Department of Energy & Climate Change

The non-domestic National Energy Efficiency Data-Framework (ND-NEED)

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Any enquiries regarding this publication should be sent to us at [insert contact for department].

Contents

Executive summary

The National Energy Efficiency Data-Framework was set up by DECC to provide a better understanding of energy use in domestic and non-domestic buildings in Great Britain. Work on the non-domestic framework is at an exploratory stage. This publication sets out the concept of the framework, the issues found, plans for improvement, preliminary results and a proposed weighting methodology.

The following represents the first analysis of the non-domestic National Energy Efficiency Data-Framework and therefore we welcome any feedback from readers to Energyefficiency.stats@decc.gsi.gov.uk.

Introduction and Coverage

The purpose of the non-domestic National Energy Efficiency Data-Framework (ND-NEED) is to match buildings data (from the non-domestic ratings (NDR) list) to electricity and gas meter point consumption data. The non-domestic aspect of the National Energy Efficiency Data-Framework is more complicated than its domestic counterpart and therefore the coverage is poorer. In considering the preliminary results in this report it is important to note that these are experimental statistics based on incomplete data. They are not consistent with other DECC statistics.

The coverage of ND-NEED is approximately 30 per cent of non-domestic electricity consumption (as compared to all non-domestic meters from the sub-national consumption statistics). Work is currently being undertaken to improve the address matching which should improve the coverage of the non-domestic data framework.

A high level of consistency exists between the data in ND-NEED for floor space and energy consumption with data from the Display Energy Certificate programme. However, the sample analysed was small and not-representative so further work must be done to validate the dataset.

Distributional bias is also observed within ND-NEED. For both electricity and gas, the coverage of high consuming meters is lower than for smaller meters. There is also bias across building types with better coverage of shops, for example, than other major building types. ND-NEED currently has fairly poor total coverage due to low matching rates and bias. Improved address matching will improve the coverage somewhat. It is expected that biases will continue to exist within ND-NEED even with improved address matching and the weighting methodology proposed in Chapter 4 must be able to correct for these biases.

Preliminary Data Results

Although there is a lack of total coverage and a number of biases within the data, Chapter 3 presents preliminary data results. They are preliminary as they are a non-representative sample, with a number of biases and they are unweighted. The analysis is based on nearly half a million records, which represents approximately one third of all buildings in the non-domestic ratings list.

For both electricity and gas consumption, the mean electricity consumption in 2011 is approximately double the upper quartile of electricity consumption in 2011, reflecting a high level of skew in the data. This is due to there being a few very high consuming records in the data.

Over the last six years there has been a reduction in the energy consumption of the non-domestic sector seen in ND-NEED as median electricity intensity fell by 10 per cent and median gas intensity fell by 24 per cent between 2006 and 2011. This is broadly consistent with the trends observed in the Digest of the United Kingdom Energy Statistics (DUKES). The use of ND-NEED provides statistics of energy use in different building types and the analysis in Chapter 3 considers energy intensity in factories, offices, shops and warehouses, as compared to all building types, by floor area, site employment and number of sites in an organisation.

The results in Chapter 3 give a useful insight into the energy consumption of non-domestic buildings but the data is not currently comparable at a national level due to the incomplete coverage and bias.

Weighting

Chapter 4 proposes a weighting methodology (for electricity only) designed to address the incomplete coverage and bias presented in ND-NEED. The weighting should gross up to the number of buildings and the total consumption for all non-domestic meters. However, the main issue is that there is not a single dataset, which combines this information. Therefore the weighting is a two-step process, firstly to gross up to the number of buildings and secondly to gross up to total consumption.

After both stages of weighting, an estimated 91-95 per cent of electricity consumption is captured. However, higher consuming meters are still underrepresented with the weighting.

The chapter invites feedback on the proposed methodology and once improved address matching has taken place, weighting will be added to the newer version of ND-NEED to observe the coverage. Feedback should be sent to Energyefficiency.stats@decc.gsi.gov.uk by 11th July 2014

Chapter 1: Overview of the Non-domestic National Energy Efficiency Data-Framework

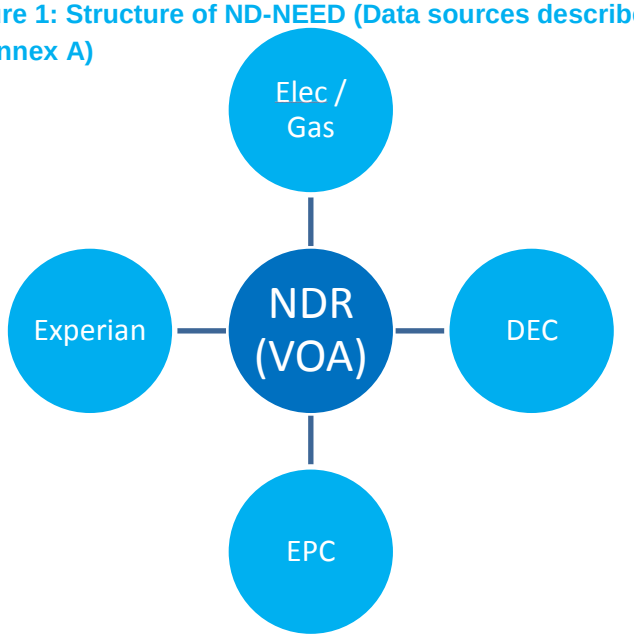
What is the National Energy Efficiency Data-Framework?

The National Energy Efficiency Data-Framework was set up by DECC to provide a better understanding of energy use and intensity in domestic and non-domestic buildings in Great Britain. Due to the coverage of the Valuation Office Agency (VOA) data that we use for the National Energy Efficiency Data-Framework, all analysis within this report relates to England and Wales only.

What is its purpose?

The purpose of the non-domestic National Energy Efficiency Data-Framework (ND-NEED) is to match buildings data (from the non-domestic ratings (NDR) list) to electricity and gas meter data, that is collected by DECC for local area analysis. Address matching is used to merge the datasets. Annex A contains a list and explanation of data sources. Business data (from Experian) and energy efficiency data such as the Display Energy Certificates (DEC) and the Energy Performance Certificates (EPC) are also matched to the buildings and meter data.

Figure 1: Structure of ND-NEED (Data sources described in Annex A)



Address Matching

Address matching of non-domestic buildings is more complicated than in the domestic sector for two reasons. Firstly, buildings are more likely to have complex addresses such as names or a number range (e.g.1-4 main street). Secondly, it is common for several businesses to occupy the same building. As a result, the data matching rates for consumption data are much lower for the non-domestic sector than the domestic sector. Chapter 2 contains an interim report on the issues of quality and bias that occur within ND-NEED. As ND-NEED is not able to provide complete coverage of non-domestic buildings, Chapter 4 presents a proposed methodology for weighting the non-domestic data to make it representative at a national level. This is presented with a set of questions to raise discussion and feedback to Energyefficiency.stats@decc.gsi.gov.uk by July 11th is requested.

How it works

The scope of ND-NEED has been defined as all rateable premises contained within the Valuation Office Agency's (VOA) NDR. These valuations take place based on the building or part of a building occupied by an organisation. In total there are 1.8 million rateable units in England & Wales, known as hereditaments. Hereditaments[1] may form part of a building or cover the entirety of a site. The matching of datasets has been done at the building level with data records aggregated to that level. This is explained in Annex A.

The NDR does not include all building types; those excluded are: places of worship, agricultural buildings, prisons and military premises. Additionally, for some building types (such as pubs), the NDR list does not have key data such as floor area.[2]

Structure of non-domestic buildings

ND-NEED relies on address matching of different datasets to Address Base (an Ordinance Survey product). The spine of ND-NEED has been defined as all rateable non-domestic buildings within England & Wales.

To create ND-NEED, address matching was performed on the datasets (see Figure 1) to the central non-domestic ratings list. The unique building references[3] are used to link the data sets allowing integration of consumption, business and programme data. However, the address matching procedure does not give complete coverage (see Chapter 2).

Current Work

Chapter 3 provides a variety of results based on the data currently available in ND-NEED. This chapter shows the different types of analysis that can be undertaken with ND-NEED and gives an insight into the level of detail that can be achieved.

Much of the current work on ND-NEED is to improve the coverage and effectiveness. Chapter 4 outlines a weighting methodology that has been produced to gross ND-NEED to the national level. The chapter also presents some preliminary results based on the methodology.

These chapters provides an insight of the potential for this data framework to inform analysis of policy, help non-domestic buildings lower their energy consumption and provide better benchmarking. The technical issues mentioned briefly on the previous page and outlined in Chapter 2 are also being addressed.

This initial work has shown that there is great potential for ND-NEED however there are a number of areas where the data can be improved, particularly data matching and coverage which, together with the proposed weighting methodology, can reduce the bias.

The value of this preliminary work is to provide an overview of what is being done and also to invite input from readers as to how this work can be improved and what would be useful to see. We welcome feedback to Energyefficiency.stats@decc.gsi.gov.uk.

[1] These *hereditaments* are referenced by their Unique Address Reference Numbers (UARNs). A hereditament is an area that is rateable for commercial valuation purposes

[2] The reason for this is that some building types, such as pubs are valued on sales, not floor area. The Valuation Office Agency collects the data we are using in ND-NEED initially to value commercial areas.

[3] The 'Unique Building References' are Unique Property Reference Numbers (UPRNs). These are linked to the UARN's and the relationship is described in Annex A.

Future Work

This report is intended to share the work that has been done and to invite comment. The next steps are to implement improved address matching within ND-NEED, which should improve the coverage of ND-NEED and reduce the bias. Following this, there will be a consideration of the weighting methodology, taking into account the feedback received. A new weighting methodology will then be implemented. Analysis will then be done on the coverage and biases of ND-NEED and whether the grossed up data, post-weighting, is nationally representative.

Applications

ND-NEED has a number of useful applications. It will provide insight into the variations of consumption and intensity of energy across different non-domestic sectors, comparable buildings and differing size and employment patterns. Furthermore, the data could be used to support a variety of projects including statistical analysis and evaluations. DECC is also undertaking a non-domestic Building Energy Efficiency Survey[4] which ND-NEED could support by providing annual consumption data and for validation purposes.

Acknowledgements

We would like to acknowledge the co-operation of the energy suppliers and others who provide the various datasets that allows us create the National Energy Efficiency Data-Framework.

[4] https://www.gov.uk/government/collections/non-domestic-buildings-energy-use-project

Chapter 2: Interim Report of Coverage

ND-NEED has good potential to provide detailed analysis of energy consumption for the non-domestic building stock. However, it also has a number of limitations and data gaps.

What proportion of buildings, meters and consumption are captured within ND-NEED?

To be of value the data framework requires successful matching of datasets, in particular to electricity and gas consumption. An assessment of coverage has been made against two populations: all non-domestic meter point data and all non-domestic buildings. The sub-national consumption statistics[5] contain all electricity and gas meters both domestic and non-domestic. A comparison can be made between the numbers of meters or amount of consumption captured in ND-NEED against the number of non-domestic meters and amount of non-domestic consumption within the sub-national consumption statistics[6]. Table 1a shows the coverage of ND-NEED as compared to all non-domestic meters.

The other population is all non-domestic buildings in the non-domestic ratings list (NDR).[7] There are 1.5 million buildings in the NDR and a comparison can be made of how many of these have at least one electricity meter or at least one gas meter. Table 1b shows the proportion of non-domestic buildings in ND-NEED with at least one meter.

Table 1a: Proportion of meters and consumption covered in ND-NEED compared to all non-domestic meters, 2011.

Electricity Meters	30%
Electricity Consumption	23%
Gas Meters	37%
Gas Consumption	23%

Table 1b: Proportion of non-domestic buildings with at least one meter (or with business data) in ND-NEED, 2011.

Electricity Meters	36%
Electricity Consumption	n/a
Gas Meters	21%
Gas Consumption	n/a
Business Data	37%

[5] https://www.gov.uk/government/collections/sub-national-electricity-consumption-data

[6] The sub-national statistics uses various thresholds (and additional tests) to determine if a meter is domestic or non-domestic. Details can be found in the methodology booklet: https://www.gov.uk/government/publications/regional-energy-data-guidance-note

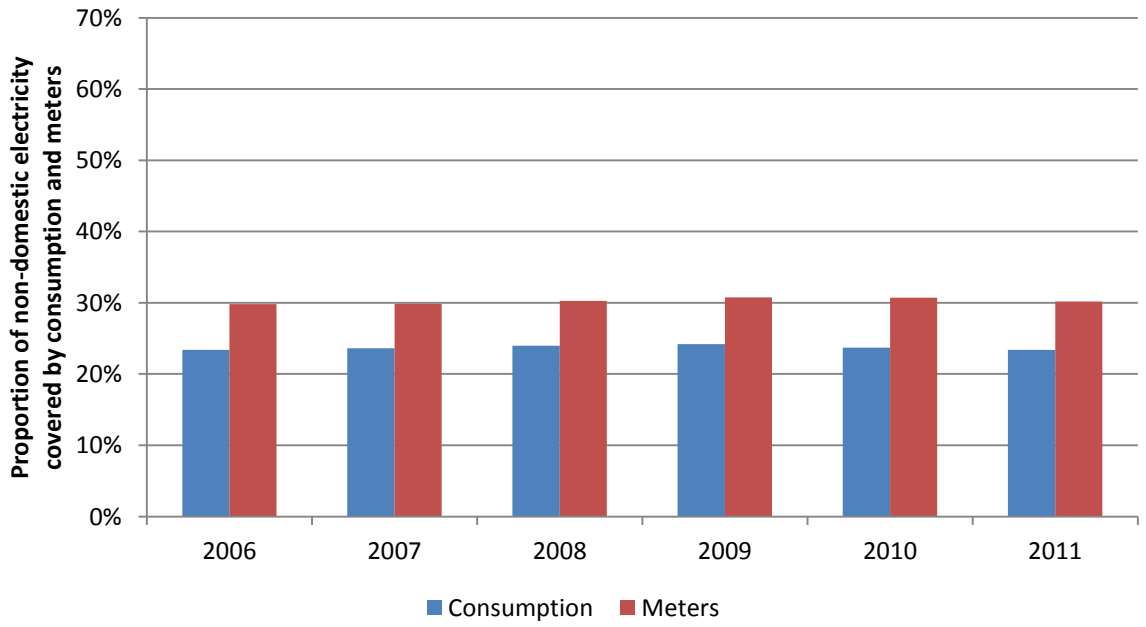
[7] This is not all non-domestic buildings as the coverage of the non-domestic ratings list is not complete.

Table 1b shows that 36 per cent of non-domestic buildings have at least one matched electricity meter, whilst Table 1a shows that only 30 per cent of electricity meters are covered in ND-NEED. This is because many buildings will have multiple meters, not all of which will be covered in ND-NEED.

The comparison for gas meters is more difficult as we do not know what proportion of all non-domestic buildings are heated by gas. Not all buildings will have gas meters as there are many other methods of heating a building. It is therefore feasible that 21 per cent of buildings would account for 37 per cent of gas meters. On the other hand it can be assumed that virtually all non-domestic buildings would have an electricity supply. In 2011, less non-domestic buildings had a matched gas meter (21 per cent) than electricity meter (36 per cent) and part of this difference may be due to not all non-domestic buildings having gas meters.

Coverage of ND-NEED is consistent between years. Figure 2 shows the proportion of all non-domestic electricity meters and consumption covered in ND-NEED between 2006 and 2011.

Figure 2: Proportion of non-domestic electricity consumption and meters recorded in sub-national consumption statistics captured in ND-NEED



The match rate varies by building type when compared to the 1.5 million buildings from the NDR. For hotels and holiday homes, 53 per cent of buildings have at least one matched electricity meter, whereas for offices just 24 per cent have at least one matched electricity meter showing bias across building types.

Conclusion

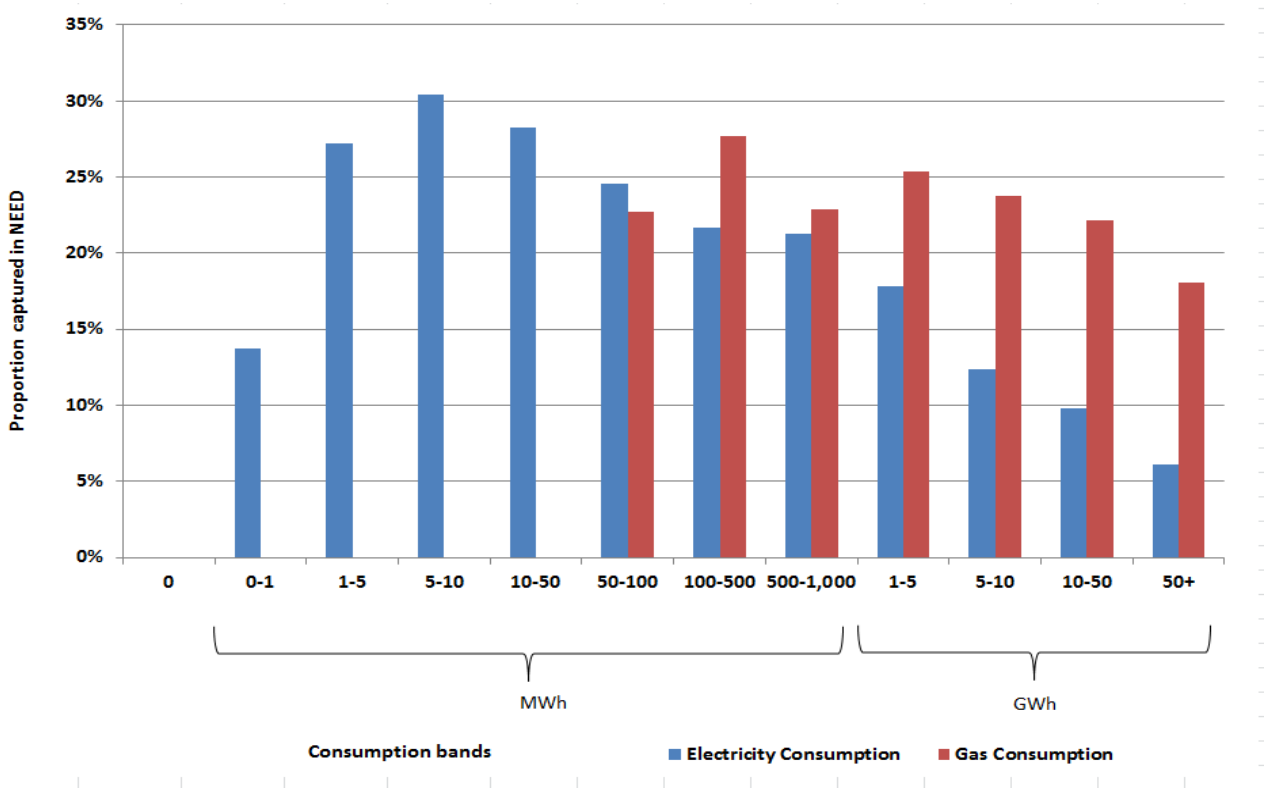
When the coverage of ND-NEED is compared to all non-domestic meters (from the sub-national consumption statistics) and total non-domestic buildings from the NDR, the coverage is between 20 per cent and 40 per cent depending on the metric. Work is currently on-going to improve the address matching within ND-NEED and if successful, this will improve the coverage of ND-NEED from its current levels. The current ND-NEED dataset contains only 488,000 records as buildings that cannot be matched are excluded from the dataset used for analysis.

Does distributional bias exist in the data?

To test for distributional bias the match rates are compared by consumption band. Electricity meters consuming between 5 and 10 MWh a year (equivalent to large domestic use) achieved the highest match rate of 31 per cent. Figure 3 shows a clear trend that the match rate decreases for large consuming meters. For gas, there is less variation in match rates but they are still slightly lower for large consuming meters.

For this analysis, the ND-NEED data was filtered to include only non-domestic electricity profile classes 3-9 and gas data above 72,300 kWh so that a comparison could be made against the sub-national consumption data.

Figure 3: Proportion of metered consumption captured in ND-NEED as a proportion of the sub-national consumption statistics by consumption Bands for non-domestic consumption.



In regards to profile class[8], profile classes 8 and 9 are under-represented in ND-NEED compared to profile classes 3 to 7 when comparing against all non-domestic consumption data. Profile classes 8 and 9 typically cover larger users of electricity and this is consistent with Figure 3 that shows lower coverage for high consuming meters. A reason for this may be that high consuming meters are more likely to be associated with sites with complex address structures. Complex address structures are more difficult to match into ND-NEED through address matching and this could be one of the reasons that there is poorer coverage of high consuming meters and buildings.

[8] Profile class is a number reflecting the meter type. Non-domestic meters are types 3-9 and typically, the higher the profile number, the higher consumption is expected to be observed. Profile 9 represents half hourly meters.

Analysis was undertaken on building type coverage by floor area for the largest building types as seen in Table 2. The share of buildings matched into ND-NEED was compared per building type and floor area band. Shops are well represented but offices, factories and warehouses[9] are not as well represented. The larger floor areas are better represented than smaller floor areas for factories and offices which is surprising given the poorer coverage of large consuming meters seen in Figure 3.

Table 2: Proportion of properties in ND-NEED by floor area band.

Building Type	Floor Area (m^2)	Number in VOA (NDR)	Number in ND-NEED	%
Factories	1-1,000	174,100	53,500	31%
	1,000-10,000	22,200	6,900	31%
	10,000+	2,100	700	36%
	Total	198,400	61,100	31%
Offices	1-1,000	234,800	56,200	24%
	1,000-10,000	10,600	2,900	27%
	10,000+	600	200	28%
	Total	245,900	59,200	24%
Shops	1-1,000	459,500	226,300	49%
	1,000-10,000	11,600	3,800	33%
	10,000+	400	200	42%
	Total	471,600	230,300	49%
Warehouses	1-1,000	131,300	35,400	27%
	1,000-10,000	27,600	7,100	26%
	10,000+	1,900	500	24%
	Total	160,800	43,000	27%
Other including non-buildings	Total	453,900	94,000	21%
Total	Total	1,530,600	488,000	37%

Conclusion

Distributional bias is observed within ND-NEED. For both electricity and gas, the coverage of consumption from high consuming meters is lower than for smaller meters. This bias is less notable in gas.

There is also bias across different building types with the coverage of shops being almost 50 per cent but the coverage of factories, offices and warehouses being closer to 30 per cent. Improved address matching should improve these rates but is unlikely to remove all the bias.

[9] Shops, offices, factories and warehouses are the biggest building types.

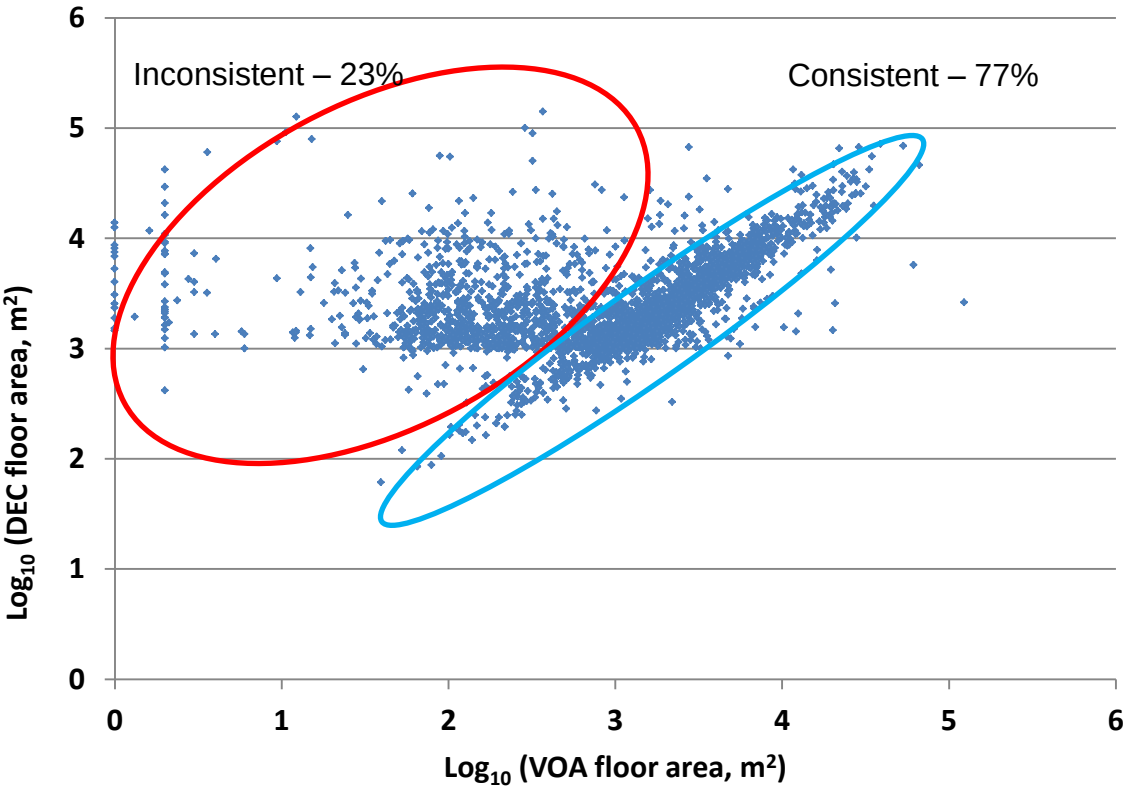
Is the data consistent with similar datasets?

To validate the data, matched comparisons were made with the Display Energy Certificate (DEC) data, held by DECC, that was also matched into NEED. Six thousand DEC records were matched into NEED. DECs are required for public buildings over 1,000 m^2 and are therefore not a representative sample of non-domestic buildings. Although DECs are only required for buildings over 1,000 m^2, many smaller buildings have DEC's. Due to the small sample size, no subsector analysis was undertaken.

A comparison was done using floor area between the VOA data (which is used as the primary floor area variable in ND-NEED) and the DEC data, see Figure 4[10]. Consistency was defined as the floor area from the DEC being 75-125 per cent of the floor area as seen in the VOA data. For floor area, there was consistency in 77 per cent of cases. In the 23 per cent that were inconsistent, the DEC generally overestimated floor area compared to the VOA. This could be due to incorrect/incomplete aggregation of the VOA sub-building, an incorrect match with the DEC or different measures of floor area.

Analysis was also done for consistency of electricity and gas consumption. Consistency was defined as the consumption from the DEC being 75-125 per cent of the consumption seen in ND-NEED. For both electricity and gas consumption a very high level of consistency was found between the ND-NEED consumption data and the DEC data. Consistency was found in 98 per cent of data points for electricity consumption and 94 per cent of data points for gas consumption.

Figure 4: Comparing DEC to VOA floor area for properties in ND-NEED.



[10] Analysis only accepts good matches which leave 3.3 thousand properties. The plotted points have been logarithmically transformed for display purposes.

Conclusion

In conclusion, a high level of consistency was observed between the ND-NEED data and the DEC data. However, the sample analysed was small and non-representative of all non-domestic properties, therefore further work on consistency is required. Further analysis should be done on other non-domestic datasets to observe if the inconsistencies are due to the DEC data or the ND-NEED data.

Negative values, large values and consistency of values

ND-NEED contains a small number of electricity records with negative values. This occurs when a previous year's consumption was overestimated. In 2011, the total negative consumption present was -30 GWh. Furthermore, there are a small number of electricity records with zero values. It is possible that these are genuine readings and that these buildings are unoccupied. Finally, there are a number of gas and electricity meter readings (relatively small in number) where a good quality match to an address has been made but the consumption value is null, which indicates an issue with the raw consumption data. 5 per cent of meters matched into ND-NEED had negative, zero or null consumption in 2011. These records are kept in ND-NEED for completeness but for the analysis in Chapter 3, these records are omitted.

The consistency of consumption over time was also examined. Between 2010 and 2011, 85 per cent of buildings in ND-NEED had electricity consumption between 50 and 200 per cent of the previous year and 95 per cent had electricity consumption that was between 10 and 1000 per cent of the previous year. The remaining 5 per cent of buildings had a range of different values, with around 1.5 per cent of these cases being consumption of 0-0.1 per cent of the previous year which could indicate a zero value in the second year. The yearly change between 2006 and 2011 is shown in Table 3.

For the years of 2007-2011 an analysis of how many of these years a "valid" change took place was done. A valid change refers to consumption that is between 75-125 per cent [11] of the previous year Less than 8 per cent of electricity meters and less than 3 per cent of gas meters had no valid changes. For gas 30 per cent of matched meters have a valid change every year and for electricity 22 per cent have a valid change every year. Currently, all records are included in ND-NEED regardless of the number of valid changes. Further analysis could be done on the impact of the "non-valid" changes.

Table 3: Annual change in Electricity and Gas consumption (A figure of 1.00 implies no change from year to year, 0.90 would be a 10 per cent reduction)

Electricity	N	10th Pctl	Lower Quartile	Median	Upper Quartile	90th Pctl
06-07 change	459,000	0.53	0.84	0.99	1.14	1.57
07-08 change	458,000	0.47	0.79	0.96	1.10	1.53
08-09 change	460,000	0.49	0.83	0.99	1.15	1.58
09-10 change	462,000	0.51	0.84	1.00	1.16	1.60
10-11 change	459,000	0.50	0.82	0.99	1.13	1.55
Gas	**N**	**10th Pctl**	**Lower Quartile**	**Median**	**Upper Quartile**	**90th Pctl**
06-07 change	197,000	0.64	0.86	1.00	1.06	1.30
07-08 change	200,000	0.63	0.87	1.00	1.06	1.30
08-09 change	200,000	0.58	0.81	0.95	1.00	1.24
09-10 change	198,000	0.65	0.89	1.00	1.10	1.39
10-11 change	196,000	0.59	0.82	0.97	1.06	1.30

[11] 75-125% of the previous year's value was arbitrarily deemed as an expected change in consumption.

A small number of high consuming buildings account for much of the consumption in ND-NEED. Less than 1 per cent of matched buildings consumed over 1 GWh of electricity in 2011 and this accounted for 48 per cent of electricity consumption captured in ND-NEED for that year. Around 2 per cent of buildings consumed over 1 GWh of gas and this accounted for 54 per cent of gas consumption captured in ND-NEED for 2011. This could be an issue going forward as the coverage of large consuming buildings is lower than other types as observed earlier in this chapter.

Some very high consuming half-hourly electricity meters are not included in DECC's meter point consumption data and therefore not in this analysis. Also, the VOA values some large industrial sites separately to the NDR and therefore these are not included within the data framework. The overlap between the missing consumption data and the missing industrial site records is not currently known.

Conclusion

The majority of consumption records in ND-NEED are valid within the year and consistent between years. However, only 22-30 per cent have "valid" changes every year from 2006 to 2011 and further work will look at the reasons for these non-valid changes. Another issue is the large amount of consumption accounted for by high consuming properties, considering that ND-NEED is poor at capturing high consuming meters. Chapter 4 of this report attempts to address some of these biases and poor coverage through weighting.

Table 4: Summary for consumption and yearly change bias.

Metric	%
Meters matched into ND-NEED with correct consumption (i.e. not negative, null or zero)	95
Meters with consumption between 50-200% of the previous year.	95
Percentage of electricity meters with valid yearly changes 2007-2011	0 valid changes – 7% 1+ valid changes – 93% 2+ valid changes – 80% 3+ valid changes – 63% 4+ valid changes – 42% 5 valid changes – 22%
Percentage of gas meters with valid yearly changes 2007-2011	0 valid changes – 2% 1+ valid changes – 98% 2+ valid changes – 92% 3+ valid changes – 78% 4+ valid changes – 56% 5 valid changes – 31%
Percentage of electricity meters with >1 GWh consumption and % of total ND-NEED electricity consumption (2011)	1% of electricity meters 48% of 2011 consumption
Percentage of gas meters with >1 GWh consumption and % of total ND-NEED gas consumption (2011)	2% of gas meters 54% of 2011 consumption

Conclusion of Interim Report of Coverage

ND-NEED currently has fairly poor total coverage compared to all non-domestic meters (from the sub-national consumption statistics) and the building population (NDR) due to low matching rates and bias. Improved address matching will increase the coverage but not completely. It is expected that biases will continue to exist within ND-NEED even with improved address matching and the weighting methodology proposed in Chapter 4 must be able to account for these biases.

Chapter 3: Preliminary Data Results

This chapter contains preliminary analysis of non-domestic buildings captured within ND-NEED.

These results should be considered preliminary due to the non-representative sample used and because the data are unweighted and hence a number of biases are present as identified in the previous chapter. Only building records which have matched electricity consumption data for at least one year (2006-2011) are included in this chapter, this amounts to around half a million buildings.[12] As a result of this filter, 31 per cent of buildings (from the non-domestic ratings list (NDR)) have been included.[13] Once improved matching of ND-NEED has been done and the weighting methodology has been implemented, more reliable results will be available which may differ significantly from these preliminary results.

Building types used within this chapter are based on the Valuation Office Agency (VOA) classifications from the NDR descriptions and may be different to definitions in other DECC publications.

Table 5 and 7 present a summary of non-domestic energy consumption and intensity data from 2011. For both electricity and gas consumption, the mean is approximately double the upper quartile reflecting the high skew in the data. Table 6 presents a summary of the domestic energy consumption statistics. Although the non-domestic electricity consumption is much higher throughout, the lower quartiles for gas are very similar for domestic and non-domestic buildings in 2011. This is probably due to small non-domestic properties, many of which would open just during normal waking hours. The non-domestic median and upper quartile are much higher than their domestic counterparts.

Figure 5 shows the distribution for the largest building types. The standard deviation is also very large indicating the varied nature of the data. Within ND-NEED, many properties consume over 20 GWh of electricity or gas per year influencing the distribution and the variance.

As the mean is higher than 90 per cent of the distribution, the remainder of this chapter will use the median which is less influenced by outliers

Gas data throughout this report has been temperature adjusted.

Table 5: Electricity and gas consumption in ND-NEED, England and Wales, 2011

	kWh					
	Observations	Mean	Standard deviation	Lower quartile	Median	Upper quartile
Electricity	473,000	57,800	613,000	4,600	12,000	27,900
Gas	196,000	85,000	896,000	8,500	20,000	47,900

[12] Data used in this annex has been observed to have some bias, see Chapter 2. The data is currently un-weighted but there are proposals for future weighting, see Chapter 4.

[13] 250 of the excluded records had gas consumption for at least one year but not electricity consumption. ND-NEED contains 488,000 good matches for consumption between 2004 and 2011. The data for 2004 and 2005 is not considered valid and therefore not used in the current analysis. Only 473,000 of records have electricity consumption for at least one year between 2006-2011. This is why there is a difference in numbers between Chapter 2 and Chapter 3.

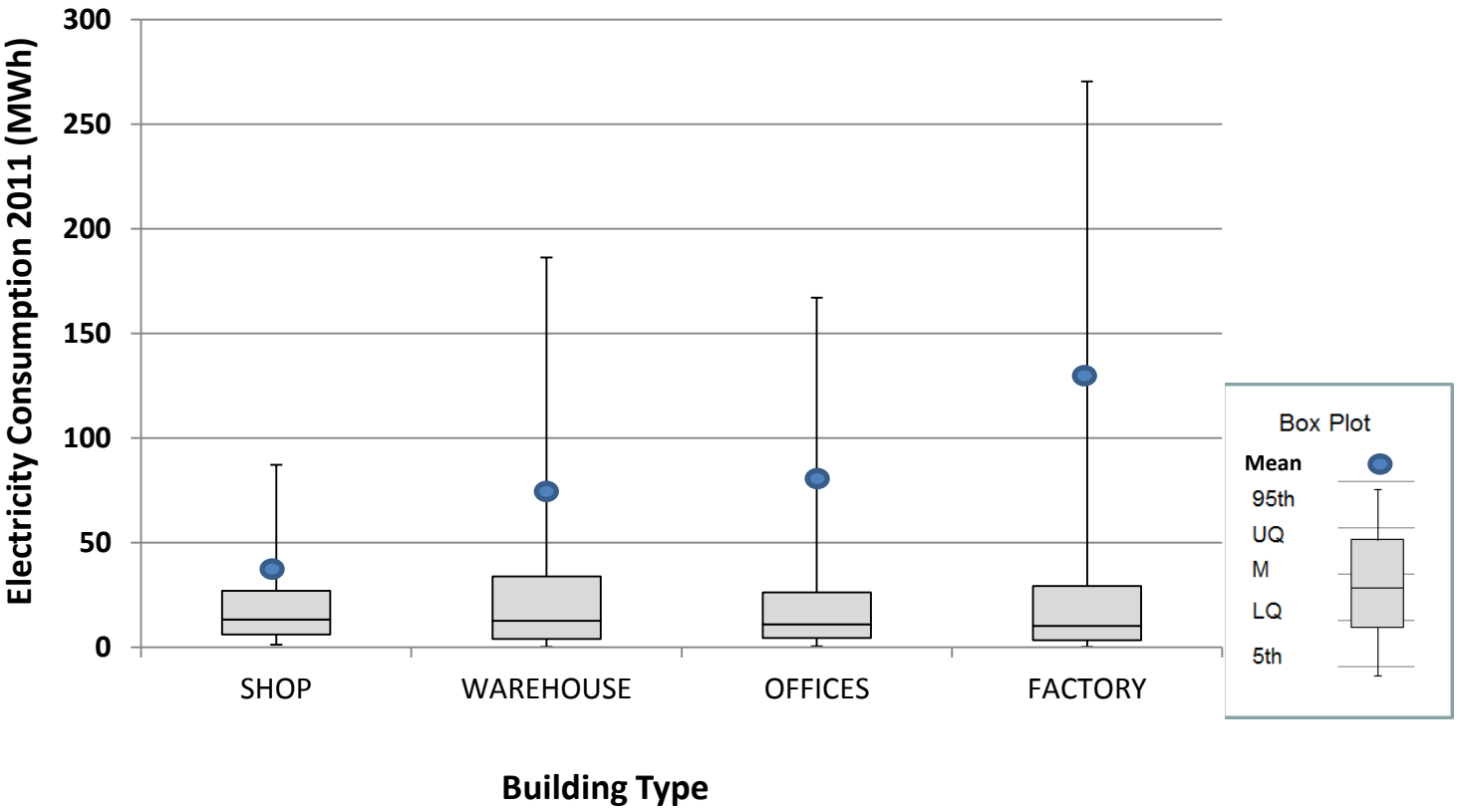
Table 6: Electricity and gas consumption in domestic NEED, England and Wales, 2011[14]

	kWh					
	Observations	Mean	Standard deviation	Lower quartile	Median	Upper quartile
Electricity	3,528,760	4.200	3,000	2,200	3,400	5,200
Gas	2,909,210	14,100	7,800	8,800	12,900	18,000

Table 7: Electricity and gas consumption per m^2 in ND-NEED, England and Wales, 2011

	kWh/m^2					
	Observations	Mean	Standard deviation	Lower quartile	Median	Upper quartile
Electricity Intensity	473,000	552	61,400	44	116	259
Gas Intensity	196,000	776	32,500	64	160	411

Figure 5: Distribution of 2011 electricity consumption by building type



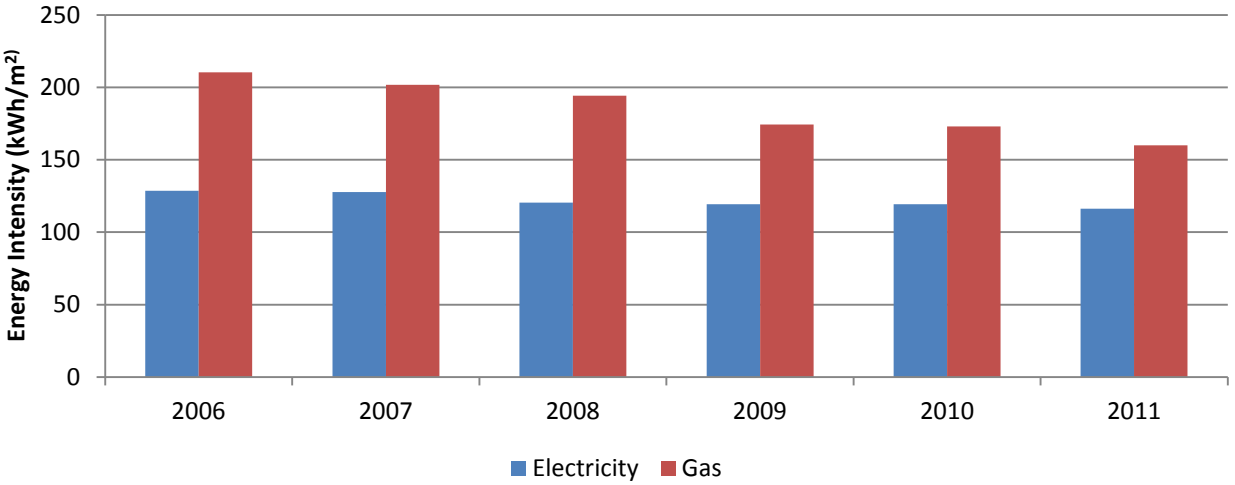
[14] https://www.gov.uk/government/publications/national-energy-efficiency-data-framework-need-report-summary-of-analysis-2013-part-1

Energy Consumption

In the following analysis, the metric used is Energy Intensity (kWh/m^2). However, floor area is only available at one data point and therefore it is a fixed value. Therefore, trends presented are actually changes in consumption.

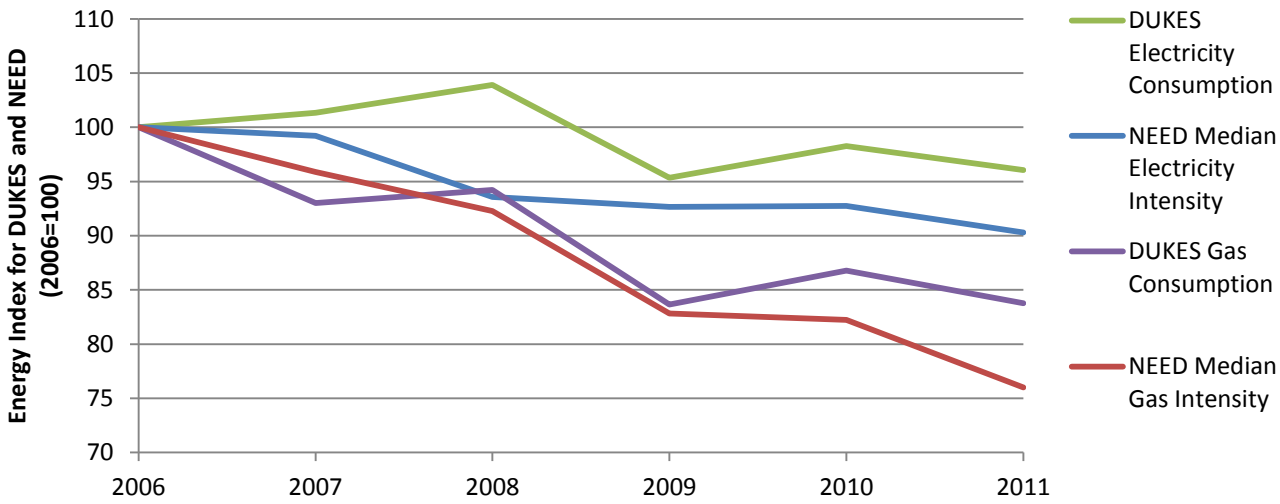
Over the last six years there has been a reduction in the energy consumption of the non-domestic sector as shown in Figure 6 Figure 6 shows the improvement in energy use, indicated by the decreasing trend of consumption from 2006 to 2011. This reduction was larger for gas which decreased by 24 per cent from 2006 to 2011 compared to electricity which decreased 10 per cent over the same time period.

Figure 6: Median electricity and gas intensity for non-domestic buildings, 2006-2011, England and Wales.



The trend seen in the ND-NEED data is broadly similar to the trends observed in the UK National Statistics, from the Digest of the United Kingdom Energy Statistics (DUKES), as seen in Figure 7. However, in 2008 the trend for electricity diverges with DUKES showing an increase in consumption and ND-NEED showing a decrease.

Figure 7: Indexed comparison of median electricity and gas intensity from ND-NEED to total electricity and gas consumption from DUKES in the non-domestic sector, 2006-2011[15]



[15] DUKES covers the UK, whilst NEED covers England and Wales. The DUKES figures are taken from Table 5.3 of DUKES when the Industry, Commercial and Public Sector are added.

Changes in energy consumption may differ across different building types. ND-NEED provides the opportunity to explore building types of interest to investigate how these are changing. For the analysis, the four biggest building types in ND-NEED have been chosen to display differences in consumption. These are factories, offices, shops and warehouses. When a total figure is presented, this includes all building types including those outside the four largest categories. This also includes non-buildings such as advertising boards, beach huts and caravan parks. Table 8 on page 24 displays the sample size of these building types in ND-NEED. There are more than three times as many shops in ND-NEED as any of the other building types and therefore shops may have a strong influence on the median of all building types.

Figure 8 displays the change in electricity consumption of the four main building types. The changes in electricity consumption by building type are similar to the overall change observed by all building types.

Electricity consumption of offices and factories fell by 11 per cent between 2006 and 2011, whilst it fell 9 and 7 per cent respectively for shops and warehouses.

Figure 8: Median electricity intensity for non-domestic buildings by building type, 2006-2011, England and Wales.

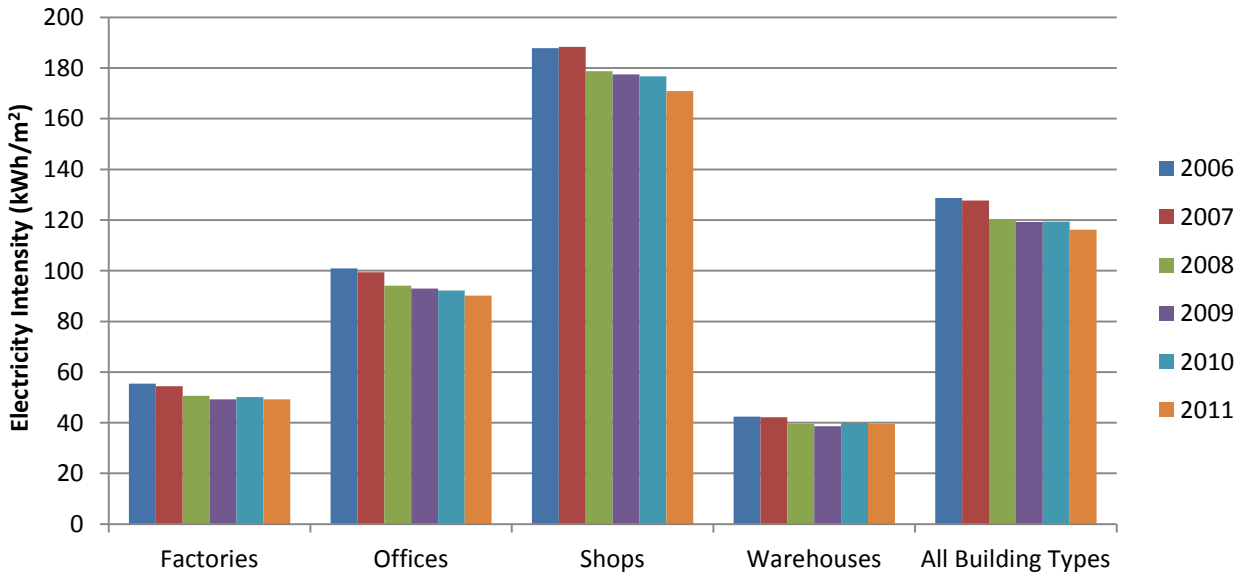
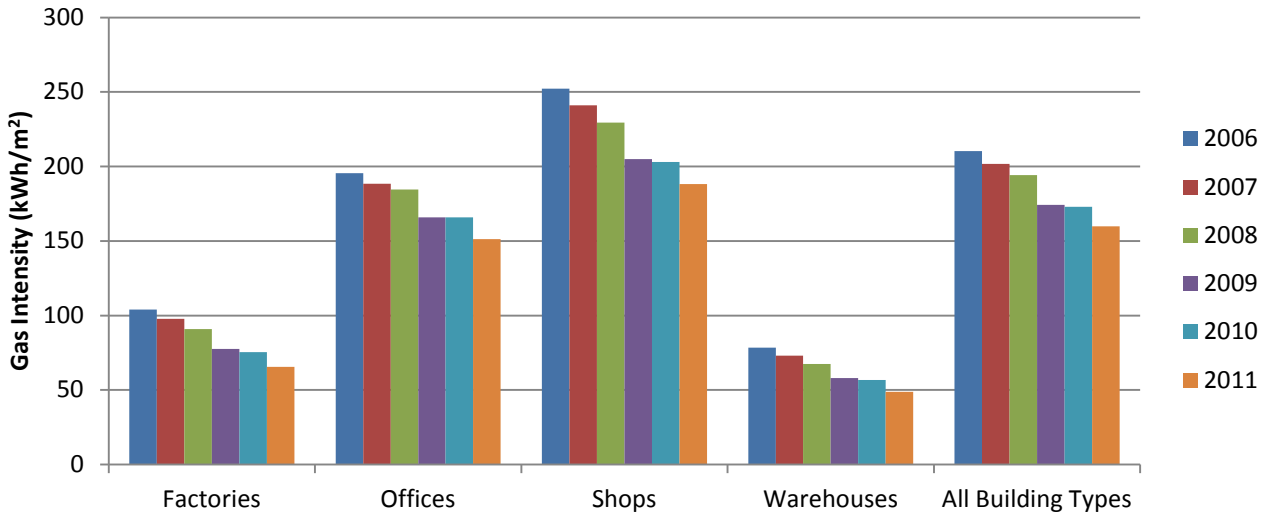


Figure 9 shows changes in gas consumption across building types. The chart shows large reductions in gas consumption over the 6 years. Gas consumption for factories and warehouses fell 37 per cent between 2006 and 2011. Gas consumption for shops and offices fell 25 and 22 per cent respectively.

Figure 9: Median gas intensity for non-domestic buildings by building type, 2006-2011, England and Wales.



Floor Space

One of the key determinants of buildings energy consumption is its floor area. Table 8 shows the frequency of a building of each floor space by building type.[16,17]

Table 8: Frequencies of each building type by floor area bandings.[18]

Building type	Floor Area (m^2)							
	Missing	0-49	50-99	100-249	250-999	1,000-4,999	5,000+	Total
Factories	490	5,160	10,350	18,400	16,890	5,760	1,500	58,550
Offices	540	10,440	14,000	18,620	10,650	2,400	420	57,070
Shops	3,190	60,010	84,720	54,710	17,550	2,960	690	223,830
Warehouses	230	2,270	4,470	11,070	15,730	5,940	1,140	40,850
Other including non-buildings	480	28,310	11,970	23,660	20,220	7,340	1,260	93,240
Total	4,930	106,190	125,510	126,460	81,040	24,400	5,010	473,540

[16] Building types are based on the NDR list of 35 building types.

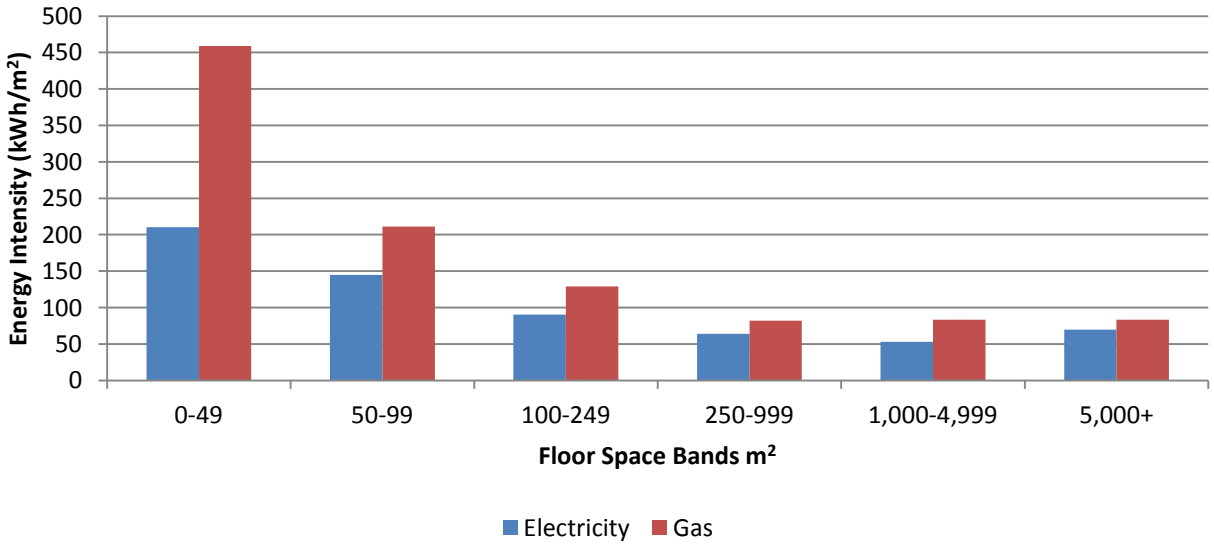
[17] The number of records used in the Chapter 3 analysis is lower than that in Chapter 2. Please see page 20 for an explanation.

[18] Figures are rounded to the nearest 10. Numbers may not add due to rounding.

Energy Intensity by Floor Space

Figure 10 displays the difference in median electricity intensity and gas intensity for all non-domestic buildings within ND-NEED against floor area. Hotels, hostels, pubs and clubs have all been excluded from this section as the floor area estimates made of these building types in the NDR are not consistent with the other building types. The median gas intensity for a building under 50 m^2 is 460 kWh/m^2. This is twice the intensity of buildings with a floor space of 50-99m^2 and four times the intensity of buildings over 5,000 m^2. The median electricity intensity for buildings under 50m^2 is 210 kWh/m^2 which is over three times higher than for buildings of over 5,000 m^2, although intensity is lower for buildings between 1,000 m^2 and 4,999 m^2 than for those over 5,000 m^2.

Figure 10: Median electricity and gas intensity in non-domestic buildings by floor area space, England and Wales, 2011.

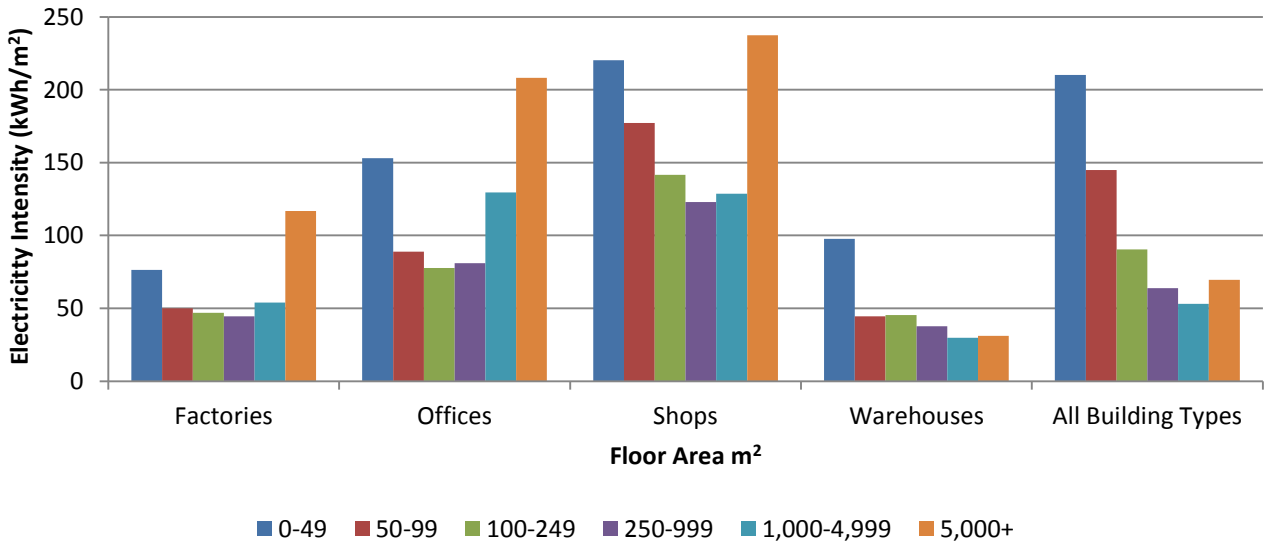


For both gas and electricity intensity there is an effect observed where the smallest and largest floor spaces have the greatest intensities within the building types. The external area of a building is very important for heat loss as smaller buildings will tend to have larger heat loss rates compared to larger ones. Furthermore once buildings get beyond a certain floor area, natural ventilation is no longer effective and mechanical ventilation is needed. For very large buildings, you often need very powerful technology for heating and cooling, regardless of the activity. Medium sized buildings can often fall between these extremes.

These differences in energy intensity can be examined further by building type. Figure 11 displays electricity intensity over different floor area bands. The breakdown by building type shows some different patterns to all non-domestic buildings together.

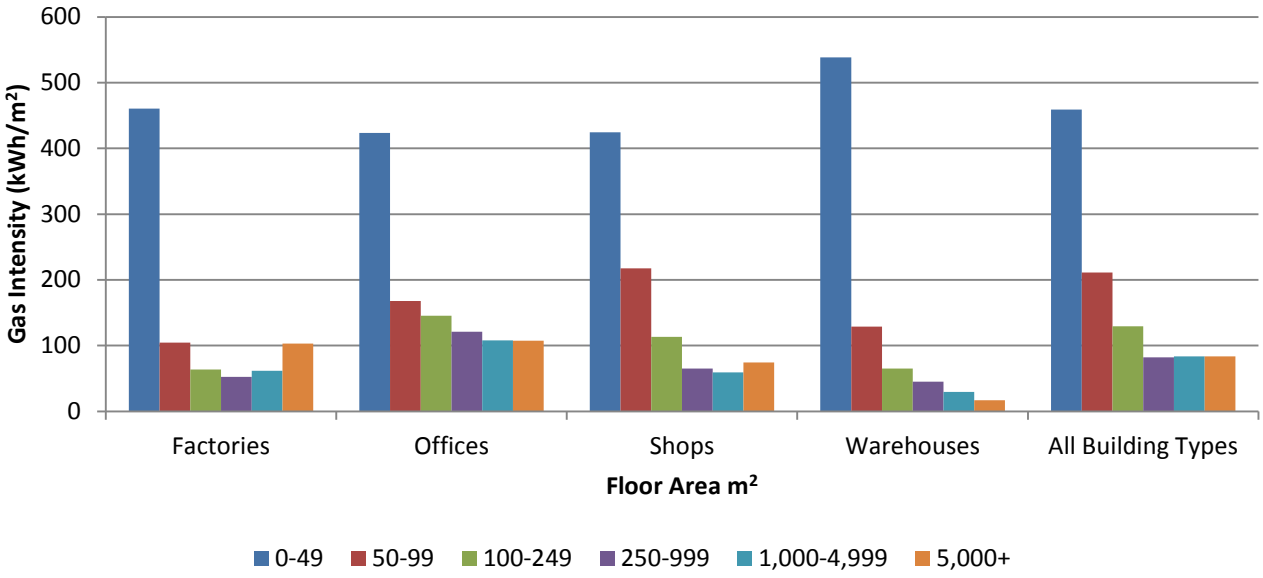
Shops, factories and offices all initially decrease their electricity intensity as floor area increases. However, in the largest buildings, electricity intensity increases quickly and for the three aforementioned building types, electricity intensity is higher in very large buildings than small buildings. On the other hand, warehouses decrease intensity as their floor size increases; warehouses also have the lowest overall electricity intensity. The trend of warehouses is unlikely to have strongly influenced total gas intensity as warehouses are a small proportion of the very small and very large floor bands. The trend of the smallest and largest floor areas having the largest energy intensity does not occur in many of the other building types. However, factories, offices and shops account for over 50 per cent of the 5,000+ m^2 buildings and this influence can be seen in the all building types trend.

Figure 11: Median electricity intensity by building type and by floor area space, England and Wales, 2011.[19]



The pattern for gas intensity is different. Figure 12 displays gas intensity over different floor area bands by building type. The observed building types follow similar trends to all building types. Similar to electricity intensity, there is an increase in gas intensity in the largest floor area band for factories and shops but unlike electricity, this is not observed for shops.

Figure 12: Median gas intensity by building type and by floor area space, England and Wales, 2011.[20]



[19] All samples are 400+

[20] All samples are 250+

Energy Intensity by Site Employment

Another key factor determining the energy use of a building is the number of employees. It should be noted that depending on the type of business activity the share of employees present at one time will vary.

Estimates of site or company employment are provided in the Experian data (see Annex A). It has only been possible to match around 65 per cent of records to this and therefore the analysis of employment is based on a smaller sample of 305,000 and contains some bias across building types. The following analysis is based on site employment (e.g. the number of employees working in a particular warehouse).

Figure 13 shows different energy intensities across the sector building types when compared to all building types. Warehouses and factories, to some extent, are more likely to be occupied for 24 hours compared to shops and offices. For each building type, electricity intensity increases as the employee numbers band increases. However, for all building types there is a decrease in electricity intensity from 1-4 employees to 5-24 and 25-99 employees. The trend then reverses for 100+ employees. Further analysis could identify what is driving the decreasing energy intensity over the first three size bands.

Figure 13: Median electricity intensity by building type and by employee numbers, England and Wales, 2011.

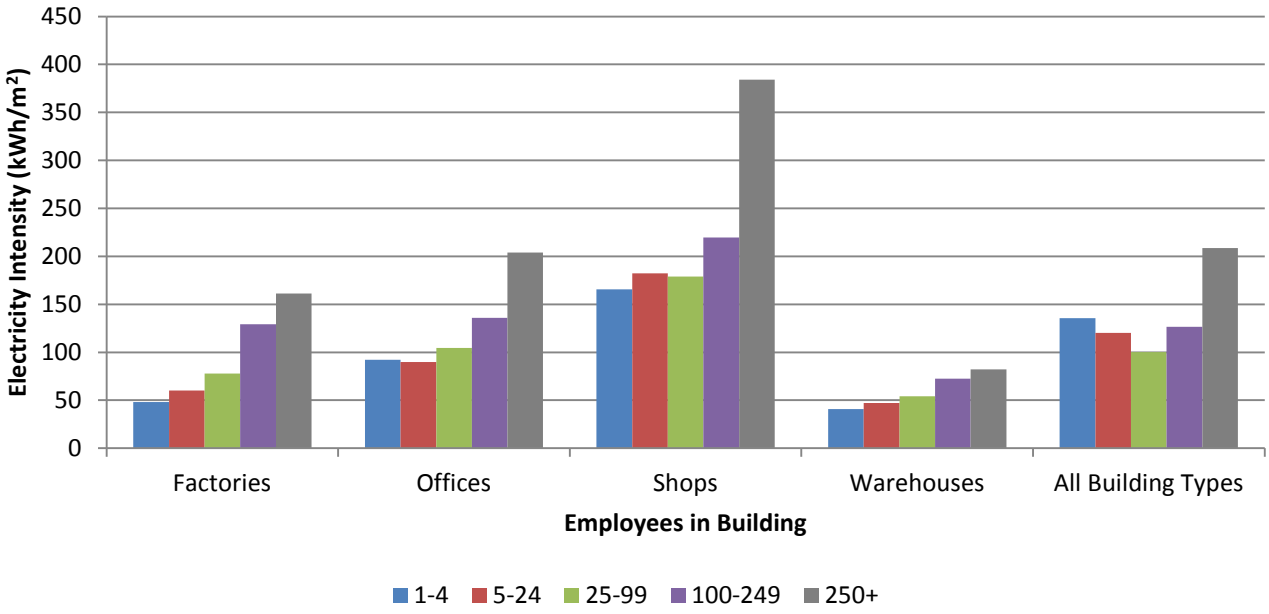
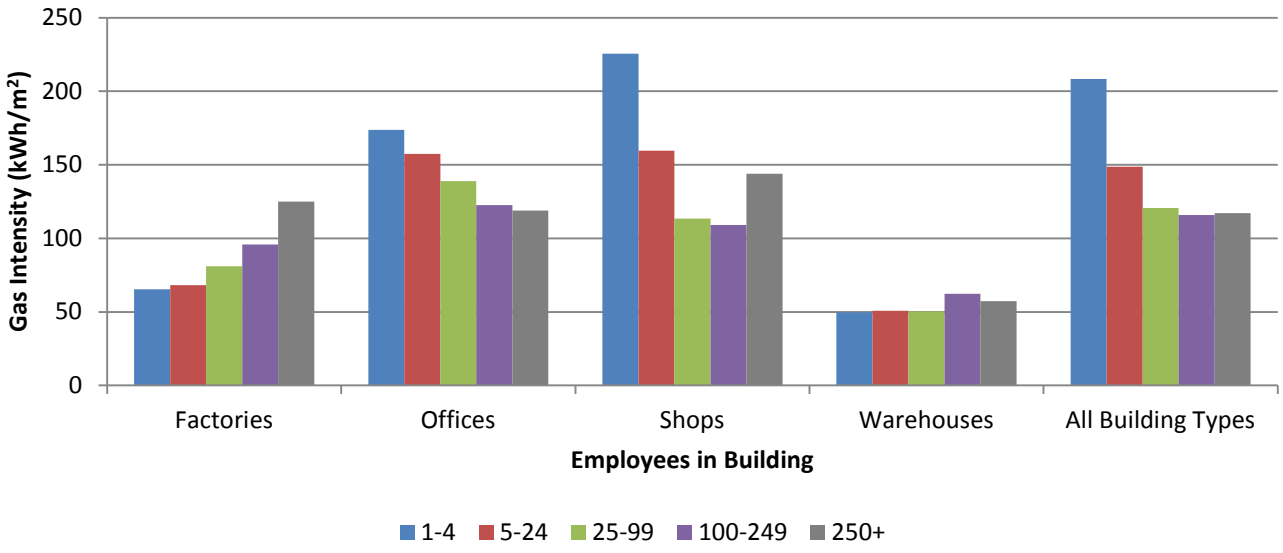


Figure 14 shows different energy intensities across different building types for gas intensity. For factories, gas intensity increases as employee number increases. Shops and offices both decrease gas intensity as their employee number increases, which is consistent with all building types. For shops, there is an increase in gas intensity in the sites with over 250 employees. Further analysis shows that the shops in this band are primarily department stores and have much higher gas consumption than the rest of the building type.

Figure 14: Median gas intensity by building type and by employee numbers, England and Wales, 2011.



Energy Intensity by number of sites in organisation

The site count of a business is the number of total sites that the organisation owns. For example, a retail chain may own hundreds of shops. The site count gives an insight into the size of the business itself as opposed to the individual building and how this may affect intensity. This allows analysis of whether small and big chains (or organisations) have different energy patterns to lone sites.

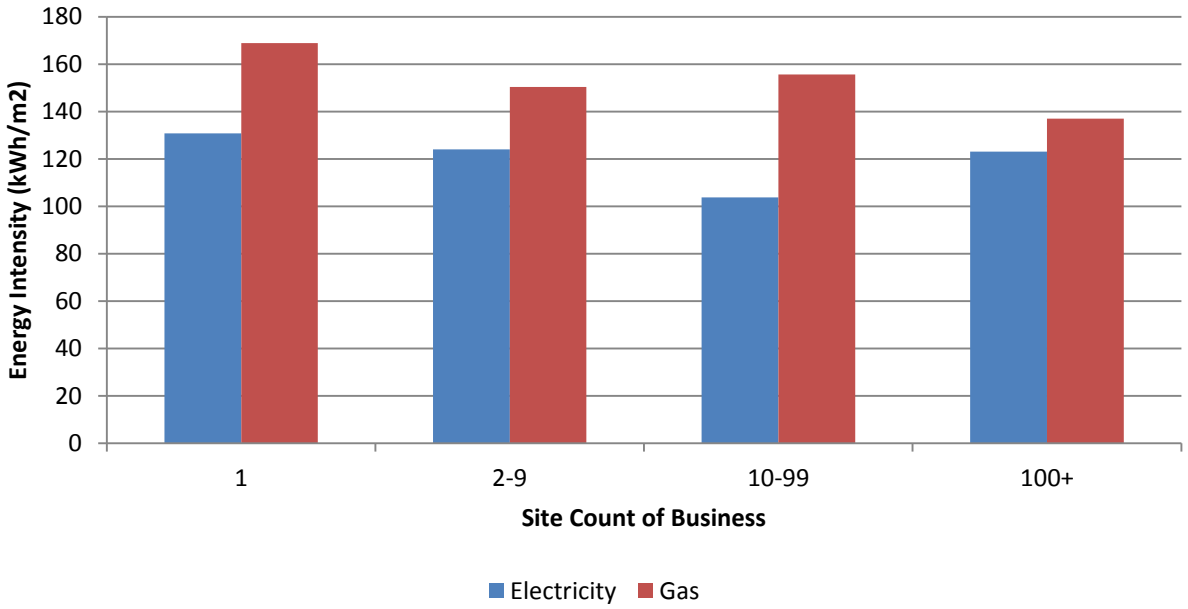
Table 9 shows the number of buildings that have each site count. As the number with a site count of over 100+ is so low, some data has been removed from the graphs, the graphs are footnoted.

Table 9: Frequency of each site count band within ND-NEED.[21]

Site Count in Organisation	Frequency within ND-NEED
1	218,000
2-9	83,000
10-99	3,200
100+	280

Figure 15 shows the median electricity and gas intensity by the site count for the business. Buildings which are the sole site have the highest energy intensity. However, for electricity when the site count is 10-99 the intensity is lowest and for gas when the site count is 10-99, the intensity is highest.

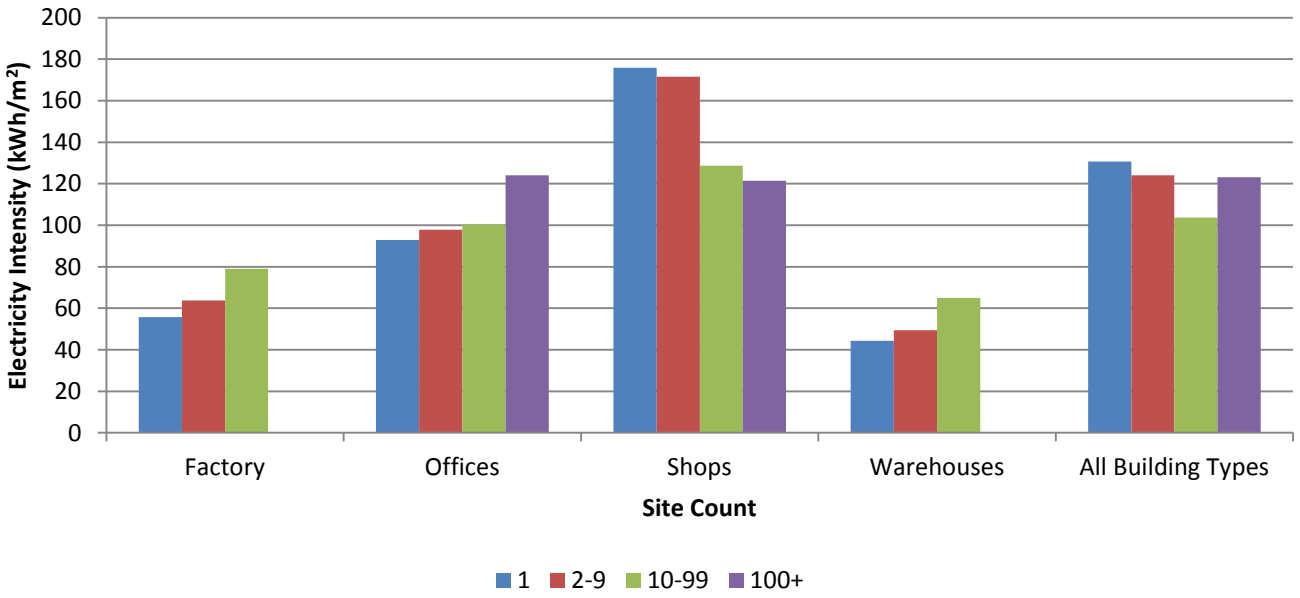
Figure 15: Median electricity and gas intensity by the site count of businesses, England and Wales, 2011.



[21] Based on the hierarchy's within the Experian dataset the site count is derived based on the number of site entries found for the company.

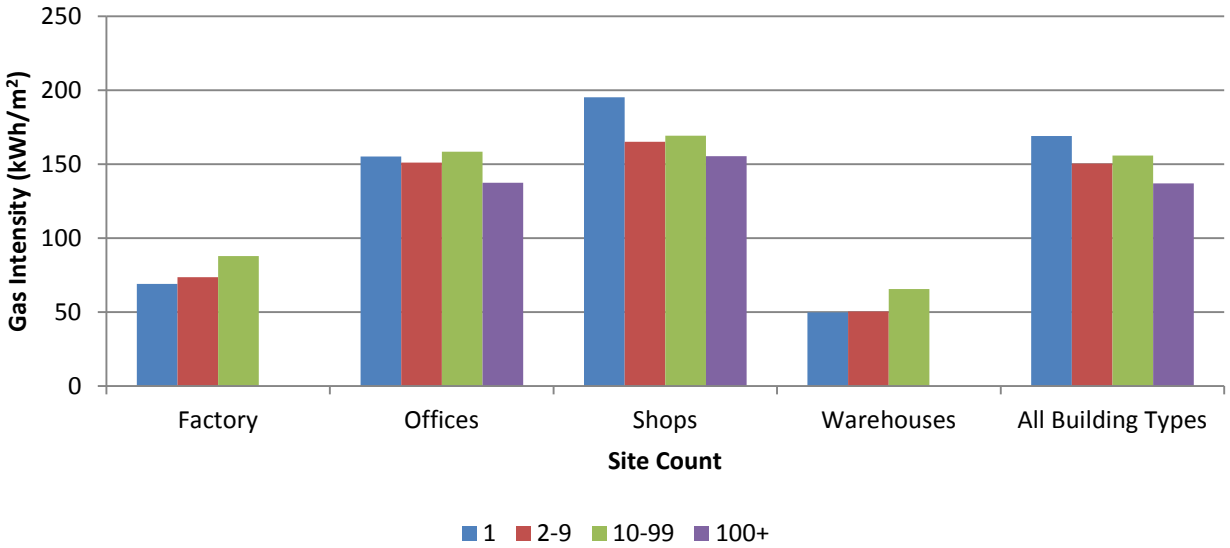
There are quite differing patterns for intensity by building type as seen in Figure 16. Electricity intensity for shops decreases as the site count increases but for factories, offices and warehouses intensity increases as site count increases. However, the trend for all building types is unusual. Over two thirds of the records in all building types for 10-99 sites are offices and this may be influencing the overall trend. This can be seen as the median intensity for offices and all building types are very similar. There is better representation of all building types for the other site count bands.

Figure 16: Median electricity intensity by building type and by site count, England and Wales, 2011[22].



The pattern for gas intensity has only minor differences occurring based on site count. Warehouses and factories increase gas intensity for businesses with a higher site count. Similar to electricity, all building types, for site count band 10-99 is very heavily influenced by offices and this may be influencing the trend.

Figure 17: Median gas intensity by building type and by site count, England and Wales, 2011.[23]



l less

[23] Factories and warehouses with more than 100+sites were removed from the graph as both samples had less than 10 records.

Summary

ND-NEED in its current form allows us to look at trends and differences in building types within our sample but the incomplete coverage and biases must be taken into account. The levels of consumption in ND-NEED are also not comparable to the national level due to the incomplete coverage. The next chapter suggests a weighting methodology which accounts for some of the biases and would allow us to consider energy consumption in the non-domestic sector at a national level.

Chapter 4: Weighting

One of the key applications of ND-NEED is to produce statistics on energy consumption across detailed segments of the non-domestic sector. However, as noted in Chapter 2, there are notable gaps in coverage and matching. Therefore, weighting must be used to make the matched data representative at the national level. This chapter presents a method for weighting the ND-NEED data for electricity consumption.

We invite readers to provide feedback on the current methodology in the form of three specific questions:

a) Is this the correct methodology to use for the weighting?

b) How could this methodology be altered for gas consumption?

c) Is the methodology used for removing out of scope consumption correct?

d) Do you have any suggestions or improvements?

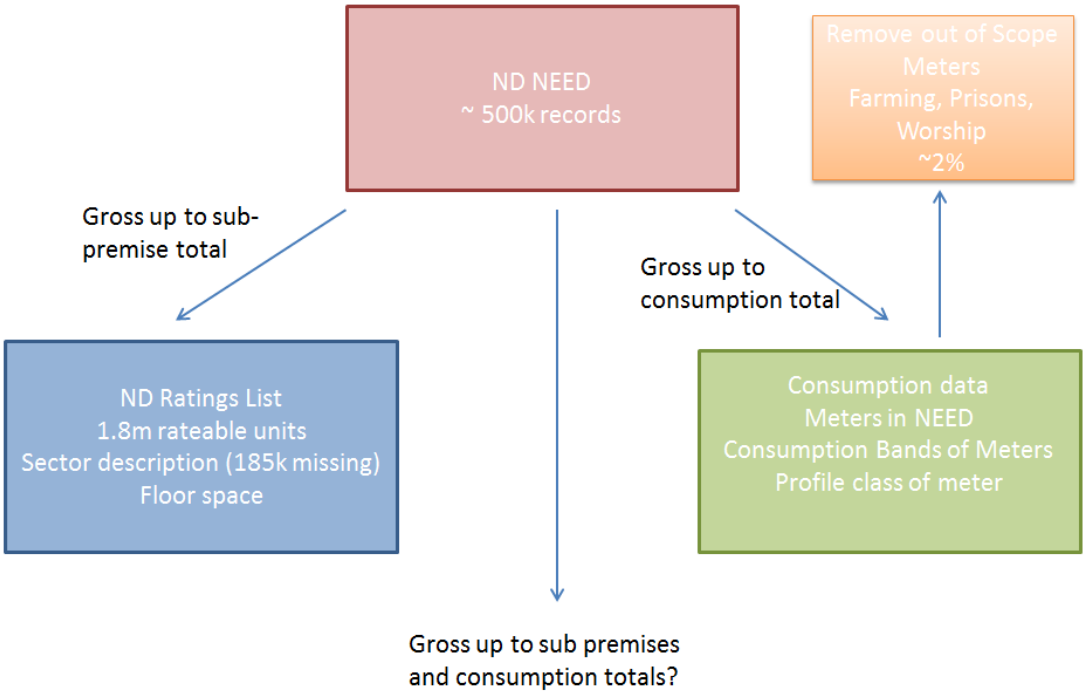
Please contact Energyefficiency.stats@decc.gsi.gov.uk with comments by 11th July 2014.

Constructing Weighting Factors

To obtain the desired analytical outcomes a set of weighting factors was constructed to enable each matched record to be grossed according to the weight it carries in the population. The results from ND-NEED should gross up to the number of rateable units and consumption for each building type. The main issue is that there is not a single dataset, which combines information on buildings, floor area and consumption, from which these weighting factors could be constructed. A two stage weighting approach was used as shown in Figure 18.

The implication of this is that both datasets need to be used in the weighting methodology.

Figure 18: Non-domestic datasets – illustration to show that there is no single dataset to construct weighting factors from



STAGE 1: Building Weight - weighted according to non-domestic subsector and floor area

This step aims to overcome the initial loss, at the first step of matching, where only 91 per cent of rateable units from the non-domestic ratings list (NDR) are matched into ND-NEED. The NDR informs us about the population of buildings by building type and floor area. Therefore it can be used to work out how many properties in the population each building in ND-NEED represents. This is calculated using Equation 1 below. The weights calculated are shown in the Annex table b2.

Equation 1:

$$x_{i,j} = \frac{N_{i,j}}{n_{i,j}}$$

In the above equation: xi,j=weighting factor, Ni,j=number of rateable units in population, ni,j=number of rateable units in ND-NEED * For i=30 building types and j=10 floor area bands.

After this step has been implemented, the weighting factors were applied meaning that the analysis is grossed to the total number of buildings. However, after this step consumption is still much lower than that of all meters, therefore a second stage is applied.

Weighting is done at a building level. Where there are less than 50 buildings within an area band, area bands are combined, see Annex B1[24]. This is to lessen the likelihood of influence from outlying figures.

STAGE 2: Weight according to consumption band (and profile class)

The second step is to further weight each weighted building according to the consumption and profile class[25] it falls into. However not all building types, and therefore all consumption, are included in the NDR. Prisons, military premises, places of worship and agricultural premises are excluded. Therefore, the meters of buildings that are not included in the NDR need to be removed from the consumption population. If these were included, it would mean we were grossing up to consumption for buildings that are outside the scope of the NDR.

To correct for this, a profile for each of these excluded building types was created from the meter data. Each of these building types was grossed up to an estimated population from the Experian business data or the UCL CARBmodel[26]. The resulting population of these building types was removed from the total population of all consumption meters ($N_{i,j}$ in equation). For example, 5 per cent of prisons (10 prisons) are profile class 6 and in consumption band 7[27] , therefore 10 meters of profile class 6, consumption band 7 were removed from the meter population. Therefore, this is 10 meters less that were grossed up to altogether. The group of out of scope meters is referred to as the 'patch'.

After the patch was removed, the weight according to consumption band and profile class was calculated using *Equation 2*. The weights calculated are shown in the Annex table B4.

Equation 2:

$$y_{i,j} = \frac{N_{i,j}}{n_{i,j}}$$

In the above equation: $y_{i,j}$=weighting factor, $N_{i,j}$=number of electricity meters in population, $n_{i,j}$=number of electricity meters in ND-NEED for i=11 consumption bands and j=9 profile class combination. It should be noted that this weighting is applied after grossing for stage 1 weighting and so there is not a double counting issue.

Where there are less than 50 meters within a consumption band, consumption bands are combined, see Annex B3. This is to lessen the likelihood of influence from outlying figures.

This weighting process uses multiple assumptions. It is assumed that the matching coverage of ND-NEED is random within a) each building type and floor space band AND b) each consumption band and profile class.

[24] Buildings are put into area bands for the purposes of weighting. These can be seen in Annex B.

[25] Profile class of electricity meter.

[26] Places of worship uses a population based on University College London's Carb model. Military is not currently removed as data is difficult to obtain and it is believed that there is a very low number of military consumption meters within the sample.

[27] Consumption bands are shown in the Annex, consumption band 7 is equivalent to 100-500 MWh.

Weighting Results

The two stage weighting process reduced the gap between ND-NEED coverage of electricity consumption and electricity consumption in the Digest of the United Kingdom Energy Statistics (DUKES) and the sub-national consumption statistics as shown in Table 10. While efforts have been made to account for differences the data are not directly comparable.

Table 10: Summary of energy consumption: 2010[28] Electricity consumption (TWh)

ND-NEED estimates	TWh
Raw consumption	29
Post Building weights (Stage 1)	115
Post Consumption weights (Stage 2)	151
Comparison to sub-national consumption (non-domestic)	
Total electricity for England + Wales as per sub-national consumption	166
Buildings out of scope for the VOA data and removed from the weighting	
Agricultural Use (UK DUKES 1.1)	-4
Prisons and Military (UK) (GGC[29])	-1
Worship (Carb[30])	-2
Total electricity for England + Wales + Unallocated minus out of scope buildings as per sub-national consumption	159[31]
DUKES (public generation final consumption only) – table 5.3	
Industry + Public admin + Commercial	182

The weighted ND-NEED is most comparable with the sub-national consumption statistics for England and Wales. The sub-national consumption statistics contain all domestic and non-domestic meters but these are filtered for non-domestic. After the two stage weighting process, an estimated 91 per cent of electricity consumption has been captured. By removing the buildings in the patch, buildings that were out of scope from the NDR, and therefore not weighted up, this is increased to 95 per cent coverage.

[28] The population data used to create the weighting is from 2010. Therefore we thought it most appropriate to look at consumption in 2010.

[29] The Greening Government Commitments provide a source of data on prisons and military buildings.

[30] Carb is University College London's non-domestic energy usage model.

[31] Totals do not add due to rounding.

The most comparable figure from DUKES is the electricity use, excluding own generation for the industry, public admin and commercial sectors combined. This difference will mainly be due to the including of Scotland and Northern Ireland consumption in these figures.

Table 11 compares the coverage in ND-NEED to that in the sub-national consumption statistics by profile class. In all classes, weighted consumption with ND-NEED is within 8 per cent of sub-national consumption statistics. The main differences occur in classes 3, 4 and 9 showing that the weighting may be distorting consumption of the smaller and largest users. An estimate of the consumption removed by the patch (out of scope buildings) removes an estimated 3 TWh. Nonetheless, profile class 9 was the most underrepresented with the current weighting.

Table 11: Coverage by profile class

Profile class	ND-NEED TWh	SubNational TWh	Coverage	Estimated Consumption removed by patch TWh[32,33]
3	22.00	20.40	108%	1.1
4	10.00	10.60	94%	1.0
5	2.60	2.60	101%	0.1
6	4.90	4.90	99%	0.2
7	2.90	2.90	101%	0.1
8	5.10	5.20	99%	0.1
9	100.60	120.00	84%	3.0

Table 12 displays the differences in consumption of all building types based on original consumption, consumption with building weights and consumption with full weights. Shops are the building type with the biggest proportional change, accounting for 28 per cent of ND-NEED consumption but only 20 per cent of the weighted consumption. Offices increase its proportion of total by 2-3 per cent which is a notable shift. Those that are under-represented when matched into ND-NEED, will have the largest building weights and thus increase their consumption considerably.

Table 12: Consumption and Coverage by Building Type.

TWh	Original Consumption	% of Total	Consumption with Building Weights	% of Total	Consumption with Full Weights	% of Total
Factories	**8.90**	31%	**33.20**	29%	**41.70**	28%
Offices	**4.40**	15%	**20.60**	18%	**27.40**	18%
Shops	**8.10**	28%	**21.30**	19%	**29.40**	20%
Warehouses	**2.80**	10%	**13.50**	12%	**18.30**	12%
Total	**29.00**	100%	**114.40**	100%	**150.50**	100%

[32] Estimate is made by multiplying population sample of out of scope meters by the mid point of the respective consumption band. The exact figure is likely to differ notably, this is an indicative estimate.

[33] The Patch contains consumption from meters that are out of scope such as military and agriculture. If we remove this, then the estimated consumption is closer to that of the subnational consumption

Summary

1) ***Is this the correct methodology to use for the weighting?***
   The current methodology fills the need to some extent by covering 91 per cent of consumption. However, are there potential improvements to be made or issues that have been overlooked?

2) ***How could this methodology be altered for gas consumption?***
   Whilst we can assume that all buildings will have an electricity supply, we cannot assume the same for gas. Although the total number of gas meters is known, we do not know the total number of buildings with a gas supply and therefore cannot gross up to it. Therefore, we would be grossing up to stage 2 (see section 2) only.

3) ***Is the methodology used for removing out of scope consumption correct?***
   As certain buildings are out of scope they are not grossed up to in stage 1. Therefore there is a methodology to remove these buildings from stage 2. Is this the correct approach? When estimated out of scope consumption is removed, the weighting accounts for 95 per cent of consumption.

4) ***Do you have any suggestions or improvements?***
   Please contact Energyefficiency.stats@decc.gsi.gov.uk with comments by 11th July 2014

Annex A: Datasets and Structure of ND-NEED

Core Datasets used in ND-NEED

Meter Point Consumption Data: DECC receives consumption data for electricity and gas meters in Great Britain from the energy suppliers. These consumption datasets include nearly all meters in Great Britain. Some very high consuming meters are excluded. For the purposes of ND-NEED we only use England and Wales as the non-domestic ratings list (NDR) only covers England and Wales.
Experian Data: Experian is a dataset providing modelled non-domestic (and domestic) business characteristics including; turnover, employment and standard industrial classification (SIC) code.

NDR: The non-domestic ratings list is created by the Valuation Office Agency and lists a rateable value of non-domestic properties. It shows all properties, their rateable values, and their descriptions. The properties are listed in alphabetical street order within postal areas and every building has its own reference number. The latest rating list is effective from 01/04/2010. Although most properties are valued based on floor area, some properties are valued based on sales, meaning that they do not have floor area estimates or do not have accurate estimates.

NDRSV: Summary Valuation data for NDR. A greater detail version of the above list containing the unit-UARN mapping with additional premises information e.g. floor area.

NLPG: National Land and Property Gazetter, contains a unique identifier for each address in England and Wales which acts as the spine of ND-NEED.

Additional Data

Display Energy Certificates: Display Energy Certificates are required by public buildings over 1,000 m^2. The data includes floor area and consumption data allowing comparisons to ND-NEED.

Energy Performance Certificates: From 1st October 2008, all non-domestic buildings on construction, sale or rent have required Energy Performance Certificates. The data includes floor area and consumption data allowing comparisons to ND-NEED.

Matching in ND-NEED

The scope of ND-NEED has been defined as all rateable premises contained within the Valuation Office Agency's NDR. These valuations take place based on the building or part of a building occupied by an organisation. In total there are 1.8 million rateable units in England & Wales, these are known as hereditaments. Hereditaments[34] may form part of a building or cover the entirety of a site and each hereditament has a unique address reference number (UARN).

An address matching process is undertaken where the address from the dataset (e.g. consumption data) is matched to the address from the National Land and Property Gazetter. If the addresses in the two datasets match, a unique property reference number (UPRN) is

[34] These *hereditaments* are referenced by their Unique Address Reference Numbers (UARNs)). A hereditament is an area that is rateable for commercial valuation purposes

assigned to the record with the same address (e.g. consumption data). There is a dataset that links the UARN to the unique property reference number (UPRN - building level references).

Each dataset is matched to the National Land and Property Gazetter in turn and assigned UPRNs. If, for example, a record in the consumption data and the business data both have the same UPRN, you can merge the record to form one line as this means that both records are about one building. That is how multiple datasets can be used relating to one building.

Confidence of matching

The low coverage seen in ND-NEED is partly due to poor address matching. In different datasets, one building could be referred to in different ways. (e.g. dataset 1 – Unit 2, 1 Main Street, dataset 2 – Unit B, 1 Main Street). To try and overcome this, the address matching uses different approaches to match the data (e.g. changing Unit 2 to Unit B). Matches are therefore given a confidence level based on whether the addresses matched identically or whether small changes had to be made.

Records are only matched into and used in ND-NEED where the meters were added to the building with a high degree of confidence. Of all the possible matches the address matching found (for this iteration of ND-NEED), around 80% were deemed to be good matches. The other 20% were not deemed to be good matches and are therefore not included in the almost 500,000 records used for Chapters 2, 3 and 4.

For the next version of ND-NEED, an improved code will be used for the address matching. This will be done within DECC which will allow better quality-assurance of the matches and better understanding of the limitations of the data.

Annex B: Weighting Components

B1: Building Counts (Cells shaded in red contain below 100 counts)

Building Type	Area band (m^2) – Cells with low counts have been merged									
	0-25	25-50	50-75	75-100	100-150	150-250	250-500	500-1000	1000-5000	5000+
Advertising Rights and Premises	1,587									
Ambulance, Police and Fire Stations	100						100	100		0
Beach Huts	200									
Bus Stations	100									
Car Parks	1,200	200	100	100	100	100	100	100		
Caravan Parks	<50									
Cinemas	100					100	100			
Community Centres	300		500	700	1,700	2,700	2,800	1,000	300	
Factories	1,300	4,800	5,800	5,800	9,000	11,000	11,000	6,700	6,000	1,600
Garages and Showrooms	100	400	700	700	1,300	2,000	2,400	1,300	1,000	100
Healthcare	500	1,100	1,700	1,700	2,500	2,400	1,700	500	300	
Hostels	300	100	100		100					0
Hotels and Holiday Homes	19,700	200	100						0	0
Libraries and Museums	100									
Military	<50									
Miscellaneous	2,700	1,000	700	600	1,000	1,300	1,500	900	1,000	300
Nurseries	100		200	300	700	1,000	800	100		
Offices	5,200	9,200	9,100	7,200	10,100	10,500	8,100	3,500	2,500	2,400
Private Schools	100				100	100	200	200	100	
Pubs and Clubs	100			100	300	800	2,000	1,300	300	
Quarries	<50									
Restaurants	100	1,200	2,200	2,200	3,200	2,900	1,900	400		
Shops	14,200	51,500	54,500	34,200	33,700	22,700	13,000	5,300	3,200	700
Sports Grounds	100	100		100	200	300	600	600	200	
State Schools	100							5,500		
Telecommunications	100									
Universities	<50									
Warehouses	1,100	2,200	2,500	2,800	4,900	7,300	9,900	7,100	6,300	1,200

B2: Building Weights

Building Type	Area band (m^2) – Cells with low counts have been merged, weights have been rounded									
	0-25	25-50	50-75	75-100	100-150	150-250	250-500	500-1000	1000-5000	5000+
Advertising Rights and Premises	24									
Ambulance, Police and Fire Stations	18						20	27		"ZIP"
Beach Huts	66									
Bus Stations	17									
Car Parks	36	17	15	15	14	14	8	12		
Caravan Parks	900									
Cinemas	7					9	9			
Community Centres	5		4	4	4	3	3	3	4	
Factories	8	5	4	4	4	4	4	4	4	4
Garages and Showrooms	7	6	5	4	4	4	4	4	4	4
Healthcare	2	3	2	2	2	2	2	3	1.0	
Hostels	3	4	3		3					"ZIP"
Hotels and Holiday Homes	2	4	4						"ZIP"	"ZIP"
Libraries and Museums	39									
Military	227									
Miscellaneous	7	6	6	5	5	5	5	5	6	5
Nurseries	3		3	3	3	3	3		4	
Offices	11	6	5	4	4	4	4	5	5	5
Private Schools	7				6	5	5	4	5	
Pubs and Clubs	20			16	15	13	12	13	14	
Quarries	1,800									
Restaurants	4	3	2	2	2	3	3		3	
Shops	3	2	2	2	2	2	3	3	3	3
Sports Grounds	14	8		7	6	5	4	3	4	
State Schools	200							2		
Telecommunications	600									
Universities	45									
Warehouses	12	7	6	4	4	4	4	4	5	5

B3: Consumption Counts

Profile Class	Number of MPANs (using building weights)											
	Electricity Consumption Band 2010											
	Zero	<1 MWh	1 to 5 MWh	5 to 10 MWh	10 to 50 MWh	50 to 100 MWh	100 to 500 MWh	500 to 1,000 MWh	1,000 to 5,000 MWh	5,000 to 10,000 MWh	10,000 to 50,000 MWh	50,000 to 100,000 MWh
3	51,500	120,200	222,000	202,700	443,500	65,800	15,700	100				
4	20,800	19,600	39,100	50,300	164,900	30,800	10,500	<100				
5	800	800	1,200	1,300	9,100	7,500	8,000	100				
6	1,000	600	1,100	900	8,800	10,800	14,800	300				
7	400	100	200	300	3,000	5,700	9,900	100				
8	500	300	400	300	2,200	3,800	11,500	600				
9	2,300	400	600	500	2,700	3,100	31,000	13,000	12,000	2,500		

B4: Consumption Weights

Profile Class	Consumption Weights – rounded to the nearest 0.1											
	Electricity Consumption Band 2010											
	Zero	<1 MWh	1 to 5 MWh	5 to 10 MWh	10 to 50 MWh	50 to 100 MWh	100 to 500 MWh	500 to 1,000 MWh	1,000 to 5,000 MWh	5,000 to 10,000 MWh	10,000 to 50,000 MWh	50,000 to 100,000 MWh
3	1.3	2.2	1.6	1.2	1.1	1.2	1.5	1.5		ZIP	ZIP	ZIP
4	1.3	1.8	1.8	1.3	1.2	1.3	1.4	2.1			ZIP	ZIP
5	2.0	1.3	1.5	1.4	1.2	1.2	1.2	1.4		ZIP	ZIP	ZIP
6	2.0	1.5	1.4	1.7	1.3	1.2	1.3	1.3			ZIP	ZIP
7	2.4	1.6	1.5	1.3	1.3	1.2	1.2	2.6		ZIP	ZIP	ZIP
8	2.7	1.9	4.3	2.6	1.8	1.6	1.7	1.3				ZIP
9	2.0	1.8	2.1	2.4	2.1	2.1	1.5	1.6	1.6	1.0		

ZIP = Zero in population.

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