECs	ARs	DECs	ARs
Academy	56	1	0	0
Maintained	78	6	0	0
Corporate	28	9	26	1
Total	162	16	26	1

DEC Corporate Profile & Performance

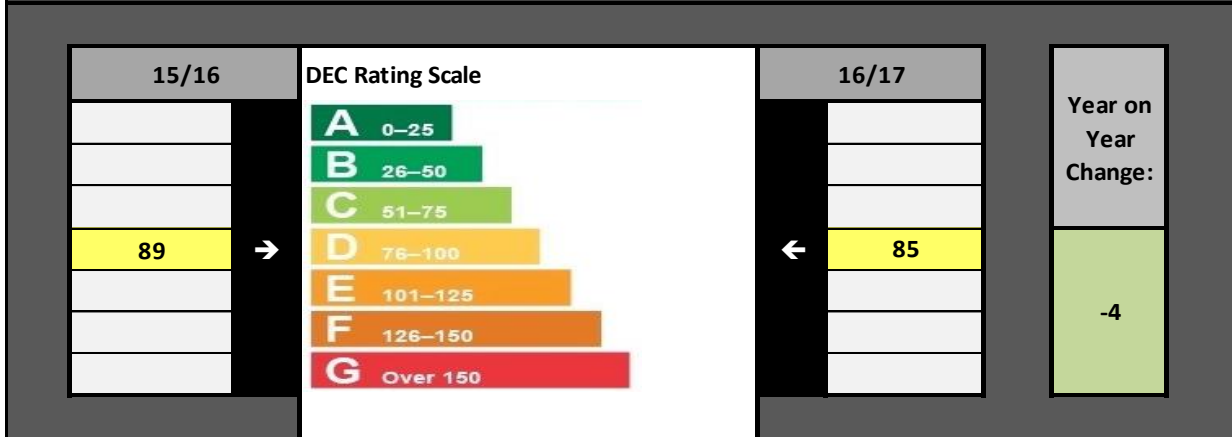
Corporate Properties - DEC Profile

15/16	16/17	DEC Rating Scale	Year on Year Change
0.0%	0.0%	A 0-25	-6%
7.1%	2.4%	B 26-50	5%
42.9%	41.5%	C 51-75	1%
23.8%	29.3%	D 76-100	
19.0%	19.5%	E 101-125	
2.4%	2.4%	F 126-150	
2.4%	2.4%	G Over 150	
24.4%	25.0%	% Total E, F & G Rated Properties	1%



DEC Corporate Profile & Performance

Corporate Properties - Average Rating per m²



Performance Measuring

- WCC used the E, F and G DEC rating of all properties (including schools and academies) as a quarterly performance reporting measure when a WES traded energy service was in place, The target was maintaining the percentage of all E, F and G rated DEC's at below 30.6% of all valid DEC's.
- From 2015 onwards WCC will use the E, F and G rating of just corporate properties as a quarterly performance reporting measure. The baseline for corporate properties of E, F and G rated DEC's is therefore 25% of all valid DEC's.
- WCC expects the average DEC rating to improve over time: as the quality of the data improves; as inefficient properties are disposed of through property rationalisation and as more investment is made in energy efficiency in the properties that are retained.

Improving DEC Ratings of Corporate Properties

Improving the energy performance of buildings that will be kept for the medium to long term could be achieved through projects such as:

- Implementing an effective maintenance and minor works programme to ensure optimum operational efficiency,
- Intelligent use of the Building Energy Management System (BMS),
- Improving insulation, heating & lighting systems, voltage control and server rooms,
- Improving the thermal performance of the building envelope,
- Implementing renewable and micro-generation energy systems,
- Low carbon whole building retrofits,
- Reducing the size of the WCC estate (property rationalisation) [note that moving to new benchmarks for increased space occupancy will increase energy use per unit of floor area, even though overall it may be better use of space],
- Procuring only buildings that fall into the top quartile of energy performance,
- Ensuring all new builds and major refurbishments (with a contract value of over £1M) achieve a BREEAM 'very good' rating,
- Ensuring all projects (with a contract value of between £350k to £1M) achieve minimum BREEAM credits in energy use / carbon reduction, water use, materials / waste minimisation and ecology,
- Rolling out smart metering ensuring accurate data, and
- Resourcing effective awareness raising and behaviour change campaigns.

Delivering such projects will have a positive effect on reducing the average DEC rating of the corporate estate and reduce carbon emissions.

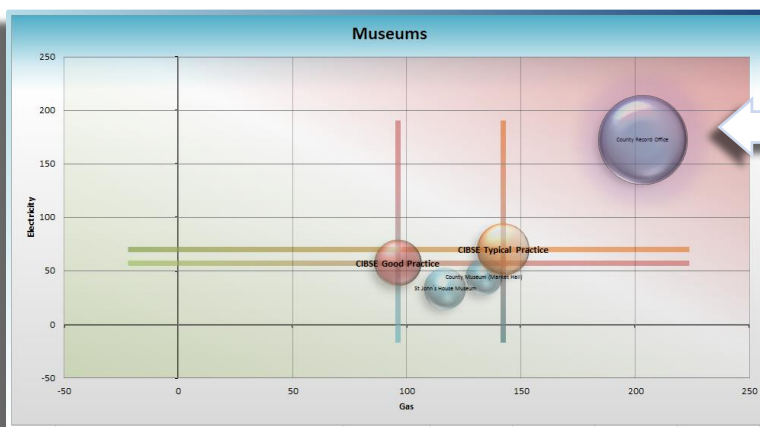
Energy Saving Improvements – Case Study

County Records Office



Background

As highlighted by the bubble chart in the benchmarking section of this report; the County Records Office was one of the highest consumers of energy per unit of floor area in the WCC corporate portfolio.



County Records Office,
FY 2015 - 16

The purpose of the County Records Office is to preserve historic records of Warwickshire and its people in a secure environment for future generations. It is home to many unique and irreplaceable documents which cover 900 years of history primarily related to Warwickshire.

These documents are stored in strongrooms, looked after by the County's Conservation Unit. The strongrooms maintain a very specific temperature and humidity controlled environment to preserve and protect these documents in compliance with the British Standard for documentation conservation.

A new way of thinking

Like many record offices around the country built in the 1970s, the Warwickshire County Record Office's repository areas are equipped with an air-conditioning system. It was designed to run 24/7 to keep the optional narrow band of temperature and relative humidity (T & RH) required. The system, whilst effective, comes at considerable expense, due to the high usage of both electricity and gas required to run. For years this was accepted as necessity in order to keep the documents safe, requiring an energy budget of over £30,000 pa.



A global shift in thinking about the way we use resources in recent years, coupled with a completely new approach in the field of conservation regulation, has made it possible to

review the way things were done at the Record Office. A pioneering experiment was undertaken in order to manage the building in a more sustainable way. Donata Santorini, Senior Conservator teamed up with WCC Property Services and Energy Team's Mathilde Robert, to bring together the expertise necessary for the project. Advice was taken from Chris Woods from the National Conservation Service, along with guidance from the 2012 Guide for the Storage and Exhibition of Archive Material (DP 5454:2012) and the new British Standards on Conservation and Care of Archive and Library Collections (BS 4971:2017).

Methodology

The Strongroom Energy Saving Project was focussed on the requirement to run the air-conditioning system constantly to maintain the requisite conditions and was divided into 2 distinct phases.

During phase 1, the air conditioning system was tested to see what impact a stop-start approach would have on the system and the strongroom environment. The system was monitored as the running time was reduced by approximately 30% and the data analysed and compared with external weather conditions and internal levels of T & RH.

Finding that the system was able to cope with this approach, phase 2 of the project implemented a more noticeable reduction of running times: 50% initially and then increasing up to 90% as it was found that the Strongrooms were able to maintain a compliant environment for long periods when not in critical times of hot summer and cold and humid winter.

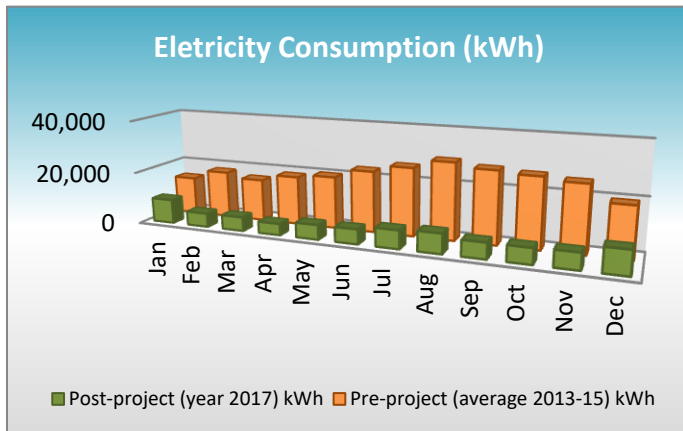
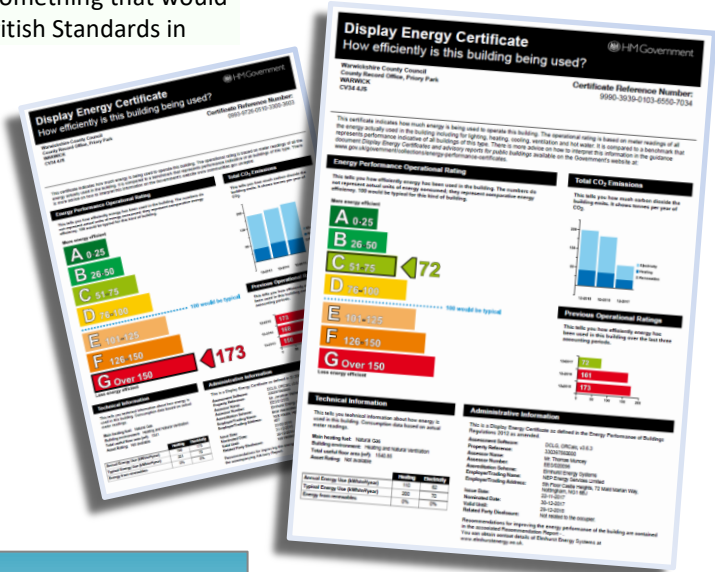
Donata explains that, "This was both worrying and exciting! I am primarily concerned for the wellbeing of our documents which has always been of paramount importance. The internal T & RH have been monitored constantly with loggers both inside and outside boxes and on racks and shelves. In the last 12 months we have aimed to achieve a nice seasonal curve".

The project so far has been a bold initiative, and Donata is, "Confident that the changes, being very gradual and slow, had little impact on our collections."

Outcome

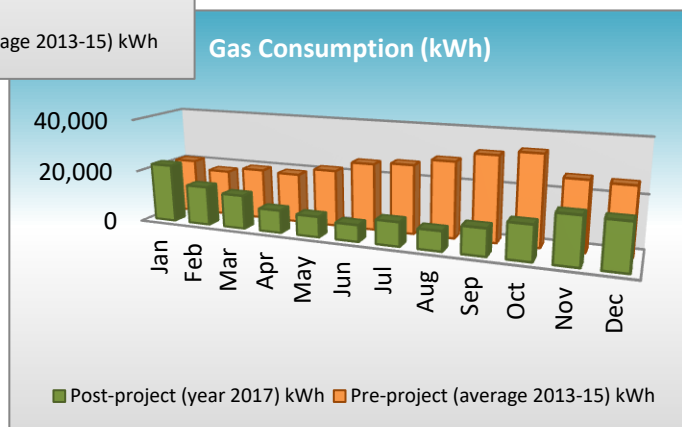
A different way of working can bring environmental and financial benefits

Over £20,000 in energy bills were saved over the last year, and the building has improved from Energy Performance Operational Rating 'G' [173], to 'C' [72] as a result. County Records are learning to use the equipment they have in a different way; something that would not have been possible before the new British Standards in conservation and associated regulations were published.



Electricity consumption was reduced by 75% in 2017 compared to pre-project period average (2013-15).

For gas, 50% was saved in 2017 compared to pre-project period average (2013-15).



Utility Costs

Calculating Representative Average Utility Costs per Unit

Methodology

Reporting the cost per square metre (£/m²) for a specific property presents a challenge if:

- The invoice data isn't complete or available in WCC's finance system (the ledger).
- The site doesn't procure through the Eastern Shires Purchasing Organisation (ESPO). The WCC Energy Team only receives invoice consumption and cost data from sites that procure through ESPO.
- The energy supply is shared between different properties on a site, or between sites.
- The energy supply is shared between tenancies within the properties served by those supplies.

Where invoice data is missing the WCC Energy Team derive a cost based on data given by the supplier with the caveat that estimation and apportioning is used to generate a consumption figure where the billing cycle does not align naturally to the financial year.

Where an energy supply is shared between properties, the consumption for the affected meter(s) is apportioned based on floor area (m²) only for the purposes of this analysis. This is a coarse methodology, as consideration is not given to other factors such as individual occupancy, operating hours and building fabric etc, but serves sufficiently for the purposes of this report.

Where an energy supply is shared between WCC and tenants within the building complex served, the consumption for the affected meter(s) is apportioned based on either:

- a) The proportion of energy costs (%) set out as the tenant's responsibility in their rental contract.
- Or
- b) The percentage of total floor area occupied by WCC.

The cost per kWh charged to each site will vary based on level of consumption, meter type and tariff.

In light of this, we establish representative single costs per unit (pence/kWh) for gas and electricity based on a weighted average using the following approach:

- Using the WCC portfolio that procures through ESPO as a representative sample range of meter types, consumptions and tariffs.
- Using the contract rate for each supply, including billing factors such as standing charge and feed in tariff recovery charge, but excluding VAT; multiplied by annual consumption values per supply.
- Aggregating all the costs per supply then dividing this figure by the total consumption to achieve a weighted average cost per kWh consumed across the entire portfolio.

For water, the same basic principle was applied to establish a representative single cost per unit (pence/litre). Here the combined charges for fresh water, surface water drainage and sewerage (costs per supply) was divided by the Rolling Megalitres per Year (annual consumption).

Calculating Representative Average Utility Costs per Unit

Weighted Average Costs per Unit

This approach results in values of:

- **Gas: 2.261 pence/kWh**
- **Electricity: 10.198 pence/kWh**
(including billing factors such as standing charge and feed in tariff recovery charge, but not VAT.)
- **Water: 0.353 pence/litre of fresh water**
(including billing factors such as surface water drainage and sewerage, but not VAT.)

Looking Forward

Market Energy Prices

Over the last year, the wholesale cost of energy for WCC dropped with ESPO contract.

However the 'Non Energy Costs', that already represent half of the total bill, continue to increase significantly (See Focus on Electricity Prices below).

'Non Energy Costs' comprise regulatory network and 3rd party cost elements of a bill linked to the transmission and metering & Government legislation to provide investment in new electricity generation.

This section provides an overview of the main energy price drivers in UK and how prices are expected to evolve.

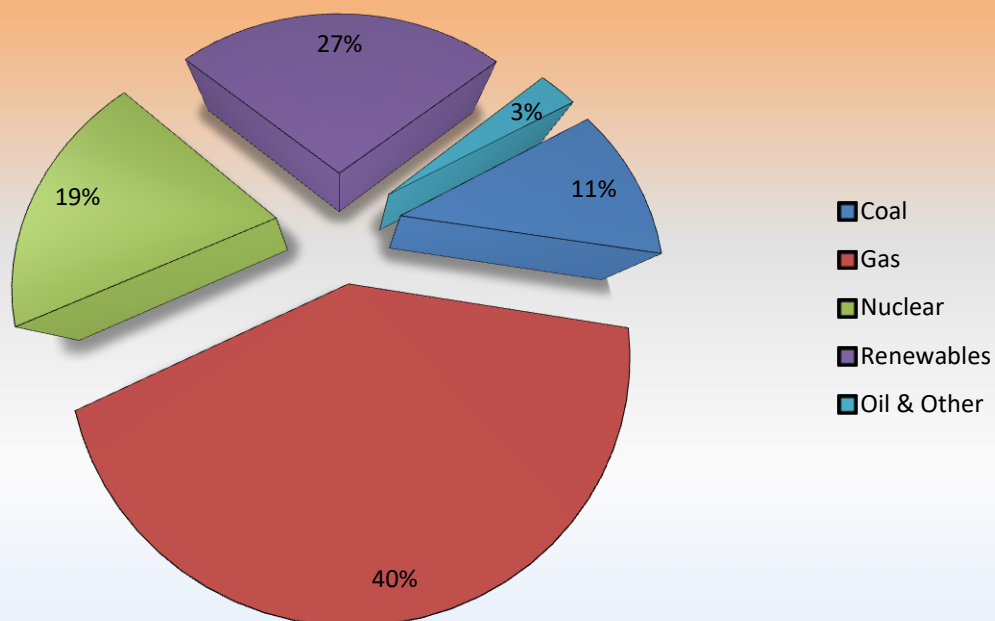
Energy Price Drivers in the UK Market

Fluctuations in the Pound / oil prices	Gas and power prices have drifted higher in recent months amid fluctuations in the Pound and oil prices.
Brexit	Uncertainty over Brexit continues to keep the Pound under pressure as the UK seems no closer to agreeing a deal than it was six months ago. Uncertainty whether UK remains part of the European Market.
French nuclear capacity constraints	Some stronger upside seen over the past month due to capacity constraints at French nuclear power plants and stronger Brent crude.
Closure of Rough Storage	Centrica permanent closure of Rough, the UK's largest gas storage site, although reaction is fairly muted as move was expected.
Tensions in Arab countries, Qatar and Saudi Arabia	Tensions between Qatar and its Arab neighbours saw LNG cargoes heading to Europe briefly diverted, causing prices to temporarily spike. Crackdown on corruption in Saudi Arabia and fresh tensions between Saudi Arabia and Iran keeping oil markets on edge.
OPEC output cuts	OPEC output cuts have propped up the oil market, with the curbs extended until March 2018.
Coal output limitation	European coal prices have provided support to power energy prices. Coal has been on an upward trend due to production limits in China, prompting higher demand for overseas imports. A rise in coal prices places an even greater demand on gas use for power generation, thus lifting both gas and power prices. UK coal phase out – UK has closed a number of coal plants for environmental reasons, and will close the remaining over the coming years, placing a greater reliance on gas-fired generation.
Additional LNG supply	New LNG supply expected in Europe from Australia and USA. UK plans to open a fourth LNG terminals by Q4 – 18 at Barrow in Furness

UPWARD PRICE

DOWNWARD PRICE

UK Electricity Mix - Q1 2017



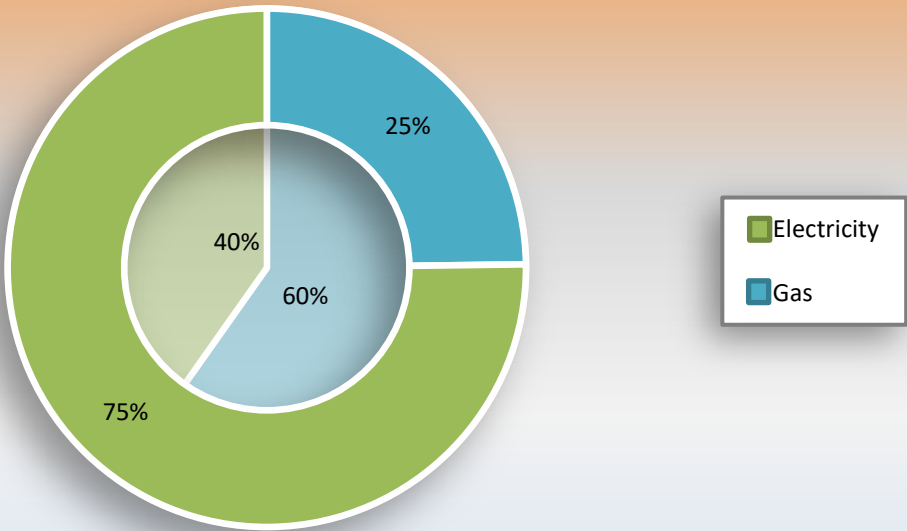
UK Electricity Mix

The chart above shows the proportional contribution of the different types of generation that go towards the UK Electricity Mix as at Q1 of 2017.

Gas-fired generation currently represents around 40% of the UK Electricity Mix meaning that both gas and electricity prices are strongly linked to factors that affect the wholesale natural gas market.

WCC Consumption vs Cost Comparative Split

Outer Ring - Cost (£) | Inner Ring- Consumption (kWh)



Comparative Costs

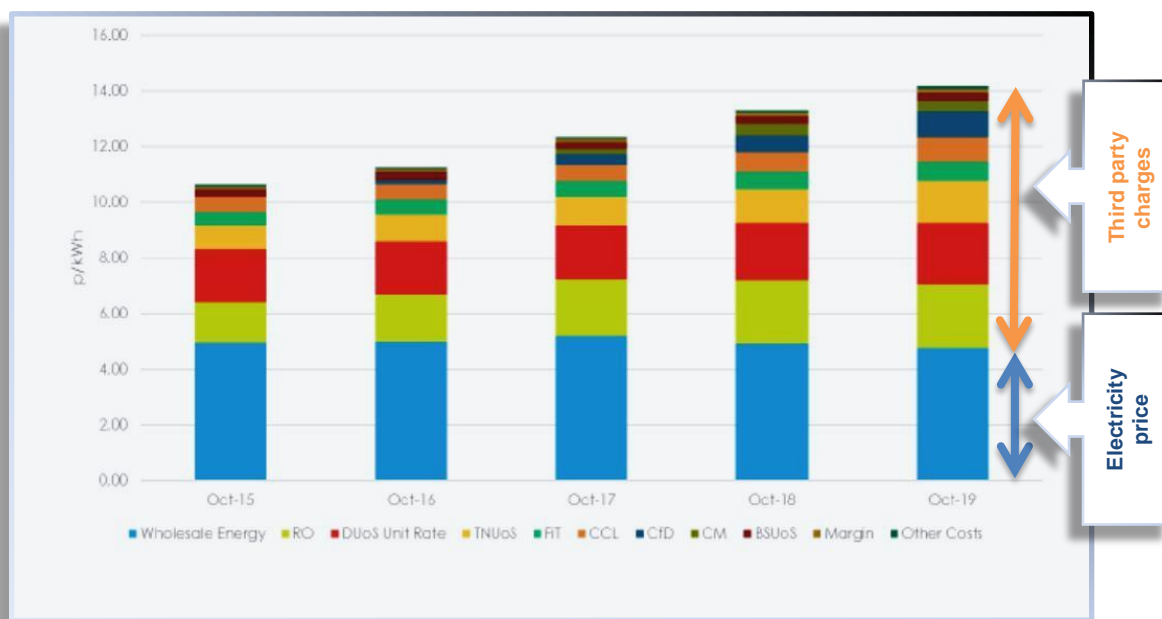
The factors above contribute to fluctuations in the wholesale cost of energy. Even though WCC uses more gas than electricity in its Corporate Portfolio, gas still only accounts for only ¼ of the total spend on energy.

With more than half of the billing for electricity made up of third party, or, non-commodity charges, changes to these charges have significant bearing on the majority of our spend looking forward.

Looking Forward

Non-Commodity Electricity Cost Drivers

Non commodity charges already represent more than 60% of the electricity bill. The chart below illustrates that whilst the wholesale prices hold relatively stable, third party charges are planned to represent approximately $\frac{2}{3}$ of the bill by 2019, meaning that the cost of the electricity itself will account for less than $\frac{1}{3}$ of the total charge billed.



Current forecasts show the cost increases year-on-year for the main four schemes outlined in the table below:

	Current (p/kWh)	2018/19 (p/kWh)	2019/20 (p/kWh)	2020/21 (p/kWh)
Renewable obligations (RO)	1.9468	2.21	2.3	-
Feed in Tariff (FiT)	0.5601	0.59	0.64	-
Contracts for Difference (CfD)	0.3741	0.5	0.75	0.98
Capacity Market (CM)	0.1702	0.35	0.35	0.5

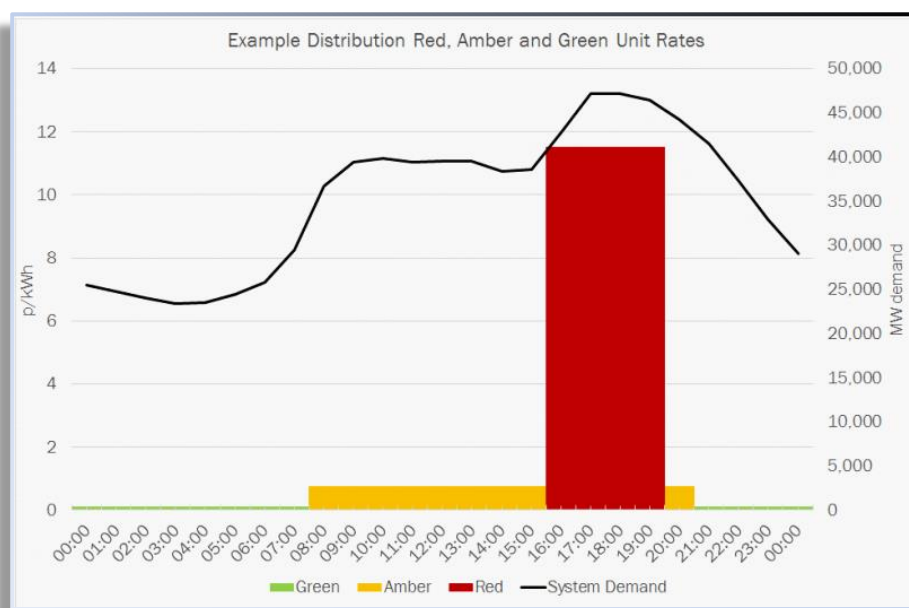
Other third party charges such as distribution, transmission and balancing are forecasted to increase by around 5% dependent on region.

Looking Forward

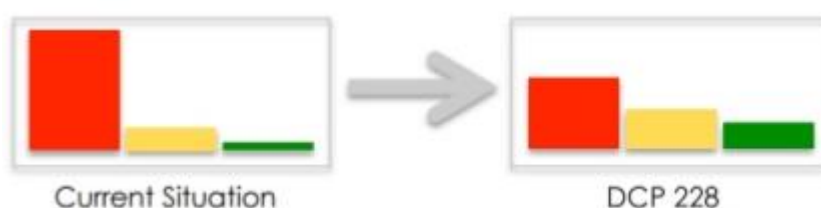
Non-Commodity Electricity Costs - DCP 228 – DUoS - Changes to distribution charges

Changes to Distribution Use of System (DUoS) charges and the way they are calculated from April 2018 with the aim to distribute costs more accurately during peak and non-peak periods, across the three time bands: Red, Amber and Green.

The example chart below illustrates how under the current structure, charges to customers who use energy during Duos Red band (peak) periods are much higher than during either Amber or Green (non-peak) periods.



The new structure will see charges during Red band periods lowered, and charges during Amber and Green raised, with the aim to flatten out charges.



The resulting increase or decrease in costs seen by customers will be dependent on the sites usage profile, but it is expected that sites with a flat usage profile will be hit with higher charges, whilst peak users with lower day and night usage will benefit.

Looking Forward

Non-Commodity Electricity Costs - DCP 161 - Excess Capacity Charges

From 1st April 2018, consumers will pay a penalty if they exceed their agreed capacity levels. In the West Midlands, the excess capacity charges will be twice the agreed capacity charge price.

DCP 161 - Excess Capacity Charges	1 April to 31 March 18		1 April 18 to March 19	
	Charge (pence/kVA/day)		Charge (pence/kVA/day)	
	Capacity	Exceeded Capacity	Capacity	Exceeded Capacity
West Midlands	3.44	3.44	3.68	7.58

Non-Commodity Electricity Costs – Climate Change Levy (CCL)

The Climate Change levy (CCL) Rates will continue to increase year on year. 2019 to see a large increase due to the removal of the CRC scheme, which will see the cost transferred to the CCL.

Taxable commodity	Rate from 1 April 2016	Rate from 1 April 2017	Rate from 1 April 2018	Rate from 1 April 2019
Electricity: (£ per KWh)	0.00559	0.00568	0.00583	0.00847
Natural Gas: (£ per KWh)	0.00195	0.00198	0.00203	0.00339

Looking Forward

WCC's Energy Contracts with ESPO

ESPO's Energy procurement is undertaken in accordance with a price risk strategy developed in consultation with the Governance Panel, a stakeholder group comprising of representatives from the main member authorities and other key stakeholders.

ESPO Price Risk Strategy – Pricing in Advance (PIA)

ESPO run a flexible procurement model for the supply of both gas and electricity, which requires small volumes to be bought periodically against wholesale market rates. Buying upfront at a fixed price aids budget security, but carries the risk that energy costs will be locked in when it might not be the opportune time to do so. The strategy of purchasing over a number of transactions, rather than all of the volume at once, spreads the risk over a longer period to achieve best blend of cost avoidance and cost certainty.

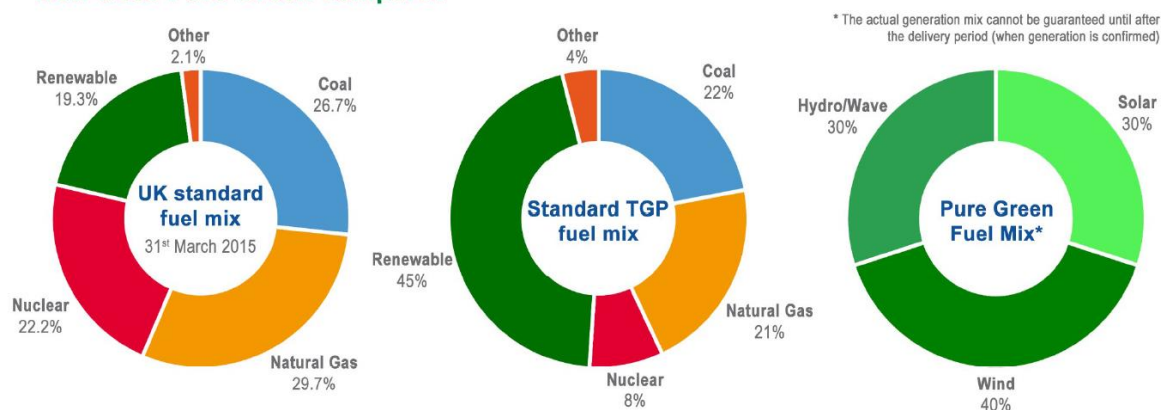
During next year, despite the wholesale price reductions secured by ESPO for the charging period, WCC expects to see prices rise in line with estimated 3rd party charge increases of between 0-5% for gas and electricity (dependent on volumes and standing charges). High demand users within the peak charging periods may see higher cost increases.

WCC's Electricity is 100% Renewable Energy from October 2016

In October 2016, WCC signed a new contract with ESPO for electricity procurement. Total Gas & Power supplies electricity for this contract.

Through this contract WCC now procures 'Pure Green Energy' for an extra 0.02p/kWh (this charge is reviewed annually and subject to change). Pure Energy comes from 100% renewable sources (solar, wind, and hydro/wave but doesn't include biomass).

How does Pure Green compare?



Appendix

Appendix 1: Combined Electricity & Gas Consumption 2016/17(Corporate Buildings Only)

UPRN	Name	kWh/m ²	£/m ²	Total CO ₂ (Tonnes)
1128	Nuneaton Training Centre	276	£10.49	15
1033	Bedworth Library & Information Centre	234	£12.27	49
1037	Warwickshire Fire & Rescue Training & Dev. Centre	237	£10.94	40
1050	Bedworth Fire Station	194	£8.17	25
1097	Centenary Business Centre	164	£14.24	214
1157	Hatters Space Community Centre	185	£8.54	45
1161	Nuneaton Library & Information Centre	161	£4.38	47
1184	Nuneaton Fire Station	268	£9.63	109
1188	The Hilary Road Centre	157	£7.79	46
1242	Kings House	187	£9.82	153
1259	Transport Depot, Units D2, D3 & D4 Greenwood Court	14	£1.46	2
1270	Eliot Park Innovation Centre	214	£15.96	320
1287	Camp Hill Education Sports & Social (CHESS)	128	£6.75	48
2017	The Ratcliffe Youth & Community Centre	227	£8.02	12
2027	Atherstone Library & Information Centre	128	£6.49	21
2036	Atherstone Fire Station	303	£11.86	34
2080	Coleshill Fire Station	210	£7.47	46
2129	Hartshill Hayes Country Park	177	£18.04	4
2143	Kingsbury Water Park	32	£3.22	28
2168	Polesworth Library & Information Centre	125	£12.71	12
2171	Polesworth Fire Station	294	£12.44	19
2214	Pooley Country Park	83	£8.45	9
2224	Coleshill Library & Information Centre	245	£12.07	14
2232	Kingsbury Water Park Outdoor Education Centre	50	£5.13	8
2233	Lower House Farm Household Waste Recycling Centre	7	£0.72	9
2239	The Arden Centre	170	£7.47	19
3037	Dunchurch Highways Sub-Depot	51	£2.66	31
3119	Hunters Lane Household Waste Recycling Centre	89	£2.01	4
3144	Rugby Fire Station	243	£8.99	75
3148	Fawsley House	167	£7.52	57
3152	The Bridge	150	£5.92	14
3205	Ryton Pools Country Park	102	£10.42	31
3225	Wolston Library & Information Centre	132	£13.46	9
3243	Oakfield Park	108	£6.49	44
3260	Sir Frank Whittle Business Centre	57	£3.05	43
3261	Rugby Register Office	420	£12.75	14
3288	Unit 5, 1 - 3 Upton Road	45	£3.14	3
4016	Alcester Fire Station	195	£9.09	23
4055	Bidford On Avon Fire Station	111	£4.93	10
4074	Fenny Compton Fire Station	137	£14.00	9
4097	Henley-In-Arden Fire Station	169	£5.24	21

UPRN	Name	kWh/m ²	£/m2	Total CO ₂ (Tonnes)
4099	Henley-In-Arden Highways Sub-Depot	115	£11.69	34
4185	Southam Fire Station	138	£14.08	10
4194	Shipston on Stour Library & Information Centre	104	£4.15	5
4199	Shipston-On-Stour Fire Station	127	£6.73	9
4204	Shipston-On-Stour Highways Sub-Depot	44	£4.45	13
4234	Stratford-Upon-Avon Library & Information Centre	147	£7.72	50
4245	Stratford-Upon-Avon Fire Station	245	£10.71	51
4255	The Saltway Centre & Stratford Family Centre	326	£10.15	50
4305	Wellesbourne Library & Information Centre	163	£6.94	10
4308	Wellesbourne Divisional Highways Depot	251	£12.34	31
4309	Wellesbourne C F M Workshops	221	£11.65	49
4367	Wellesbourne Fire Station	266	£10.76	21
4388	Stratford upon Avon Park and Ride	650	£66.24	33
4389	Winton House	204	£6.23	14
5010	Trading Standards Headquarters	173	£8.96	66
5012	Budbrooke County Highways Head Office	151	£8.47	22
5013	Budbrooke Highways Depot	542	£55.25	16
5042	Kenilworth Library & Information Centre	81	£1.82	14
5043	Cherry Orchard Household Waste Recycling Centre	0	£0.04	0
5058	Kenilworth Fire Station	304	£13.02	20
5097	Pound Lane Training Centre	151	£6.54	53
5106	Leamington STEPS - 43 Rugby Road	137	£4.40	4
5110	Lillington Library & Information Centre	159	£6.11	18
5111	Leamington Household Waste Recycling Centre	78	£6.00	22
5124	Fire & Rescue Service Headquarters	249	£11.89	246
5178	Cape Road Car Park (Front Part)	251	£25.61	0
5182	Myton Sports Ground and Pavillion	55	£5.66	5
5187	Shire Hall Complex	188	£10.84	823
5190	Former Judges House	267	£10.84	62
5196	Northgate House Conference Centre	197	£15.83	75
5197	Barrack Street Block	187	£10.82	324
5199	Premises At Montague Road	183	£6.61	284
5247	St John`s House Museum	150	£6.08	49
5248	County Museum (Market Hall)	178	£7.58	37
5252	County Record Office	267	£15.46	126
5254	Priory Bungalow	874	£21.93	13
5268	Myton Park Centre	181	£6.68	75
5293	Whitnash Library & Information Centre	105	£10.74	12
6002	Marle Hall Outdoor Education Centre	211	£8.55	98
5384-1	Saltisford Office Park 1	148	£11.06	112
5384-2	Saltisford Office Park 2	187	£14.26	109
5384-3	Saltisford Office Park 3	151	£12.33	255
4235	Burton Farm Household Waste Recycling Centre	165	£16.85	14
1095	Hammond Business Centre			
2098	Coleshill Motorway/Divisional Highways Depot	77	£7.84	74

Appendix 2 - WCC Corporate Property Display Energy Certificate Profile

Site Code	Site Name	Grade	Rating
1161	Nuneaton Library & Information Centre	B	39
4097	Henley-In-Arden Fire Station	B	50
1050	Bedworth Fire Station	C	51
5247	St John's House Museum	C	53
2027	Atherstone Library & Information Centre	C	58
3243	Oakfield Park	C	58
2080	Coleshill Fire Station	C	59
5042	Kenilworth Library & Information Centre	C	59
5136	Holly Walk House	C	59
4389	Winton House	C	60
5199	Premises At Montague Road	C	60
3152	The Bridge	C	62
2239	The Arden Centre	C	64
3148	Fawsley House	C	65
5268	Myton Park Centre	C	65
2232	Kingsbury Water Park Outdoor Education Centre	C	66
4234	Stratford-Upon-Avon Library & Information Centre	C	66
5199	Premises At Montague Road	C	69
3144	Rugby Fire Station	C	70
4245	Stratford-Upon-Avon Fire Station	C	70
5124	Fire & Rescue Service Headquarters	C	70
5252	County Record Office	C	72
5293	Whitnash Library & Information Centre	C	72
1188	The Hilary Road Centre	C	74
5110	Lillington Library & Information Centre	D	76
5384	Saltisford Office Park	D	77
5097	Pound Lane Training Centre	D	78
1242	Kings House	D	79
4004	Globe House	D	80
1033	Bedworth Library & Information Centre	D	83
1184	Nuneaton Fire Station	D	83
4255	The Saltway Centre & Stratford Family Centre	D	84
1287	Camp Hill Education Sports & Social (CHESS)	D	86
5384	Saltisford Office Park	D	88
5248	County Museum (Market Hall)	D	89
5010	Trading Standards Headquarters	E	102
1157	Hatters Space Community Centre	E	107
5187	Shire Hall Complex	E	109
5384	Saltisford Office Park	E	109
5196	Northgate House Conference Centre	E	113
5103	The Fordsfield Complex Needs Centre	E	117
1037	Warwickshire Fire & Rescue Training & Dev. Centre	E	125
1198	Ramsden Complex Needs Centre	F	142

Appendix 3 - Links

Historic Building Energy Review Reports

Similar reports for previous years can be found on the internet on the WCC Energy Performance web page:

<https://www.warwickshire.gov.uk/buildingenergyperformance>

Or from the following links:

2010/11 Building Energy Consumption Review <http://apps.warwickshire.gov.uk/api/documents/WCCC-599-14>

2011/12 Building Energy Consumption Review <http://apps.warwickshire.gov.uk/api/documents/WCCC-599-15>

2012/13 Building Energy Consumption Review
<http://apps.warwickshire.gov.uk/api/documents/WCCC-599-42>

2013/14 Building Energy Consumption Review
<https://apps.warwickshire.gov.uk/api/documents/WCCC-599-54>

2014/15 Building Energy Consumption Review
<https://apps.warwickshire.gov.uk/api/documents/WCCC-599-57>

2015/16 Building Energy Consumption Review
<https://apps.warwickshire.gov.uk/api/documents/WCCC-599-63>

These documents contain further information about energy management at WCC.

Energy Web Pages

The following energy related web pages have been maintained.

- Home > Environment > Energy

Energy Plan: <http://www.warwickshire.gov.uk/energyplan>

Energy Strategy Policy: <http://www.warwickshire.gov.uk/energystrategyandpolicy>

Building Energy Performance: <https://www.warwickshire.gov.uk/buildingenergyperformance>

Energy Resources: <http://www.warwickshire.gov.uk/schoolenergy>

