The Non-Domestic National Energy Efficiency Data-Framework 2020 (England and Wales)

20th November 2020   **Official Statistics**

This report summarises analysis of the non-domestic building stock and non-domestic building energy consumption in England and Wales using the latest version of the Non-Domestic National Energy Efficiency Data-Framework (ND-NEED).

What you need to know about these statistics

The statistics in ND-NEED cover non-domestic buildings in England and Wales, under the ND-NEED definition.

Information on the non-domestic building stock (building number, building use, building size) reflects the position at the end of March 2020. Information on energy consumption covers 2016-2018, and comprises electricity and gas consumed via the public distribution system (onsite generated electricity consumption is not included).

The key results are:

- Under the ND-NEED definition, there are 1,656,000 non-domestic buildings in England and Wales (end of March 2020). The top three uses of non-domestic buildings are Shops (29%), Offices (20%) and Factories (14%).

- The total energy consumption of non-domestic buildings in England and Wales is 293 TWh (2018).

- The three building uses that consume the most energy are Factories (34%), Other (15%) and Offices (10%) (2018).

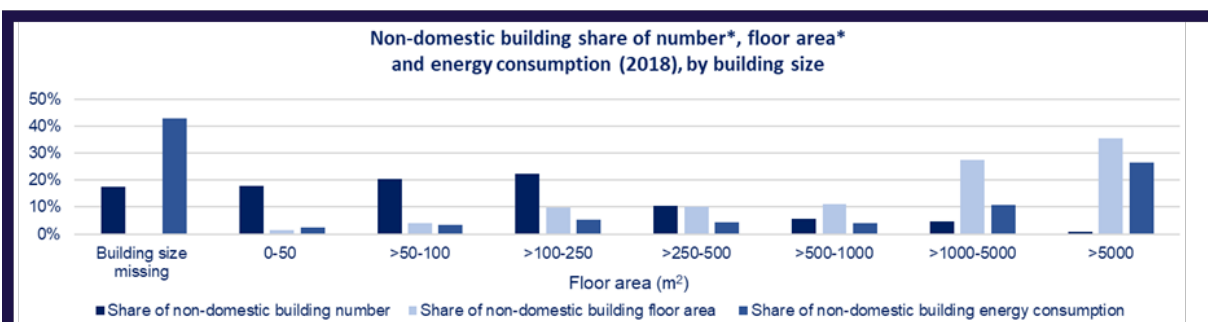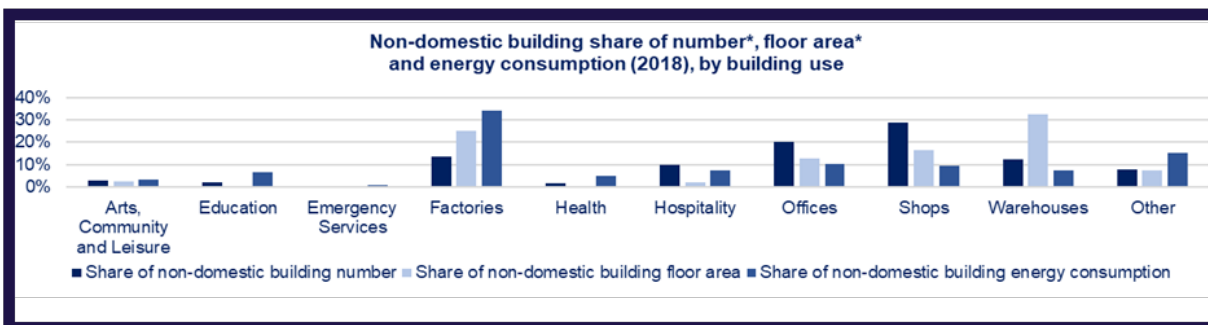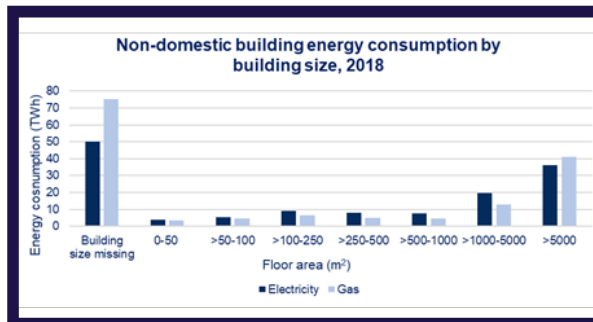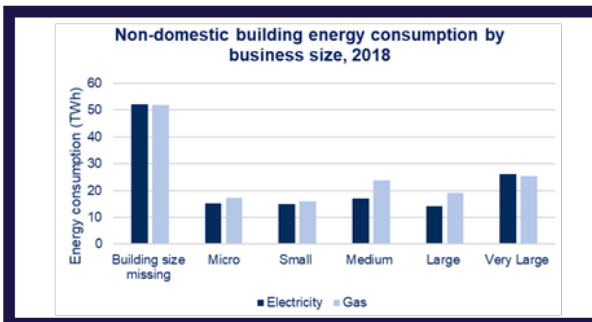- The building use that has the highest energy intensity is Hospitality (2018).
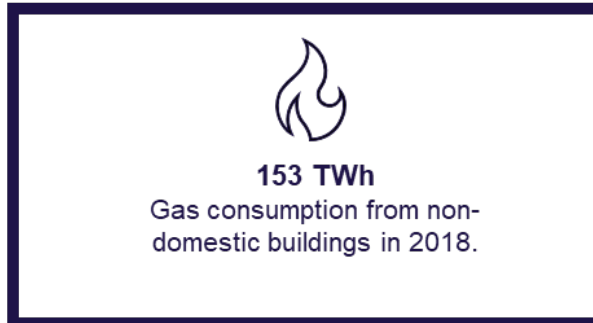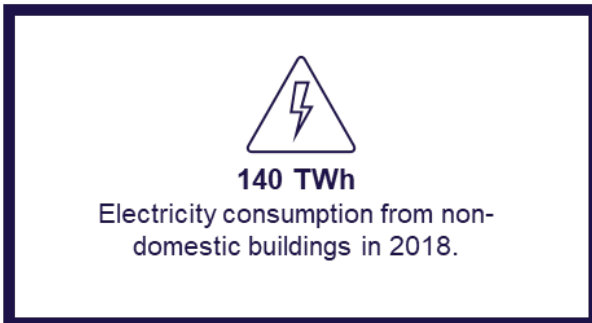
A summary of the key results in this publication can be found in Figure 1.

Further detail including a breakdown of non-domestic building stock by building use and building size, and a breakdown of electricity consumption/intensity and gas consumption/intensity by building use, building size and occupying business size can be found in the results section of the report.

Figure 1: A summary of the key results from ND-NEED[1].

1,656,000
Non-domestic
buildings in England
and Wales*

51,000 Arts, Community and Leisure*

39,000 Education*

4,000 Emergency Services*

227,000 Factories*

26,000 Health*

162,000 Hospitality*

335,000 Offices*

476,000 Shop*

204,000 Warehouses *

132,000 Other*

140 TWh
Electricity consumption from non-domestic buildings in 2018.

153 TWh
Gas consumption from non-domestic buildings in 2018.

Non-domestic building energy consumption by business size, 2018

Non-domestic building energy consumption by building size, 2018

Non-domestic building share of number*, floor area* and energy consumption (2018), by building use

Non-domestic building share of number*, floor area* and energy consumption (2018), by building size

*All ND-NEED non-domestic building stock figures are the position at the end of March 2020.
[1]The non-domestic building electricity and gas consumption figures in ND-NEED differs from the figures in other statistical publications such as the subnational statistics and ECUK. More information on the reasons for these differences can be found in the methodology.

Contents

1.Introduction

The Non-Domestic National Energy Efficiency Data-Framework (ND-NEED) provides an insight into the electricity and gas consumption of non-domestic buildings in England and Wales in 2018, and how this has changed since 2016. It also provides information on the non-domestic building stock in England and Wales – under the ND-NEED definition - with a breakdown of non-domestic buildings by building use and building size.

ND-NEED is based on the Valuation Office Agency (VOA)'s list of all non-domestic premises ("hereditaments") in England and Wales (the non-domestic ratings list (NDR)) and the VOA's summary valuation data (SMV) which contains information on the premises' use and size. ND-NEED uses the position of the 2017 NDR/SMV as at the end of March 2020. BEIS have been given access to this data via a legal gateway (specified in an information sharing agreement), and securely receives this data directly from the VOA.

In ND-NEED, the NDR/SMV data are aggregated to the building level and used, following further processing, to provide information about the number, use and floor area of buildings in the ND-NEED non-domestic building stock. As the NDR and SMV cover all non-domestic buildings in England and Wales, these datasets cover all of the 1,656,000 buildings included in the ND-NEED non-domestic building population.

The non-domestic building stock is matched to information on electricity and gas consumption (2016-18), at meter point level, held by BEIS. This gives a large sample of 726,000 non-domestic buildings with electricity consumption data and 287,000 non-domestic buildings with gas consumption data. This sample is then matched to business characteristics data (from Experian) to provide information on the size of the business occupying a building.

The matched dataset can then be used to analyse the electricity/gas consumption of non-domestic buildings from a large sample size. The sample contains information on building use, occupying business size (for those successfully matched to Experian) and building size, so the consumption data can be disaggregated by these characteristics. The resulting consumption data for the sample are then weighted to be representative of the population level.

More information about producing the ND-NEED sample and the weighting process can be found in the [methodology](#). The key limitations of the ND-NEED methodology, and a discussion of the impact of these limitations on the ND-NEED results, can be found in the [limitations](#) section.

This is the first update to ND-NEED since its original publication in March 2015[2]. The next update to ND-NEED is currently planned for the summer of 2021.

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[2]Non-domestic National Energy Efficiency Data-Framework: energy statistics 2006-12
https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data framework-energy-statistics-2006-12

What questions can be answered by ND-NEED?

- How many non-domestic buildings are there in England and Wales?

- How many non-domestic buildings are there in England and Wales of a particular building use or building size?

- How does non-domestic electricity/gas consumption/intensity change by building use, occupying business size, or building size?

- What is the total electricity/gas meter consumption of non-domestic buildings and how has this changed over time (2016-2018)?

What questions cannot be answered by ND-NEED?

- What are the characteristics of the non-domestic building stock in Scotland and Northern Ireland?

- What is the electricity/gas consumption/intensity of non-domestic buildings in Scotland and Northern Ireland?

- What are non-domestic buildings using their energy for (e.g. is energy used for heating/lighting/industrial processes etc.)?

- How much of other fuels (e.g. biomass/LPG/oil) do non-domestic buildings consume?

- How much energy generated onsite is consumed by non-domestic buildings?

- How does non-domestic building energy use differ between rented/owner-occupied buildings?

Further information related to these questions can be found in Energy Consumption in the UK[3] (ECUK) and the Building Energy Efficiency Survey[4] (BEES).

[3]ECUK - https://www.gov.uk/government/statistics/energy-consumption-in-the-uk
[4]BEES - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

2.Results

England and Wales non-domestic building stock

In ND-NEED a building is defined as a property that has a unique property reference number (UPRN). In general, each building has a distinct UPRN, so the information presented in ND-NEED can be considered to be at the building level.

There are however a few exceptions to this. Where a single physical structure contains multiple properties with UPRNs e.g. a shopping centre containing multiple shops each with distinct UPRNs, then this is considered to be multiple buildings in ND-NEED.

The key limitations of the ND-NEED methodology and a discussion about their impact on the ND-NEED results can be found in the limitations section.

Under the ND-NEED definition, there were 1,656,000 non-domestic buildings in England and Wales at the end of March 2020.

There are some building types that are not covered by the ND-NEED figures. These are:

Figure 2: The number of ND-NEED non-domestic buildings in England and Wales

- Agricultural Buildings, Places of Worship and Prisons as these are not included in the VOA's list of non-domestic properties (the NDR) that ND-NEED is based on. It is estimated these building types make up 4% of non-domestic buildings in England and Wales[5].

- Caravan Parks, Advertising Premises[6], Car Parks, Beach Huts, Quarries, and Telecoms[7]. These are included in the NDR but are not considered to be buildings in ND-NEED and so are excluded. The exclusion of these 'non-buildings' from ND-NEED reduces the number of buildings in the stock by 8%.

1,656,000 Non-domestic buildings

[5]Figures based on the UCL Carb model, UCL's non-domestic energy use model which provides estimates of total number of buildings for different building types.
[6]Places uses for advertisement e.g. roundabout adverts, bus shelter adverts, advertising banners.
[7]Places used for communication e.g. communication stations, public telephones, wifi infrastructure.

Number of non-domestic buildings by building use

According to the definition of a building in ND-NEED, within a single building there may be several building uses. Where this is the case, the building use is assigned to that of the component premises ("hereditament") that has the largest floor area.

This will have a distorting effect on the building stock figures as uses that often occur as the smaller use (by floor area) in mixed used buildings will be underestimated. However, as only 3% of buildings in the ND-NEED building stock contain multiple hereditaments the impact of this distortion on the building stock figures presented in ND-NEED is likely to be negligible.

The breakdown of non-domestic buildings in England and Wales by building use can be seen in Figure 3. See Annex B for definitions of the categories used.

Figure 3: The number of ND-NEED non-domestic buildings in England and Wales by building use (as at end of March 2020).
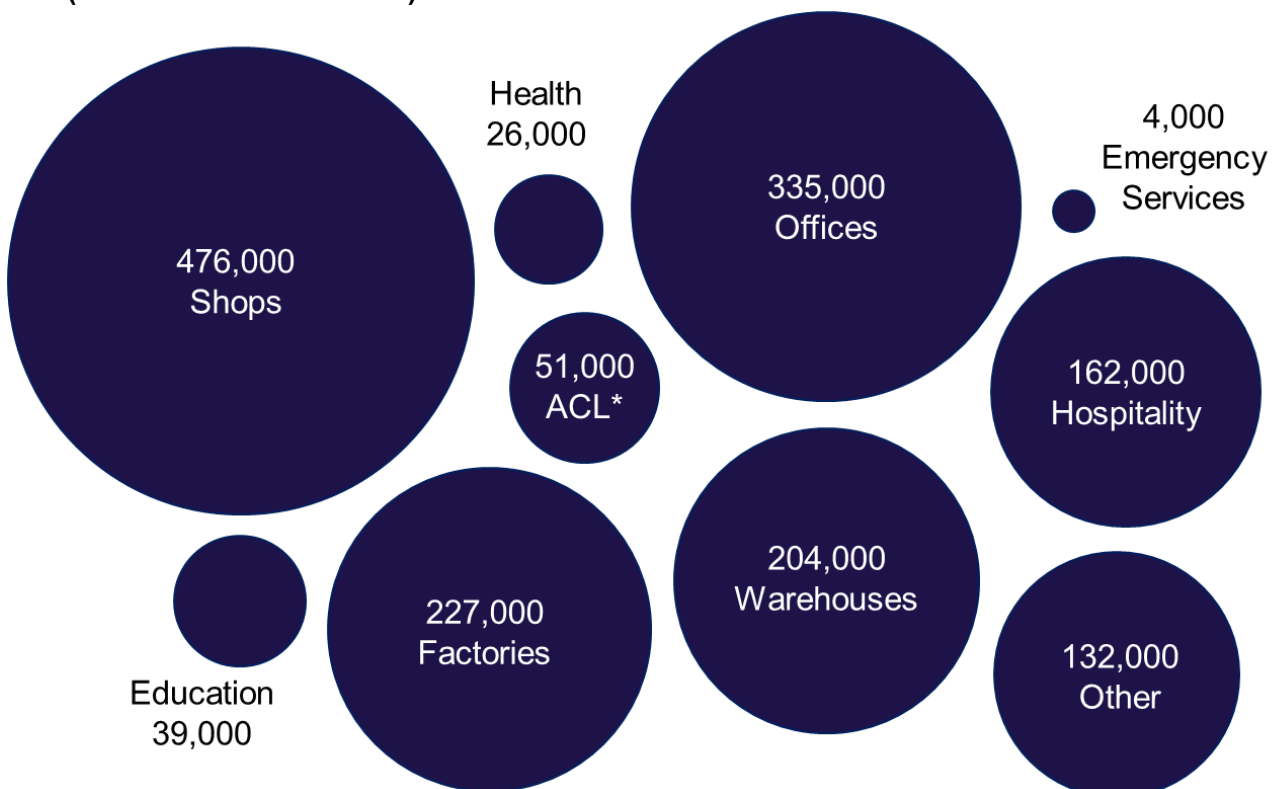
*ACL is an abbreviation for Arts, Community and Leisure

Shops are the largest building use category with 476,000 buildings (29% of non-domestic buildings in England and Wales). The next largest category is Offices with 335,000 buildings (20% of all non-domestic buildings in England and Wales), then Factories with 227,000 (14% of non-domestic buildings in England and Wales).

Note, the building use categories in this version of ND NEED are not the same as those used in the March 2015 version[2].

The categories have been changed so that they align as far as possible with the categories used in BEIS's Energy Consumption in the UK (ECUK)[3] publication, as well as the 2015 Business Energy Efficiency Survey (BEES)[4] and to reduce the previously substantial size of consumption in the 'Other' category.

In the March 2015 publication, there were six categories: Factories, Offices, Restaurants, Shops, Warehouses and Other. The Other category was responsible for 40% of energy consumption in 2012 (the latest year covered by the 2015 version of ND-NEED).

In this version of ND-NEED there are ten categories: Arts, Community and Leisure; Education; Emergency Services; Factories; Health; Hospitality; Offices; Shops; Warehouses and Other. The Other category is responsible for 15% of energy consumption in 2018.

More information about what is included in each building use category can be found in Annex B.

Floor area of non-domestic buildings by building use

The combined floor area of all non-domestic buildings in ND-NEED for which floor area information is available is 592,228,000 m^2 (see Table 1).

Of the 1,656,000 buildings in ND-NEED, 288,000 (17%) do not have floor area information. Because of this, all floor area information presented here should be treated with caution as it is likely to be an underestimate.

The three reasons that buildings may be missing floor area information are:

- Some non-domestic buildings do not have floor area information available in the SMV data.

- If a hereditament in a non-domestic building has a floor area of less than 15m^2 in the SMV it is treated as having no floor area information in ND-NEED.

- If non-domestic buildings fall into a building use category where floor area data does not inform the VOA rating, then it is treated as having no floor area data in ND-NEED. This means that there are some distortions in the floor area by building use figures, as some building uses will have more floor area information excluded than others. However, this distortion is likely to be small because the excluded building use categories are very diverse and include buildings in all building use categories. For more information on which business use categories have their floor area data removed and why see Annex D.

[2]Non-domestic National Energy Efficiency Data-Framework: energy statistics 2006-12 - https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data framework-energy-statistics-2006-12
[3]ECUK - https://www.gov.uk/government/statistics/energy-consumption-in-the-uk
[4]BEES - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

Table 1: The total floor area of ND-NEED non-domestic buildings in England and Wales by building use (as at end of March 2020).

| Building type	Total floor area (m²)	Proportion of total floor area
Arts, Community and Leisure	14,634,000	2%
Education	3,619,000	1%
Emergency Services	160,000	0%
Factories	148,466,000	25%
Health	2,348,000	0%
Hospitality	12,591,000	2%
Offices	76,158,000	13%
Shops	97,104,000	16%
Warehouses	192,710,000	33%
Other	44,438,000	8%
Total	**592,228,000**	**100%**

From Table 1, we can see that Warehouses are the building use which occupies the largest floor area, with a third of non-domestic floor area. This is followed by Factories, occupying a quarter of non-domestic floor area, and Shops occupying 16%.

We can also compare the number of buildings in a building use category and the floor area that the building use category occupies. From Figure 4, we can see that for several sectors there are substantial differences in the share of building use between the two measures.

Both Warehouses and Factories occupy a greater proportion of non-domestic floor area than their share of the total number of non-domestic buildings. This is because these building uses generally occupy large sites. For all other building use sectors the proportion of the total number of non-domestic buildings that they occupy is larger than their share of the non-domestic floor area.

Note, the proportions presented are only based on the non-domestic buildings where floor area information is available. They therefore implicitly assume that the building size distribution of the buildings that are missing building size information is the same as that of those with this information.

Figure 4: The share of ND-NEED non-domestic building number and floor area by building use (as at end of March 2020).
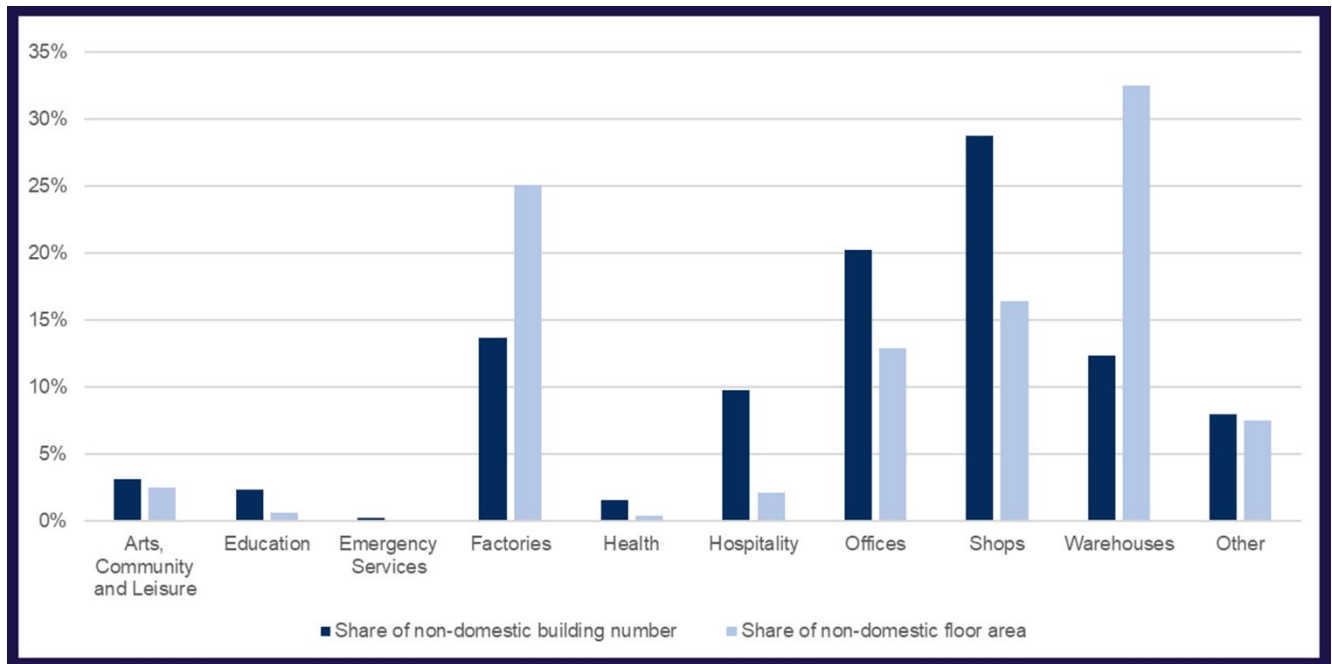
Number of non-domestic buildings by building size

The breakdown of the number of non-domestic buildings in England and Wales by building size can be seen in Figure 5.

Figure 5: The number of ND-NEED non-domestic buildings in England and Wales by building size (as at end of March 2020).

| 634,000 0-100m² | 370,000 >100-250m² | 173,000 >250-500m² | 94,000 >500-1000m² | 96,000 >1000m² | 288,000 Missing |

The general trend is that as building size increases, the number of non-domestic buildings decreases. This is true even though the building size categories used in ND-NEED are wider for larger business sizes.

Almost 75% of non-domestic buildings in England and Wales (for which floor area information is available) have a floor area of less than 250m², and more than 90% have a floor area of less than 1,000m².

Note, because 288,000 (17%) of non-domestic buildings in ND-NEED are missing building size information, the number of buildings in each size category is likely to be an underestimate as some buildings in the missing category will fall into them as well.

Floor area of non-domestic buildings by building size

The total floor area of non-domestic buildings in each floor area band is given in Table 2. This shows that larger buildings occupy a greater proportion of non-domestic floor area than smaller buildings. This is despite there being fewer larger buildings in the non-domestic building stock.

The difference between the building number and total floor area trends by building size can be seen in Figure 6.

> Note, the proportions presented are only based on the non-domestic buildings where floor area information is available. They therefore implicitly assume that the building size distribution of the buildings that are missing building size information is the same as that of those with this information.
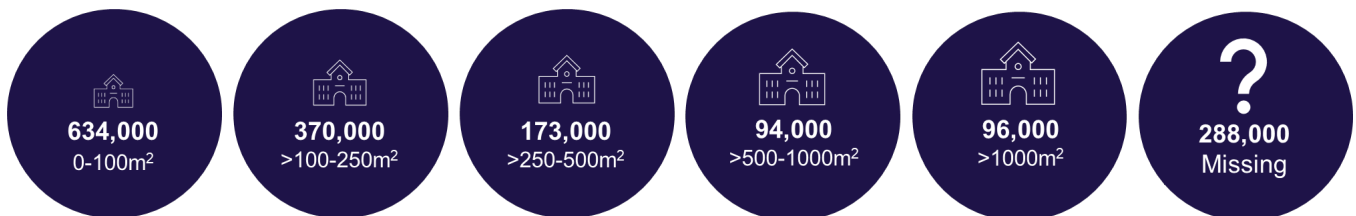
Table 2: The total floor area of ND-NEED non-domestic buildings in England and Wales by building size (as at end of March 2020).

Building size	Total floor area (m^2)	Proportion of total floor area
0 - 50m^2	9,667,000	2%
>50 - 100m^2	24,489,000	4%
>100 - 250m^2	58,713,000	10%
>250 - 500m^2	60,610,000	10%
>500 – 1000m^2	65,854,000	11%
>1000m^2 – 5000m^2	162,464,000	27%
>5000 m^2	210,431,000	36%
Total	**592,228,000**	**100%**

Figure 6: The share of ND-NEED non-domestic building number and floor area by building size (as at end of March 2020).
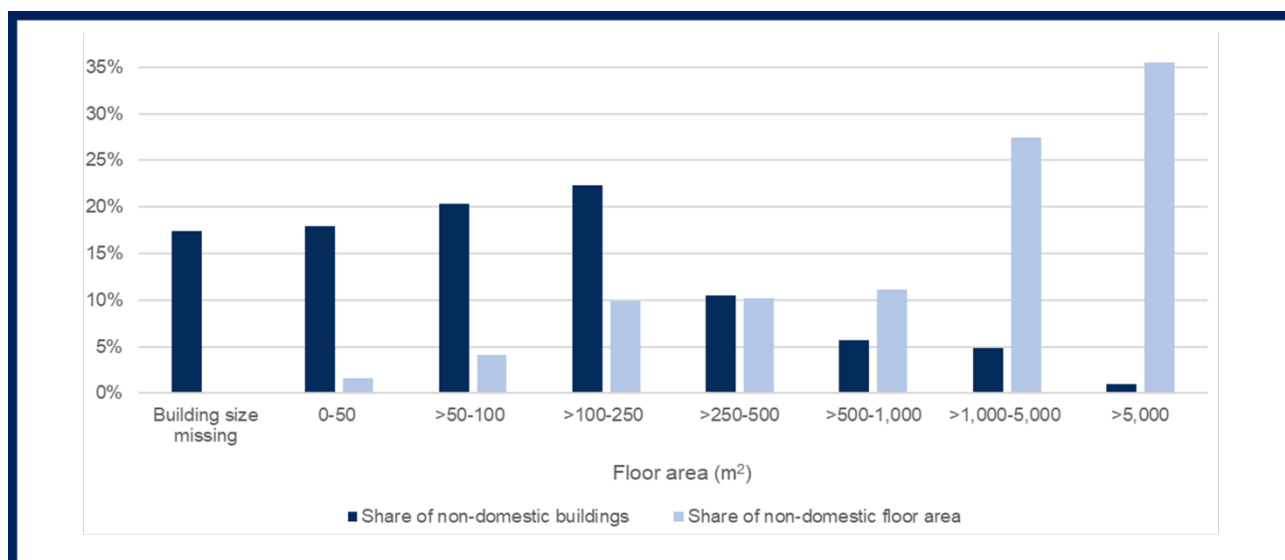
England and Wales non-domestic building energy consumption

According to ND-NEED, in total non-domestic buildings in England and Wales used **140 TWh of electricity** and **153 TWh of gas** in 2018 (the most recent year for which data are available).

These consumption figures are based on a sample of the ND-NEED building stock that was successfully matched to electricity and gas meter-point data (gas consumption figures are temperature corrected). This sample is then weighted to be representative at the population level.

More information about the weighting process in ND-NEED can be found in the methodology.

> As business size information is only available for the sample and not for the whole building population, the weighting does not account for potential differences between the size of businesses in the sample and the size of businesses in the population. This means there is more uncertainty around whether the energy consumption figures by business size are representative of the population, than for the consumption figures by building use or by floor area.

Because the consumption figures are based on meter-point data, any energy consumed that is not via the electricity or gas grid e.g. energy generated onsite from renewables, is not included. According to the Digest of UK Energy Statistics (DUKES)[8] 89% of non-domestic building electricity consumption was from the grid in 2018.

The fact that ND-NEED is based on meter-point data also means that the consumption figures cover all grid energy consumed by a non-domestic building, regardless of end-use e.g. heating, lighting, industrial processes etc. This is different from some other publications such as BEES[4] which only cover energy consumed by the building itself e.g. heating, lighting, but not energy consumed by activities within the building e.g. industrial processes.

[8]DUKES, Table 5.2, Sectors: Industry, Commercial, Public administration. Public Distribution System as a share of Total Consumption - https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes
[4]BEES - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

Non-domestic electricity consumption by building use

Electricity consumption

Figure 7: The electricity consumption of ND-NEED non-domestic buildings in England and Wales by building use, 2018.
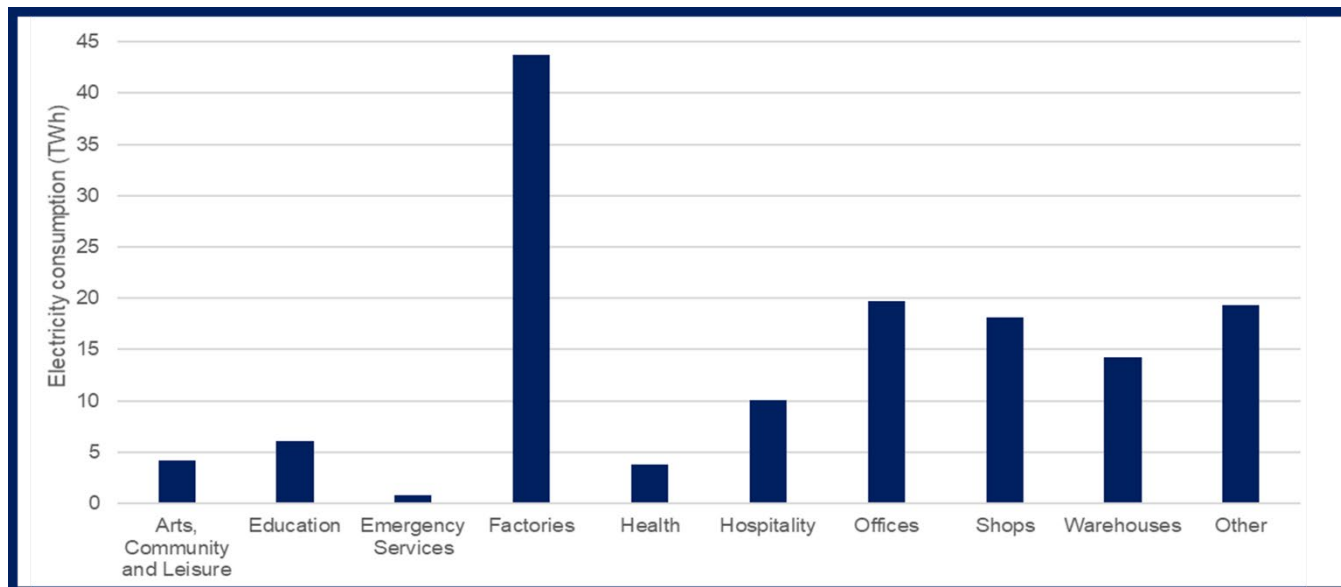

Figure 7 shows non-domestic building electricity consumption by building use. It shows that Factories are the building use that consumes the most electricity (44 TWh in 2018). This is more than twice the consumption of any other building use.

This is despite there being more Shops (476,000) and Offices (335,000) than there are Factories (227,000) in England and Wales. This suggests that the high electricity consumption in Factories is driven by the relatively large size of their buildings (Factories occupy more floor area than either Shops or Offices) and/or that Factories are carrying out processes that have high electricity demands.

The high electricity demands of Factory processes can be seen in ECUK[3] which shows that more than half of the electricity used in Industry is for industrial processes e.g. motors, high temperature processes, low temperature processes.

Electricity intensity

The level of energy consumption in a building use category is in part driven by the number and size of buildings of that type. To control for this, energy intensity can be used. Energy intensity is the average amount of energy used in a square metre of a building. Differences in energy intensity between sectors are therefore not affected by differences in the number or size of buildings.

The electricity intensity figures presented in ND-NEED are the median electricity intensity, weighted by the energy weight (for more information on the energy weight see the methodology).
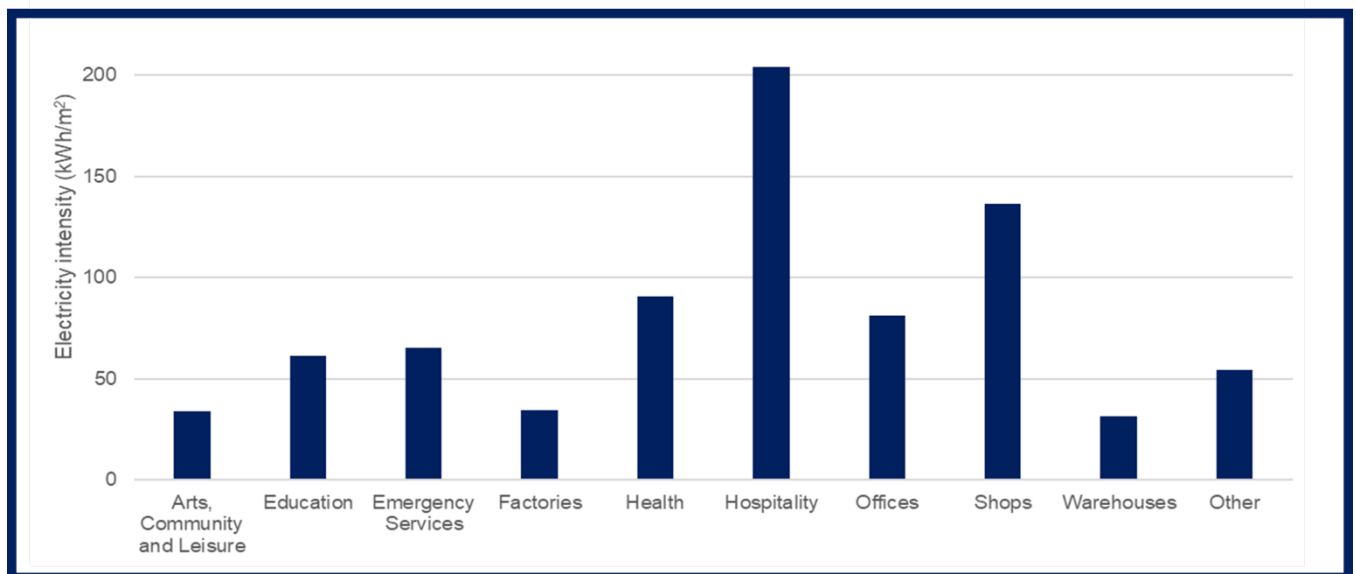
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[3]ECUK, End-use data tables, Table U2 - https://www.gov.uk/government/statistics/energy-consumption-in-the-uk

Energy intensity is influenced by both the energy consumption and floor area of a building. However, the weighting only accounts for the energy consumption. If the floor area of buildings with similar consumption values differs between the sample and the population this will not be accounted for in the current weighting.

Figure 8 shows that Hospitality is the building use with the highest electricity intensity. This is partly driven by the high electricity demands of catering activities, which can be seen in other publications that split energy consumption by end-use (ECUK[3] and BEES[4]).

Factories have a relatively low electricity intensity which suggests the high electricity demands of the industrial processes many Factories carry out, are counterbalanced by the large size of these sites.

Figure 8: The median electricity intensity of ND-NEED non-domestic buildings in England and Wales by building use, 2018.

[3]ECUK, End-use data tables, Table U5 - https://www.gov.uk/government/statistics/energy-consumption-in-the-uk
[4]BEES, Overarching tables, Figure 3.12   - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

Non-domestic gas consumption by building use

Gas consumption

Figure 9: The gas consumption of ND-NEED non-domestic buildings in England and Wales by building use, 2018.
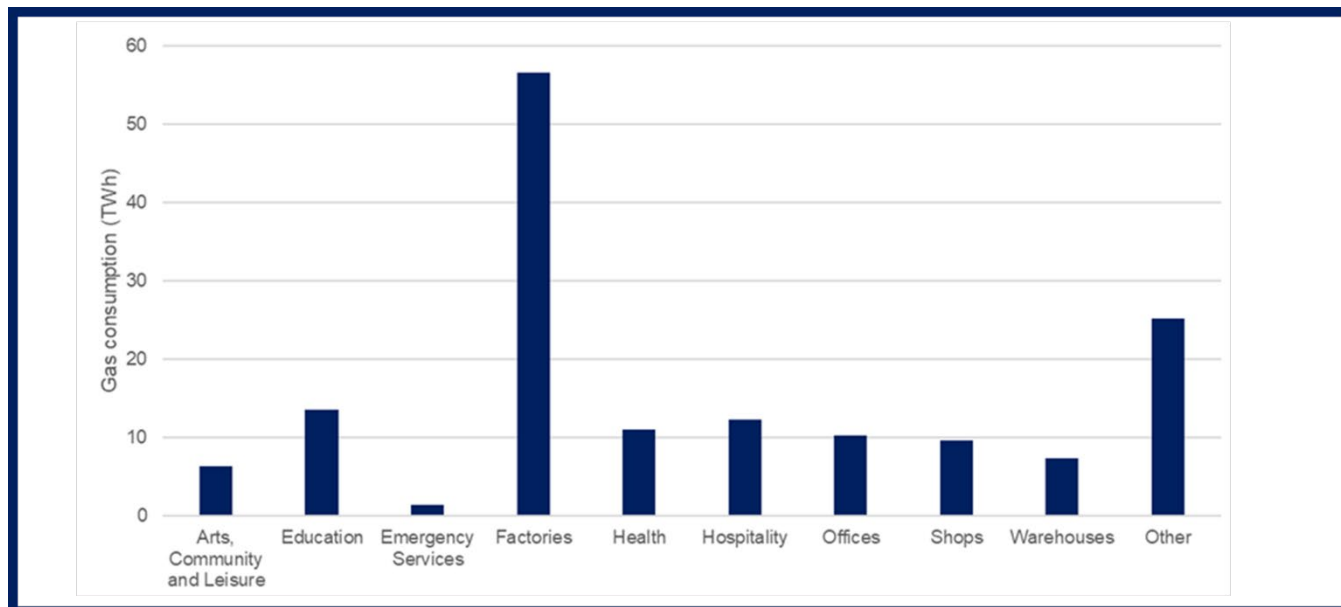

Figure 9 shows that the pattern for gas consumption by building use is similar to that of electricity consumption. Factories have the highest gas consumption, consuming 57 TWh in 2018. This is more than four times higher than the gas consumption for any other building use (excluding the 'Other' category). This is despite that fact that Factories are not the largest building use category in terms of building numbers.

The high gas consumption of Factories is in part driven by their large size and in part by the highly gas consuming processes they carry out:

- Factories account for 14% of non-domestic buildings, but 25% of non-domestic building floor area (of the buildings with floor area information available).
- From ECUK[4] we can see that industrial processes e.g. high and low temperature processes, drying/separation, are responsible for more than half of gas use in industry, and so a large part of gas consumption in Factories is likely driven by these processes.

Most other building types consumed around 10 TWh of gas in 2018. The exceptions to this are Arts, Community and Leisure where the buildings consumed 6 TWh of gas, and Emergency Services where the buildings consumed 1 TWh of gas (due to low building numbers (4,000) and small floor area (160,000m^2)).

[3]ECUK, End-use data tables, Table U2 - https://www.gov.uk/government/statistics/energy-consumption-in-the-uk

Gas intensity

Figure 10: The median gas intensity of ND-NEED non-domestic buildings in England and Wales by building use, 2018.
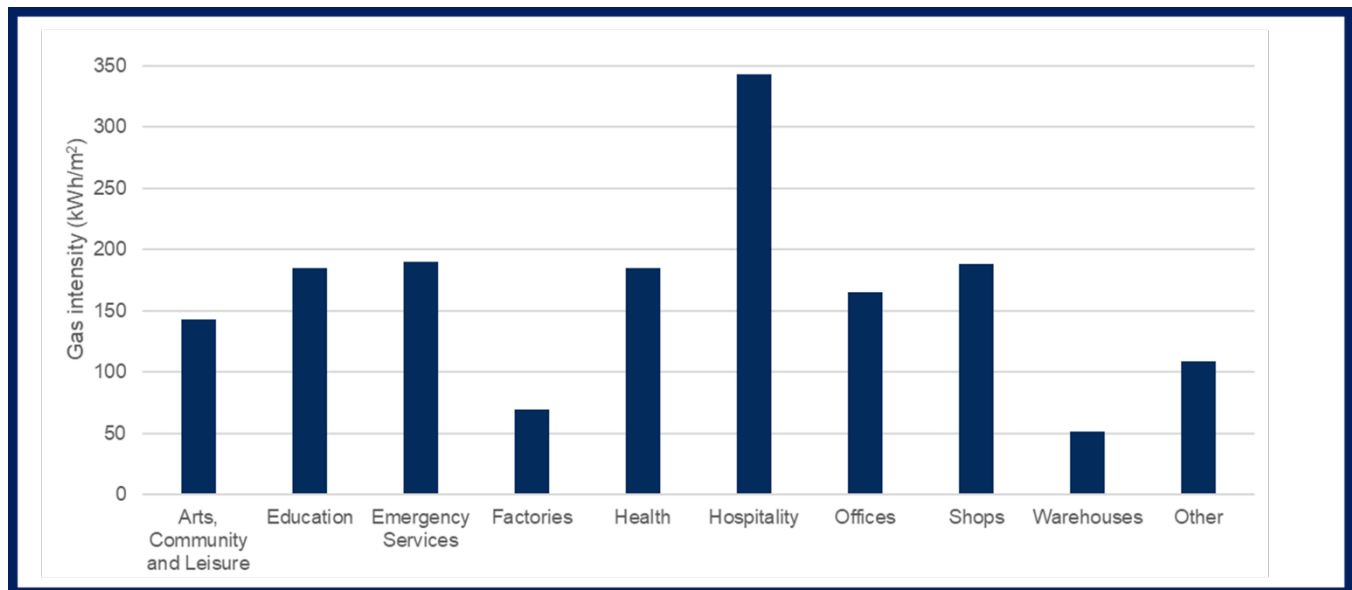
Hospitality is the building use category with the highest gas intensity (343 kWh/m^2), consuming almost twice as much gas per square meter as any other building type. This is partly due to the high gas demands of catering activities, which can be seen in other publications that split energy consumption by end-use (ECUK[3] and BEES[4]).

Most other building use categories have a gas intensity of around 160 kWh/m^2. The exceptions to this are the 'Other' category with 109 kWh/m^2 and Factories and Warehouses with around 60 kWh/m^2.

Non-domestic electricity consumption by business size

A Micro business has less than 10 employees, a Small business has 10 - 49 employees, a Medium business has 50 - 249 employees, a Large business has 250 - 999 employees and a Very Large business has 1,000 employees or more.

Note, the number of employees refers to the number of employees employed by the business as a whole, not just the employees that work in the building. This means that small branches of larger businesses e.g. a corner shop that is part of a national chain, will be in the larger categories. This is because information on the number of employees in a particular building is not available from Experian.

[3]ECUK, End-use data tables, Table U5 - https://www.gov.uk/government/statistics/energy-consumption-in-the-uk
[4]BEES, Overarching tables, Figure 3.13 - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

Electricity consumption

Figure 11: The electricity consumption of ND-NEED non-domestic buildings in England and Wales by business size, 2018.
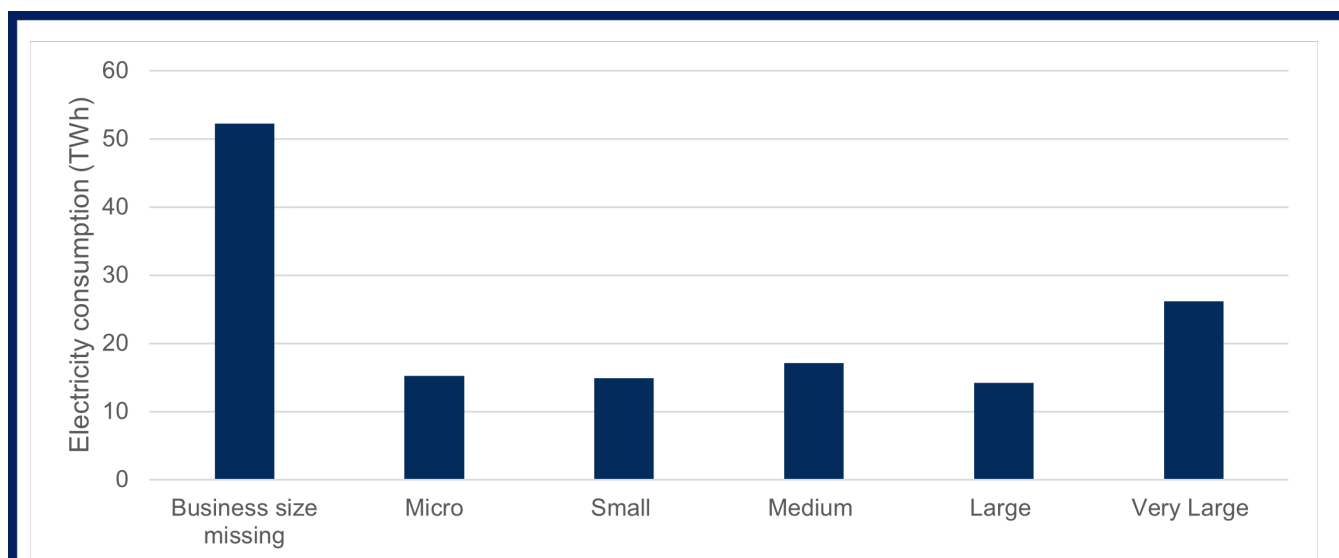

Figure 11 shows the contribution of business of different sizes to non-domestic building electricity consumption.

If the occupying business is Very Large (1,000 employees or more) electricity consumption tends to be higher, with buildings occupied by Very Large business consuming 50% more electricity than buildings occupied by another business size (excluding the missing category).

Note, 52 TWh of electricity consumption is missing business size information. This is the electricity consumption of the 357,000 buildings of the 726,000 in the ND-NEED electricity consumption sample where information on the occupying business size is not available. In ND-NEED the business size information comes from the Experian business characteristics dataset which is matched onto the non-domestic buildings and energy consumption data. There are two reasons why business size information may not be available:

- The Experian dataset may not contain business size information for a building. This is responsible for 43 TWh of the 52 TWh of consumption from buildings that are missing business size information.

- The Experian dataset may contain business size information, but this cannot be successfully matched to the corresponding building due to the limitations of the matching process. This is responsible for 9 TWh of the 52 TWh of consumption from buildings that are missing business size information.

Because of the substantial size of the 'Business size missing' consumption category, the consumption figures for other categories e.g. Micro, Small etc. should be used with caution as they are likely to be underestimates (as some of the consumption in the 'Business size missing' category should be in those categories).

Electricity intensity

Figure 12: The median electricity intensity of ND-NEED non-domestic buildings in England and Wales by business size, 2018.
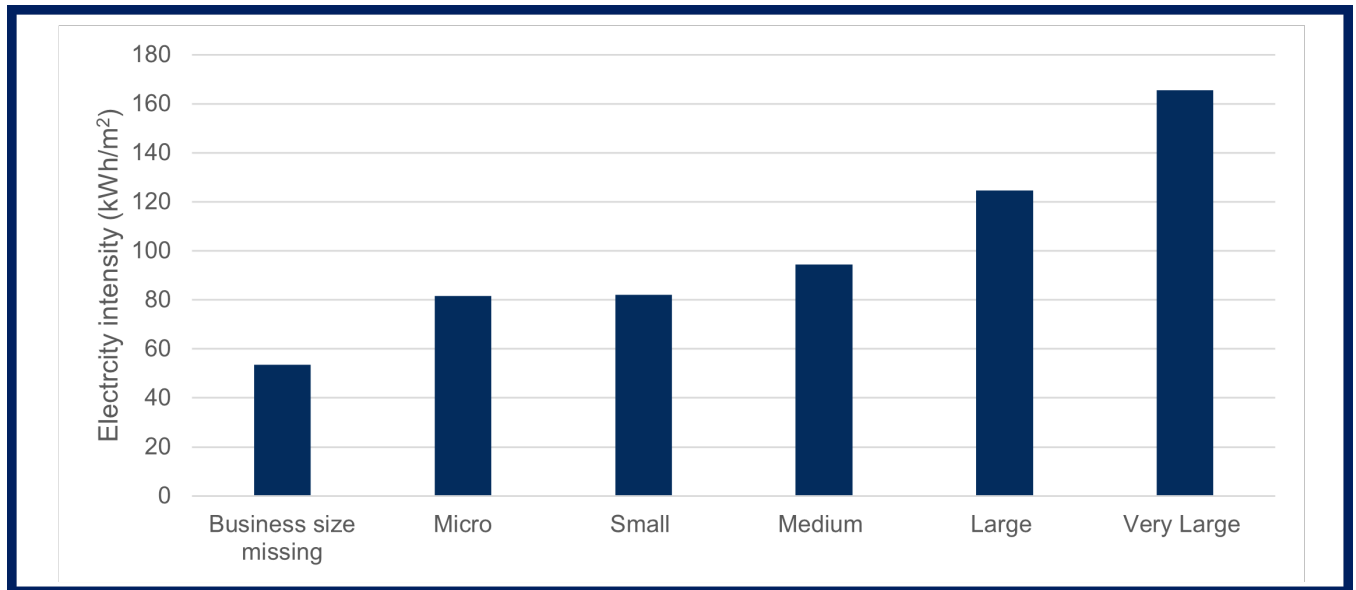
Electricity intensity shows a much stronger trend by business size than electricity consumption. Electricity intensity increases as the occupying building size increases.

Non-domestic gas consumption by business size

Gas consumption

Figure 13: The gas consumption of ND-NEED non-domestic buildings in England and Wales by business size, 2018.
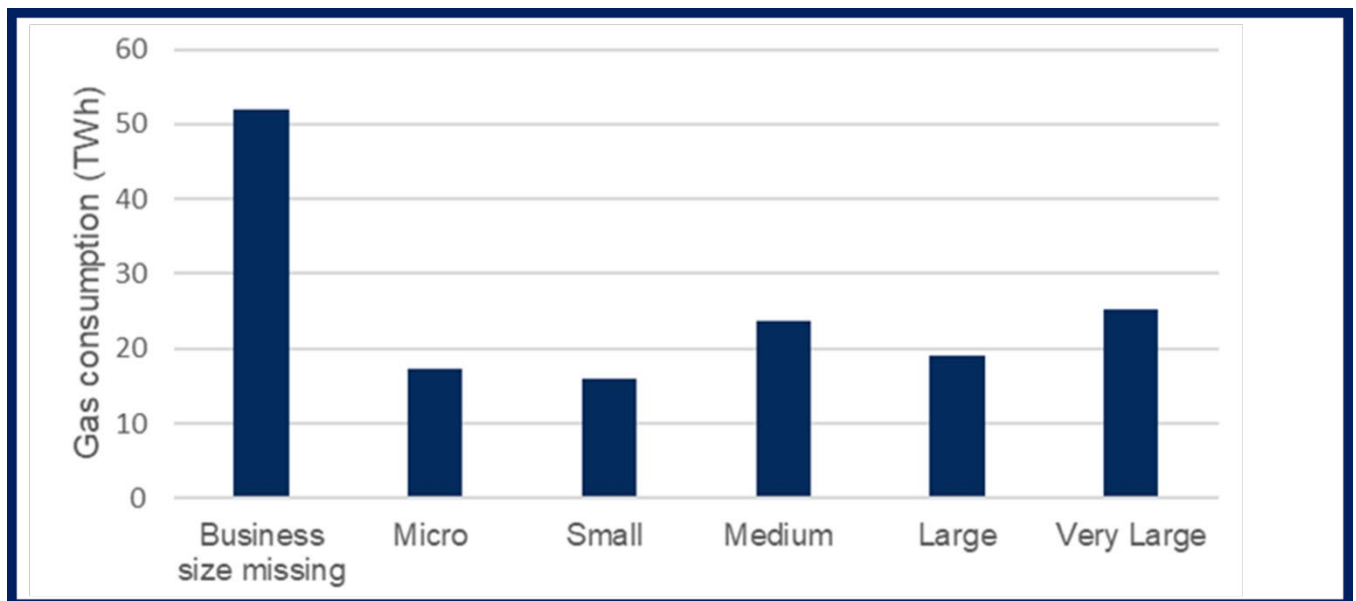
Gas consumption does not seem to vary with business size, with all businesses size categories (excluding missing) consuming between 15 TWh and 25 TWh in 2018.

It is important to note the substantial consumption of 52 TWh from the 'Business size missing' category. This is because 126,000 of the 287,000 buildings in the ND-NEED gas consumption sample are missing business size information. Because of this, the consumption figures for each business size category are likely to be underestimates (as some consumption from buildings that are missing business size information is likely to fall into each category).

Gas intensity

Figure 14: The median gas intensity of ND-NEED non-domestic buildings in England and Wales by business size, 2018.

Smaller businesses have the highest gas intensity, with gas intensity decreasing as the number of employees increases. This is the opposite pattern than is seen for electricity intensity.

Non-domestic electricity consumption by building size

Electricity consumption

Figure 15: The electricity consumption of ND-NEED non-domestic buildings in England and Wales by building size, 2018.
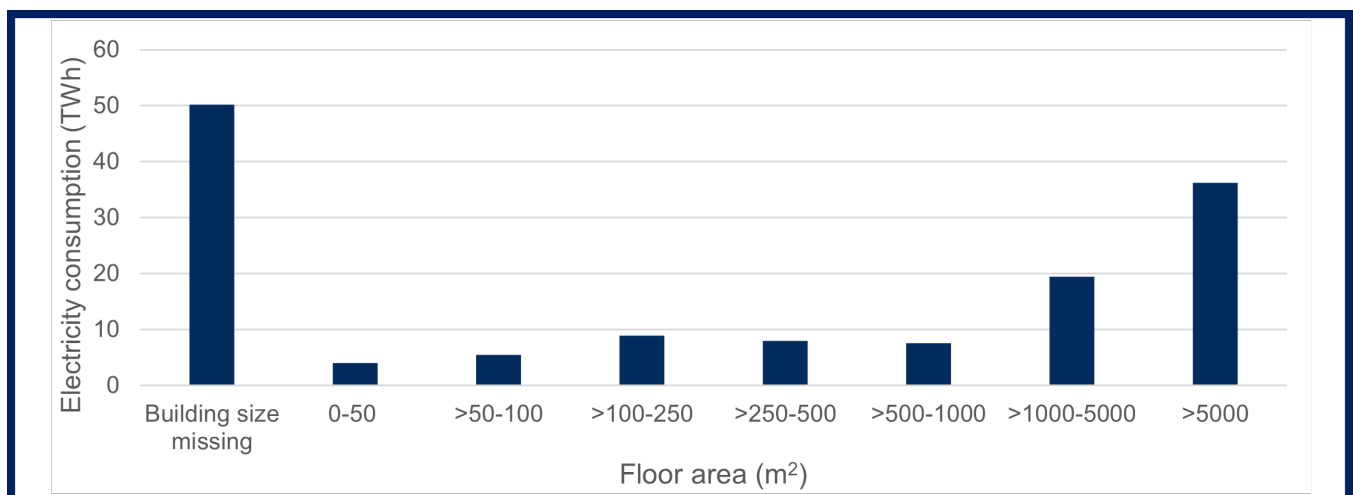
There is a clear trend that as building size increases the electricity consumption increases. This is particularly true for buildings that are over 1,000m^2.

This trend is not driven by the number of buildings as there are more buildings in the smaller floor area categories than there are in the larger ones (see Figure 5 and Figure 6).

Instead this trend is at least partly driven by the floor area of buildings in these categories. The total floor area has a similar pattern to the electricity consumption figures with a greater floor area in the larger floor area bands.

As with business size above there is a substantial proportion of non-domestic buildings in ND-NEED that are missing building size information. Of the 726,000 buildings in the ND-NEED electricity consumption sample, 113,000 are missing this information. These buildings are responsible for 50 TWh of electricity consumption.

This means figures on the electricity consumption of a particular building size should be used with caution as they are likely to be an underestimate.

Electricity intensity

Figure 16: The median electricity intensity of ND-NEED non-domestic buildings in England and Wales by building size, 2018.
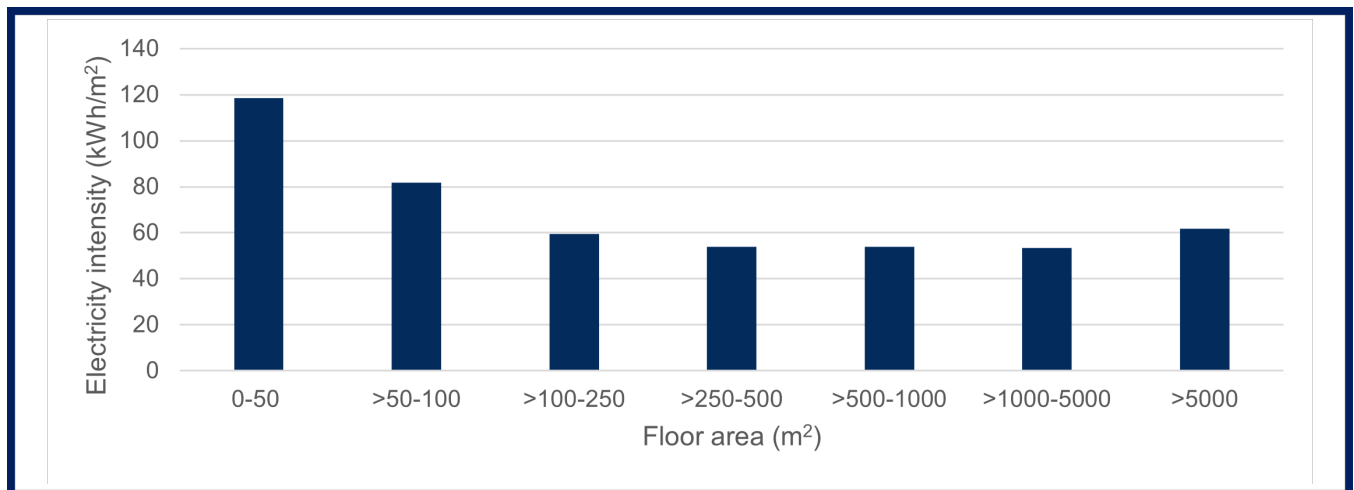

Electricity intensity shows the opposite trend to electricity consumption with smaller buildings using more electricity per square foot than larger buildings.

Non-domestic gas consumption by building size

Gas consumption

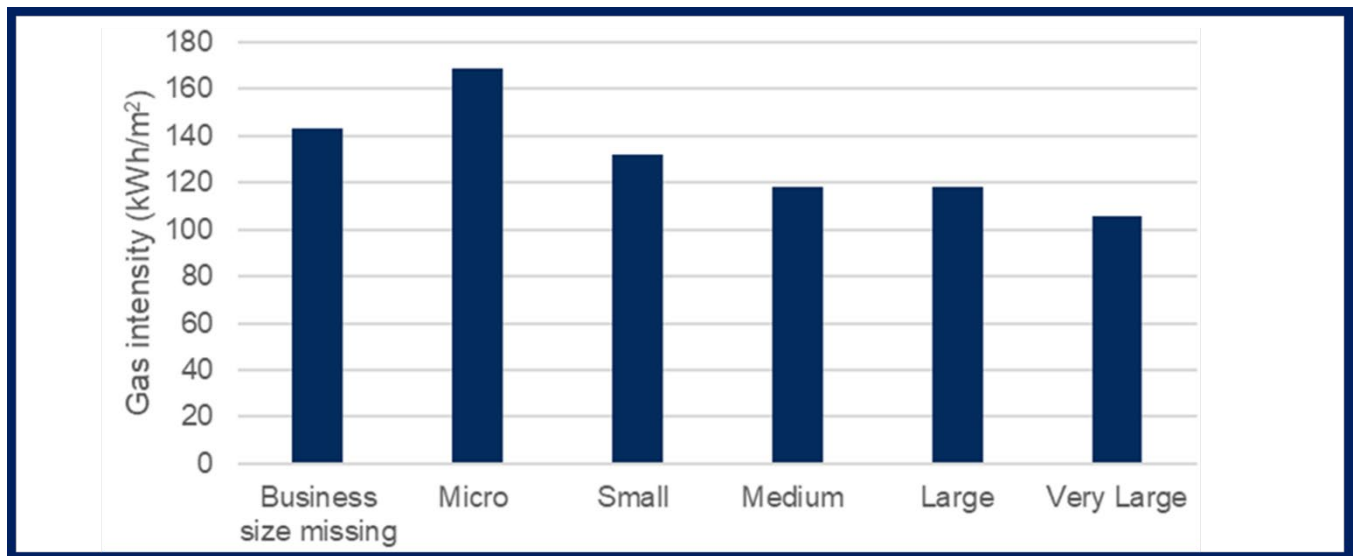**Figure 17: The gas consumption of ND-NEED non-domestic buildings in England and Wales by building size, 2018.**
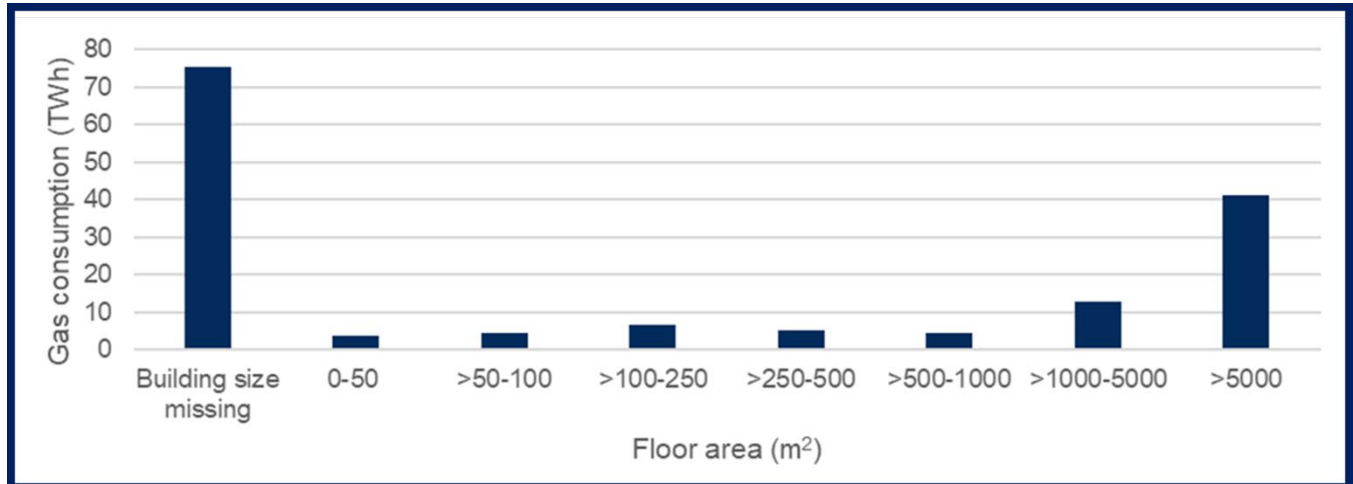
As with electricity consumption, gas consumption tends to increase as building size increases. Again, this trend is at least in part driven by the larger total floor area of the buildings in the larger floor area bands.

It is important to note the substantial size of the 'Building size missing' category which makes up 75 TWh (49%) of consumption, more than any other building size category. This consumption comes from the 59,000 buildings in the 287,000 buildings in the ND-NEED gas consumption sample that are missing building size information. The size of the missing category means that that the consumption figures for each building size category are likely to be underestimates, and so should be used with caution.

Gas intensity

**Figure 18: The median gas intensity of ND-NEED non-domestic buildings in England and Wales by building size, 2018.**
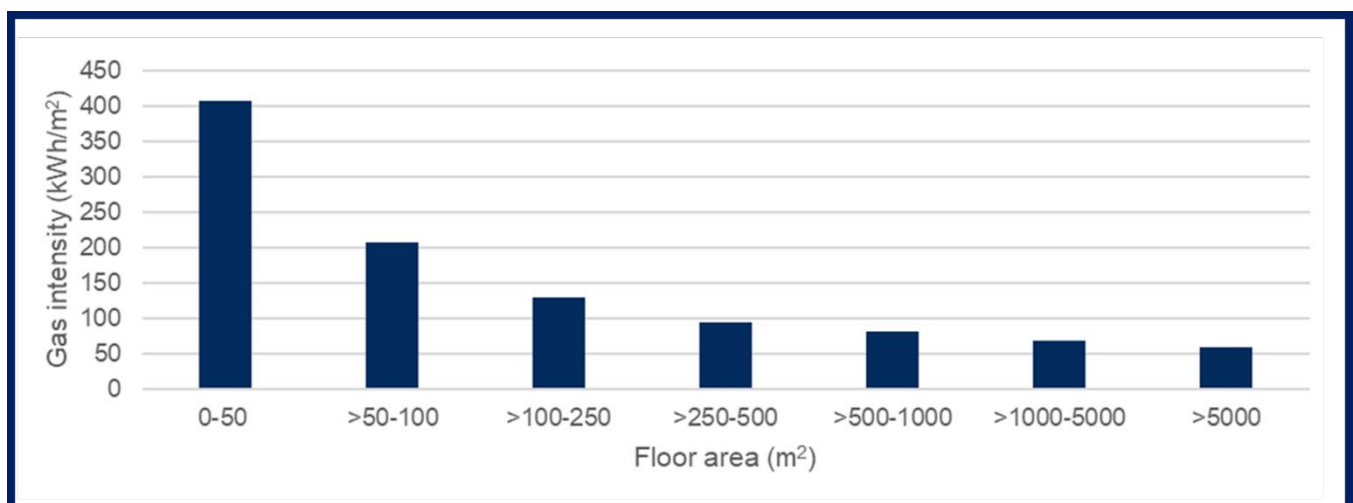
Gas intensity shows the opposite trend to gas consumption with smaller buildings using more gas per square metre. This is the same trend that is seen in the electricity intensity data.

How has energy consumption in non-domestic buildings changed over time?

ND-NEED can also provide information on the electricity and gas consumption over time, which can be disaggregated by building use.

In this update we have presented estimates only for the last three years. This is for several reasons:

1. The latest building stock figures, based on the position of the 2017 NDR as at March 2020, does not include sites that have closed (or no longer attract business rates, for example, if converted to domestic use).
2. Similarly, we also believe the meter data may not cover sites that closed before the latest year.
3. The existing weighting method uses a constant weight across the time series. This is based on the last three years, and may not sufficiently compensate for #1 and #2 above for years prior.

The combination of these three factors means that the weighted consumption figures for earlier years may be under-estimated, with the impact increasing the further back we go. We are planning to review the above (and the scale of the impact), and hope to provide a longer-series in the next edition.

How has electricity consumption in non-domestic buildings changed over time?

Figure 19: Electricity consumption in ND-NEED non-domestic buildings in England and Wales, by building use (2016-18).
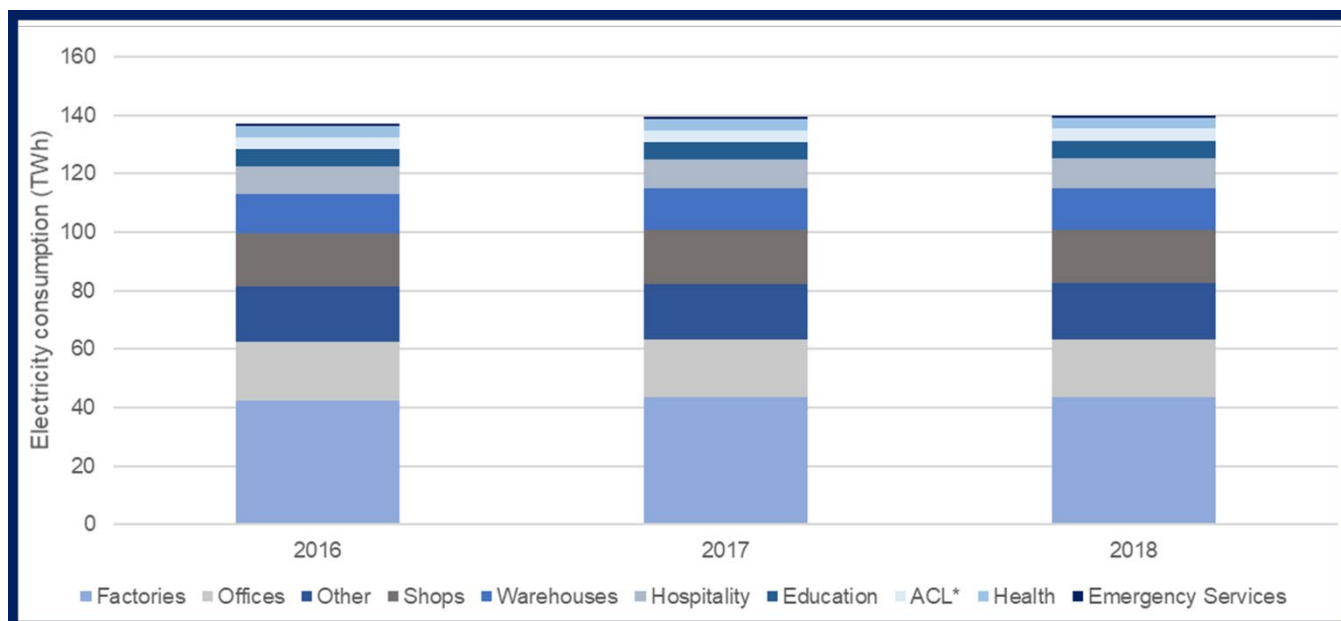
ACL – Arts, Community and Leisure

Figure 19 shows that, according to ND-NEED, electricity consumption in non-domestic buildings has remained broadly stable between 2016 – 2018, rising from 137 TWh in 2016 to 140 TWh in 2018.

This stability in consumption is seen in all on ND-NEED sectors.

The overall trend in Figure 19 is broadly consistent with comparable trends in the subnational electricity consumption statistics[9] and DUKES[8].

How has gas consumption in non-domestic buildings changed over time?

Figure 20: Gas consumption in ND-NEED non-domestic buildings in England and Wales, 2016-18.
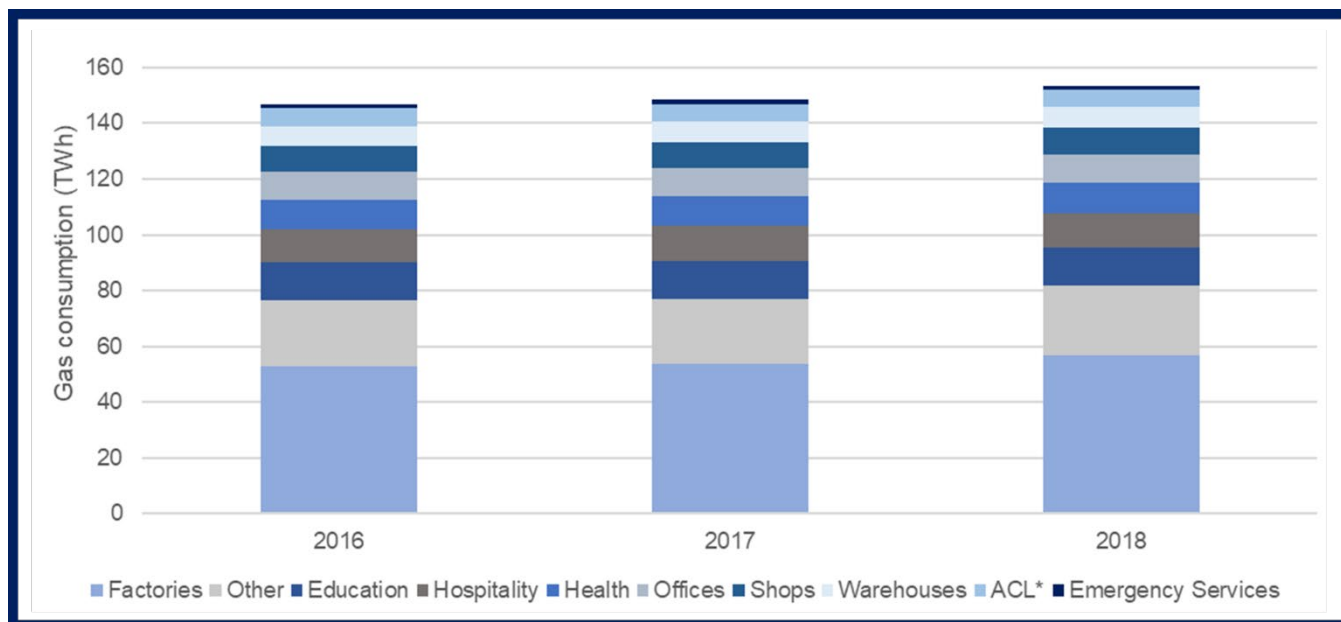
ACL – Arts, Community and Leisure

> Note, the gas consumption figures in ND-NEED are temperature adjusted so any temperature differences between years will not influence the ND-NEED gas consumption trend.

Figure 20 shows that, according to ND-NEED, gas consumption in non-domestic building gradually increased between 2016 and 2018, from 147 TWh in 2016 to 153 TWh in 2018. This is consistent with the trend seen in the subnational gas consumption statistics[10] and DUKES[11] which both show a slight increase in gas consumption over this period. We can see that this slight increase in overall gas consumption is driven by a slight increase in consumption across all building uses, rather than one particular sector.

[9]Subnational electricity consumption figures - https://www.gov.uk/government/statistical-data-sets/regional-and-local-authority-electricity-consumption-statistics
[8]Dukes, Table 5.2, Sectors: Industry, Commercial, Public administration - https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes
[10]Sub-national gas consumption statistics - https://www.gov.uk/government/collections/sub-national-gas-consumption-data
[11]DUKES, Table 4.2, Sectors: industrial, commercial, public admin and misc – https://www.gov.uk/government/statistics/natural-gas-chapter-4-digest-of-united-kingdom-energy-statistics-dukes

3.Methodology

ND-NEED building stock

To calculate the building stock figures in ND-NEED, the 2017 version of the VOA's non-domestic ratings list (NDR) and the VOA's summary valuation data (SMV), as at the end of March 2020, are used.

This data is collected by the VOA as part of their business rate calculations. Almost all properties that are not used for domestic purposes are valued for business rates and so are included in the NDR.

There are however a few non-domestic building uses that are exempt from business rates. These are not included in the NDR and so are also not covered by ND-NEED. Non-domestic buildings that are exempt from building rates include agricultural buildings and places of worship.

The NDR and SMV contain information on the number of non-domestic hereditaments in England and Wales, the size of these and their use. A hereditament can be a building, but there can also be multiple hereditaments within a single building.

Each hereditament in the NDR/SMV has a unique address reference number (UARN). Each hereditament also has a unique property reference number (UPRN), which is a unique building reference. Two hereditaments in the same building will have different UARN's but the same UPRN.

Converting NDR/SMV hereditaments to ND-NEED building stock dataset

Before analysis of the NDR/SMV data can be carried out, any hereditaments which do not have a UPRN or that have a null rateable value are removed. This takes the number of hereditaments in the dataset from 2,105,000 to 1,915,000.

The 1,915,000 remaining hereditaments must then be aggregated to the building (UPRN) level, which results in 1,798,000 unique UPRNs.

Table 3: Single versus multiple hereditaments in ND-NEED non-domestic buildings in England and Wales (end of March 2020).

Number of hereditaments in a building	Number of buildings (UPRNs)
Building (UPRN) containing a single hereditament (UARN)	1,751,000
Building (UPRN) containing multiple hereditaments (UARN)	47,000

To determine the floor area of buildings containing multiple hereditaments, the floor area of the hereditaments within it are summed. If a hereditament has a floor area of less than 15m^2 this is not included in the building floor area as this floor area data is thought to be unreliable for the purposes of ND-NEED, as it results in some extremely high energy intensity values.

The NDR/SMV also contain hereditament floor area information for some building uses for which this floor area information is thought to be unreliable for the purposes of ND-NEED as the floor area does not inform the business rating. The floor area for these building uses is therefore removed. A list of the building uses which have their floor area information removed can be found in Annex D.

If a building contains hereditaments with multiple building uses, the building use of the hereditament with the largest floor area is taken to be that for the building.

Once the NDR/SMV data has been aggregated to the building level there is some further processing before the building use analysis is carried out.

The NDR/SMV contain some building uses which are not considered to be non-domestic buildings for the purposes of ND-NEED. These 'non-buildings' are removed before the building stock figures are calculated. The building types that are removed are: Caravan Parks, Advertising Rights and Premises, Car Parks, Beach Huts, Quarries and Telecoms. The removal of the 'non-buildings' takes the number of buildings from 1,798,000 to 1,656,000.

The data can then be used to provide information on the building number, use and size of the ND-NEED non-domestic building stock in England and Wales.

Figure 21: The key steps from the NDR/SMV data from the VOA to the ND-NEED building stock population.

NDR/SMV from the VOA   ND-NEED building stock dataset

2,105,000
Hereditaments

→

1,915,000
Hereditaments
(hereditaments missing
UPRN's or that have a null
rateable value are removed)

→

1,798,000
Buildings

→

1,656,000
Buildings
(excluding non-buildings)

Energy consumption

To calculate the non-domestic energy consumption figures in ND-NEED, the list of non-domestic buildings in England and Wales with building use and building size information is matched with energy consumption data (at the meter-point level) held by BEIS and business size data from Experian. This creates a sample of non-domestic buildings with energy consumption and building/business characteristic information. This sample is then weighted to scale the results up to the population level.

Note that all 1,798,000 buildings are matched to the energy consumption data (including non-buildings).

The gas consumption meter data is temperature corrected so ND-NEED gas consumption figures are all temperature corrected.

The reason non-buildings are not removed before matching is that some of the energy consumption in the consumption data is thought to come from non-buildings. Therefore, if the non-buildings were removed before matching, the energy consumption for non-domestic buildings (excluding non-buildings) would be artificially high as it would be scaled up to population figures that include non-building consumption.

To prevent this the non-buildings are matched to the energy consumption data and included when the weights are calculated to scale the sample up to the population. After the weights have been calculated the non-buildings are removed.

Matching the ND-NEED building stock and energy consumption data

The 1,798,000 buildings in the ND-NEED building stock and the energy consumption data do not share a common unique identifier. Therefore, to match the datasets together address matching is used.

Address matching is when two addresses from different datasets are deemed to correspond to the same property. Address matching of non-domestic buildings can be difficult as non-domestic addresses are often complex. For example, a non-domestic building may occupy a range of building numbers or list the company name in the address. More information about the address-matching process in ND-NEED can be found in Annex A.

Using address matching just over 40% of buildings in the ND-NEED stock (733,000 buildings) were successfully matched to electricity meter data. Of these 733,000 buildings, 288,000 were also successfully matched to gas consumption meter data. This reduced sample size is also in part due to much less of the building stock having a gas connection.

> Note, this means all analysis on gas consumption/gas intensity in ND-NEED is based on a smaller sample size than similar analysis on electricity consumption/electricity intensity.

Matching the ND-NEED sample and Experian data

The buildings that have successfully matched to the meter data (the ND-NEED sample) are then matched to the Experian business characteristics dataset. This dataset contains information about the number of employees of the business occupying the building.

Both ND-NEED sample and the Experian dataset contain a UPRN field and this is used to match these datasets together.

Just over 50% of business in the ND-NEED sample successfully match to the Experian data.

> Note, the Experian business characteristics dataset is a bespoke dataset that BEIS receives from Experian.

Figure 22: The key steps from the ND-NEED buildings stock to the ND-NEED electricity and gas sample matched to the Experian dataset.
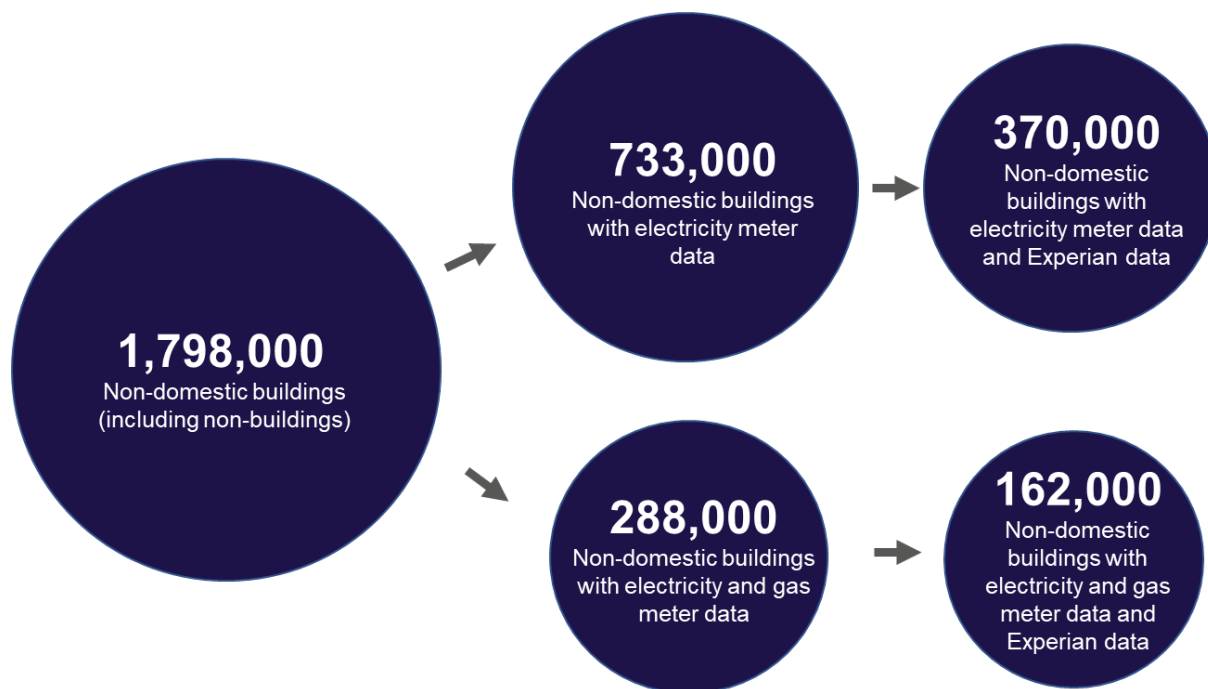
Weighting

As not all non-domestic buildings can be matched to energy use data, weights are used to scale up the ND-NEED sample to population. Weighting is used to ensure the results from ND-NEED are as representative of the non-domestic building population as possible.

As there is not a dataset that contains all non-domestic buildings and all non-domestic building electricity/gas consumption, this weighting takes place in two stages (the building weight and the energy weight).

Note, for the weighted sample figures to be representative of the population, the weighting must account for the key characteristics that could influence energy consumption. For example, if there are disproportionately fewer factories in the sample compared their frequency in the population, the factory consumption in the sample should be weighted to account for this.

Both building use and floor area are used to inform the weighting, so the ND-NEED consumption figures should be representative for these characteristics.

It should be noted however that where floor area information is missing the weighting is less effective as buildings missing floor area in the sample will be weighted up to buildings missing floor area in the population, even though the actual floor sizes of buildings in these groups might differ substantially. For this reason, there is more uncertainty around the ND-NEED consumption figures by floor area than by building use (where there is no missing information).

Building weighting

The building weights scale up the number of buildings in the ND-NEED sample to the number of buildings in the ND-NEED building population.

To account for biases in the ND-NEED sample the building weights are constructed based on building type and building size. A single building weight is calculated for each building in the ND-NEED sample.

The building population and sample are stratified into 35 building uses and 17 floor area bands to form a matrix. A few of the building types have too few counts in either the population or the sample to be stratified into an area band (a count of below 40 was used as the minimum cut-off). In these cases, two or more area bands were merged (in both the population and the sample).

For each cell in the matrix, the population count is divided by the sample count. For example, if there were 1,000 cinemas with a floor area of >500 – 1,000m^2 in the population, and 500 cinemas with a floor area of >500 – 1,000m^2 in the population these buildings would be assigned a building weight of 2.

It is not possible to include occupying business size in this weighting process as information on occupying business size is only available for buildings in the sample, not for the whole population.

Energy weighting

The next stage of the weighting process is to calculate the energy weights. The energy weights scale up the energy meters in the ND-NEED sample to match the number of energy meters in the non-domestic meter population. The weights for electricity meters and gas meters are calculated separately.

The non-domestic meter population contains some building uses that are not covered by ND-NEED. These are agricultural buildings, place of worship and prisons. The meters associated with these building uses are therefore excluded from non-domestic meter population before the energy weights are calculated.

To do this, a profile for each of the excluded building types was created from the meter data. Each of these building types were then grossed up to an estimated population from the Experian data or the UCL Carb model[12]. The resulting population of these building types was then removed from the total population of all consumption meters. For example, 5% of prisons (10 prisons) are profile class 6 and in consumption band 7, therefore 10 meters of profile class 6 and consumption band 7 are removed from the meter population, before the consumption data is grossed up to the population.

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[12]The UCL Carb model is UCL's non-domestic energy use model which provides estimates of total number of buildings for different building types.

Electricity weight

The population for the electricity weight is all the non-domestic electricity meters in the sub-national consumption statistics (profile class of 3 – 9)[13], and any other electricity meters that match to a building in the ND-NEED building stock dataset. The sample is the number of electricity meters in the ND-NEED sample multiplied by their building weight.

To account for biases in the ND-NEED sample the electricity weights are constructed based on their average electricity consumption in 2016 - 2018 and meter profile class. The population and sample of meters is stratified into 17 consumption bands and into seven profile classes to form a matrix. For each cell in the matrix, the ratio of population count to sample count is calculated. Any meters in the sample with a profile class of 1 or 2 are given a weighting of one, as any further meters of these profiles would be expected to be domestic, so should not be scaled.

If a building has multiple meters the total consumption for the building is divided by the number of meters and assigned the resulting consumption band.

For each combination of consumption band/profile, a single electricity weight is calculated, as the population to sample ratio, averaged over the last three years (2016-2018). This is then applied to all years of electricity consumption, for each building in the sample, in the corresponding band.

Gas weight

The population for the gas weight is all of the non-domestic gas meters in the sub-national consumption statistics[11] (meters than consume more than 73,200 kWh a year), and any other gas meters that match to a building in the ND-NEED building stock dataset. The sample for the gas weight is the gas meters in the ND-NEED sample multiplied by their building weights.

To account for biases in the ND-NEED sample the gas weights are constructed based on their average gas consumption in 2016 - 2018. The population and sample of meters is stratified into 17 consumption bands. For each cell in the matrix, the ratio of population count to sample count is calculated. As for electricity, any gas meters with a consumption of less than 73,200 kWh a year are given a gas weight of one, since any further meters would be expected to be domestic, so should not be scaled.

If a building has multiple meters the total consumption for the building is divided by the number of meters and assigned the resulting consumption band.

For each consumption band, a single gas weight is calculated, as the population to sample ratio, averaged over the last three years (2016-2018). This is then applied to all years of gas consumption, for each building in the sample, in the corresponding band.

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[13]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.
[11]Sub-national gas consumption statistics - https://www.gov.uk/government/collections/sub-national-gas-consumption-data

Removing non-buildings

Once the electricity and gas weights have been calculated the buildings that were originally included in the ND-NEED electricity/gas consumption sample, but that are not considered to be non-domestic buildings in ND-NEED ('non-buildings'), are removed. The buildings that are removed are: Caravan Parks, Advertising Right and Premises, Car Parks, Beach Huts, Quarries and Telecoms.

The removal of these 'non-buildings' reduces the size of the ND-NEED electricity consumption sample from 733,000 buildings to 726,000 buildings, and the size of the gas consumption sample from 288,000 buildings to 287,000 buildings.

Figure 23: The removal of non-buildings from the ND-NEED electricity and gas consumption samples.
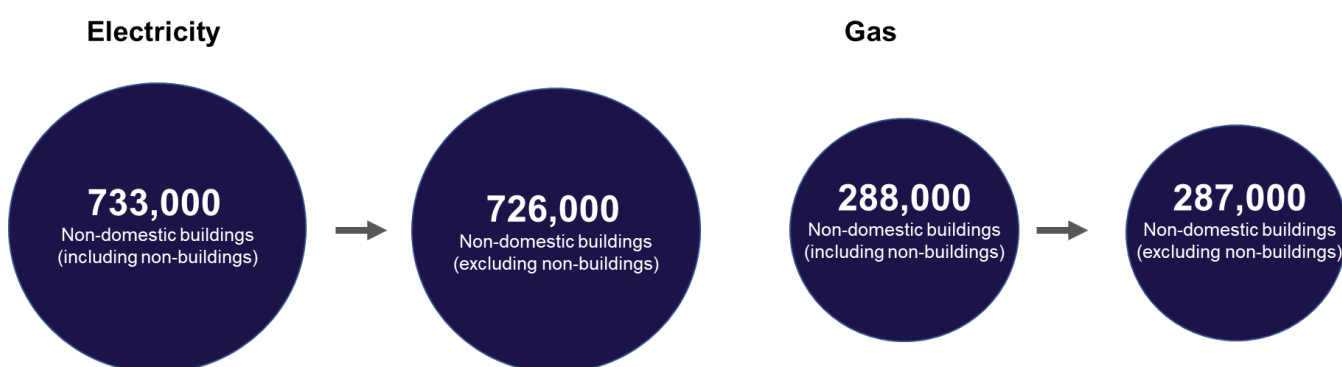
The removal of non-buildings from the sample also removes the energy consumption associated with these non-buildings from the ND-NEED consumption figures (see Table 4).

Table 4: Electricity and gas consumption for non-buildings in England and Wales.

Year	Electricity consumption (TWh)	Gas consumption (TWh)
2016	20	14
2017	21	15
2018	21	15

The removal of non-buildings from the ND-NEED sample is one of the reasons that the ND-NEED energy consumption figures for non-domestic buildings are generally lower than comparable figures from other sources such as the subnational consumption statistics. This can be seen in Table 5, 6, 7 and 8 below.

Table 5: Weighted and unweighted ND-NEED electricity consumption figures *excluding* non-buildings, compared to subnational consumption figures for England and Wales[9].

Year	Unweighted electricity consumption excluding non-buildings (TWh)	Weighted electricity consumption excluding non-buildings (TWh) Final ND-NEED figures	% of subnational consumption	Subnational consumption (England and Wales)[9]
2016	55	137	90%	152
2017	56	139	90%	154
2018	56	140	90%	155

Table 6: Weighted and unweighted ND-NEED electricity consumption figures *including* non-buildings, compared to subnational consumption figures for England and Wales[9].

Year	Unweighted electricity consumption including non-buildings (TWh)	Weighted electricity consumption including non-buildings (TWh)	% of subnational consumption	Subnational consumption (England and Wales)[9]
2016	56	158	103%	152
2017	58	160	104%	154
2018	57	160	103%	155

Table 7: Weighted and unweighted ND-NEED gas consumption figures *excluding* non-buildings, compared to subnational consumption figures for England and Wales[10].

Year	Unweighted gas consumption excluding non-buildings (TWh)	Weighted gas consumption excluding non-buildings (TWh) Final ND-NEED figures	% of subnational consumption	Subnational consumption (England and Wales)[10]
2016	44	147	94%	155
2017	45	148	91%	164
2018	46	153	92%	167

[9]Subnational electricity consumption statistics – https://www.gov.uk/government/statistical-data-sets/regional-and-local-authority-electricity-consumption-statistics
[10]Sub-national gas consumption statistics - https://www.gov.uk/government/collections/sub-national-gas-consumption-data

Table 8: Weighted and unweighted ND-NEED gas consumption figures *including* non-buildings, compared to subnational consumption figures for England and Wales[10].

Year	Unweighted gas consumption including non-buildings (TWh)	Weighted gas consumption including non-buildings (TWh)	% of subnational consumption	Subnational consumption (England and Wales)[10]
2016	45	161	103%	155
2017	47	163	100%	164
2018	48	168	101%	167

Comparing the results in ND-NEED to comparable figures from other publications

The electricity/gas consumption of non-domestic buildings broken down by building use is available in other publications as well as in ND-NEED.

Figures 24 and 25 compare the total electricity and gas consumption figures for non-domestic buildings from three different sources (ND-NEED, BEES[4] and ECUK[3]). Note, ND-NEED and BEES figures cover England and Wales, whereas ECUK figures cover the UK as a whole.

In general, all three publications have similar electricity consumption figures by building use. The figures in ECUK are generally higher than the figures in ND-NEED and BEES. This is consistent with the fact that ECUK covers the whole of the UK, whereas the ND-NEED and BEES just cover England and Wales. Methodological differences also account for some of this difference.

The notable exception to this is Factories where consumption in BEES is much lower than in ND-NEED (11 TWh in BEES compared to 43 TWh in ND-NEED). Factory consumption figures are not available for ECUK. This difference can be explained by a difference in the BEES and ND-NEED methodologies. The BEES consumption figure refers to all electricity consumed by the building whereas the ND-NEED figures, as they are based on meter point data, refer to all energy consumed by the building and any activity inside the building. In the case of factories, this means that industrial processes are not included in the BEES consumption figures, but they are included in ND-NEED.

[10]Sub-national gas consumption statistics - https://www.gov.uk/government/collections/sub-national-gas-consumption-data
[3]ECUK, End uses data tables, Table U5 - https://www.gov.uk/government/statistics/energy-consumption-in-the-uk
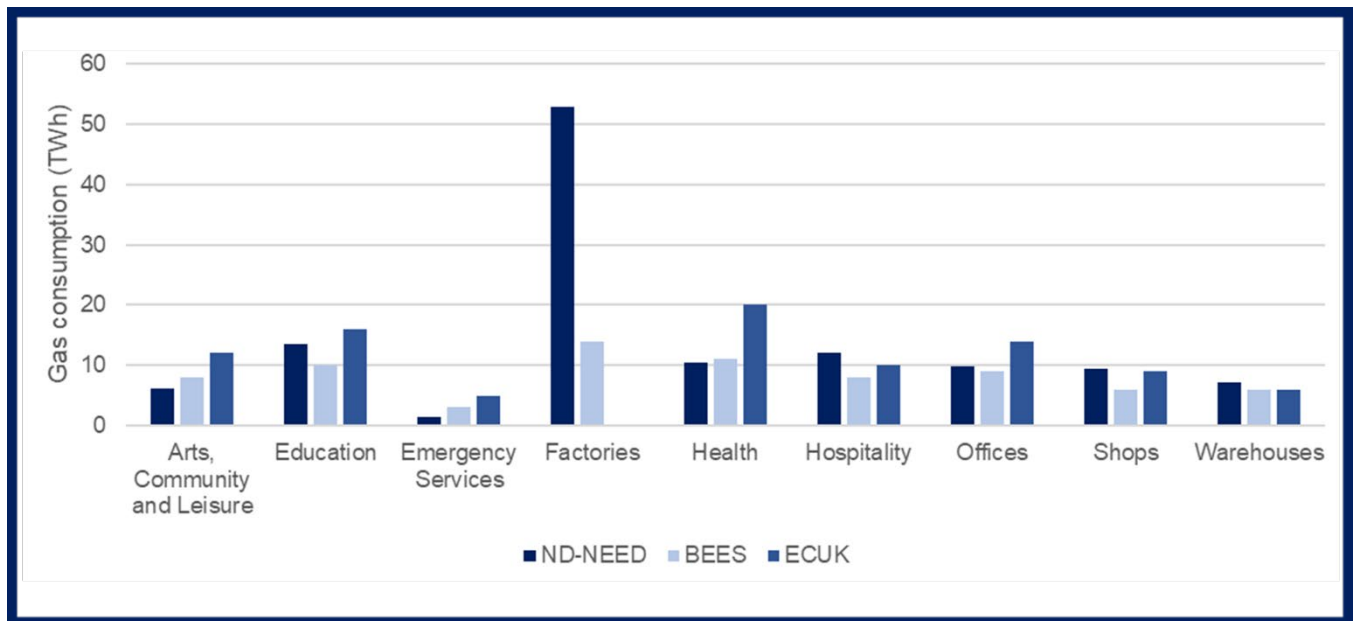[4]BEES, Overarching report tables, Figure 3.1 - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

The gas consumption figures show a similar pattern to the electricity consumption figures. For all sectors except Factories the consumption figures are relatively consistent across all three publications. The ND-NEED consumption figures for Factories is much higher than the BEES consumption figure for the reason stated above.

Figure 24: Non-domestic building electricity consumption from this version of ND-NEED for 2016, BEES for 2014-15[4], and ECUK for 2016[3].
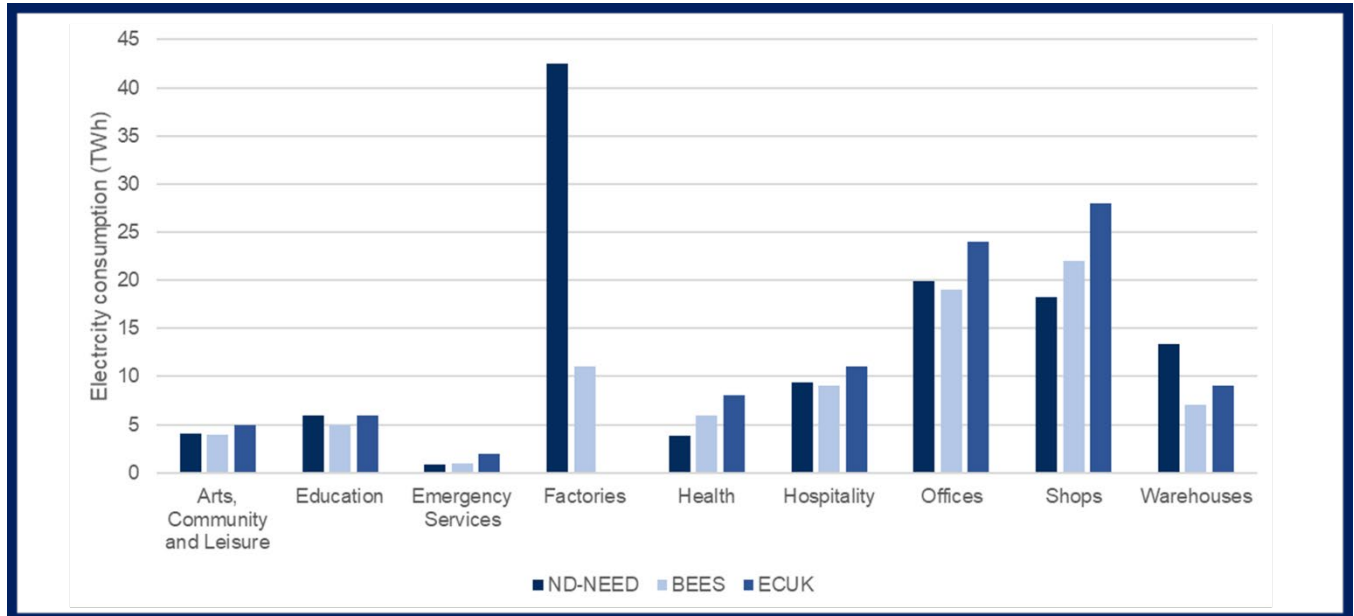
Figure 25: Non-domestic building gas consumption from this version of ND-NEED for 2016, BEES for 2014-15[4], and ECUK for 2016[3].

[3]ECUK, End uses data tables, Table U5 - https://www.gov.uk/government/statistics/energy-consumption-in-the-uk
[4]BEES, Overarching report tables, Figure 3.1. BEES does not have figures for gas consumption so non-electric consumption figures are used. - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

Current limitations of ND-NEED

There are several aspects of ND-NEED's methodology which currently limit the insights that's ND-NEED can provide. Before the next publication of ND-NEED, work will be undertaken to see if any of these limitations can be addressed.

The key limitations of ND-NEED are:

Address matching

- Incorrect matches between the non-domestic buildings data and the energy consumption data (see Annex A).
  - Due to difficulties with the address matching process used to match the energy consumption data to AddressBase, some matches will not be correct. It is estimated that around 5% of address matches are incorrect.
  - If an energy meter data has been matched with the wrong address in AddressBase it will then match to the wrong address in the ND-NEED building stock. The consumption of that building with therefore be assigned to the wrong building and business characteristics information, and weighted accordingly, causing distortions in the data.
- Lower than 50% match rate between the non-domestic buildings data and the energy consumption data (see Annex A).
  - Only 44% of non-domestic buildings in the ND-NEED building stock are matched to electricity consumption data and only 17% are matched to gas consumption data (excluding non-buildings).

Weighting (see weighting section of the methodology)

- Because we cannot match all non-domestic buildings data with their energy consumption data, weighting is needed to ensure the ND-NEED consumption figures are representative of the population.
  - There are however several limitations of the ND-NEED weighting process. Firstly, there is currently no information in ND-NEED about business size at the population level. Business size is therefore not accounted for in the weighting process. Secondly, although floor area is a factor in the weighting process, the relatively high rates of missing floor area information in ND-NEED reduces the efficacy of the floor area weighting.
- Applying energy weights to energy intensity figures.
  - Energy intensity is influenced by both the energy consumption and the floor area of a building, whereas the energy weight currently applied to energy intensity figures is just influenced by a building's energy consumption. This means that differences in floor area between the buildings in the sample and the population are not accounted for.

Time series

- The building stock figures used in ND-NEED, based on position of the 2017 NDR at March 2020, do not include sites that have closed (or no longer attract business rates, for example, if converted to domestic use) since the previous update (in 2010). Because of this, any buildings that do not exist in March 2020 will not be included in the ND-NEED stock and so cannot be matched to energy consumption data.
- The energy consumption data used in this version of ND-NEED only includes meters which are active in 2018. Because of this, any energy consumption from meters that have now been deenergised e.g. because the building has been destroyed, is not captured.
- The weighting process in ND-NEED is currently unable to account sufficiently for this. This makes it difficult to create a robust time series from the ND-NEED. Energy consumption in earlier years is likely to be underestimated, as energy consumed by buildings/meters that no longer exist would not be captured.

Missing data

- Many buildings in ND-NEED are missing information on business/building size (see [Annex E](#)).
  - The main consequences of the high level of missing data in ND-NEED is that the consumption value associated with a particular business or building size will likely be an underestimate, as some consumption from buildings that are missing business/building size information will likely fall into that category.

Mixed building use

- Assigning building use to buildings containing multiple hereditaments of different building uses.
  - The data received from the VOA (NDR/SMV) is at the hereditament level and must be aggregated to the building level for use in ND-NEED. Where a building contains multiple hereditaments of different building uses the building use of the hereditament with the largest floor area is assigned to the building. However, it is possible that the building use of the hereditament with the largest floor area does not best represent the building use of the building as a whole. Improving the building use classification for building uses with multiple hereditaments would improve the accuracy of ND-NEED's energy consumption and energy intensity figures by building use.

Business size

- The business size information in ND-NEED is the size of the business that occupies the building, not the number of employees that work in the building. Because of this a small branch of a national store will be a large business in ND-NEED, even if there are only a few employees in the building.

Accompanying tables

The following tables are available on the department's statistics website:
https://www.gov.uk/government/collections/non-domestic-national-energy-efficiency-data-framework-nd-need

1	Number and total floor area of ND-NEED non-domestic buildings by building use, end of March 2020.
2	Number and total floor area of ND-NEED non-domestic buildings by floor area bands, end of March 2020.
3.1 & 3.2	ND-NEED non-domestic building electricity consumption and intensity by building use, 2016-2018.
3.3 & 3.4	ND-NEED non-domestic building gas consumption and intensity by building use, 2016-2018.
4.1 & 4.2	ND-NEED non-domestic building electricity consumption and intensity by business size, 2018.
4.3 & 4.4	ND-NEED non-domestic building gas consumption and intensity by business size, 2018.
5.1 & 5.2	ND-NEED non-domestic building electricity consumption and intensity by building size, 2018.
5.3 & 5.4	ND-NEED non-domestic building gas consumption and intensity by building size, 2018.
6.1	ND-NEED non-domestic building number and floor area by building use and building size, end of March 2020.
7.1 & 7.2	ND-NEED non-domestic building electricity and gas consumption by business size and building size, 2018.
8.1 & 8.2	ND-NEED non-domestic building electricity and gas consumption by building use and business size, 2018.
9.1 & 9.2	ND-NEED non-domestic building electricity consumption by building use and building size, 2018.

Related statistics

Non-domestic National Energy Efficiency Data-Framework: energy statistics 2006-2012

Previous release of the ND-NEED statistics, March 2015.

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

Overview of the concept of ND-NEED, known issues, plans for improvement, preliminary results and the proposed weighting methodology, May 2014.

National Energy Efficiency Data-Framework (NEED)

Summary statistics of domestic energy consumption 2005-2018, June 2020.

Revisions policy

The BEIS statistical revisions policy sets out the revisions policy for these statistics, which has been developed in accordance with the UK Statistics Authority Code of Practice for Statistics.

User engagement

Users are encouraged to provide comments and feedback on how these statistics are used and how well they meet user needs. Comments on any issues relating to this statistical release are welcomed and should be sent to: energy.stats@beis.gov.uk.

The BEIS statement on statistical public engagement and data standards sets out the department's commitments on public engagement and data standards as outlined by the Code of Practice for Statistics.

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4.Annex A: Address matching

The non-domestic building stock and BEIS's energy meter data do not share a unique identifier and so cannot be directly matched.

Instead the energy meter data is first matched to the AddressBase dataset. This is an Ordnance Survey dataset that contains the addresses of all buildings in Great Britain as well as their Unique Property Reference Number (UPRN). As both the energy meter data and the AddressBase dataset contain the buildings address, address matching is used to match these datasets together.

An algorithm is used to carry out the address-matching. Since the 2015 publication of ND-NEED, changes have been made to the address-matching algorithm to improve the quality of matches.

Where buildings in the energy meter dataset successfully match to AddressBase, the UPRN for the building can be identified. As the non-domestic building stock contains UPRN information, the UPRN can then be used to match the energy meter and building stock datasets.

Figure 26: Matching the non-domestic building stock to the energy meter data in ND-NEED.
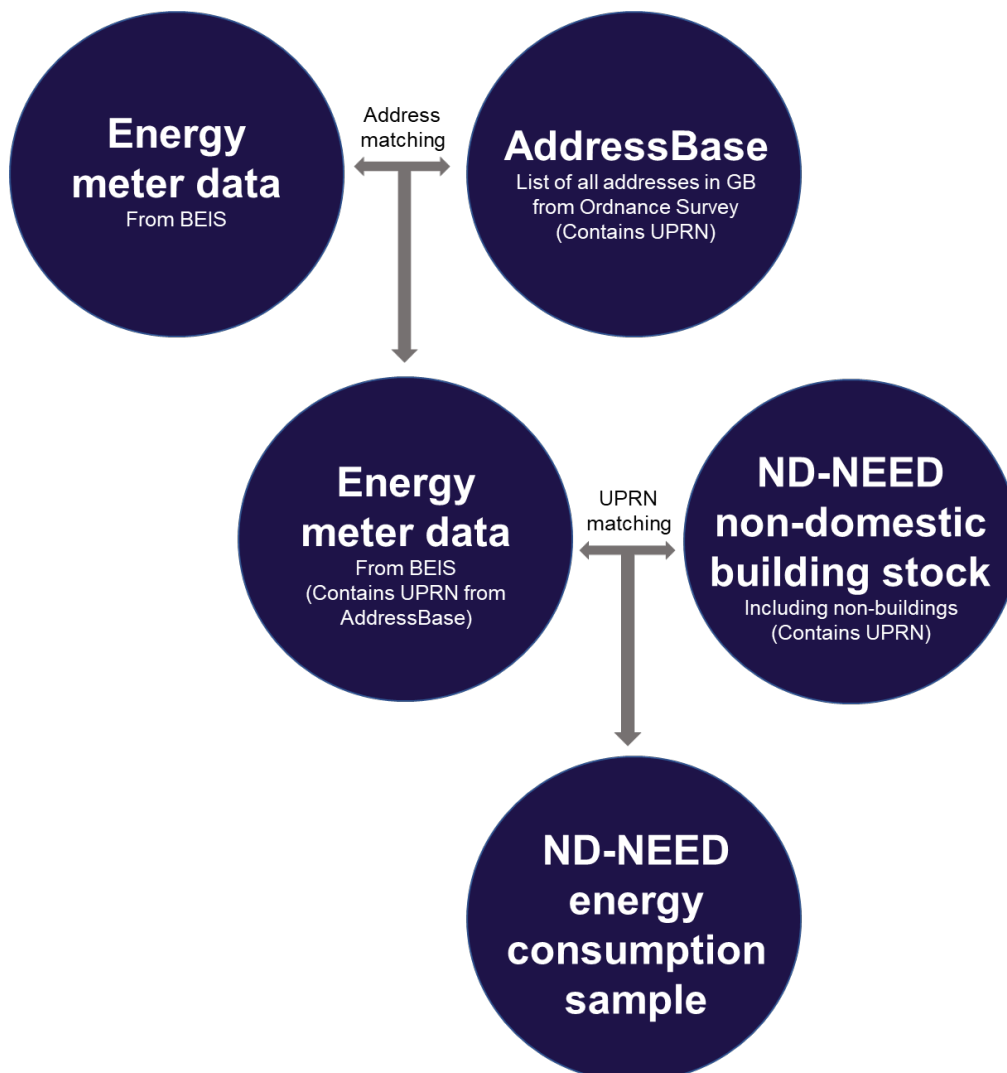
5.Annex B: Building use categories

The building use categories that are used in this version of ND-NEED have been chosen to align as far as possible with the categories used in the Energy Consumption in the UK (ECUK)[3] and Business Energy Efficiency Statistics (BEES)[4].

In the March 2015 publication of ND-NEED, six building use categories were used: Factories, Offices, Restaurants, Shops, Warehouses and Other.

In this publication 10 building use categories are used: Arts, Community and Leisure; Education; Emergency Services; Factories; Health; Hospitality; Offices; Shops; Warehouses and Other.

Details of the buildings uses that are included in these 10 categories can be found in Table 9 below.

Table 9: The building uses included in the 10 building use categories in ND-NEED.

Building type	Buildings included
Arts, Community and Leisure	Cinemas, Community centres, Libraries/Museums, Sports centres, Sports grounds
Education	Nurseries, State schools, Private schools, Universities
Emergency Services	Ambulance/Fire stations, Police stations
Factories	Factories
Health	Healthcare
Hospitality	Restaurants, Hostels, Hotels, Holiday homes/Guesthouses, Pubs
Offices	Offices
Shops	Shops
Warehouses	Warehouses
Other	Bus stations/moorings, Cemeteries, Docks, Electricity hereditaments, Garages, Markets, Military premises, Sewage treatments

[3]ECUK, End uses data tables, Table U5 - https://www.gov.uk/government/statistics/energy-consumption-in-the-uk
[4]BEES, Overarching report tables, https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

6.Annex C: Changes since the 2015 publication

ND-NEED was last published in 2015. Since 2015 there have been several changes to the methodology.

 The key changes are listed below:

- Improvements to address matching (see Annex A)

- Updated VOA data. The 2020 publication of ND-NEED uses the 2017 ratings list as at the end of March 2020, whereas the 2015 publication used the 2010 ratings list.

- Updated meter data

A further change between the 2015 and 2020 versions of ND-NEED are the charts and data tables that have been published.

The 2020 version of ND-NEED includes new information about the building type and floor area of the non-domestic building stock. This was not present in the 2015 version of ND-NEED.

The 2020 version of ND-NEED also contains a slightly different combination of charts and data tables for the energy consumption data. The charts and data tables included in the 2020 version of ND-NEED are designed to be easy to use and understand, and to cover the topics most useful to the ND-NEED end-users.

7. Annex D: Removing inaccurate floor area data

The NDR/SMV received from the VOA contains information on floor area. This floor area information is at hereditament level. For some hereditaments, this floor area information is missing in the VOA's data.

As ND-NEED presents information at the building level, when there are multiple hereditaments in a single building are the floor area of the constituent hereditaments are added together. Before hereditament floor areas are aggregated to the building level all hereditaments with a floor area of <15m^2 have their floor area value are removed. This is because, for the purposes of ND-NEED, these floor area values are thought to be inaccurate.

The floor area of building uses for which floor area is not used to inform VOA's building rating are also removed. This occurs for the building uses listed below:

Abattoirs and Slaughterhouses,
Agricultural Showgrounds,
Air Ports,
Air Strips,
Aluminium Smelting Works,
Amusement Parks,
Aquaria,
Archives,
Arenas,
Army Hereditaments,
Artificial Fibre Works,
Asphalt Plants,
Beet Sugar Factories,
Bingo Halls,
Bird Sanctuaries,
Bowling Centres,
Brickworks,
Bulk Cement Storage Depots,
Bus Garages,
Bus Stations,
Caravan Parks,
Caravan Sites and Pitches,
Cattle Breeding Centres,
Cement Tiles Works,
Cement Works,
Cemeteries,
Chalet Parks,
Chemical Works,
Cinemas,
Civic and Public Buildings,

Civic Amenity Sites,
Civil Airports,
Coaching Inns,
Coastguard Stations,
Courts,
Coking and Carbonising Plants,
Colleges of Further Educations,
Communication Stations,
Concert Halls,
Concrete Batching Plants,
Concrete Block Works,
Concrete Product Works,
Conference and Exhibition Centres,
Conference Centres in Country Houses,
Country House Hotels,
Courts,
Crematoria,
Cricket Centres,
Cricket Grounds,
Crown Miscellaneous,
District Heating Undertakings and Networks,
Docks and Harbours,
Domestic Fuel Installations,
Effluent Minewater Treatment Plants and Premises,
Electricity Undertakings,

Field Study Activity and Adventure Centres,
Fire Stations,
Fish Farms,
Flour Mills,
Football Stadia,
Formula Assessed Miscellaneous,
Game Farms,
Gas Processing Plants,
Go Kart Rinks,
Golf Driving Ranges,
Grain Silos,
Greyhound Racetracks,
Hatcheries/Poultry Farms,
Health Farms,
Heliports,
Heredits used for Primary Treatment/Processing of Minerals,
Heritage Railways,
Holiday Centres,
Horse Racecourses,
Hospitals and Clinics NHS,
Hospitals and Clinics Private,
Hotels (3 star and under), Operated,
Ice Rinks,
Information/Visitor Centres,
Iron and/or Steel Works,
Lakes with Water Sport Facilities,

Land used for Car Boot Sales,
Landfill Gas Generator Sites,
Land used for Waste Composting,
Leisure Miscellaneous,
Libraries,
Lifeboat Stations,
Liquid Bulk Storage,
Livestock Markets,
Local Authority Schools,
Lodges,
Marinas,
Markets,
Mineral Depots and Premises,
Minerals Miscellaneous,
Mineral Producing Hereditament – Blockstone,
Mineral Producing Hereditament – Brine,
Mineral Producing Hereditament – Chalk,
Mineral Producing Hereditament – China Clay,
Mineral Producing Hereditament – Clay,
Mineral Producing Hereditament – Coal,
Mineral Producing Hereditament – Fluorspar,
Mineral Producing Hereditament – Gas,
Mineral Producing Hereditament – Hardrock,
Mineral Producing Hereditament – Inert,
Mineral Producing Hereditament – Oil,
Mineral Producing Hereditament – Other Mineral Categories,
Mineral Producing Hereditament – Putrescible,
Mineral Producing Hereditament – Sand, Gravel, and, Slates,
Miniature Railways,
Model Villages,
Mortuaries,
Motor Racetracks,
Motor Vehicle Works,

Motorway and Major Road Service Areas,
Museums and Art Galleries (Contractors),
Museums and Art Galleries (Non-Contractors),
Nuclear Establishments,
Nursing Homes,
Observatories,
Oil Refineries,
Oxbridge Colleges,
Peat Fields,
Petrol Filling Stations,
Pipelines,
Pitch and Putting Greens
Pleasure Piers,
Point to Point and Eventing Courses,
Police Stations,
Police Training Colleges,
Power Generators,
Prison Service Hereditaments,
Property used for Secondary Aggregate Processing,
Provender Mills,
Public Conveniences,
Public Halls,
Public Houses/Pub Restaurants,
Public Houses/Pub Pumping Mines
Railways and Tramways,
Religious Retreats/Study Centres (Residential),
Restaurants (inc. Lodge),
Roller Skating Rinks,
Rugby League Grounds,
Sea Dredged Aggregate Processing Plants and Depots,
Sewage Works,
Ship Building Yards,
Ship Repair Yards,
Ski Centres,
Showhouses,
Speedway Racetracks,
Spoil Heap Workings,
Sporting Rights,
Sports and Leisure Centres (Dry Only),

Sports and Leisure Centres (Wet and Dry),
Sports and Leisure Centres Within/Part of Specialist Property,
Sports Stadia,
Stately Homes and Historic Houses,
Statutory Docks and Harbours (Formula),
Statutory Docks and Harbours (Non-Formula Prescribed),
Statutory Docks and Harbours (Other),
Surgeries Clinics Health Centres (Contractors Valuation),
Swimming Pools (Local Authority),
Swimming Pools (Private),
Telecommunications Cable Networks,
Telecommunications Switching Centres,
Telescope Sites,
Tennis Centres,
Theatres,
Theme Parks,
Timeshare Complexes,
Tolls,
Totalisators on Horse Racecourses,
Tourist Attractions/Dark Rides,
Training Centres (Residential),
University – Ancillary Land or Buildings,
Universities (excluding Oxbridge),
University Occupation Within Hospitals,
War Game Courses/Misc. Agriculture Use,
Waste Incinerator Plants,
Waste Transfer Stations,
Water Undertakings (Non-Statutory),
Windmills,
Zoos and Safari Parks.

8.Annex E: Detailed breakdown of the ND-NEED sample

In the ND-NEED data some buildings are missing building/business characteristic information. The number of buildings that are missing building/business characteristic information, and the information that they are missing can be seen in the tables below.

Table 12: The number of buildings in the ND-NEED building stock which have building use and floor area information.

	Building use	Floor area	Building use and floor area
Building stock	1,656,000	1,368,000	1,368,000

Table 13: The number of buildings in the ND-NEED electricity/gas consumption sample which have building use, floor area and business size information.

	Building use	Floor area	Business size	Building use and floor area	Building use and business size	Floor area and business size	Building use, floor area and business size
Electricity	726,000	613,000	369,000	613,000	369,000	328,000	328,000
Gas	287,000	228,000	161,000	228,000	161,000	136,000	136,000

Table 14: The number of buildings in the ND-NEED building stock which are missing building characteristic information.

	Missing building use	Missing floor area	Missing both building use and floor area
Building stock	0	288,000	288,000

Table 15: The number of buildings in the ND-NEED electricity/gas consumption sample which are missing building/business characteristic information.

	Missing building use	Missing floor area	Missing business size	Missing building use and floor area	Missing building use and business size	Missing floor area and business size	Missing building use, floor area and business size
Electricity	0	113,000	357,000	113,000	357,000	73,000	73,000
Gas	0	59,000	126,000	59,000	126,000	34,000	34,000