Department of Energy & Climate Change

The Non-Domestic National Energy Efficiency Data-Framework: Energy Statistics 2006-12

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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. This report presents statistical analysis for the non-domestic sector, looking at the type of buildings and businesses using energy in England and Wales.

The new report follows on from the May 2014 publication[1], which reported the development and quality assurance of this project. Since then improvements in address matching have been made, and feedback from the consultation held on weighting has been implemented. The results in this report should be considered experimental since the weighting methodology has been implemented for the first time. We welcome any feedback on both the results presented and ideas for how this analysis could be improved and what users would like to see done with the data. Energyefficiency.stats@decc.gsi.gov.uk

Introduction

The purpose of the non-domestic National Energy Efficiency Data-Framework (ND-NEED) is to match information about buildings to metered electricity and gas consumption data. Buildings data are gathered from the Valuation Office Agency's (VOA) Non-domestic Ratings List (NDR), whilst energy consumption data are supplied to DECC at a meter point level. In the last report less than 30 per cent[2] of electricity meters were matched to buildings data. Since then, work has been done to improve the address matching and the construction of ND-NEED, analytical dataset. This is outlined in Annex A. The coverage of ND-NEED is now just below 50 per cent of non-domestic buildings, this represents a significant improvement over the previous version.

The statistics presented in this report are now weighted for both electricity and gas, as set out in the methodology provided in Annex B. The weighted results from ND-NEED are within 5 per cent of the equivalent consumption from DECC's National Statistics for England & Wales.

ND-NEED currently includes a matched sample of over 1,000,000 electricity meters in over 750,000 buildings with electricity consumption data. Sub-samples are used where necessary to include analysis of variables present in other datasets.

[1] ND-NEED Report – May 2014: https://www.gov.uk/government/statistics/the-non-domestic-national-energy-efficiency-data-framework-nd-need

[2] The overall match rate is defined based on the number of buildings matched to at least one electricity meter

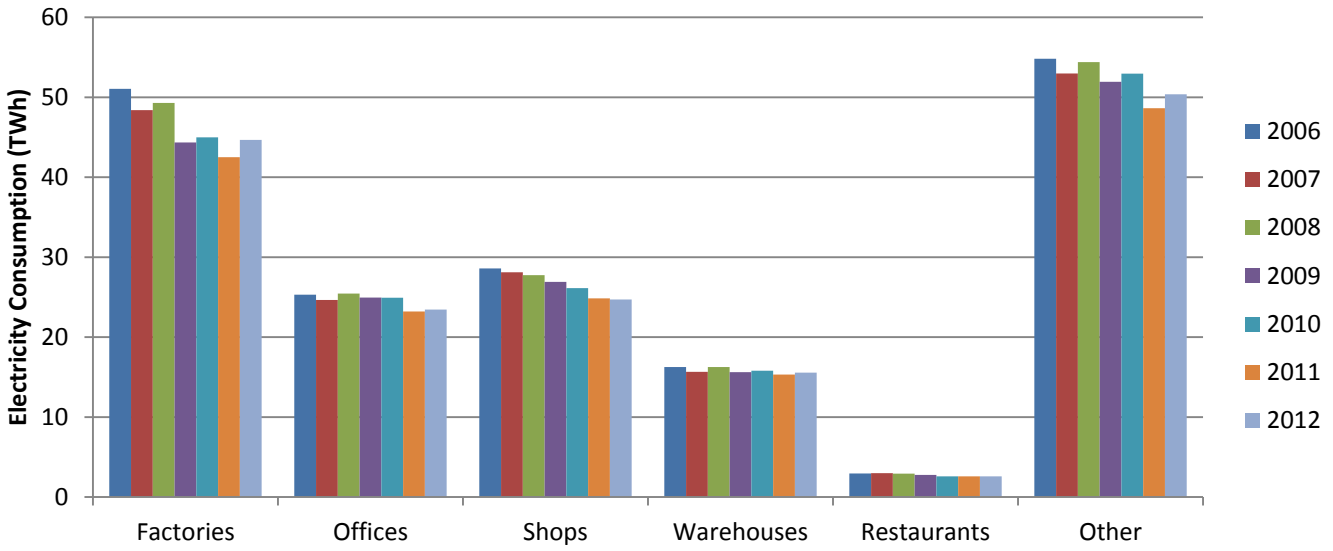
Consumption Analysis

ND-NEED attempts to capture all metered non-domestic energy consumption in England and Wales in premises subject to valuation by the VOA. In 2012, electricity consumption rose by 3 per cent and gas consumption[3] fell by 0.2 per cent compared to 2011 (see Chapter 2). Electricity consumption has fallen by 10 per cent since 2006 whilst total gas consumption has fallen by 15 per cent since 2006 in these buildings.

Figure 1 (electricity) and Figure 2 (gas) show how ND-NEED can disaggregate consumption between the main building types. Factories are the largest consuming group of buildings in the non-domestic sector and account for over one quarter of electricity consumption and over a third of gas consumption. Electricity consumption of factories decreased by 13 per cent between 2006 and 2012 and their gas consumption by 25 per cent, with the majority of savings between 2008 and 2009 as UK industrial index of production fell by 10 per cent over the year. Shops (the second highest consuming building type) decreased their electricity consumption by 18 per cent and their gas consumption by 16 per cent between 2006 and 2012.

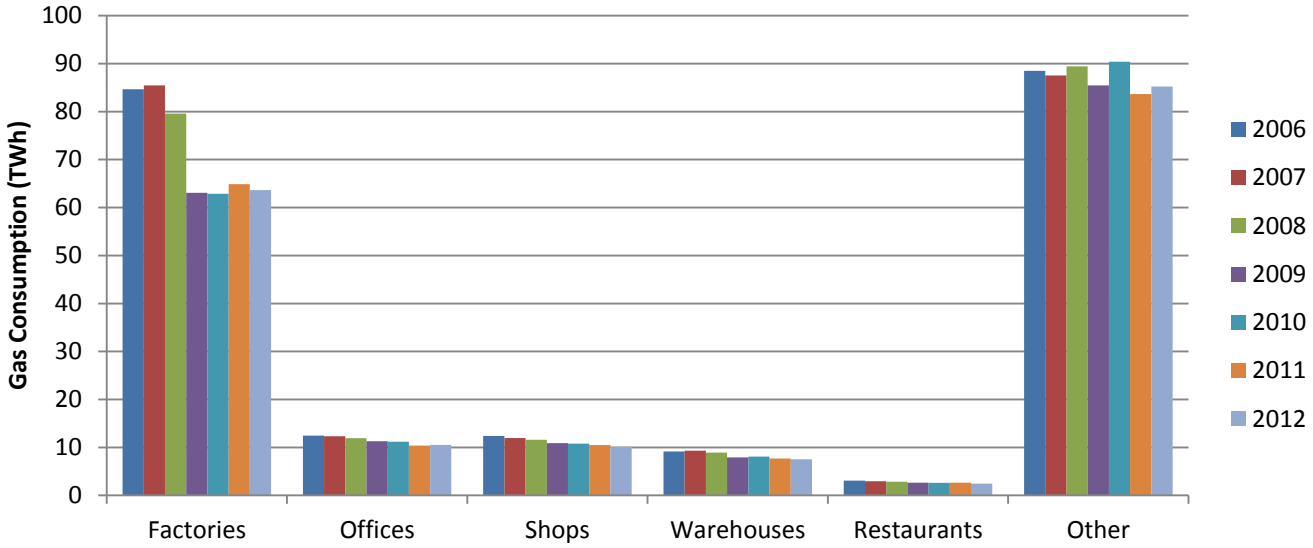
The majority of gas consumption in ND-NEED comes from a small percentage of buildings. An example is factories (the largest consuming building type), where 5 per cent of buildings have a floor area of over 5,000 m^2 but these account for 79 per cent of factory gas consumption.

Figure 1: Electricity consumption (TWh) for each building type for each year in ND-NEED, 2006-2012



[3] All gas data are weather corrected whilst electricity data is not temperature corrected in ND-NEED.

Figure 2: Gas consumption (TWh) for each building type for each year in ND-NEED, 2006-2012



Electricity and Gas Intensity Analysis

For both electricity and gas, warehouses have the lowest average intensity, measured as consumption per m^2, followed by factories. Electricity and gas intensities fell across all building types between 2006 and 2012 with reductions of between 14 and 25 per cent in electricity intensity for the main building types between 23 and 33 per cent reductions for gas intensity. The largest falls were seen in factories and warehouses. It should be noted that the floor area data in ND-NEED is a fixed value for each building since the data has been taken from a 2012 version of the 2010 Ratings List. Changes over time in the size of individual buildings will not be factored in to the analysis but buildings will only be included in the analysis if they have valid consumption readings in for the relevant year and therefore the overall floor area included in the analysis does vary year on year.

Analysis of floor area in Chapter 3 shows that for electricity, the smallest and largest buildings have the highest intensities, whereas for gas it is the smallest buildings which have the highest energy intensities. However, the trend does vary across different building types. Factories and restaurants are likely to have a diverse range of energy uses, rather than just heating, lighting and small power. ND-NEED cannot identify the actual end uses of consumption.

Figure 3: Median electricity intensity for non-domestic buildings by building type, 2006-2012

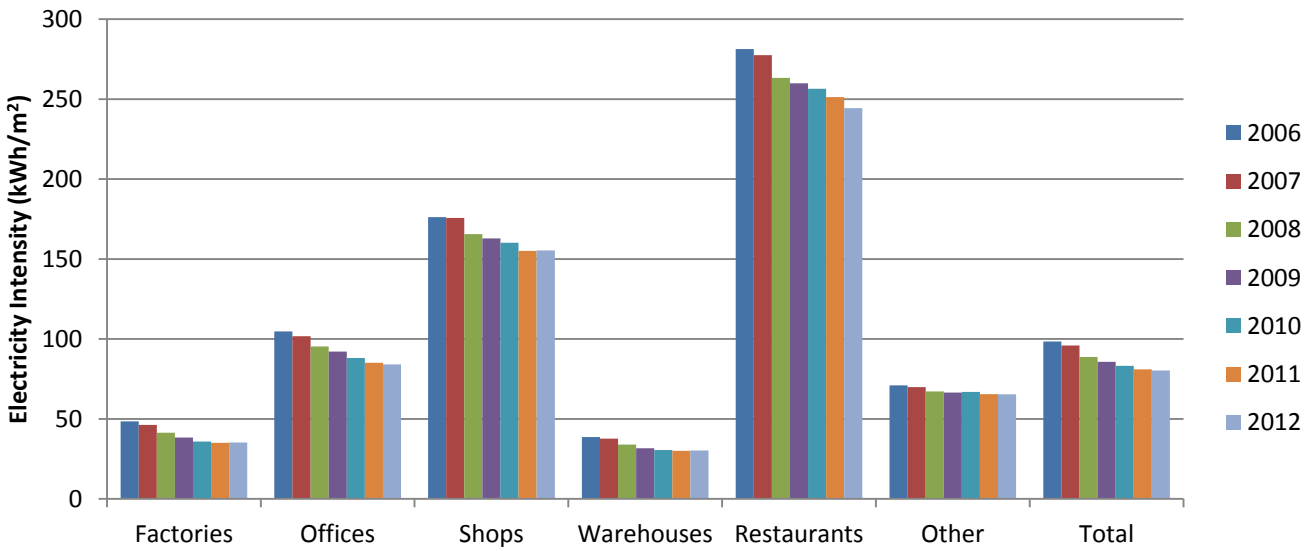
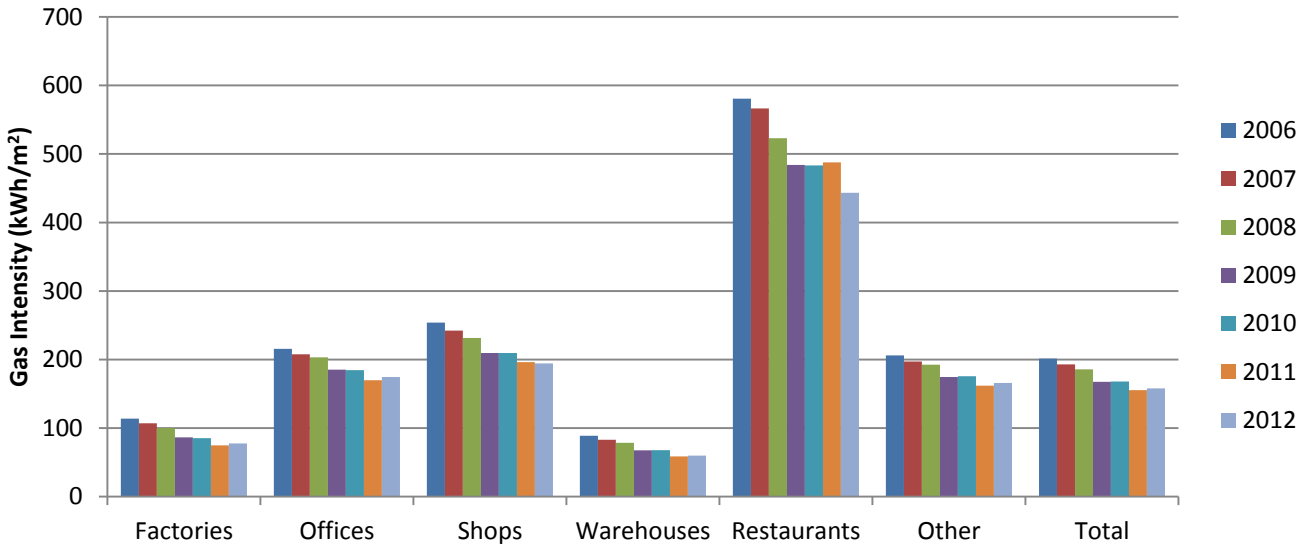


Figure 4: Median gas intensity for non-domestic buildings by building type, 2006-2012



Business Size Analysis

Using the Experian data in ND-NEED, it is possible to analyse trends by size of business in terms of site and organisation employment. No specific weighting has been applied to correct for the sample of ND-NEED records that have matched to Experian data.

For electricity, larger businesses (in terms of employment) have higher average intensities than smaller businesses. However, for gas the intensity is generally lower for larger businesses, although this is not the case for factories.

The analysis found statistically significant differences between small & medium sized enterprises (SMEs) and larger enterprises in their rate of reduction in electricity and gas intensity for most building types. These results are shown in Chapter 4.

Summary of key facts

The report sets out the analysis undertaken on energy use in non-domestic buildings. The key facts arising from the ND-NEED analysis are summarised here.

Energy consumption (Chapter 2)[4]

Headline figures for 2012

- In 2012, non-domestic buildings consumed 158 TWh of electricity
  - Factories 28%, Offices 15%, Shops 15%, Warehouses 9%

- In 2012, non-domestic buildings consumed 179 TWh of gas
  - Factories 35%, Offices 6%, Shops 6%, Warehouses 4%

- In 2012, non-domestic buildings consumed 337 TWh of electricity & gas (combined)
  - Factories 32%, Offices 10%, Shops 10%, Warehouses 7%

- In 2012, 53% of electricity & gas was consumed by SMEs (businesses with less than 250 employees). 57% for electricity and 50% for gas.

- In 2012, 52% of electricity & gas was consumed in buildings over 5,000m^2 [5]. 47% for electricity and 63% for gas.

Trends

- Between 2006 and 2012, electricity & gas consumption fell by 12%. The largest reductions were factories by 20%, restaurants 17% and shops 15%.

- During the period of recession (2007 to 2009) overall electricity & gas consumption fell by 9% but 20% for factories.
  - Large business consumption (250-999 employees) fell by 19% over that recession period.

- Large business consumption fell by 19% in the recession, compared to 7% overall but no change for the very large (1,000+ employees).

[4] Note “other” category included within the total.

[5] Calculation excludes buildings with floor area unknown

Energy intensity per m^2 (Chapter 3)

- Electricity intensity (per m^2) fell across all building types between 2006 and 2012 with reductions of between 14 and 25 per cent.

- Gas intensity (per m^2) fell across all building types between 2006 and 2012 with reductions of between 23 and 31 per cent.

- For electricity, larger businesses (in terms of employment) have higher average intensities than smaller businesses. However, for gas the intensity is generally lower for larger businesses, although this is not the case for factories.

- Over the period 2006 to 2012, electricity intensity fell significantly more for factories, offices and warehouses among larger business than in SMEs.

- Over the period 2006 to 2012, gas intensity fell significantly more for shops and warehouses among SMEs business than in larger businesses.

Chapter 1: Overview of the Non-domestic 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. This report covers analysis for the non-domestic sector is restricted to England and Wales only

1.1 Introduction and Overview

What is the purpose of the Non-domestic National Energy Efficiency Data-Framework?

The non-domestic National Energy Efficiency Data-Framework (ND-NEED) matches data about non-domestic premises to electricity and gas consumption data (see Figure 1.1). Premises (buildings) data is gathered from the Valuation Office Agency's (VOA) non-domestic Ratings List (NDR), additional buildings and business data is supplied by Experian (see Annex A). Electricity and gas consumption data are collected by DECC at a meter point level, additional energy efficiency data from Display Energy Certificates (DECs) and Energy Performance Certificates (EPCs) are also collected and used within the framework. To join premises data to energy data, address matching is used.

Address Matching

The premises data and the consumption datasets do not share a unique identifier; therefore to match the datasets together address matching is used. Address matching is when two identical (or very similar) addresses are found and deemed to be the same premises.

The addresses for each record from the datasets are matched to Address Base (an Ordnance Survey product). This provides each record with a unique identifier. The datasets are then joined by this unique identifier (Annex A has further details).

Address matching of non-domestic premises can be difficult since non-domestic addresses are often complex. For example, non-domestic premises may use a range (e.g. 1-4 Main Street); may list the company name as the address and this can

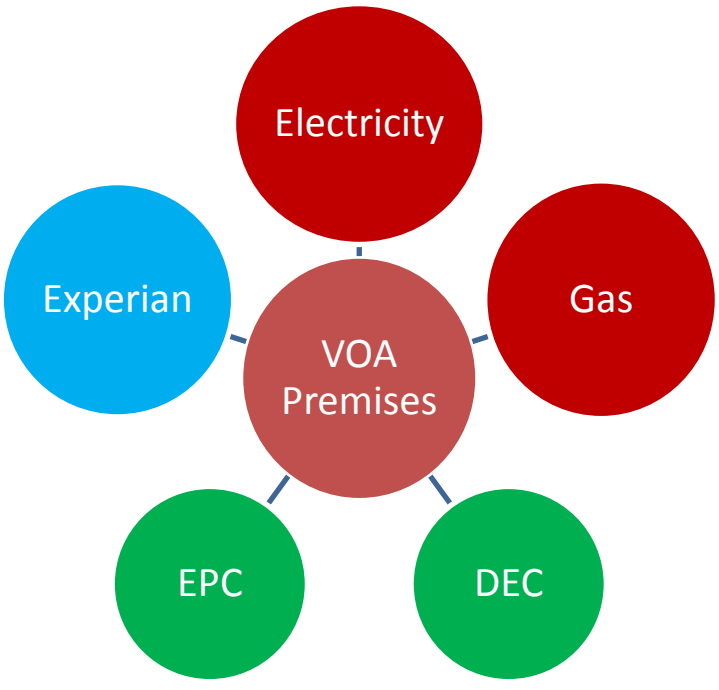


Figure 1.1: Structure of ND-NEED

change over time; and it is common for several businesses to occupy the same premises.

Due to the difficulties of address matching, just less than 50% of electricity and gas consumption data has been matched to a building and a process of weighting is used to aggregate the matched data to the national level. The issues around coverage and weighting are discussed in Sections 1.2 and 1.3 and Annex A.

How it works

The scope of ND-NEED has been defined as all rateable premises contained with the VOA's NDR. In total, there are 1.8 million premises in the NDR list in England and Wales, these are known as *hereditaments*. *Hereditaments* may form part of a building or the entirety of a building, or group of buildings. ND-NEED aggregates these hereditaments to work at a building level, this is explained in detail 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, government buildings and hotels)[6], the NDR list does not have key data such as floor area.

Buildings

This report uses the term 'Buildings' to mean either single hereditaments, hereditaments aggregated to the building level or in some cases a collection of buildings, for example a campus. It is not possible to obtain reliable match rates at a more detailed level. The term building is used as a generic term to cover all of these scenarios.

Therefore a 'building' could actually be a range of premises types. The physical structure of the 'building' will have implications for energy usage, especially in cases of space heating.

Where premises have been aggregated to the building level, the descriptions in ND-NEED are based on the largest premises within the 'building', defined by floor area.

New Developments

Since the previous publication on ND-NEED, work has been undertaken to improve the address matching and weighting procedures (Annexes A and B). This work has allowed for a detailed analysis of electricity and gas consumption in the non-domestic sector for the first time, which is the focus of this report. Furthermore, Chapter 4 features statistical analysis of the different energy intensities for SMEs and large businesses[7].

This report is intended to share the work that has been done and to invite comment and feedback from interested parties. If you have any feedback or questions, please e-mail Energyefficiency.stats@decc.gsi.gov.uk.

[6] Some building types such as pubs or hotels are valued on other criteria (location, sales, rooms) than floor area. The Valuation Office Agency collects the data we are using in ND-NEED initially to value commercial areas.

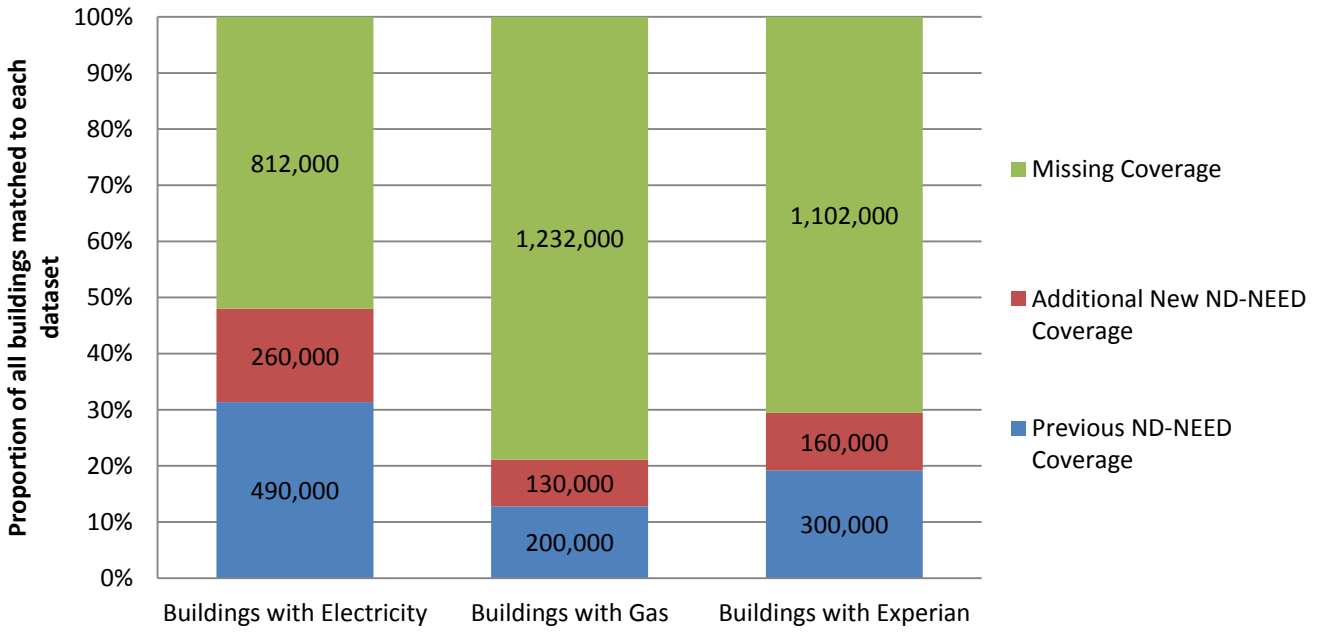
[7] Small and Medium Enterprises (SMEs) are defined here as businesses with less than 250 employees, 'larger businesses' are those with more than 250 employees.

1.2 ND-NEED Development and Coverage

The May 2014 ND-NEED report[8] provided an explanation of the coverage issues that affected ND-NEED. Since this publication, work has been done to improve the coverage of ND-NEED.

Previously, approximately 30% of the NDR building population had been matched to an electricity or gas meter. Work has been done to develop ND-NEED and these are outlined in Annexes A and B. Figure 1.2 shows the coverage of the previous version of ND-NEED compared to the current version of ND-NEED.

Figure 1.2: Comparisons of coverage between the previous version of ND-NEED and the current version of ND-NEED[9]



The VOA's NDR has a population of 1.562 million non-domestic buildings based on aggregating 1.8 million hereditaments to the building level. In this analysis, 49 per cent of these buildings have electricity consumption for at least one year, 21 per cent of buildings have gas consumption and 29 per cent have Experian business data. This coverage has improved from 31 per cent for electricity, 13 per cent for gas and 19 per cent for Experian business data. Although matching rates have improved, the match rate is still below 50 per cent overall. Therefore ND-NEED uses weighting factors to gross up to the national level.

The matched sample of data used in the ND-NEED analysis contains all records that have matched to electricity and it is assumed that all buildings will use electricity. For gas it is not known to what extent the buildings that have not matched to gas don't have a gas supply or whether it just hasn't been matched. In this experimental analysis, no weighting is applied to control for the Experian data coverage so results based on that are subject to greater

[8] ND-NEED Report – May 2014: https://www.gov.uk/government/statistics/the-non-domestic-national-energy-efficiency-data-framework-nd-need

[9] The raw matches to Gas data and Experian data are higher but as the records have not matched to electricity they can't be used in the analysis.

uncertainty. Further work is needed to understand how the data sources available could be used to develop a weighting methodology for the Experian coverage.

1.3 The Weighting Process

The raw data in ND-NEED matches electricity consumption to almost 50 per cent of non-domestic buildings from the NDR and covers 24-30 per cent of non-domestic consumption depending on the year as compared to the DECC sub-national consumption statistics.[10] For analysis from ND-NEED to be applicable at a national level, the ND-NEED data must be grossed up.

Some types of buildings and meters have a better match rate than others, meaning that there is bias in the matching process. Therefore the weighting process grosses known populations of non-domestic buildings and the total consumption of non-domestic meters. Annex B gives a detailed methodology of the weighting process. There is no single dataset that contains data for the populations of both buildings and consumption, therefore a two stage weighting process is used.

All analysis in this paper is weighted. However, when the number of records used in an analysis is presented as "Sample in ND-NEED", this is the raw number of records in ND-NEED.

BOX – Weighting methodology

The weighting requires multiple stages because there is no single dataset that contains a population of all buildings and all electricity (or gas) consumption that can be grossed to. Therefore, records are weighted to the building population and then the weights are adjusted for the consumption matching bias.

The weighting is done in three stages.

1. Construct building weights, by grossing the sample in ND-NEED to the VOA's NDR list.
2. Construct electricity weights. This is done by adjusting the building weights form the sample of matched meters in ND-NEED to the 'population' of non-domestic meters from DECC's sub-national consumption statistics.
3. Construct gas weights. This process is the same as for electricity weights.

Each of these stages are explained in detail in Annex B

1.4 Outliers and Trimmed Means

The consumption data in ND-NEED is skewed due to the relative few records with very large amounts of annual consumption for electricity and/or gas. Less than five per cent of records account for over two thirds of electricity consumption. The records in ND-NEED are skewed due to the nature of the energy use in a diverse group of non-domestic buildings, where a small proportion of non-domestic buildings (e.g. large factories) will account for large amounts of consumption.

[10] https://www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics#sub-national-energy-consumption-statistics

An outlier analysis was undertaken on ND-NEED. Figures 1.3 and 1.4 show the extent of the skew for all records and excluding the highest 5% of energy intensity records. For both electricity and gas intensity, the mean is around or above the 75th percentile of the distribution.

Figure 1.3: Distribution of Electricity intensity with the untrimmed mean and the 95% trimmed mean

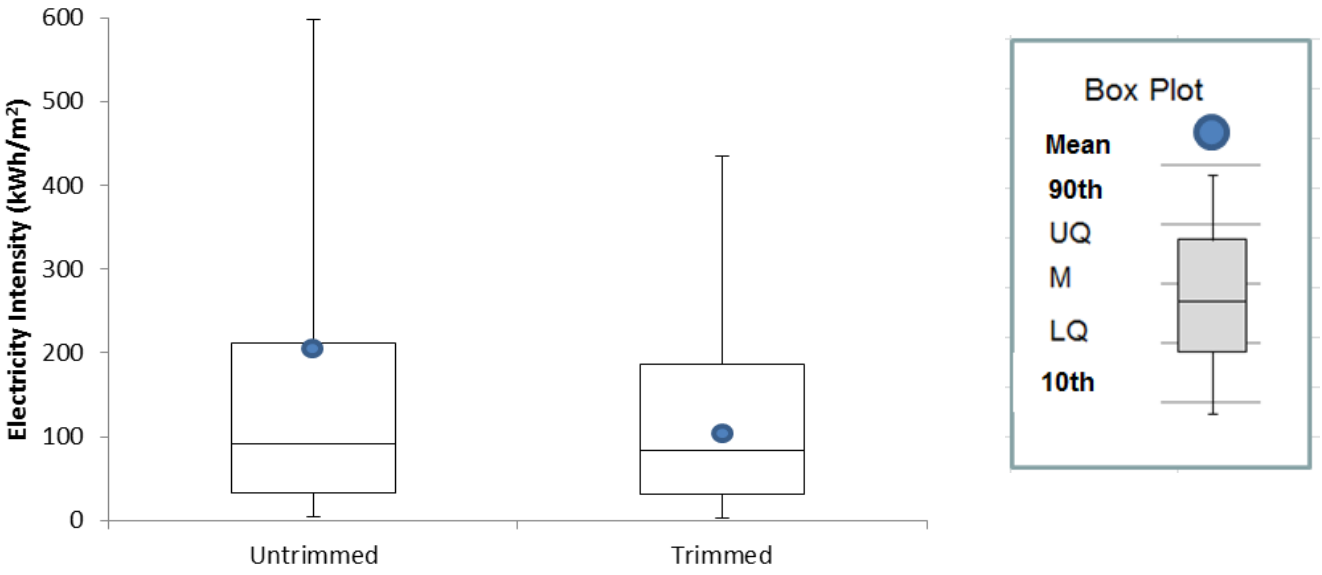
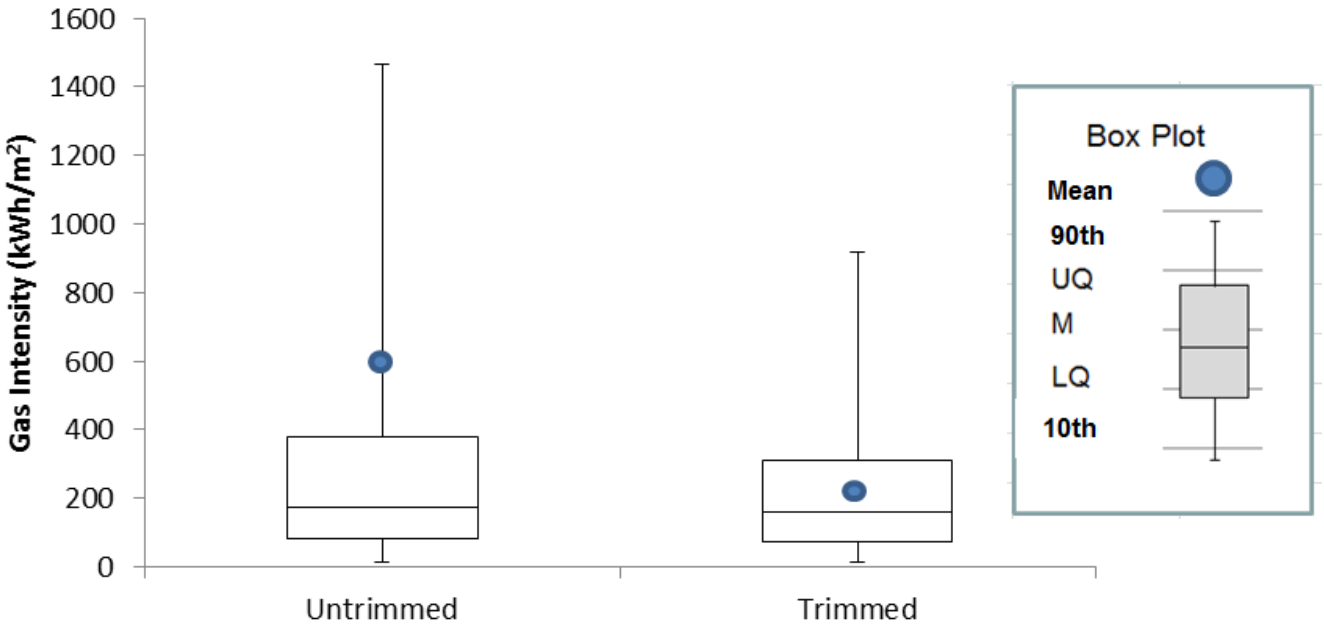


Figure 1.4: Distribution of gas intensity with the untrimmed mean and the 95% trimmed mean



Outlier analysis has been carried out based on electricity and gas intensity (kWh/m^2) to look at the top 1% of values and the top 5% of values. Around half of the top 1%, had a floor area of less than 15 m^2, which is approximately equivalent to a standard sized living room. Therefore a decision was made to remove any floor areas of less than 15 m^2.

Analysis of samples of the outliers showed some evidence of false positives in the matching of electricity meters and this adds uncertainty to the results. For example, a very high consuming building (such as a factory) may be attributed to a more typical consuming building (such as a shop). No pattern could be identified and therefore given the size of the dataset it is not feasible to identify and remove these.

There is a notable difference between the trimmed means and the unadjusted means with the 95% trimmed mean being between 30-60 per cent lower for each building type. However, there is also a 10-20 per cent difference between the 95% and 99% trimmed means. The untrimmed medians are between 12-30 per cent lower than the 95% trimmed means and 40-75 per cent lower than the unadjusted mean. Given the uncertainty of the most energy intensive data points it was decided this report should use the median as the key measure. Analysis using the 95% trimmed means has been included in the supporting tables that covers more of the distribution but is considered less robust.

To minimise the risk of large outliers for energy intensity distorting the analysis, medians have been used as the key statistic in the energy intensity sections of this report. The median represents the middle value in a distribution and can therefore be considered to represent a typical building in a sub-group. While this presents a pragmatic solution to this issue it should be noted that it is not representative of the distribution as a whole. For aggregate consumption analysis the impact of these outliers in a large dataset is much less so all records have been included.

Figures 1.6 and 1.7 show comparisons of electricity intensity and weighted electricity consumption when a 95% and 99% upper trimmed mean are used, compared to all data. Trimmed means are applied to each building type separately, therefore the top 1 or 5 per cent of factories are cut out and the top 1 or 5 per cent of shops are cut out, it is not the top 1 or 5 per cent of all records.

High consuming buildings have a large impact on the mean (as can be seen in Figure 1.5) and therefore can make analysis of energy usage by an ‘average’ building more difficult. The average electricity intensity of factories is almost twice as large when all factories are used, as opposed to just the bottom 95%.

Figure 1.5: Frequency distribution of electricity use at building level[11]

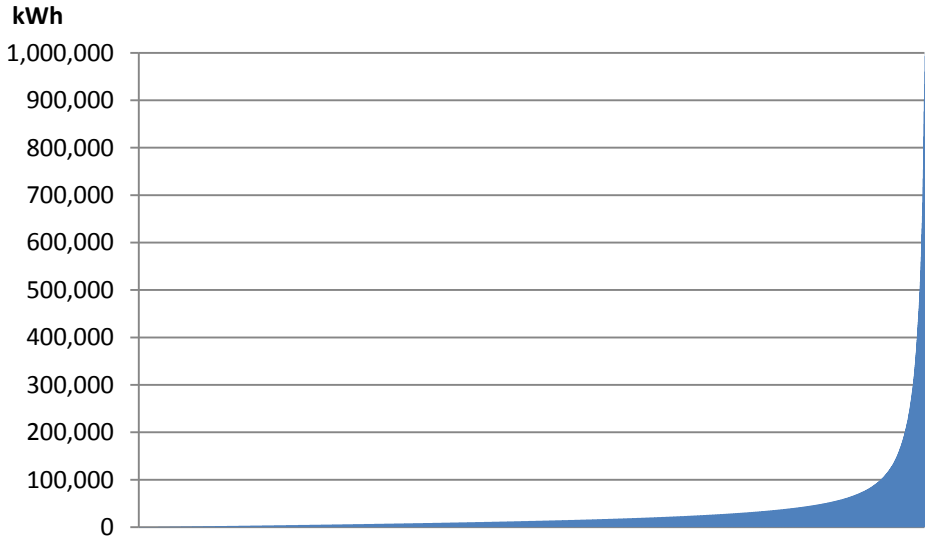
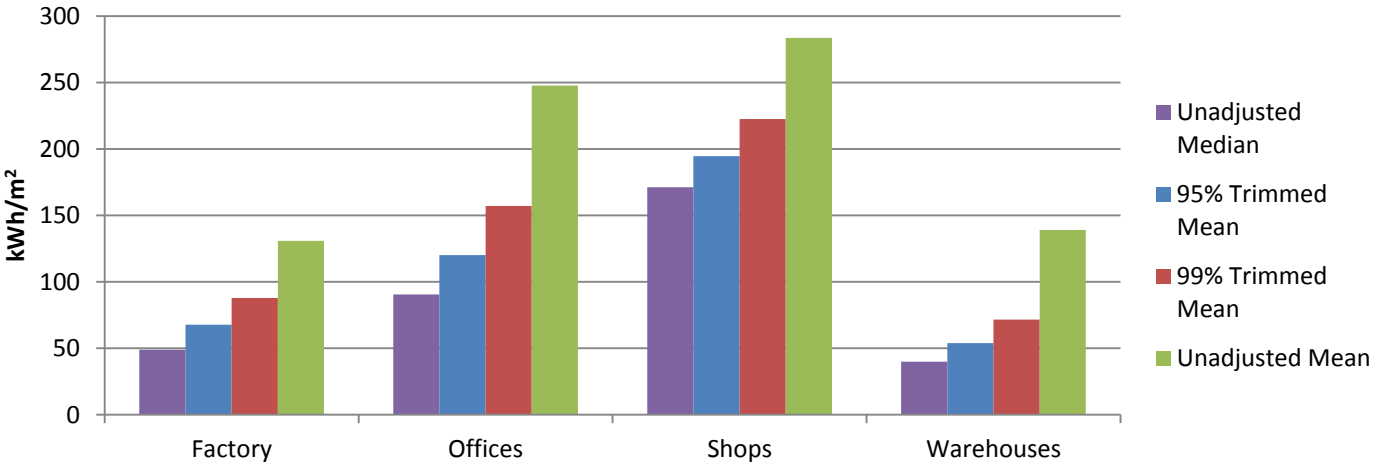
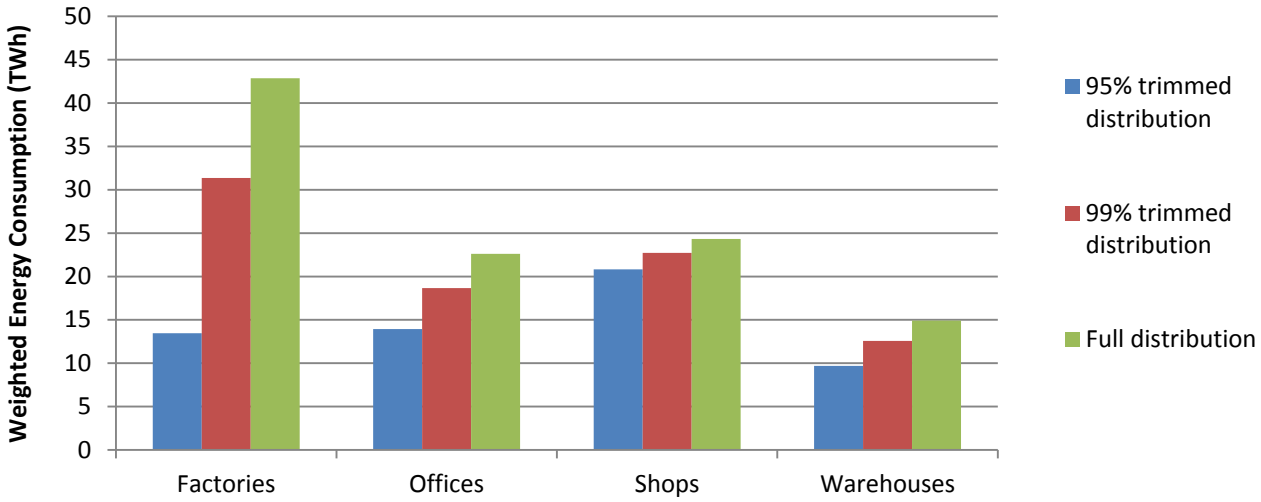


Figure 1.6: Comparisons of electricity intensity using a 95% or 99% trimmed mean, an unadjusted mean or median, 2012



[11] Individual consumption values over 1GWh have been excluded due to scale. This has removed 0.7% of the distribution.

Figure 1.7: Comparisons of weighted electricity consumption between a distribution trimmed at 95% or 99% and the full distribution, 2012



As a further validation, ND-NEED also only includes values for electricity or gas consumption with more than 100 kWh per year. This is consistent with the methodology used for the DECC sub-national consumption statistics.

In this report, when electricity and gas intensity are reported in Chapters 3 and 4, tables use the median. The additional tables published alongside the report are also available for the 95% trimmed mean.

Chapter 2 uses the full distribution as it is looking at total consumption.

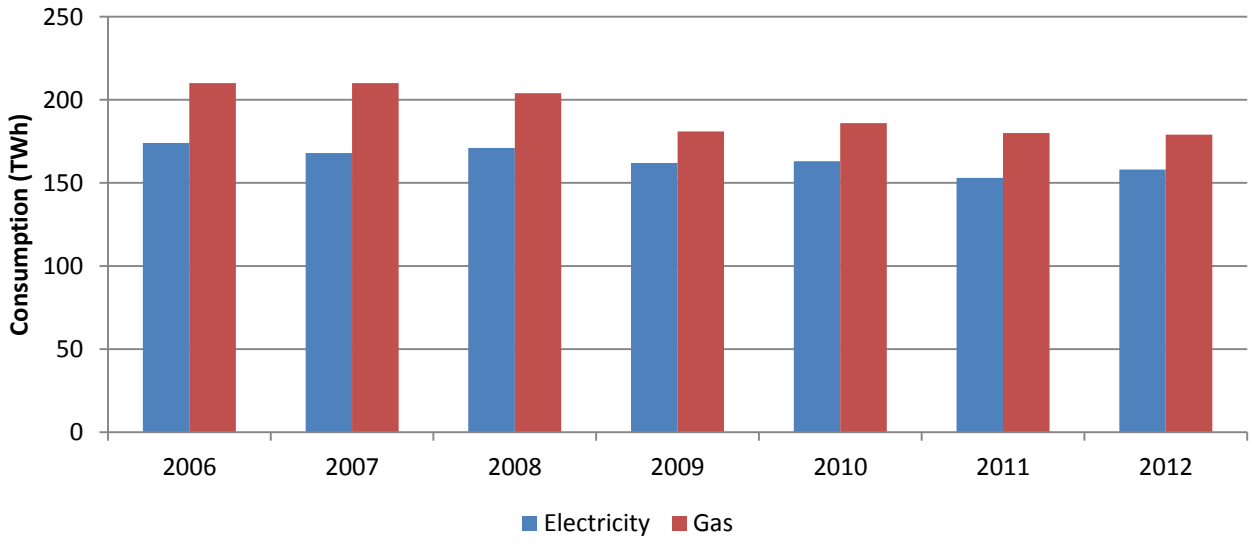
Chapter 2: Results – Consumption Trends

This chapter looks at consumption trends for non-domestic electricity and gas consumption. The chapter uses weighted data (as explained in Section 1.3) because the matched records are grossed to the total consumption figures for the buildings in scope. Records for non-domestic consumers not considered buildings were out of scope for this analysis[12]. Although these are not buildings they will have energy consumption so they have been included in the analysis to assess the coverage of ND-NEED and develop the weighting. Therefore the total consumption reported differs from that in seen in Annex A. As outlined in Chapter 1, ND-NEED covers rateable non-domestic premises in England and Wales.

2.1 Non-domestic Consumption Trends [13]

In 2012, electricity consumption in ND-NEED was 3 per cent higher compared to 2011 but gas consumption was 0.2 per cent lower (see Figure 2.1). Electricity consumption has fluctuated slightly year on year but overall fell by 9 per cent since 2006 to 158 TWh in 2012. Gas data in ND-NEED are presented on a temperature adjusted basis. On this basis, total gas consumption has fallen by 15 per cent since 2006 to 179 TWh in 2012 and fell in each year except 2010 as consumption picked up following the recession.

Figure 2.1: Electricity and gas consumption of England and Wales, 2006-2012



[12] Non-buildings are defined as premises listed by the NDR as advertising rights and premises, beach huts, car parks, caravan parks, quarries and telecoms. Full details about the non-domestic rating lists are available here. https://www.gov.uk/government/statistics/central-local-rating-lists-non-domestic-rating-in-england-wales

[13] Weighted consumption trends of non-domestic buildings defined as in-scope by the Valuation Office Agencies Non-Domestic Ratings list. This excludes military, religious, agricultural, and some crown estate buildings. Gas data has been weather corrected.

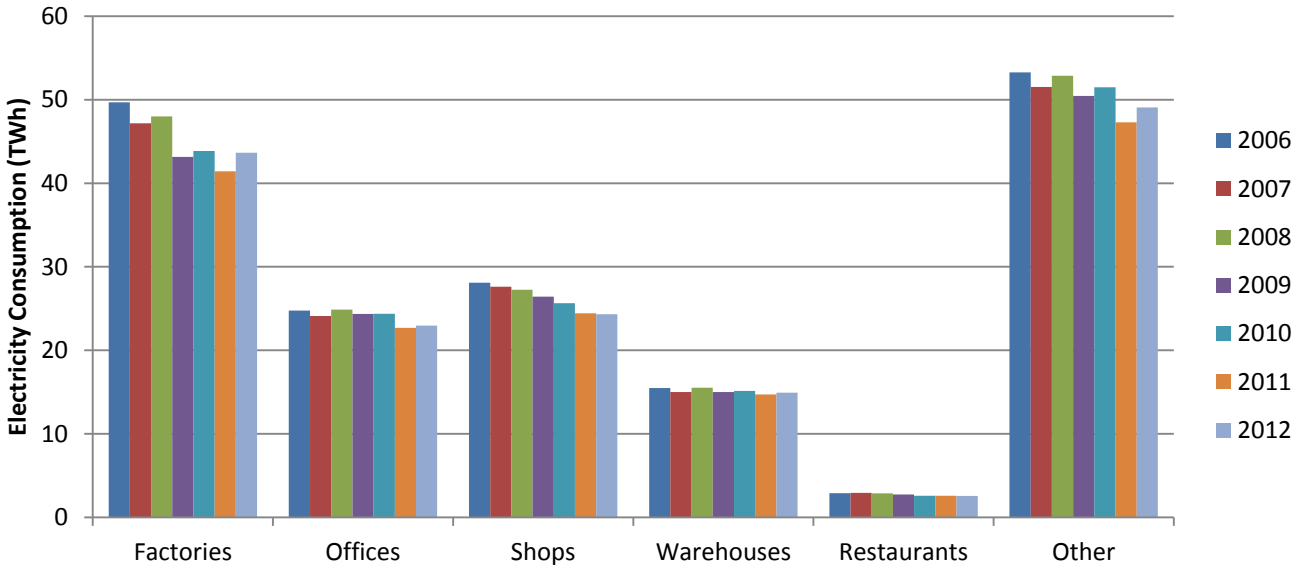
2.2 Energy Consumption by Building Type

Electricity

ND-NEED enables analysis of energy consumption by building type. Over two thirds of non-domestic electricity consumption is consumed by factories, shops, offices and warehouses.

The "other" category consists of all other building types (excluding non-buildings), but also includes records with a missing building type.[14] This group will include building types that don't have a summary valuation record in the VOA data (e.g. schools, hospitals) that contains key information such as floor area. Electricity consumption in all building types fell between 2006 and 2012. The largest reduction in electricity consumption was seen in shops where consumption fell by 14% over the period, and average of 2.4 per cent per annum. The smallest change was in restaurants where consumption fell by 4 per cent.

Figure 2.2: Electricity consumption (TWh) for each building type for each year in ND-NEED, 2006-2012



Analysis was undertaken into the consistency of the building types provided by the VOA with Experian. It identified that many restaurants were listed as shops in VOA, and this uncertainty of classification must be noted when making comparisons across building types. The reason for the difference is that the VOA classifies buildings for valuation purposes. For example, a restaurant within a shopping centre may be valued as a shop based on the potential value of sales from that premises.

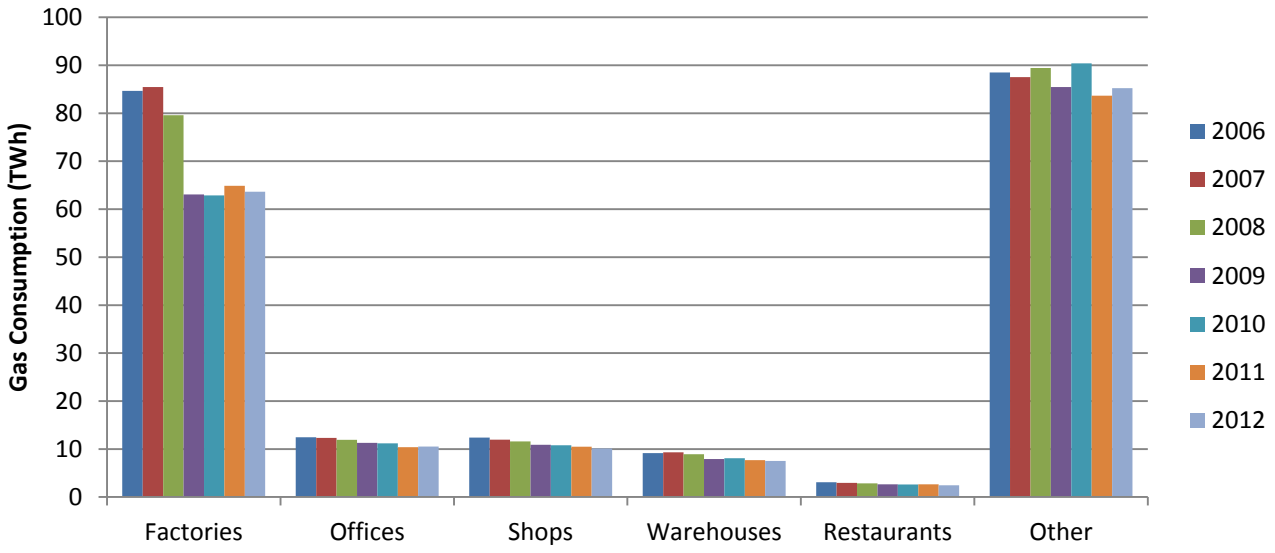
[14] There are 164,000 records in matched sample classified as Other. Of these, 76,000 have a missing building type and 13,000 have a miscellaneous building type. The VOA miscellaneous category includes a number of public sector building.

Gas

Factories, offices, shops and warehouses accounted for over half of gas consumption in 2012. Around one third of all gas consumption is by factories, which use almost 6 times more gas than any other single building type. In 2009, gas consumption by factories fell by 21 per cent compared to the previous year. This was the first full year of the recession and this large drop in consumption is coupled with a 10 per cent reduction in Gross Value Added of the Manufacturing sector (see Section 4.3). Furthermore, between 2006 and 2012 there was a 12 per cent reduction in the number of factories with valid consumption reported for those meters as manufacturing output in particular fell during the recession which implies that these ceased production over that period.

Over the period as a whole, gas consumption fell in all except “other”, with factories (25%) and restaurants (21%) the largest.

Figure 2.3: Gas consumption (TWh) for each building type for each year in ND-NEED, 2006-2012

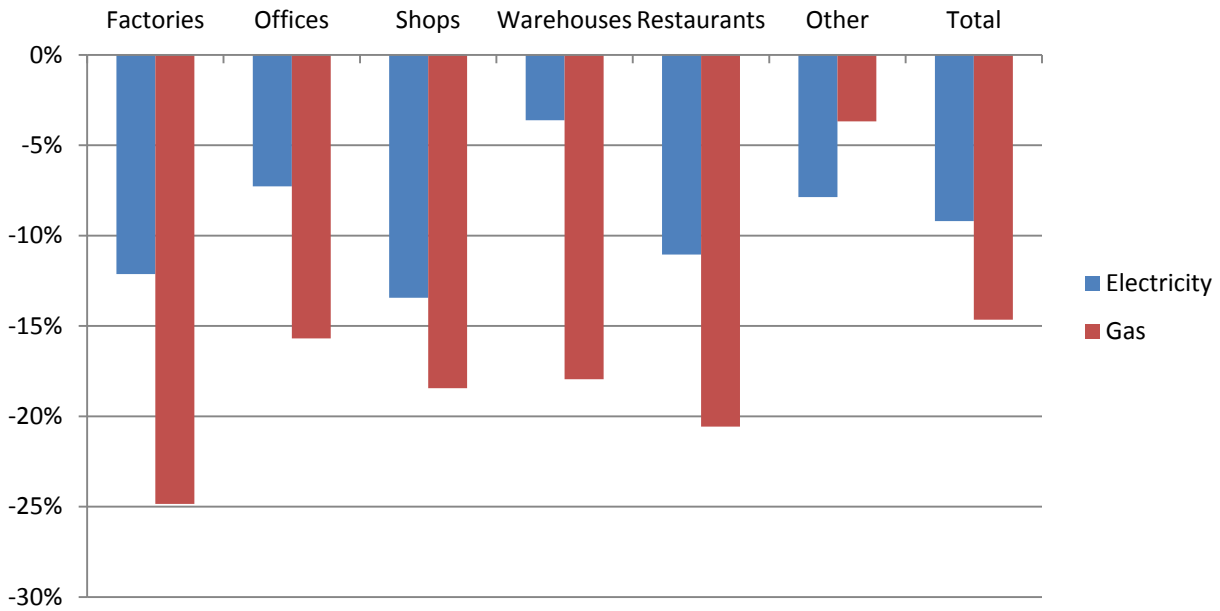


Overall electricity & gas changes

Electricity and gas consumption fell in all building types between 2006 and 2012. The largest reductions in electricity consumption were for shops and factories with reductions of 13 and 12 per cent respectively (Figure 2.4). The largest reductions in gas consumption were for factories and restaurants with reductions of 25 and 21 per cent respectively. Both factories and restaurants are more likely to use gas for businesses processes (e.g. manufacture & cooking) than the other building types.

The reduction in gas consumption was greater than the reduction in electricity consumption for the building types in the analysis. However, for the other category, there was a greater reduction in electricity consumption than for gas consumption.

Figure 2.4: Percentage change in energy consumption between 2006-2012 by building type

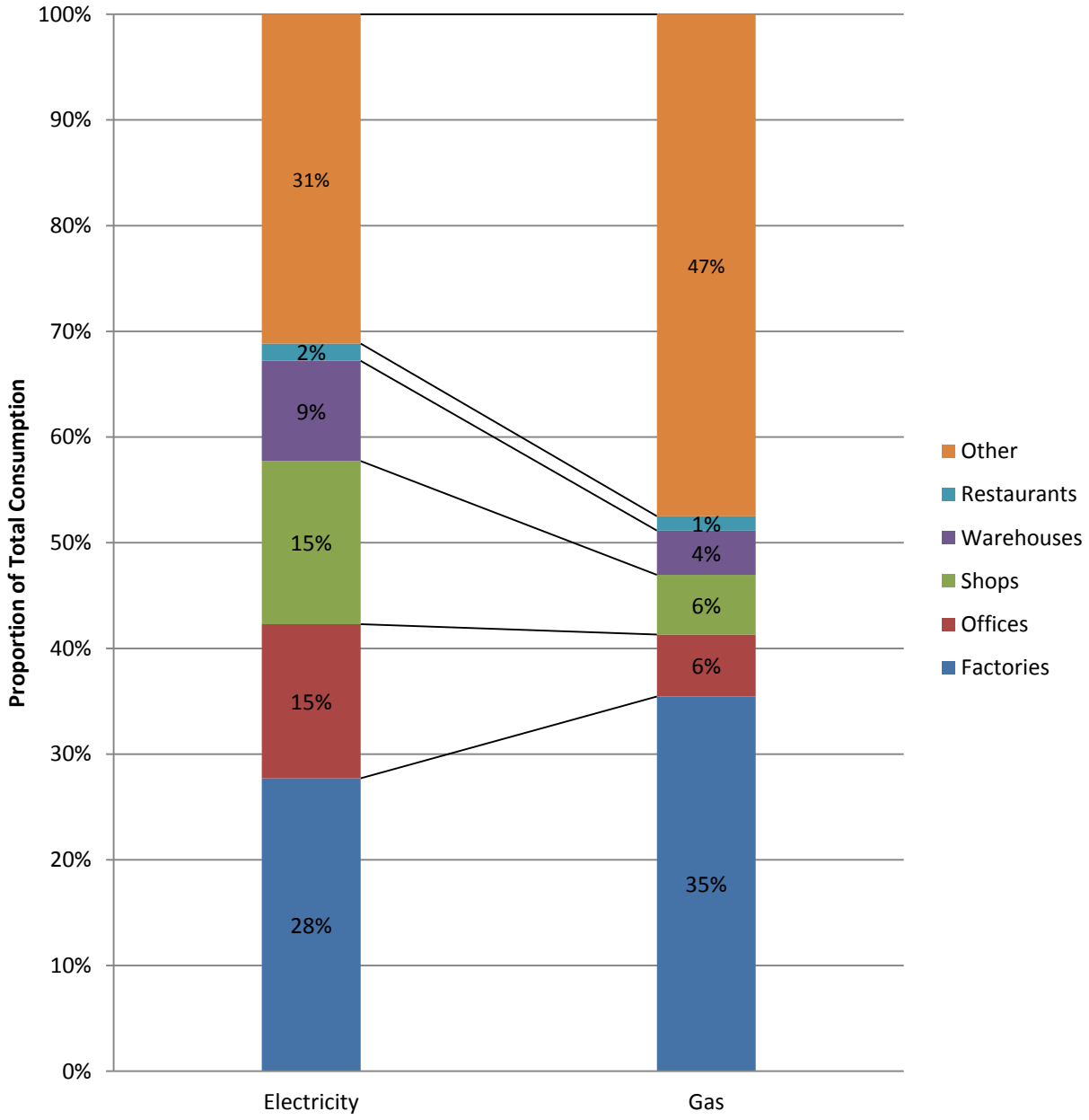


Looking specifically at the period 2007 to 2009, overall gas consumption fell by 13 per cent compared to 4 per cent for electricity. The electricity data are not weather corrected and 2009 was colder than 2007 but as is clearly illustrated by factories and restaurants, gas consumption fell by significantly more reflecting the impact of the recession greater on their heating and process / cooking demand more than on electricity used for more general purposes (e.g. lighting).

2.3 Proportions of Consumption by Building Type

Factories account for a larger proportion of total gas consumption than total electricity consumption (see Figure 2.5). However, for all other main building types, electricity consumption accounts for a greater proportion of consumption than their gas consumption.

Figure 2.5 – Proportion of total consumption by each building type, 2012



ND-NEED allows us to observe the trends in different building types for electricity and gas consumption which helps our understanding of energy usage across the non-domestic sector. Factories, offices and shops account for the largest amounts of energy consumption. The "Other" category is large and nearly 80 per cent of consumption in this category is not assigned to a building type (i.e. is missing) in ND-NEED due to record without Summary Valuation records.

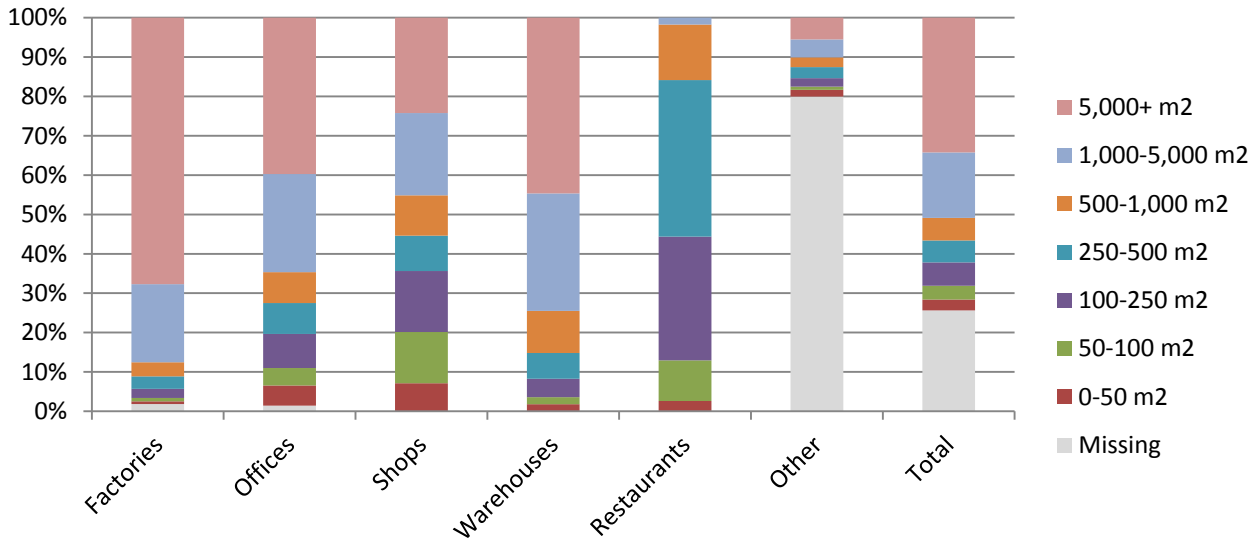
2.4 Energy Consumption by Floor Area and Building Type

Figures 2.2 and 2.3 showed the amount of consumption per building type in ND-NEED. This can be further disaggregated to look at the proportions of this consumption by size of floor area. Many of the other building types do not have floor area data as can be seen in Figure 2.6. It should be noted that as valid floor areas are required this analysis uses a smaller sample of the overall ND NEED data.

Electricity

Figure 2.6 shows the proportion of electricity consumption by floor area and building type for 2012. Overall, 47 per cent of total electricity consumption is from buildings with a floor area of over 5,000 m^2 (excluding buildings with unknown floor area)

Figure 2.6: Proportion of total electricity consumption by each floor area band by building type[15], 2012

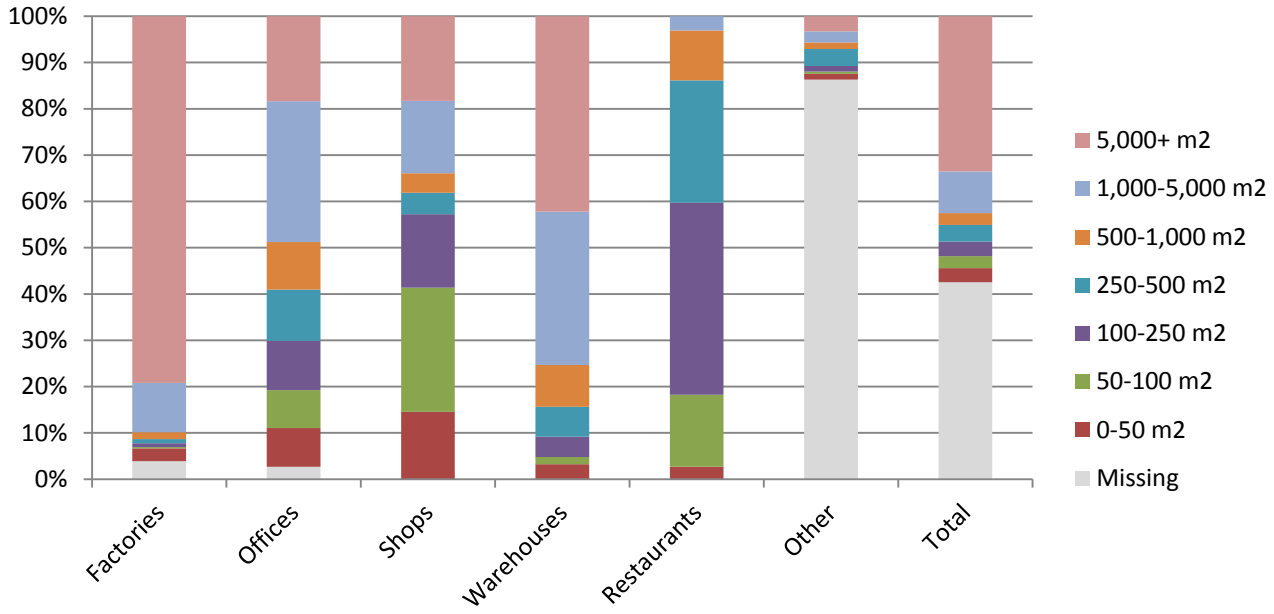


Gas

Figure 2.7 shows the proportion of gas consumption by floor area and building type for 2012. Factories account for 59 per cent but outside this sector the share of gas consumption between building sizes is more evenly distributed than for electricity. For factories, 5 per cent of these have a floor area of over 5,000+ m^2, account for 79 per cent of factory consumption. Given the dominance of factories in gas consumption overall, 58 per cent of total gas consumption (excluding missing floor area) is from buildings with a floor area of over 5,000 m^2.

[15] Those with a missing building type also often have missing area bands. This is the reason for the high amount of total consumption from missing in Figure 2.6.

Figure 2.7: Proportion of total gas consumption by each floor area band by building type[16], 2012



[16] Those with a missing building type also often have missing area bands. This is the reason for the high amount of total consumption from missing in Figure 2.6.

2.5 Energy Consumption by Business Size

ND-NEED also contains data about employment at both the site and organisational level. For this analysis organisational level employment has been used, which is a better proxy for organisational management and corporate functions. Business size is derived from Experian business data and is based on a one off estimate for 2013 and therefore a building in ND-NEED will be classified within the same organisational size band in each year.

Not all records in ND-NEED have a business size variable and therefore the (un-weighted) number of records which also have floor area are 374,000[17] buildings for electricity intensity and 183,000 buildings for gas intensity. Therefore the total consumption does not sum to the national consumption figure. Median electricity use within the sample matched to Experian is 21-27 per cent higher than the full dataset. For gas, the Experian median is just 2-4 per cent higher. This implies that the Experian matches are higher for larger consuming sites thus users should note there will be some bias to analysis using Experian data.

The category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which have fewer than 250 employees. This analysis uses employee numbers only to determine business size and does not look at turnover or balance sheet needed to comply with the formal definition of SME.

The 2014 BIS business population statistics show that 99% of businesses in England & Wales employ less than 50 people[18]. However, many of these will not have a premises or area defined as a ratable area and are therefore out of the scope of ND-NEED. Just 0.1 per cent of businesses employee over 250 people but many of these are very large and hence account for a significant share of the non-domestic building stock and energy use. Many small businesses e.g. roving builders, plumbers etc., do not operate from a building.

Electricity

Figure 2.8 shows electricity consumption by business size.[19] Although consumption for all business sizes fell over the period, there are fluctuations over the period 2008-2011. Electricity data are not temperature adjusted so this could be due to the temperature changes in these years as well as effects of the economic recession. Very large and micro businesses are using the highest amount of electricity but only two thirds of total national consumption is represented in this graph. Although very large businesses account for 0.1 per cent of total businesses, they account for over a quarter of all electricity consumption.

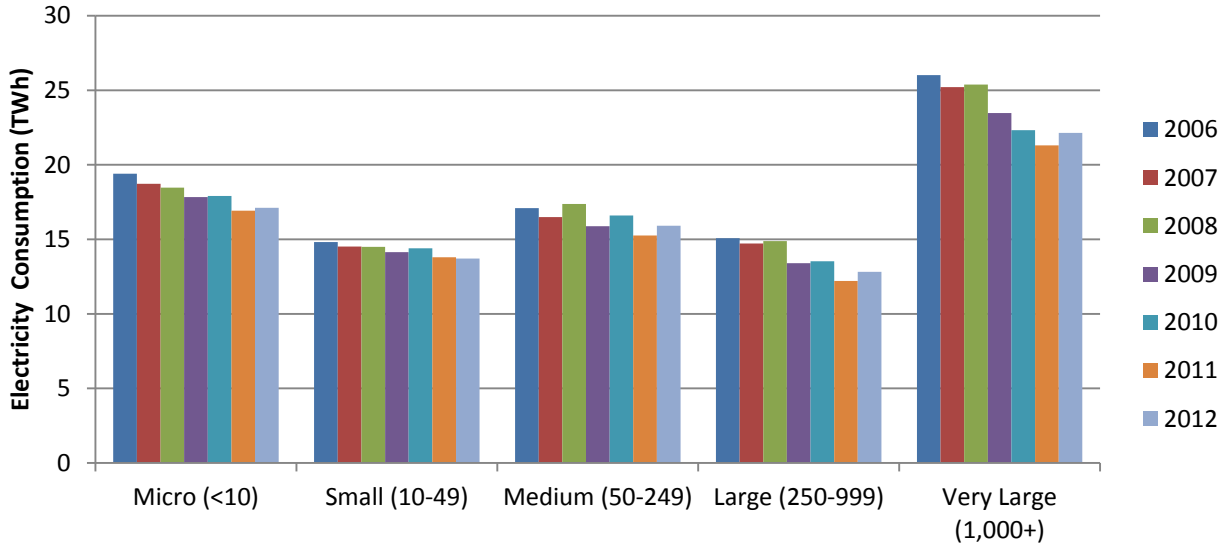
Using this sample of the data with business size matched, electricity consumption overall fell by 12 per cent between 2006 and 2012. Larger businesses observed larger savings with large and very large businesses reducing consumption by 15 and 16 per cent respectively over the period.

[17] This is larger than the number used for the intensity analysis in Chapter 4. This is because intensity requires the floor area variable, which not all of the above records will have.

[18] BIS Population Estimates – 2014 https://www.gov.uk/government/statistics/business-population-estimates-2014. These statistics include all businesses regardless of whether they have premises.

[19] Only consumption for records with matched Experian business data. Between 75-85 TWh of electricity consumption each year is not included in this analysis.

Figure 2.8: Total electricity consumption by business size, 2006-2012[19]



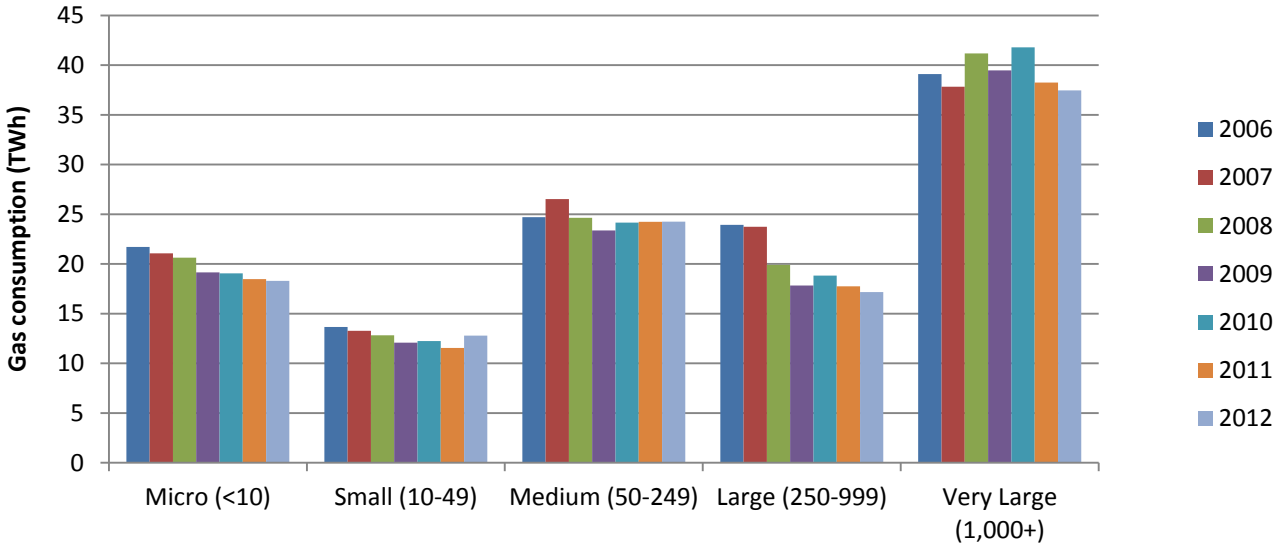
Gas

Figure 2.9 shows gas consumption by business size.[20] Consumption for all business sizes, except medium, fell over the period. Although very large businesses account for 0.1 per cent of businesses, they account for over one third of gas consumption.

Using this sample of the data, gas consumption overall fell by 11 per cent between 2006 and 2012. Large businesses observed savings of 28 per cent but very large business use fell by just 4 per cent.

[20] Only includes records with business data. Between 69-87 TWh of gas consumption each year are not included in this analysis.

Figure 2.9: Total gas consumption by business size, 2006-2012[20]



Looking at consumption by business size allows better consideration of the differences in usage between small and medium businesses as compared to larger businesses. Chapter 4 analyses businesses sizes in greater detail.

Chapter 3 - Results – Electricity and Gas Intensity Analysis

The previous chapter looked at energy consumption trends at the national level[21]. In the current analysis, energy intensity has been defined as kWh per m^2. Floor area in ND-NEED is a fixed value for each building because the data has been taken from a 2012 version of the 2010 Ratings List. Some meters only have valid consumption readings in certain years and therefore the overall floor area included in the analysis does vary year on year.

This analysis compares the change in energy consumption in these buildings of different types and sizes. Using electricity and gas intensity allows shops and factories (for example) to be compared in a more meaningful way as their energy intensities are more similar than their energy consumption.

This chapter uses the median as the primary measure, and at times discusses the 95% trimmed means that are discussed in Section 1.4. Non-buildings are excluded from this chapter.

3.1 Electricity and Gas Intensity – Consumption per m^2 – Summary Statistics

Analysing the electricity and gas intensity of a building (kWh per m^2) provides an insight into the changing patterns of energy usage by a building across different building sizes, company sizes and building types.

Electricity

Table 3.1 shows the distribution and trend of electricity intensity for all building types between 2006 and 2012. Median electricity intensity has fallen every year since 2006, and in 2012 was 18 per cent lower than in 2006 for all building types.

Table 3.1: Non-domestic electricity intensity (kWh/m^2) summary statistics, 2006-2012

Year	Observations[22]	95% Trimmed Mean	Lower Quartile	Median	Upper Quartile
2006	624,000	147	34	98	231
2007	624,000	143	32	96	229
2008	625,000	134	28	89	217
2009	630,000	130	25	86	212
2010	629,000	127	23	83	209
2011	627,000	123	22	81	203
2012	626,000	120	22	80	204

[21] Excluding non-buildings.

[22] Rounded to the nearest thousand. The 95% trimmed mean will have approximately 5% less observations.

Gas

Table 3.2 shows the distribution and trend of gas intensity for all building types for each year between 2006 and 2012. The median gas intensity fell every year from 2006 to 2011 before increasing slightly in 2012. In 2012, median gas intensity was 22 per cent lower than 2006 for all building types.

Table 3.2: Non-domestic gas intensity (kWh/m^2) summary statistics, 2006-2012

Year	Observations[23]	95% Trimmed Mean	Lower Quartile	Median	Upper Quartile
2006	266,000	345	88	202	479
2007	269,000	327	82	193	459
2008	271,000	309	77	186	437
2009	271,000	280	68	168	398
2010	270,000	276	67	168	396
2011	270,000	265	60	155	379
2012	268,000	252	60	158	370

[23] Rounded to the nearest thousand. The 95% trimmed mean will have approximately 5% less observations.

3.2 Electricity and Gas Intensity – Consumption per m^2 – Building Types

When considering the electricity and gas intensity for different building types it is important to consider the average floor areas as shown in Table 3.3. The previous chapter reported that factories have the highest total energy consumption. However, they do not have the highest intensities on this metric, and this is because factories have a larger average floor area than many other building types.

Table 3.3: The mean and median floor areas and the median electricity and gas intensities for the analysis group as well as other building types, 2012

Building Type	Mean Floor Area (m^2)	Median Floor Area (m^2)	Median Electricity intensity (kWh/m^2)	Median Gas Intensity (kWh/m^2)
Factories	636	158	35	78
Offices	315	97	84	175
Shops	215	76	155	194
Warehouses	945	238	30	60
Restaurants	172	126	244	443
Other Building Types	465	199	65	166
All Building Types	438	114	80	158

Electricity

Figure 3.1 shows median electricity intensity for each year between 2006 and 2012. The electricity intensity of warehouses is the lowest of the building types. In 2012, the median electricity intensity of warehouses was 30 kWh/m^2, a 22 per cent improvement compared to 2006. The next lowest is factories, for which intensity has decreased by 27 per cent over this time period. However, the intensity of factories and warehouses rose slightly in 2012, these are the only increases of electricity intensity between 2006 and 2012.

The intensity of offices, shops, and restaurants fell by 20, 12 and 13 per cent respectively between 2006 and 2012. Between 2006 and 2012, the electricity and gas intensity of other building types fell by 8 per cent.

The largest year on year reductions in electricity intensity were in 2009 with overall reductions of 3 per cent, including reduction in intensity of 7 per cent for warehouses and factories.

Figure 3.1: Median electricity intensity for non-domestic buildings by building type, 2006-2012

Gas

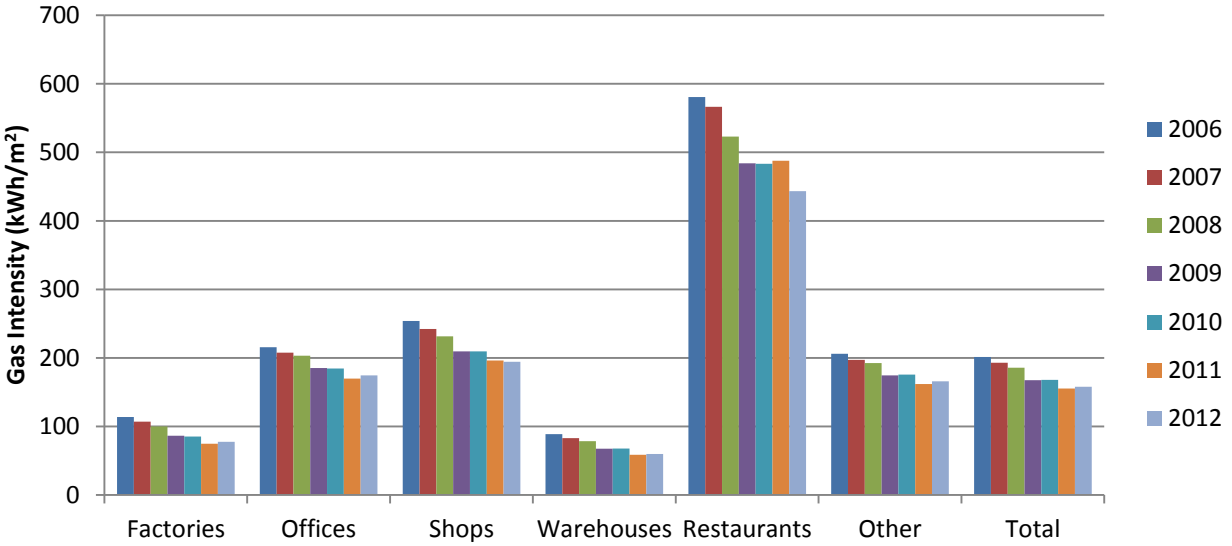
Figure 3.2 shows a similar pattern for gas intensity between 2006 and 2012. In 2012, the median gas intensity of warehouses was 60 kWh/m^2, a reduction of 33 per cent compared to 2006. The next lowest is factories, for which intensity decreased by 32 per cent over the time period. However, the intensity of factories, warehouses and offices slightly increased in 2012, whilst the intensity of restaurants increased in 2011. These are the only increases of gas intensity between 2006 and 2012.

The intensity of shops, restaurants and offices fell by 23, 24 and 19 per cent respectively over the period. The intensity of other building types fell by 19 per cent over this time period and also saw a small increase in 2012.

The largest year on year reductions in gas intensity were in 2009 with overall reductions of 10 per cent, including reduction in intensity of 14 per cent for warehouses and factories and a reduction of 10 per cent shops. 2009 was the year in which the UK officially began its economic recession.

Although 2009 saw the largest overall reduction, there were large reductions in intensity in 2011 all building types except for restaurants. In the following year, all building types saw an increase in intensity, other than shops (1 per cent fall) and restaurants (9 per cent fall).

Figure 3.2: Median gas intensity for non-domestic buildings by building type, 2006-2012



Summary

There have been large reductions in intensity for both electricity and gas between 2006 and 2012. The changes are generally greater for the main building types than for the other building types.

In 2012, the Gross Value Added of Manufacturing was 9 per cent lower than it was in 2006[24] whilst Gross Domestic Product was unchanged between 2006 and 2012[25]. Between 2008 and 2012, there was a 9 per cent fall in energy consumption per unit of output for manufacture and 8 per cent for services. Therefore a combination of reduced output and better efficiency will have contributed to the falls in energy consumption between 2008 and 2012.[26]

In addition to economic impacts, a large proportion of the reduction in intensity is likely to be due to increased energy efficiency such as more efficient, lighting, heating and industrial processes. Section 4.3 summarises the different government policies that may have impacted on intensity in the non-domestic sector.

[24] ONS Blue Book 2013, Table 2.4 Gross value added at basic prices: by industry: Chained Volume Indices

[25] ONS Blue Book 2013, Gross Domestic Product: chained volume measures

[26] Energy Consumption in the UK tables 1.15

3.3 Electricity and Gas Intensity by Floor Space

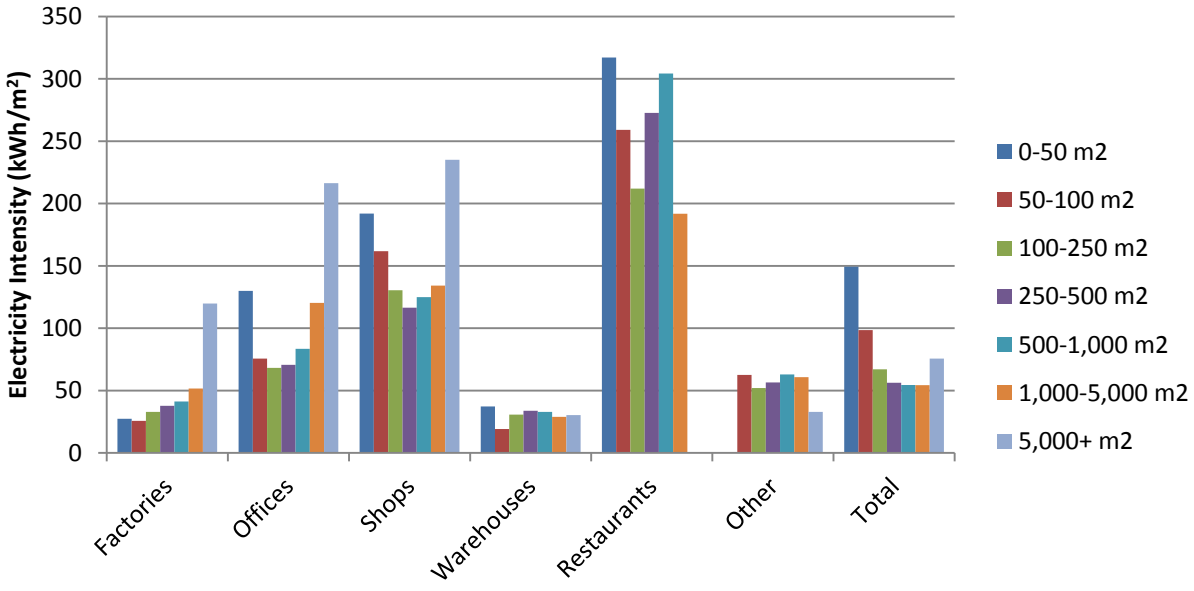
The floor space of a building is a key factor in the amount of electricity and gas consumption of a building. Chapter 2 reported that 47 per cent of electricity consumption and 58 per cent of gas consumption is from buildings with a floor area of over 5,000 m^2 (see Section 2.4). An understanding of how intensity varies by different floor areas is important to better understand how energy efficiency can be improved in non-domestic buildings.

Electricity

Figure 3.3 displays the difference in electricity intensity for each building type against floor area. For offices and shops, electricity intensity decreases as the area band gets larger, until at least 250 m^2 at which point the electricity intensity begins to increase. For warehouses, electricity intensity is similar across the size bands. For factories, electricity intensity increases as the floor size increases. There is no clear pattern for restaurants reflecting the diversity of food and accommodation across this sector but the large restaurants (over 1,000 m^2) have the lowest energy intensity. For factories, offices and shops, the highest intensity is buildings over 5,000 m^2 and for offices and shops this is followed by those less than 50 m^2.

Buildings with the smallest and largest floor spaces often have the highest energy intensities. The external surface area relative to total size of a building is a very important factor for heat loss because 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.

Figure 3.3: Median electricity intensity for non-domestic buildings by building type and floor area, 2012[27]



[27] All floor areas under 15m^2 are removed by the outlier analysis. Floor area for under 50m^2 in other category removed as floor areas considered unreliable.

A fall in intensity does not necessarily mean an increase in energy efficiency as there may be structural differences in the activities undertaken in businesses across different building sizes. For example, large shops selling electrical goods (e.g. TVs on display) will have higher intensities than a similarly sized store selling clothes. The electrical goods store consumption would be directly impacted by the type of products displayed.

Gas

Figure 3.4 displays the difference in gas intensity for each building type against floor area. The gas intensity of restaurants is very different to the other building types. The difference in intensity between floor sizes is small for restaurants. This is likely because most restaurants will use gas for similar purposes (e.g. cooking).

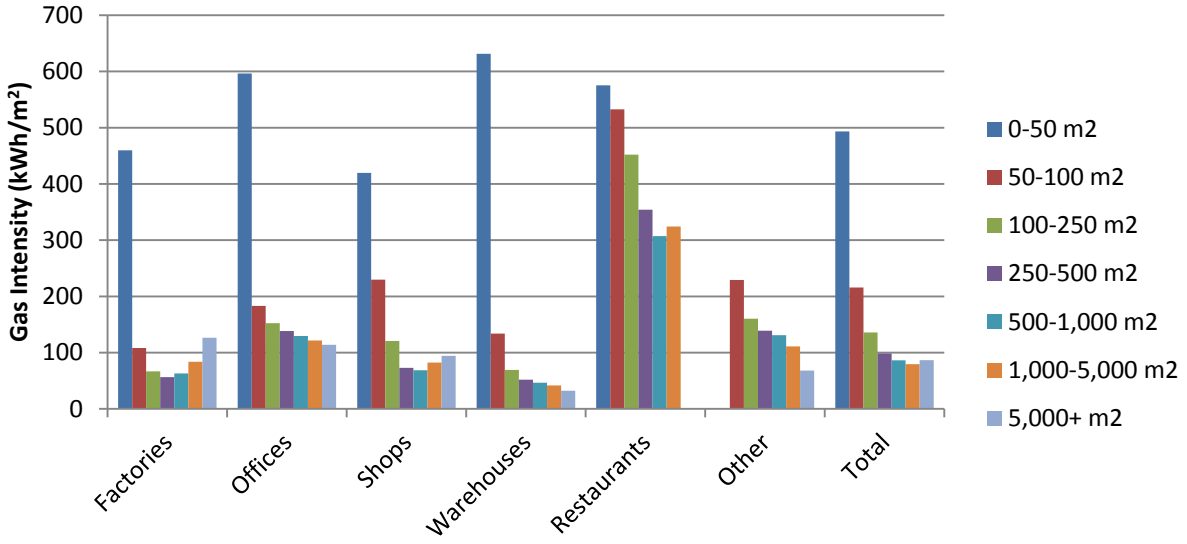
For the other building types shown there is a trend, where by gas intensity decreases as the floor area bands increase. The exception is factories which increase in the largest floor area band. For all buildings, the gas intensity for buildings for floor area of 0 to 50 m^2 is the highest of all floor areas.

Similarly to restaurants, it is likely that for many factories (and possibly some shops and offices) gas consumption does not just represent space and water heating but also industrial processes. It is not possible using ND-NEED to understand the different usages within a building. However, industrial processes would help to explain the increased gas intensity of factories over 5,000 m^2 as well as that, as mentioned in Chapter 2, 58 per cent of all (non-missing) gas consumption is consumed by factories over 5,000 m^2.

The large difference in gas intensity between the low floor areas and the larger floor areas may suggest that there are large improvements in energy efficiency that could be made in these small buildings. However, it may be more difficult for small buildings to improve their space and water heating due to factors such as: not owning the building, having budget limitations or not having the expertise to notice and improve their efficiency.

As noted for electricity, an element of the very high gas intensity for other building types under 50 m^2 may be related to incorrect matching.

Figure 3.4: Median gas intensity for non-domestic buildings by building type and floor area, 2012



Intensity by floor space follows different trends for electricity and gas. For electricity, the smallest and largest buildings have the highest intensities, whereas for gas it is the smallest buildings with the highest intensity. Better understanding of how electricity and gas intensity varies across building sizes is important to help improve energy efficiency in the non-domestic sector. However, ND-NEED cannot distinguish between the end uses for electricity and gas. It is likely that a large amount of gas consumption from factories and restaurants is for industrial and business processes as opposed to space and water heating.

Chapter 4 – Business Size Analysis

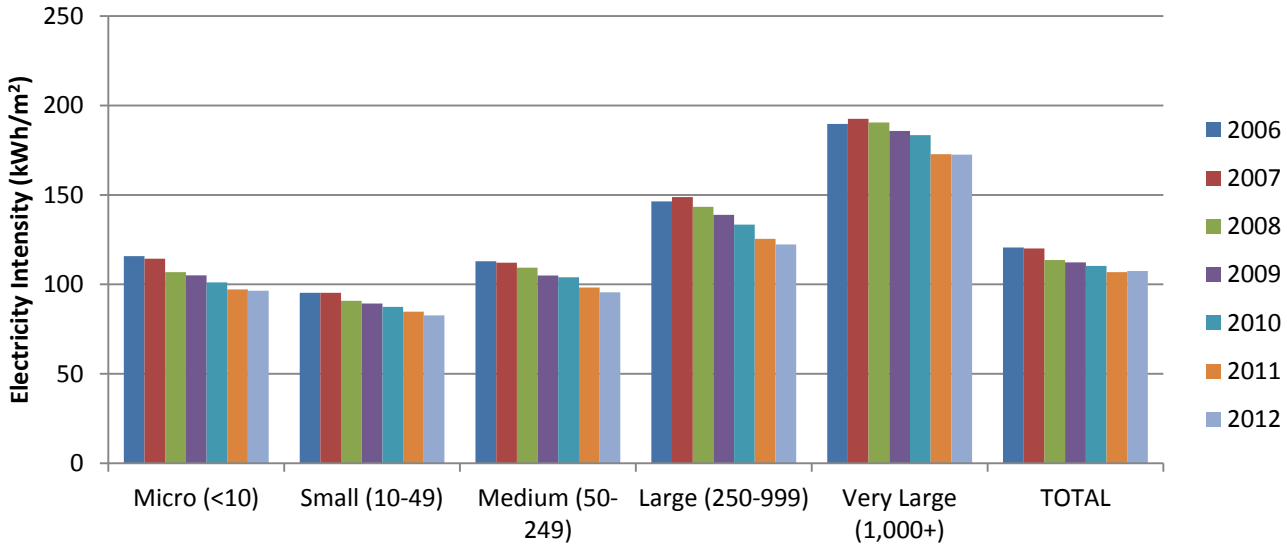
ND-NEED is able to look at electricity and gas intensity (with respect to floor area) by the size of the business. This can help to understand if larger businesses are using energy more efficiently than smaller businesses. Business size is based on Experian business data and the data used is a fixed estimate; therefore a building in ND-NEED will be classified as belonging to the same organisational level business size for each year. Records are only included in this analysis if they have floor area[28].

As described in Section 2.5, not all building records in ND-NEED have been successfully matched to the Experian data and hence don't have a business size variable. Therefore the (un-weighted) number of records in the following analysis is 340,000 buildings for electricity intensity and 161,000 buildings for gas intensity. The analysis in this chapter is based on the business size with respect to employment at the overall business level rather than at site level.

Electricity

Figure 4.1 shows electricity intensity by business size between 2006 and 2012. Electricity intensity per m^2 was highest for very large businesses, followed by large businesses and micro businesses. The median electricity intensity for each business size has decreased between 9 and 17 per cent between 2006 and 2012.

Figure 4.1: Median electricity intensity for non-domestic buildings by business size, 2006-2012



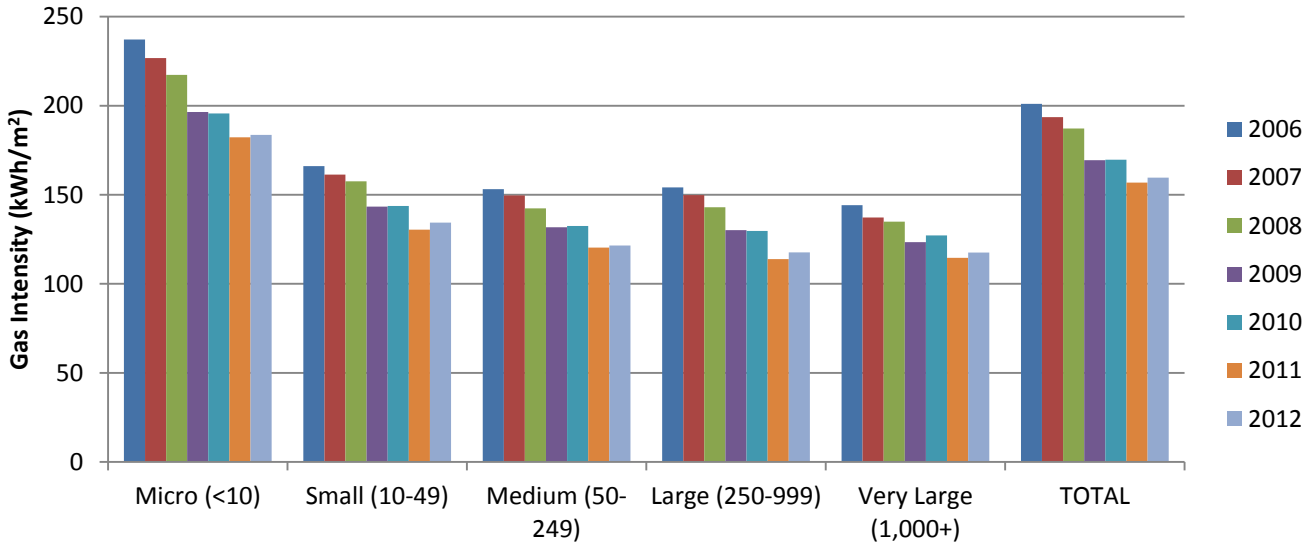
[28] There are 40,000 less electricity records in this analysis than in the Business Size Analysis in Chapter 2 because information on floor area data are not available.

Gas

Figure 4.2 shows gas intensity by business size between 2006 and 2012. Gas intensity is highest for micro businesses. The gas intensities for all other business sizes are roughly similar.

The gas intensity of large businesses has decreased by 24 per cent between 2006 and 2012, and for micro sized businesses by 23 per cent over this period. The intensities of small, medium and very large businesses have decreased by an average of 18 to 20 per cent between 2006 and 2012.

Figure 4.2: Median gas intensity for non-domestic buildings by business size, 2006-2012



Electricity and gas intensities by business size have similar trends to those seen in the floor area analysis when all building types are looked at. As different building types have widely varying intensities, it is important to compare the intensities for different building types. There are differing trends for electricity and gas usage with very large businesses having the highest electricity intensity but one of the lowest gas intensities.

4.1 Electricity and Gas Intensity by Business Size – Building Types

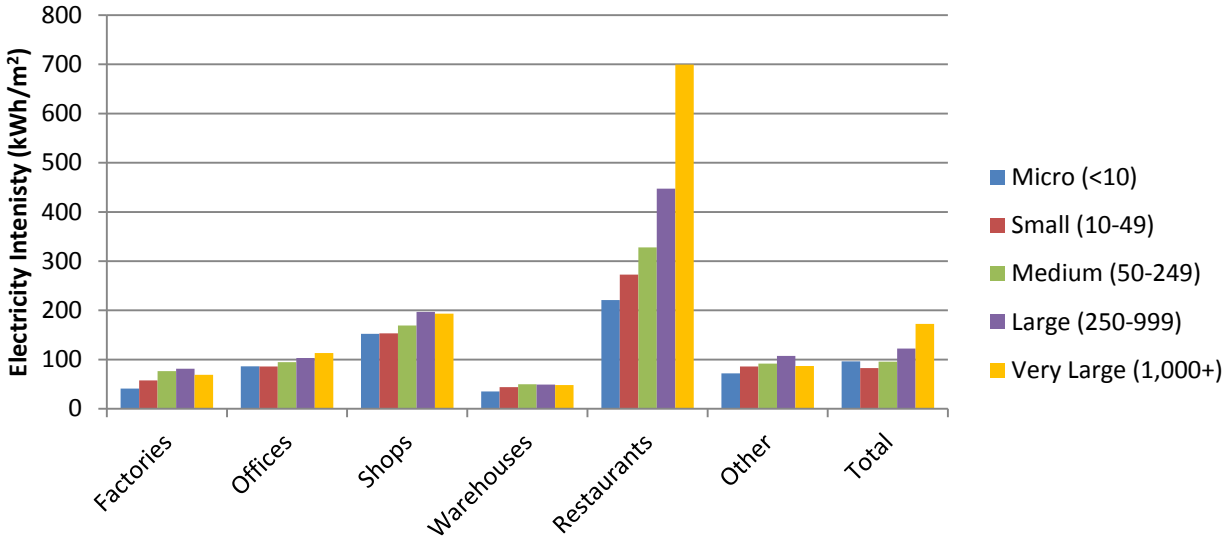
To better understand the electricity and gas intensity of different business sizes, the types of buildings and their intensity can be analysed.

Electricity

Figure 4.3 displays the median electricity intensity of each building type by the business size. Shops and offices have similar trends, where the small businesses have the lowest electricity intensity and the very large businesses have the highest electricity intensity. For factories and warehouses, the smallest business sizes have the lowest intensities.

Restaurants have the highest overall electricity intensity and the intensity increases notably by business size. Restaurants and factories may be using electricity and gas for business process, more so than lighting and heating which will account for the greatest energy use in other building types.

Figure 4.3: Median electricity intensity by building type by business size, 2012

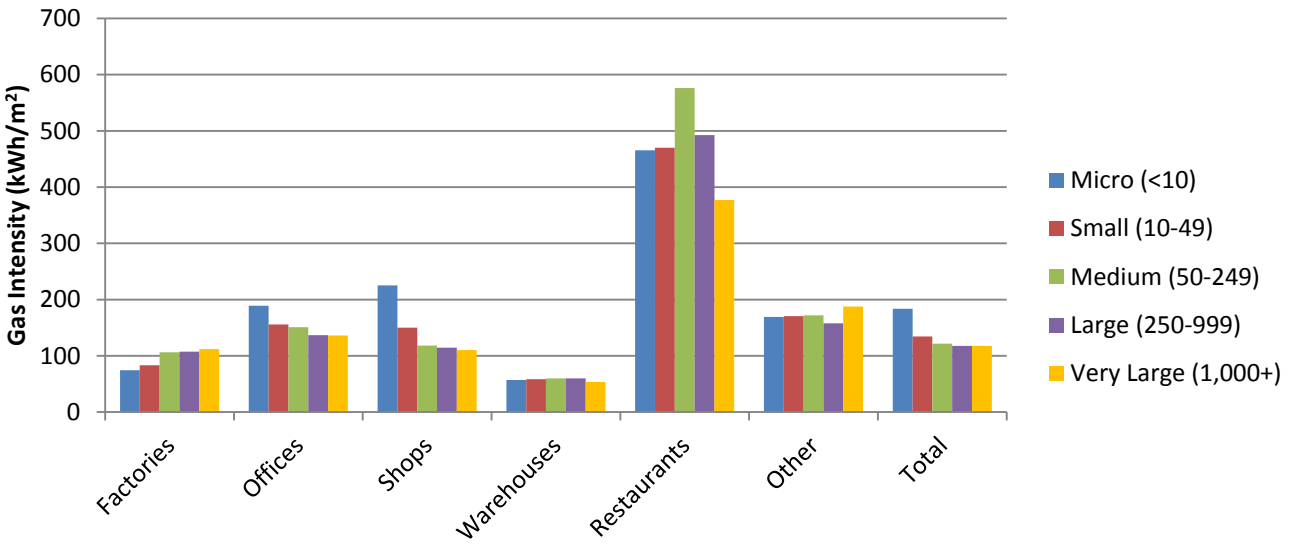


Gas

Figure 4.4 displays the gas intensity of each building type by business size. For offices and shops, gas intensity is lower for larger businesses. Larger factories have higher gas intensity and warehouses are fairly consistent. For restaurants, the intensity is highest for medium businesses, followed by large businesses. However, very large businesses have the lowest intensity, perhaps reflecting a pattern of the type of restaurant operating in the size band.

For other building types, there is a small difference where very large businesses have slightly higher median gas intensity than the other sizes.

Figure 4.4: Median gas intensity by building type by business size, 2012



Analysis of electricity and gas intensity of business size shows different trends for the different building types. For electricity, larger businesses are more energy intensive per m^2. However, for gas this pattern is less clear. Very large businesses do not have the highest intensities for any of the building types analysed. Micro businesses have the highest intensities for offices and shops, whereas large businesses have the highest for factories.

4.2 Analysis of Energy Use in SMEs and Larger Businesses

The previous analysis of business sizes showed different levels of electricity and gas intensity for different business sizes. Overall, larger businesses had higher electricity intensity but lower gas intensity. For gas, micro and smaller businesses had higher intensities than larger businesses.

More detailed survey information would be needed to identify the reasons for this but for electricity it may be that the intensity of operations within buildings occupied by large businesses is higher. Gas is primarily used in buildings for heating purposes and it can be assumed that the higher the absolute energy cost the more a business prioritises efficiency of heating but also that larger businesses may require less heating due to incidental heat gained through occupancy and processes within. Average non-domestic electricity prices[29] have risen by 38 per cent between 2006 and 2012 whilst average non-domestic gas prices have risen by 35 per cent between 2006 and 2012.

Between 2006 and 2012, electricity and gas intensity fell in all business sizes across all building types. To demonstrate the effect of business size on the rate of improvement significance testing is used. To simplify this, businesses sizes are split into two groups: Larger (covering “large” and “very large”) and Small and Medium Enterprises (SMEs) (covering “small” and “medium”). Note micro businesses were excluded from the analysis because they would appear to be a separate group, whose inclusion would distort the analysis of the key question of SMEs.

Hypothesis testing

The statistical analysis in this chapter tested the hypothesis of whether the electricity and gas intensity of large businesses changes at a different rate to SMEs between 2006 and 2012. The hypothesis was tested separately for factories, offices, shops, warehouses and restaurants and was tested separately for electricity and gas.

The analysis tested for statistically significant effects by **business size** and the measurement was on annual improvement of intensity.[30] A summary of the details of these tests is provided in Table 4.1. These significance tests have been run at the 5% significance level[31].

ND-NEED is unable to explain what has caused a reduction within a given year. Reductions in electricity and gas intensity will be caused by a combination of energy efficiency improvements including the impact of Government policies, the structural and economic effects or temperature variations.

[29] Including the Climate Change Levy – Quarterly Energy Prices Table 3.4.2

[30] Due to the large amount of skew in the data, see Section 1.4, all intensities were logarithmically transformed making the data more normally distributed to better aligned with the assumption necessary for Repeated Measures Analysis of Variance (ANOVAs).

[31] Statistical significance is a result that is not likely to occur randomly, but is attributable to the given cause. The significance level (5%) indicates the probability accepted. If a result is statistically significant at the 5% level it means that the probability of the effect occurring due to random chance is less than 5%.

Electricity

Figure 4.5 shows electricity intensity in 2006 and 2012 for each building type for small and medium enterprises (SMEs) and larger enterprises, per building.

Figure 4.5: Electricity intensity of SMEs and Larger Businesses by Building Type, 2006 & 2012

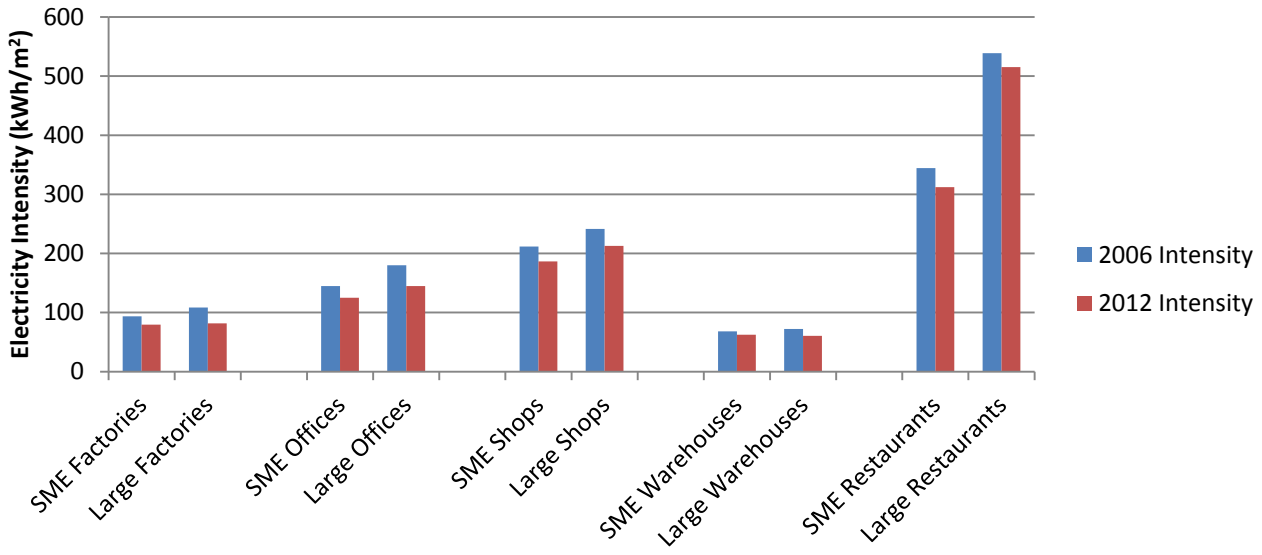
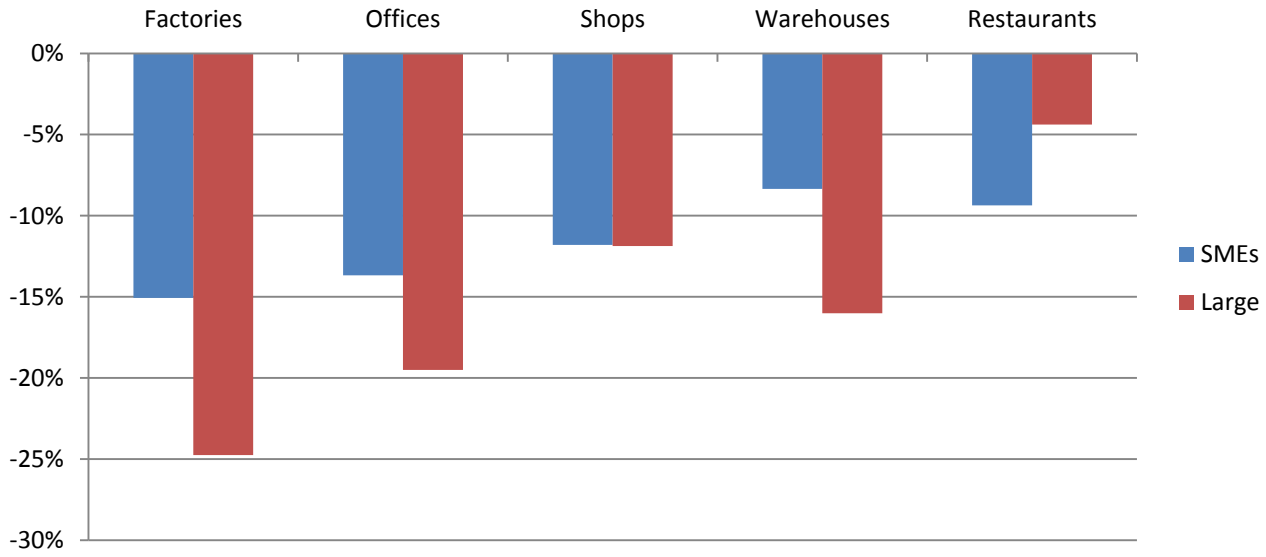


Figure 4.6 shows the comparative percentage change between the 2006 and 2012 median intensities for SMEs and larger enterprises by building type. For factories, offices and warehouses, the larger businesses decreased their electricity intensity by a greater amount, whilst for shops intensity decreased by 12 per cent in both size bands. The biggest difference is in factories where the reduction is 25 per cent for larger businesses as compared to 15 per cent for SMEs.

Figure 4.6: Reductions in electricity intensity between 2006 and 2012 of SMEs and Larger Businesses by building type



There is a statistically significant difference for factories, offices and warehouses meaning that the intensity of larger businesses fell by a significantly greater amount than for SMEs.

Gas

Gas intensity in all building types and business sizes fell between 2006 and 2012 by between 18 and 29 per cent. For factories and warehouses, intensity is higher in larger businesses whilst in offices, restaurants and shops intensity is higher in SMEs.

Figure 4.7: Gas intensity of SMEs and Larger Businesses by Building Type, 2006 & 2012.

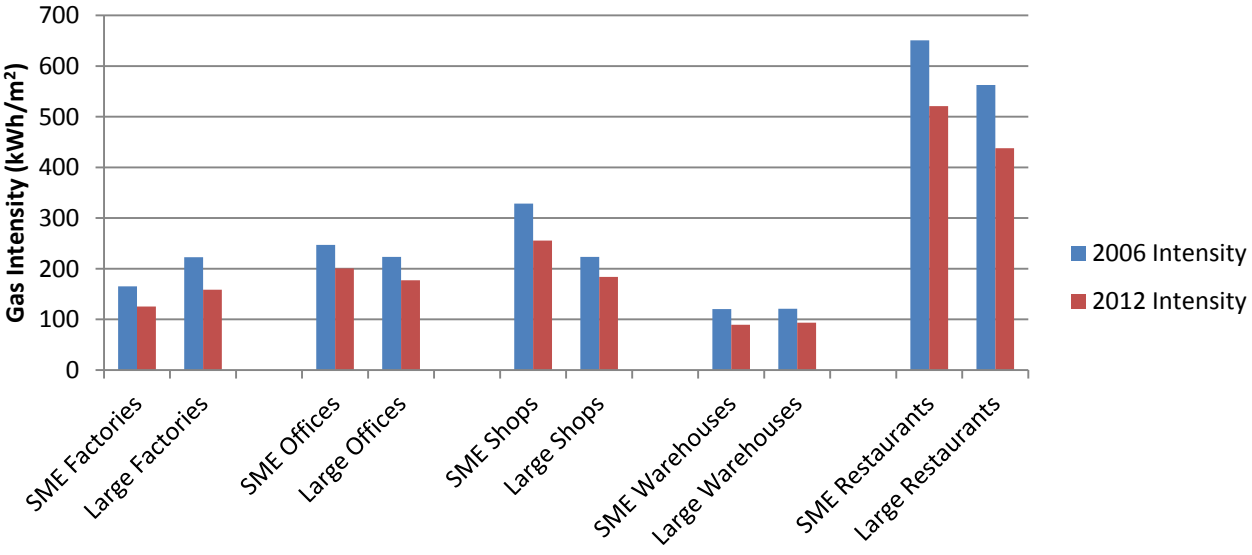
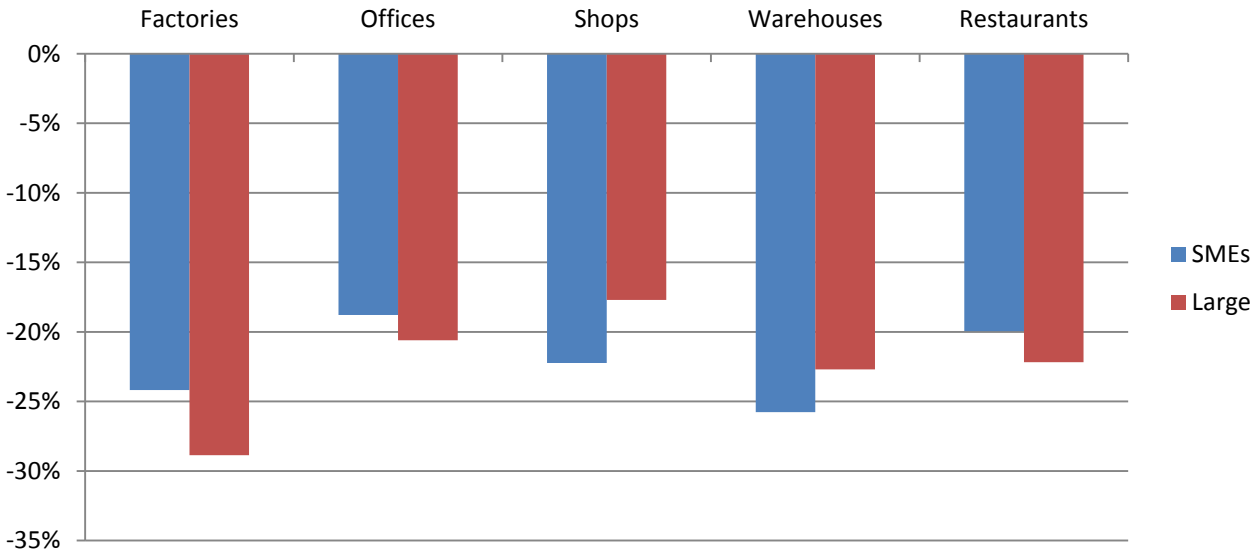


Figure 4.8 shows the comparative percentage change between 2006 and 2012 gas intensity for SMEs and larger businesses by building type. For factories, offices and restaurants, the change in intensity was bigger for large businesses, whereas for shops and warehouses it was bigger for SMEs. The largest absolute difference was again in factories where SMEs decreased intensity by 24 per cent, as compared to 29 per cent for larger businesses.

Figure 4.8: Reductions in gas intensity between 2006 and 2012 of SMEs and Larger Businesses by building type



There is a significant difference for business size for offices, shops and restaurants. For offices and restaurants, larger businesses are decreasing intensity by a significantly greater amount, whereas for shops SMEs are decreasing intensity by a greater amount.

Significance Values

Table 4.1 shows the p values for the significance testing. Records marked with (*) are statistically significant at the 5% level.

Table 4.1: Summary of p- values for hypothesis testing of differences in energy intensity changes over the period 2006-2012 between SMEs and Larger Businesses

	Significance Level	
Building Type	Electricity	Gas
Factories	**<.01***	0.92
Offices	**<.01***	**<.01***
Shops	0.13	**<0.01***
Warehouses	**<.05***	**<.05***
Restaurants	0.91	<0.01

Over the period 2006 to 2012, electricity intensity fell significantly more for factories, offices and warehouses among larger business than in SMEs. Over the same period, gas intensity fell significantly more for shops and warehouses among SMEs business than in Larger businesses.

These differences show that businesses of different sizes are reducing their intensity at different rates. The reasons for this will be a combination of effects:

- Different business activities will be impacted differently by a range of economic factors
- Government policies together with practical issues covering access to opportunities to invest in energy efficiency
- The control that a site has over its energy management.

4.3 Summary of known factors driving changes in energy intensity

This report shows that in the vast majority of business energy intensity has fallen over the period 2006-2012 but at different rates in each sub-sector. This section summarises some key known drivers affecting these.

Energy Efficiency

Energy efficiency is a measure of energy used for delivering a given service. Improving energy efficiency means getting more from the energy that we use. Energy efficiency can be improved through technological changes (more efficient lighting, heating), behavioural changes (energy management systems) and reductions in waste. Energy efficiency is often cost-effective and can cut energy bills for non-domestic buildings, it is therefore likely that much of the reduction in intensity observed in ND-NEED is due to energy efficiency. However, it is difficult to quantify.

Government Policies

There have been a number of Government policies introduced between 2006 and 2012 that will affect the energy usage of non-domestic buildings. These policies include:

EU Emissions Trading System (EU ETS) - The EU ETS covers around 11,000 energy-intensive industrial installations throughout Europe. The UK has around 1,000 EU ETS participants and these will account for over 50% of the emissions reductions needed to meet UK targets between 2013 and 2020. This scheme was launched in 2005 and its effects will be seen over the years in ND-NEED. It is most likely to affect factories in ND-NEED, especially those that belong to large or very large businesses. For more information please see: https://www.gov.uk/government/policies/reducing-the-uk-s-greenhouse-gas-emissions-by-80-by-2050/supporting-pages/eu-emissions-trading-system-eu-ets

Climate Change Agreements (CCAs) – CCAs are voluntary agreements that allow eligible energy-intensive sectors to receive up to 90% reduction in the Climate Change Levy[32] if they sign up to stretching energy efficiency targets agreed with Government. More than 9,000 sites have signed up to these targets. This is most likely to affect factories in ND-NEED, primarily those that are large or very large business sizes. CCAs have been around since before 2006 so will likely affect data over all years in ND-NEED. https://www.gov.uk/government/policies/reducing-demand-for-energy-from-industry-businesses-and-the-public-sector--2/supporting-pages/climate-change-agreements-ccas

CRC Energy Efficiency Scheme- The scheme is designed to target emissions not already covered by the CCAs or the EU ETS and features a range of drivers to encourage organisations to develop better energy management strategies. Organisations that meet the qualification criteria (consumption of over 6 GWh annually) are required to participate and must buy allowances for every tonne of carbon they emit. The scheme was announced in 2007 and is therefore likely to affect the years 2008-2012 in the ND-NEED data. The scheme is likely to affect all building types (in our analysis group) and is most likely to apply to large and very large business sizes.

https://www.gov.uk/government/policies/reducing-demand-for-energy-from-industry-businesses-and-the-public-sector--2/supporting-pages/crc-energy-efficiency-scheme

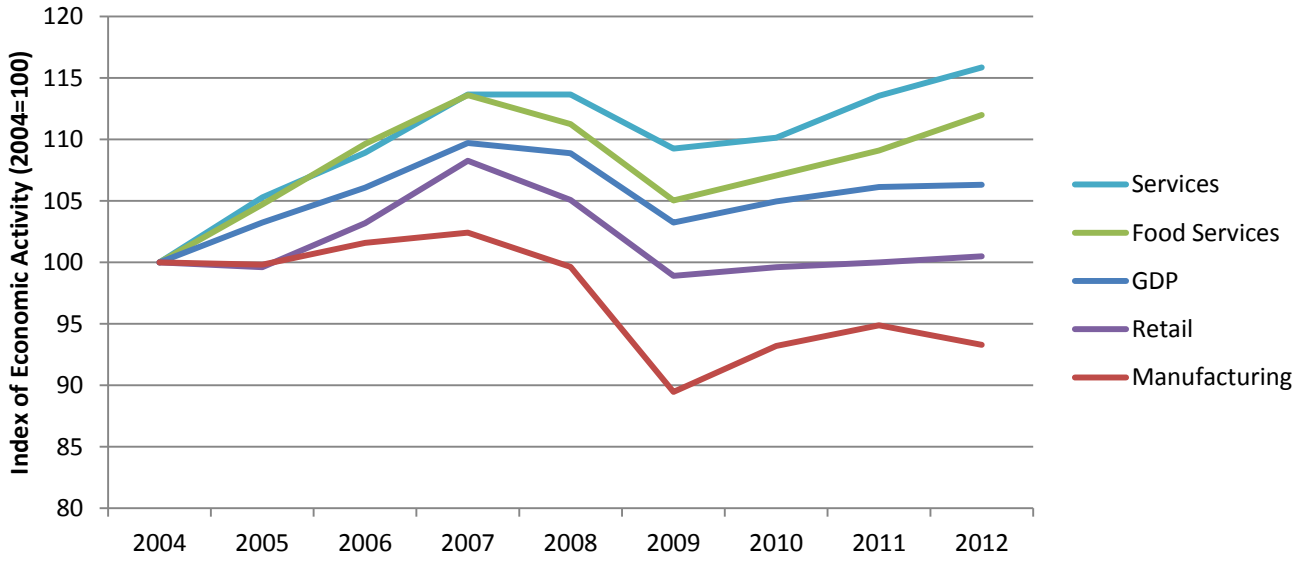
Economic Climate

The UK went into economic recession in 2008, this lasted for much of 2009. This economic recession followed a long period of growth. During periods of growth, businesses will often

[32] The Climate Change Levy is a tax on energy delivered to non-domestic users.

invest and expand, which could lead to greater electricity and gas intensity within a building. During a recession, businesses will often cut production and/or staff levels, which could lead to a decrease in electricity and gas intensity. Figure 4.9 shows the UK GDP and the GVA of services, hotels, retail and manufacturing. Although all of these sectors were affected by the recession, the impact on services and hotels was minor. The impact on retail and manufacturing was much more noticeable and manufacturing has not recovered to pre-recession levels. Therefore, the impact of the recession is more likely to affect shops and factories in our analysis. The chart shows that services were least affected by the recession and have continues to grow rapidly since 2010.

Figure 4.9: Index of economic activity for key sectors in the UK, 2004-2012[33]

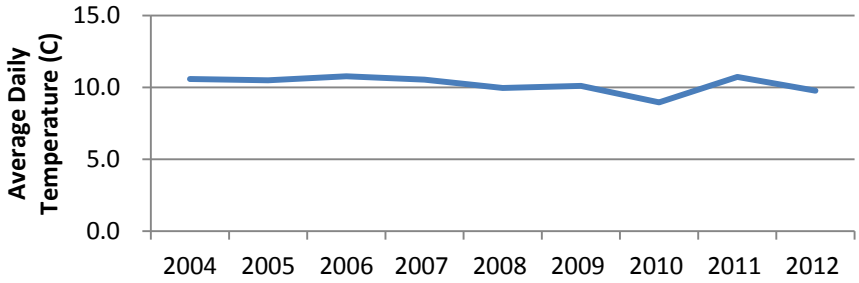


Annual temperatures

The UK annual average temperature can affect the energy consumption of buildings. Changes in temperature have a greater influence on gas but can also impact on electricity. The gas data in ND-NEED is partially temperature corrected but there may remain some effects of temperature that have not been corrected for. Electricity data is not temperature corrected.

Figure 4.10 shows the average daily temperature for the UK between 2004-2012. The years of 2010-2012 are of particular interest because 2010 was an especially cold year (higher energy usage) before a warmer than average 2011 and a slightly colder than average 2012. This may explain some of the change in electricity and gas intensity in non-domestic buildings, especially those building types that have employees or customers. This is less likely to affect building types like warehouses.

Figure 4.10: Average daily temperature, 2004-2012[34]



[33] Source: ONS Blue Book

[34] Source: Digest of UK Energy Statistics, Table 1.1.9

ANNEX A: Data Sources, Address Matching and the Construction of ND-NEED

A.1 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.

A.2 Matching in ND-NEED

The structure of ND-NEED can be seen in Figure A.1. ND-NEED is constructed at the building (UPRN) level. The NDR contains 1.56 million buildings and each of these has a unique identifier (UPRN). However, the datasets matched to the NDR do not have this unique identifier. The address matching process attempts to add the correct unique identifier (UPRN) for each data record. To achieve this, the address given in the dataset (e.g. the meter address) is matched to an address lookup dataset called Addressbase (an Ordinance Survey product).

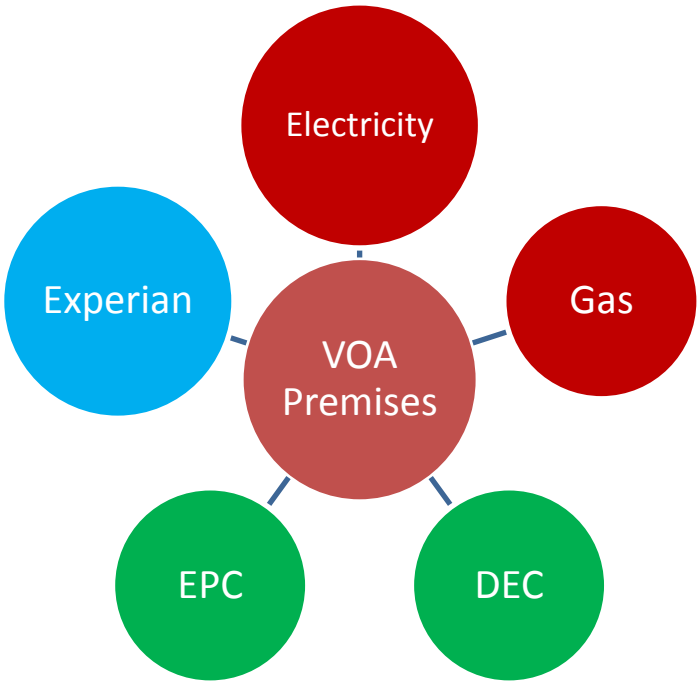


Figure A.1: Structure of ND-NEED

If the address listed (of a meter for example) matches with Addressbase, a UPRN is added to the record. It can then easily be matched to the NDR. However, non-domestic addresses are often complex and the accuracy can be low. For ND-NEED, there have been two separate projects to address match the various datasets to Addressbase, one performed by a contractor (GB Group) and one done internally in DECC. The current ND-NEED is a compilation of the two projects. Both address matching processes, use a number of algorithms to identify when two different addresses are actually the same address. Both projects use a number of steps, one for example changes numbers to letters (e.g. Unit 1, Main Street would be changed to Unit A, Main Street). However, there are a large number of steps that bring in far more complex techniques.

For both projects, there is an identified cut off point below which a matched address is not seen as a ‘good’ match. For ND-NEED only matches that are identified as a ‘good match’ are used. This removes around 150,000 potential matches from ND-NEED but the confidence in these matches is low and there would be a risk of lowering the quality of ND-NEED.

A.3 The Construction of ND-NEED

ND-NEED is constructed through a number of steps. The understanding of the construction of ND-NEED can help a user to better understand the data and the framework. A short outline of the process is described here.

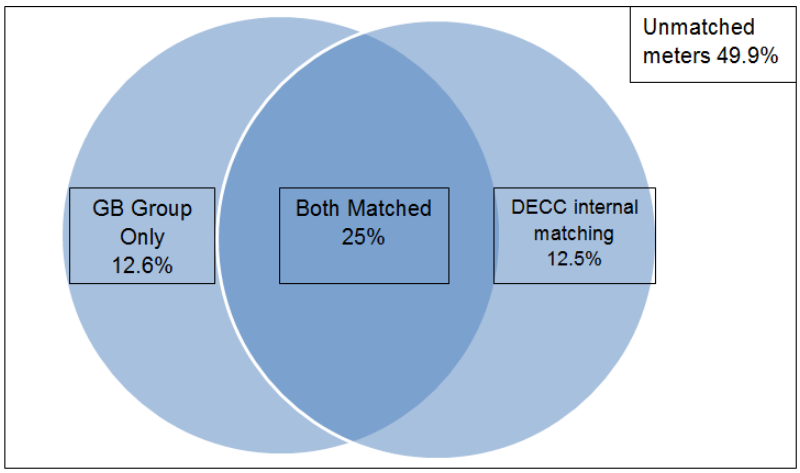


Figure A.2: Proportion of electricity meters matched in by the GB Group matching process, the DECC internal process and those that matched to both processes

Stage 1: Aggregate the NDRs data – The NDR is available at the UARN level but for the purposes of ND-NEED, analysis is done at the UPRN level.

The first step is therefore to aggregate UARNs to the UPRN level, aggregating the floor area with it. This ensures that no floor area data is lost. When aggregation of UARNs occurs, information regarding the building type and business activity is taken from the largest UARN by floor area (for example, a building (UPRN) has three UARNs, two offices of 30 m^2 and one shop of 50 m^2. The building type for the aggregated building would be 'shops'). The end of this stage produces 1.56 million 'buildings' which form the spine of ND-NEED.

Stage 2: Electricity consumption data – Any electricity meter that was matched (with confidence) from either the GB group matching or the DECC internal matching is compiled into a dataset (see Figure A.2). If both GB group and DECC internally matched one electricity meter to two different buildings, then the DECC internal match would be taken as correct as we have higher confidence in the quality of these matches. The next step is to aggregate these to the building level. All electricity meters associated with one building are aggregated, a note of the number of meters is taken and the profile class and any other data are taken from the highest consuming meter.

Stage 3: Gas consumption data- The process for gas is the same as that for electricity.

Stage 4: Experian, Energy Performance Certificates, Display Energy Certificates - Once the core of ND-NEED is matched together in the first three stages, additional business and program data can be added to the record when Experian, EPC and DEC data records are assigned to a building from the address matching procedure.

The end of stage 4 completes the formation of ND-NEED. However, for the analysis in this report, consumption has been grossed to the national level. The grossing was done through a weighting process which is outlined in Annex B.

Figure A.3 compares the coverage of the previous and current versions of ND-NEED.

Table A.1: Coverage of the previous and current versions of ND-NEED

	Number of Records		% Coverage	
	Previous ND-NEED	Current ND-NEED	Previous ND-NEED	Current ND-NEED
Buildings in ND-NEED	490,000	750,000	31%	48%[35]
Rateable Areas in ND-NEED	510,000	780,000	28%	43%[36]
Buildings with Electricity	490,000	750,000	31%	48%
Electricity Meters	580,000	970,000	26%	44%[37]
Buildings with Gas	200,000	330,000	13%	21%
Gas Meters	220,000	400,000	n/a	n/a[38]
Raw Electricity Consumption 2011[39] (TWh)	27.4	48.9	17%	30%[40]
Raw Gas Consumption 2011 (TWh)	16.7	41.7	10%	24%

[35] As compared to the non-domestic ratings list.

[36] As compared to the number of UARNs in the non-domestic ratings list.

[37] As compared to the DECC sub-national consumption statistics.

[38] Total is unknown.

[39] 2011 is used so that the previous version of ND-NEED can be compared to the current version.

[40] Exact total unknown, this figure is based on the DECC sub-national consumption statistics.

ANNEX B: Weighting Methodology

B.1 Weighting Principles

Improvements have been made in the coverage of ND-NEED. These are covered in the Address Matching Annex (Annex A). However, the coverage of buildings and meters still remains at around 50%. Therefore a weighting methodology was used so that the ND-NEED consumption data could be grossed up to a national level. The May 2014 ND-NEED report contained a detailed outline of a methodology for electricity and requested feedback. Following this feedback, the methodology has been altered slightly and implemented. A similar methodology has been applied for gas.

The weighting requires multiple stages as there is not one dataset that contains a population of all buildings and all electricity (or gas) consumption that can be grossed too. Therefore, buildings are first weighted to the building population, followed by consumption.

ND-NEED matches 820,000 buildings to electricity or gas consumption; however the decision was made to only use buildings that have electricity consumption for the weighting process. The weighting uses the assumption that every non-domestic building consumes electricity. This provides 750,000 buildings to be weighted.

The weighting is done in three stages.

1. Construct building weights, by grossing the sample in ND-NEED to the VOAs NDR list.
2. Construct electricity weights. This is done by grossing the sample of meters in ND-NEED (after the building weights are applied) to the 'population' of non-domestic meters from DECC's sub-national consumption statistics.
3. Construct gas weights. This process is the same as for electricity weights.

Each of these stages are explained in detail below.

B.2 The Building Weights

The construction of the building weights is done based on the building type (e.g. office, warehouse) and the floor area of the building. The population of buildings (the NDR) is then stratified into 35 building types and 17 floor area bands, to form a population matrix. The sample of buildings (ND-NEED) is also stratified into the same 35 building types and 17 area bands, to form a sample matrix.

Although the VOA data provides a floor area for every building, some of these contain arbitrary values, which are not the actual floor area of the building, an example of this is hostels. Therefore, for each special category (SCAT) code where the buildings are not valued based on area, the respective weighting does not take into account floor area.[41]

[41] The VOA categorises activity types in buildings by 361 special category codes. The VOA provided a list of codes in which the rateable value of the hereditament is not based on floor area. Therefore, the floor area for these records is likely to be inaccurate and has been removed for the purposes of this analysis.

A few of the building types have too few counts in either the population or the sample to be stratified into an area band. If this is the case, two or more area bands were merged (in both the population and the sample). A count of below 40 was used as the minimum cut off.[42]

For each cell on the matrixes, the population count was divided by the sample count. For example, if there were 1,000 Cinemas with an area of 500 to 999m^2 in our population and 500 Cinemas with an area of 500 to 999 m^2 in our sample, the building weight in ND-NEED for cinemas with an area of 500 to 999 m^2 would be 2.

B.3 Consumption Weights - The Consumption Patch

The next stage is to weight up to the consumption population. However, certain building types are out of the scope of ND-NEED (Military, Agricultural, Worship, Prisons) and therefore the consumption associated with these buildings should not be grossed up to.

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 Carb model[43]. The resulting population of these building types was removed from the total population of all consumption meters. For example, 5 per cent of prisons (10 prisons) are profile class 6 and in consumption band 7, 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 adjustment performed for the group of out of scope meters is referred to as the 'patch'.

For gas meters a scaling factor was applied to each consumption band under the assumption that for each electricity meter present in an out of scope building, there would be one gas meter.

B.4 Electricity Weights

Following the addition of the consumption patch, the next stage of the weighting process was to gross up to the population of electricity meters. The population is all electricity meter points in England and Wales identified as non-domestic meters[44].

The population of meters is stratified into 17 consumption bands and into the 7 profile classes.[45] The sample is the weighted number of meters in ND-NEED. To construct the sample, the number of meters in each building was multiplied by the building weight. This was done to avoid double counting in the weighting process. These meters in the sample were also stratified into 17 consumption bands and into the 7 non-domestic profile classes.

Every meter in the population and the sample was assigned a consumption band, the consumption band assigned was based on the average consumption of the meter between

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[42] There were some exceptions to this, for some building types there are less than 40 records, therefore they could be merged no further but they are kept in ND-NEED.

[43] The UCL carb model provides estimates of the total number of buildings for different building types.

[44] Electricity meters are labelled with a 'profile class'. A profile class of 1 or 2 indicates a domestic property. A profile class of 3-9 indicates a non-domestic property. Typically, the higher the consumption of a meter, the higher the profile class. Profile class 9 indicates a half-hourly electricity meter. Profile classes remain constant in ND-NEED. If one meter changes assignment over the years in ND-NEED, for the weighting it will be given the most recent value as a constant. Some meters in ND-NEED do not have a profile class. If this is the case, they were given an appropriate profile class based on their consumption.

[45] Any meters with a profile class of 1 or 2 are given a weighting of 1.

2010 and 2012. [46] The assigned consumption band stays constant across years in the weighting. A number of the profile classes had too few counts in a consumption band. In these cases consumption bands were merged.[47]

It is common for an electricity meter to have null consumption for one year but consumption in other years. For this reason, the weighting for electricity (and gas) was done separately for 2010, 2011 and 2012 and the average weight (for each combination) was taken.

The population and the sample of meters were taken for each year and were based on whether the meter in question had any consumption in the given year. Therefore, the numbers of the population and sample vary slightly across years (<1%).

A weight was obtained for each combination of profile class and consumption band for 2010, 2011 and 2012 separately. For each combination, the average of the 3 years was taken for the final weight.

B.5 Gas Weighting

The third stage of the weighting process was to gross up to the population of gas meters. The population was all gas meter points in England and Wales identified as non-domestic meters. However, unlike electricity, there is no simple way to identify gas meters. The DECC sub-national consumption statistics, identifies non-domestic meters as those with a consumption of over 73,200 kWh in a year.

This weighting process used the same cut off point of 73,200 kWh. These meters were stratified into 17 consumption bands only. The sample is the weighted number of meters in ND-NEED that have over 73,200 kWh. To construct the sample, the number of meters in each building was multiplied by the building weight. This was done to avoid double counting with the weighting. These meters in the sample were also stratified into 17 consumption bands.[48]

Every meter in the population and the sample was assigned a consumption band, the consumption band assigned was based on the average consumption of the meter between 2010 and 2012. [49] The assigned consumption band stays constant across years in the weighting.

It is fairly common for a gas meter to have null consumption for one year but consumption in other years. For this reason, the weighting for gas (and electricity) is done separately for 2010, 2011 and 2012 and the average weight (for each combination) was taken.

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[46] In ND-NEED some buildings have multiple meters, in the construction of ND-NEED these meters are aggregated to give a total consumption for the building. During the assigning of the consumption bands, the total consumption of the building is divided by the number of meters and assigned the resulting consumption band. For example if a building has a total consumption of 100 kWh and 3 meters. It would count for 3 meters in the sample, each with a 33 kWh of consumption.

[47] There was not a single cut-off value used for meters. Due to the building weighting being used to construct the sample, some profile classes had a high amount of meters in higher consumption bands. Therefore a subjective decision making process was used for the merging of consumption bands to ensure that the weights would not disproportionately affect the consumption data.

[48] Any meter with average annual consumption of under 73,200 kWh per year was given a weight of 1.

[49] In ND-NEED some buildings have multiple meters, in the construction of ND-NEED these meters are aggregated to give a total consumption for the buildings. During the assigning of the consumption bands the total consumption of the UPRN is divided by the number of meters and assigned the resulting consumption band. For example if a UPRN has a total consumption of 100 kWh and 3 meters. It would count for 3 meters in the sample, each with a 33 kWh of consumption.

The population and the sample of meters were taken for each year and were based on whether the meter in question had any consumption in the given year. Therefore, the numbers of the population and sample vary slightly across years (<1%).

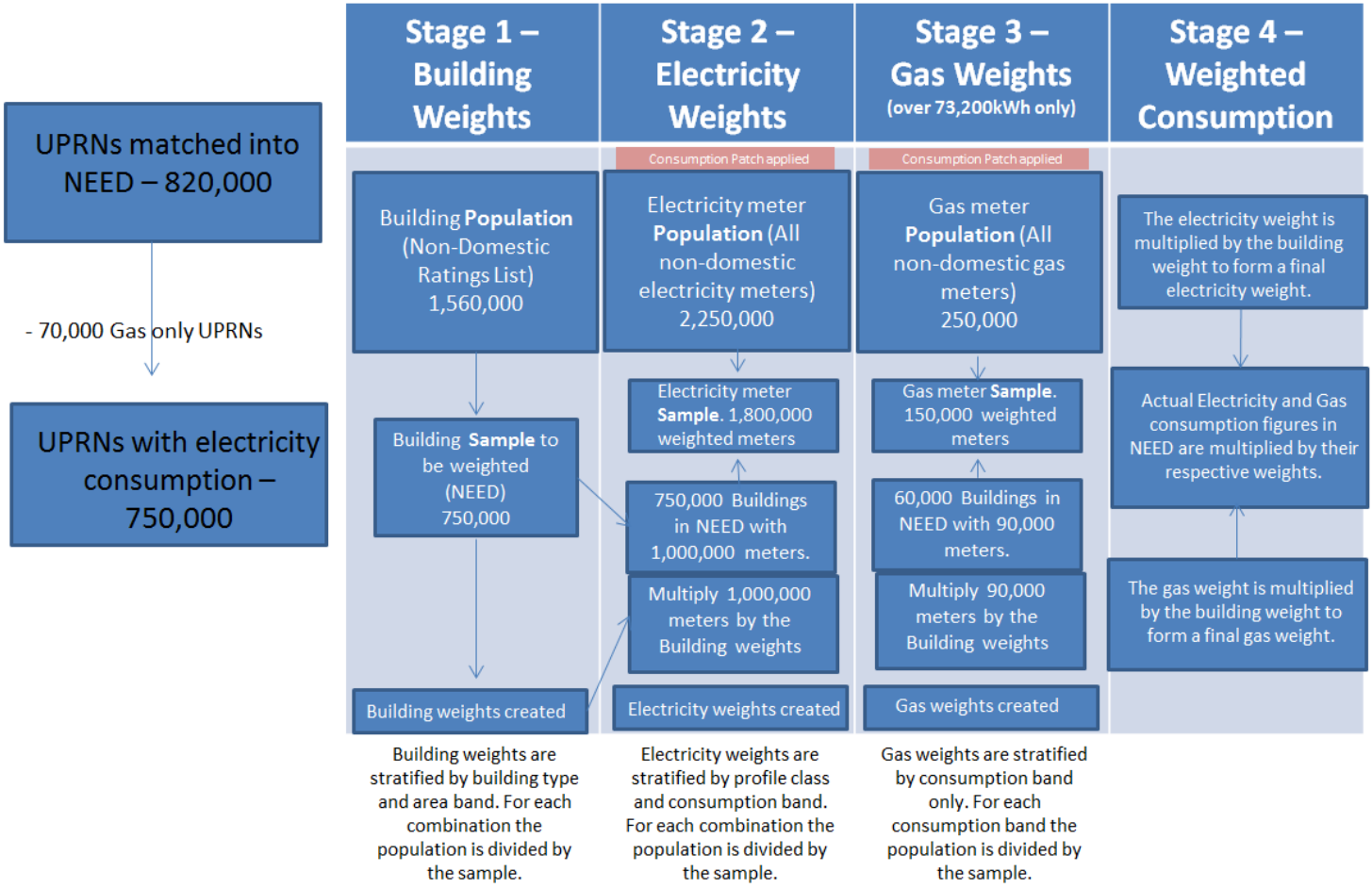
A weight is obtained for each consumption band for 2010, 2011 and 2012 separately. For each cell, the average of the 3 years is taken for the final weight.

B.6 Assumptions

The weighting process makes many assumptions, most of which are listed above.

1) All non-domestic buildings have electricity consumption. If a building does not have consumption, it is not included in ND-NEED for the current analysis.
2) The most recent profile class designated to a meter will be the most accurate.
3) Meters that are matched into ND-NEED with a profile class of 1 or 2 (a designated domestic meter) are used in analysis but are given a consumption weight of 1.
4) It is assumed that gas consumption for out of scope buildings (churches, prisons, places of worships) follows the same distribution as electricity consumption for these buildings. It is also assumed that for each electricity meter in one of these buildings, there is one gas meter.

Figure B.1: The Weighting Process



B.7 Results and Comparisons with Published Statistics

Tables B.1 and B.2 show the results of the weighting process.

Table B.1 – Comparisons of Un-weighted and Weighted electricity consumption in ND-NEED to the total population (profiles 3-9 only)[50]

TWh	Un-weighted Electricity Consumption in ND-NEED	Weighted Electricity Consumption in ND-NEED	Total Consumption of the Population	%
2006	53.0	180.0	180.2	100%
2007	51.4	173.6	172.9	100%
2008	52.0	176.8	171.6	103%
2009	49.5	167.6	162.5	103%
2010	49.7	168.7	170.8	99%
2011	47.0	157.6	156.9	100%
2012	47.7	162.4	165.8	98%

When weighted, the electricity consumption in ND-NEED is between 98-103% of the consumption seen in the total population. The years of 2010-2012, which the weighting is based upon, are even closer with between 98-100% of consumption covered from the total population

Table B.2 – Comparisons of Un-weighted and Weighted gas consumption in ND-NEED to the total population (meters consuming over 73,200 kWh per year only)

TWh	Un-weighted Gas Consumption in Need	Weighted Gas Consumption in NEED	Total Consumption of the Population	%
2006	40.0	199.9	205.1	98%
2007	39.8	200.0	197.5	101%
2008	39.1	196.6	184.9	106%
2009	34.9	175.5	168.9	104%
2010	36.3	181.8	173.5	105%
2011	35.1	176.4	186.3	95%
2012	35.0	177.3	173.5	102%

[50]There is an additional 2-3 TWh of consumption per year for electricity meters with profile classes 1 or 2 in ND-NEED. However, as these are not used in the weighting process, they are not used in the comparison tables.

When weighted, the gas consumption in ND-NEED is between 93-106% of the consumption seen in the total population.

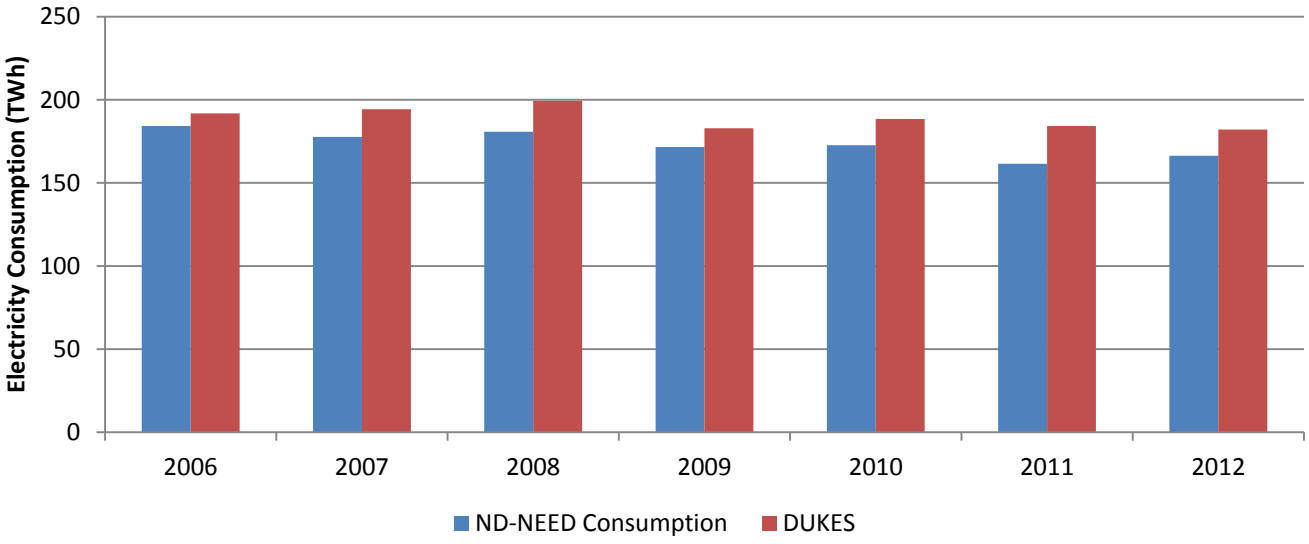
The results of the weighting provide support to the methodology used with a maximum difference of 7% in total consumption between the weighted ND-NEED consumption and the total population consumption.

The current methodology of weighting will be used for the analysis of ND-NEED going forward. However, when future work on the role and impact of high consuming outliers is undertaken, the consumption and coverage of weighted ND-NEED may change.

Comparisons to UK National Energy Statistics

The Digest of United Kingdom Energy Statistics (DUKES) provides national estimates of electricity and gas consumption. These estimates also contain consumption for Scotland and Northern Ireland and may include some buildings that are deemed out of scope of ND-NEED. Figure B.2 shows comparisons of electricity consumption between ND-NEED and DUKES[51]. DUKES shows a 1 per cent fall in non-domestic electricity consumption between 2011 and 2012 whilst ND-NEED shows a 3 per cent rise over this time period. For all other years (except for 2008), the trend is similar for ND-NEED and DUKES.

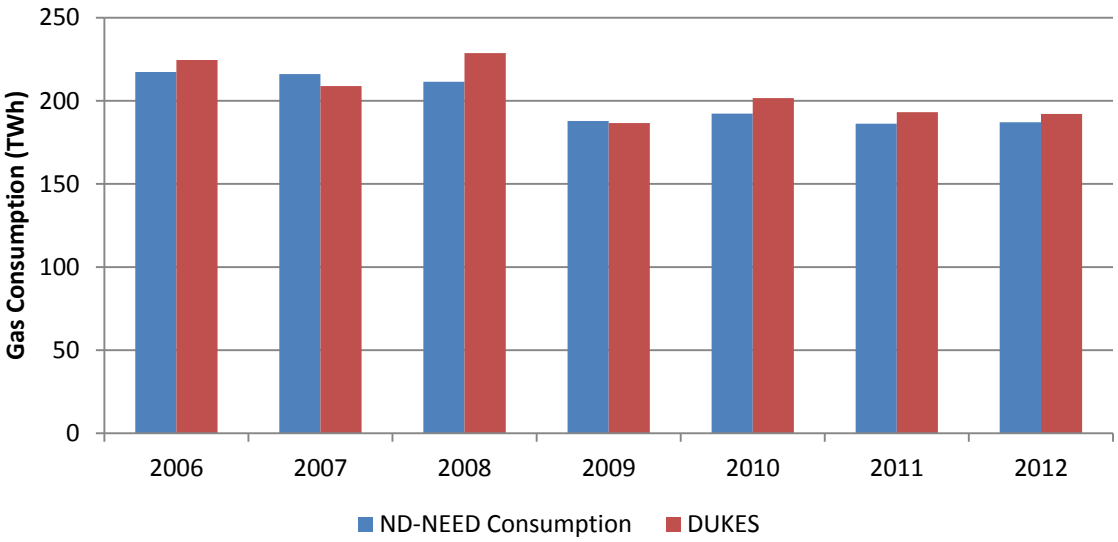
Figure B.2: Electricity consumption comparisons for ND-NEED and DUKES, 2006-2012



DUKES shows a 1 per cent fall in gas consumption between 2011 and 2012 whilst ND-NEED shows a 0.5 per cent rise in gas consumption over the same time period. Gas consumption in ND-NEED is temperature corrected whereas it is not in DUKES, therefore small differences are to be expected. For all other years (except for 2008), the gas consumption trend is similar for ND-NEED and DUKES.

[51] From DUKES table 5.2. The consumption figure is equivalent to Industry plus Commercial plus Public Administration.

Figure B.3: Gas consumption comparisons for ND-NEED and DUKES, 2006-2012



Differences are expected between DUKES and ND-NEED due to the slightly different coverage, different sources and other factors such as temperature correction for gas. Both DUKES and ND-NEED are showing an overall downward trend in energy consumption of the non-domestic sector. The similarity in the trend is a positive sign that helps to validate the use of ND-NEED data.

B.8 Floor Space Analysis[52]

The Valuation Office Agency (VOA) publishes experimental Floor Space statistics based on the non-domestic ratings list. ND-NEED can be used to show floor area at a disaggregated level[53]. Table B.3 shows the comparisons of coverage between the VOA floor space statistics and those in ND-NEED.

Table B.3 shows the coverage is similar in both ND-NEED (using weighting) and the full VOA list. The biggest discrepancy is for offices where ND-NEED is capturing just 81% of the floor space. The category other captures 103% of floor are and it is therefore likely that some office floor space is being captured under other.

Table B.3: Comparisons of floor area (m^2, thousands) in ND-NEED and in the VOA experimental floor space statistics

Building type	Sample in ND-NEED	Floor Space in ND-NEED m^2 (thousands)	Floor Space in VOA m^2 (thousands)	Coverage
Industry	135,800	312,200	323,100	97%
Retail	369,900	116,400	118,200	98%
Offices	78,700	75,400	92,700	81%
Other	53,600	50,700	41,800	121%
Total	638,000	554,700	575,800	96%

[52] Various building types do not have good floor space data in the VOA and therefore may be under-represented. This includes but is not limited to: Hotels, Hostels, Universities, Schools, Crown Estate buildings, Agricultural, Worship.

[53] Business Floor space - http://www.voa.gov.uk/corporate/statisticalReleases/120517_CRLFloorspace.html

The VOA floor space statistics presents floor space at the Industry, Retail, Offices and Other level only. Using ND-NEED, these can be disaggregated further. The total floor space for each building type are shown in table B.4. Warehouses have the largest floor space of any building type in ND-NEED. However, they are just the fourth largest energy consuming type of building, showing lower electricity and gas intensity than for warehouses. This is further explored in Chapter 4.

Table B.4: Floor area (m^2, thousands) in ND-NEED by building type[54]

Building	Sample in ND-NEED	m^2 (thousands)
Warehouses	56,400	160,000
Factories	79,500	152,200
Shops	335,300	94,400
Offices	78,700	75,400
Miscellaneous	11,500	24,700
Garages & Showrooms	12,700	15,400
Community Centres	11,500	9,600
Restaurants	21,400	5,900
Pubs & Clubs	6,300	5,500
Healthcare	15,600	4,300
Sports Grounds	2,500	2,900
Nurseries	4,200	1,900
Cinemas	500	600
Other	2,000	1,700
Total	638,000	554,700

[54] Buildings with a 'missing' building type in ND-NEED will not have a floor area.

B.9 Public Sector Buildings and Hotels

The weighting methodology for ND-NEED takes into account the fact that certain non-domestic building types are not included in the VOA such as agricultural, military and religious buildings as well as prisons. This is covered by the consumption patch. However, analysis of weighted consumption by building type showed that public sector buildings are not sufficiently being taken into account by ND-NEED.

Energy consumption in the UK estimates that Education and Health accounted for an estimated 50 TWh of UK energy consumption in 2012. However, in ND-NEED (weighted) they accounted for less than 4 TWh of energy consumption in 2012.

It should be noted that due to the under-estimation of energy consumption for these building types, there could be an over-estimation for other building types. However, it is also possible that the consumption for these public sector building types is being attributed to the 'missing' or 'miscellaneous' categories. Therefore, this point should be taken into account when the analysis is being considered.

It is also likely that the consumption of hotels is being under-estimated and analysis done shows that many records in ND-NEED that have missing description types are identified as hotels by EPC or Experian data. If the Experian data is used by SIC code then the gas consumption of hotels and restaurants in 2012 was 11 TWh. Using the VOA classifications, this figure is closer to 3 TWh.

The VOA classifications are done for the purpose of valuation, not business activity. For example, a restaurant that is within a unit of a shopping centre may be classified as a shop by the VOA because the location would provide the same commercial opportunity for a shop.

B.10 Accompanying Excel Tables

Excel tables have been produced to accompany this report. The following tables are available:

2.1: Annual electricity and gas consumption 2006-2012
2.2: Annual electricity and gas consumption by building type per year 2006-2012
2.3: Annual electricity and gas consumption by floor area by building type, 2012.
2.4: Annual electricity and gas consumption by business size, 2006-2012
2.5: Consumption and number of buildings by building type, with each electricity meter profile class, 2012.
3.1: Annual electricity and gas intensity summary statistics, 2006-2012.
3.2: Annual electricity and gas intensity by building type by year, 2006-2012.
3.3: Annual electricity and gas intensity by building type, by floor area, 2012.
4.1: Annual electricity and gas intensity by business size, 2012.
4.2: Annual electricity and gas intensity by building type by business size, 2012.

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