Department for
Business, Energy
& Industrial Strategy

BUSINESS ENERGY STATISTICAL SUMMARY

How energy is used and by whom in the non-domestic sector

July 2018

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This publication is available for download at

https://www.gov.uk/government/publications/business-energy-statistical-summary.

Contents

Introduction

Background

This report provides an overview of energy consumption, costs and potential savings for the UK non-domestic sector. It will incorporate the main data sources available, explaining how they can be used and the results they show. There are seven main sections of the report: how much energy is used by business; how energy is used by businesses; business expenditure; emissions; potential savings; international comparisons and policy overlaps.

Currently there are no plans for an annual publication. The data sources used in the publication cover different periods. When there are significant changes to the data sources we will update the evidence used.

The evidence used in this publication is based on analysis of existing sources, including, but not limited to:

- DUKES – The Digest of United Kingdom Energy Statistics is an annual energy statistics publication produced by BEIS. It provides a detailed and comprehensive picture on the production and consumption of individual fuels and of energy. This publication will reference the 2017 release, with data up to 2016. The DUKES publication can be found at the following link: https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

- ECUK – Energy Consumption in the United Kingdom is an annual statistical publication that provides a comprehensive review of energy consumption and changes in efficiency, intensity and output since the 1970s, with a focus on trends since 2000. This publication will reference the 2017 release, with data up to 2016. The ECUK publication can be found at the following link: https://www.gov.uk/government/collections/energy-consumption-in-the-uk

- BEES – The Building Energy Efficiency Survey is a data source that covers the energy consumption and abatement potential (energy savings) within buildings in England and Wales for 2014/2015. Two datasets were derived from around 4000 telephone surveys; one on energy use showed the different end uses for different buildings. The other showed the impact that implementing different energy savings measures would have on these buildings. This publication will reference the 2016 release, with data for 2014/15. The survey results are published at the following link: https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

- ND NEED – The Non-Domestic National Energy Efficiency Data-framework; a data set held and created by BEIS. It is created using the Valuation Office Agency (VOA) non-domestics ratings list as a sampling frame and merging consumption data from meter points with business characteristics from Experian. This creates a data set which can be used to investigate business sector consumptions; energy consumption by business size; how much energy and what number of businesses fall within the scope of different government policies. This publication will reference the 2014 release, with meter point data updated to 2015. For more information please see the latest ND-NEED publication at the following link: https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-energy-statistics-2006-12

- Experian - a data set purchased by the department. It provides business characteristics information such as SIC codes (business type), number of employees and turnover. This is one of the data sets used in ND-NEED, but also provides additional information which can be used in other analysis of businesses.

The non-domestic sector is very heterogeneous, containing buildings with very different energy consumption requirements; from offices to large manufacturing factories. In addition, there are many ways to split energy consumption, such as by use, type of business or size of business.

This heterogeneity means that it is important to clearly define the key terms used throughout this publication.

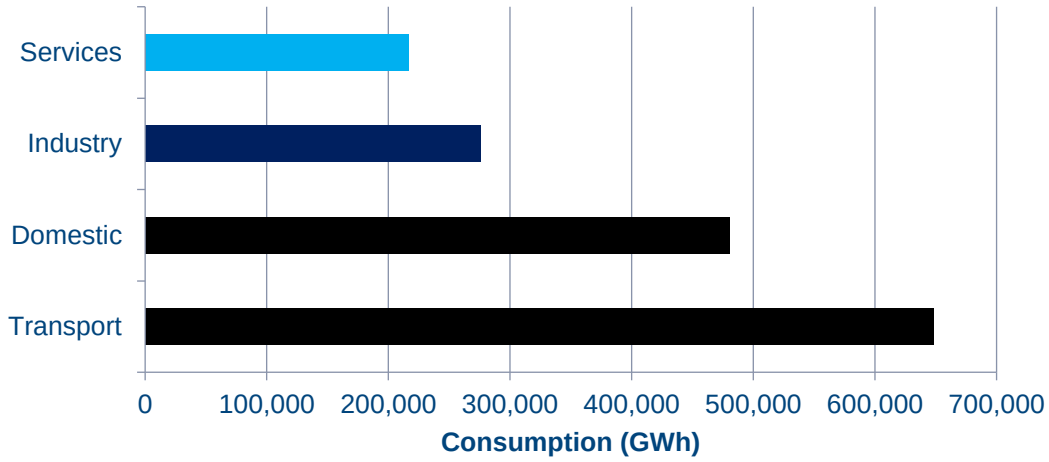
Business
Throughout this publication, business will be used to describe all non-domestic organisations, excluding transport[1]. This includes all services, industry and the public sector.
Buildings
This refers to the premises occupied by a business. This could vary in size, type and uses. Due to these varying factors, the amount of energy used by a building can differ.
Industrial Processes
This refers to the use of energy to manufacture products such as iron and steel, glass or cement. Like buildings, the amount and type of energy used in this process can vary across different businesses.
Public Sector
This includes several branches such as emergency services, military, education and health, all of whom will require differing uses and amounts of energy.

[1] This excludes business expenditure for transport end-use purposes. Transport Final Consumption data from DUKES is not included within the scope of this report and buildings in the transport sector were excluded in BEES data.

Business energy in context

This publication will cover all the consumption in the services sector (commercial and public) and industry sectors up to 2016, which combined are responsible for 493,000 GWh of the total final UK energy consumption; this is 30 per cent of UK consumption.

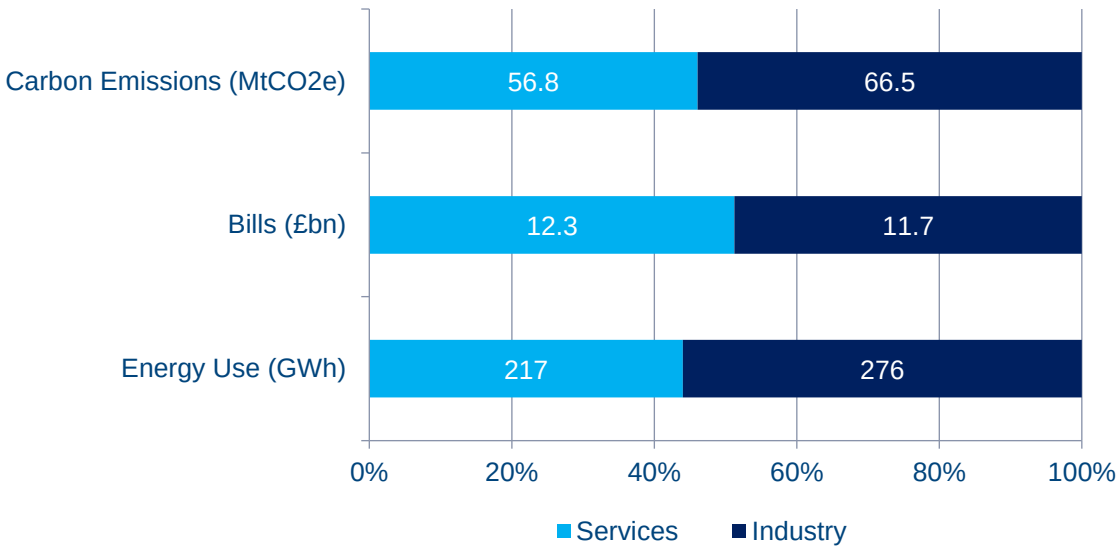
Chart 0.1: Total final energy consumption in the UK in 2016 (GWh)



Source: DUKES 2017

The industrial sector in the UK (including industrial buildings such as factories as well as industrial processes) is consuming 27 per cent more energy than the services sector and producing 17 per cent more emissions. However, the industrial sector energy bills are 5 per cent lower. These key trends will be explored further throughout this publication.

Chart 0.2: UK services and industry comparisons in 2015



Source: DUKES 2017 and BEES 2016[2]

[2] Carbon Emissions calculated from sector energy use and does not include non-energy related emissions

What this publication will cover

There are seven main sections of the report;

Section 1: How much energy is used by businesses – this section provides breakdowns by sectors and the impact of business characteristics on the amount of energy consumed.

Section 2: How energy is used by businesses – this section covers the interaction of businesses with energy.

Section 3: Business expenditure – this section covers the extent to which energy is a significant cost compared to other operating costs and what businesses are spending money on.

Section 4: Emissions – this section outlines current emissions for business, industry and the public sectors and the emissions reduction pathway to 2050.

Section 5: Savings potential – this section covers the energy efficiency potential across businesses.

Section 6: International comparisons – this section compares UK energy efficiency relative to other EU countries.

Section 7: Policy overlaps – this section covers the range of policies promoting the uptake of energy efficiency measures and the overlaps with energy use.

Section 1: How much energy is used by businesses

Business energy use by organisation size

The non-domestic sector is diverse; it can range from large energy intensive manufacturing factories all the way to small newsagents. There are many characteristics which impact the amount of energy a business consumes, but one of the key ones is the size of the organisation.

Organisation size

This is based on the number of full time employees working for the business or within the building. The following four categories are often used:

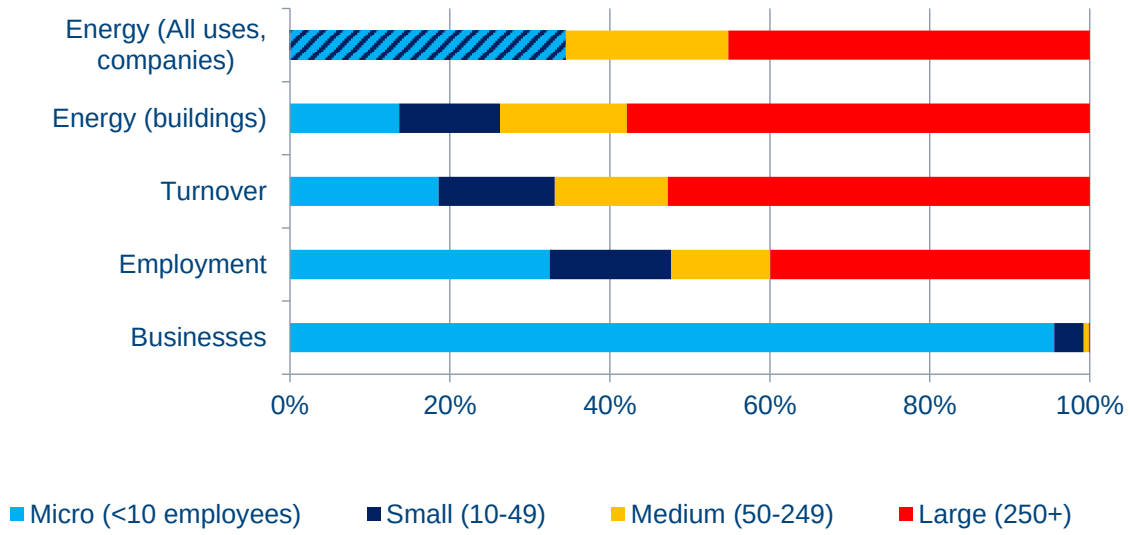
- Micro: Less than 10 employees
- Small: 10 to 49 employees
- Medium: 50 to 249 employees
- Large: 250 employees or more

On occasion, an extra category of very large is used; for organisations with 1,000 or more employees.

Often micro, small and medium categories are combined to form SME (small and medium employers).

As can be seen in chart 1.1, most businesses are micro (96 per cent) with only 0.1 per cent being large. However, large businesses consume 45 per cent of non-domestic energy. A similar pattern is also seen in turnover and employment, where these large organisations account for 53 per cent of turnover and 40 per cent of employment.

Chart 1.1: Share of business sector by organisation size: 2015[3]



Source: Non-domestic National Energy Efficiency Data-framework 2014[4] & Business Population Estimates 2016[5]

[3] Includes Industry.

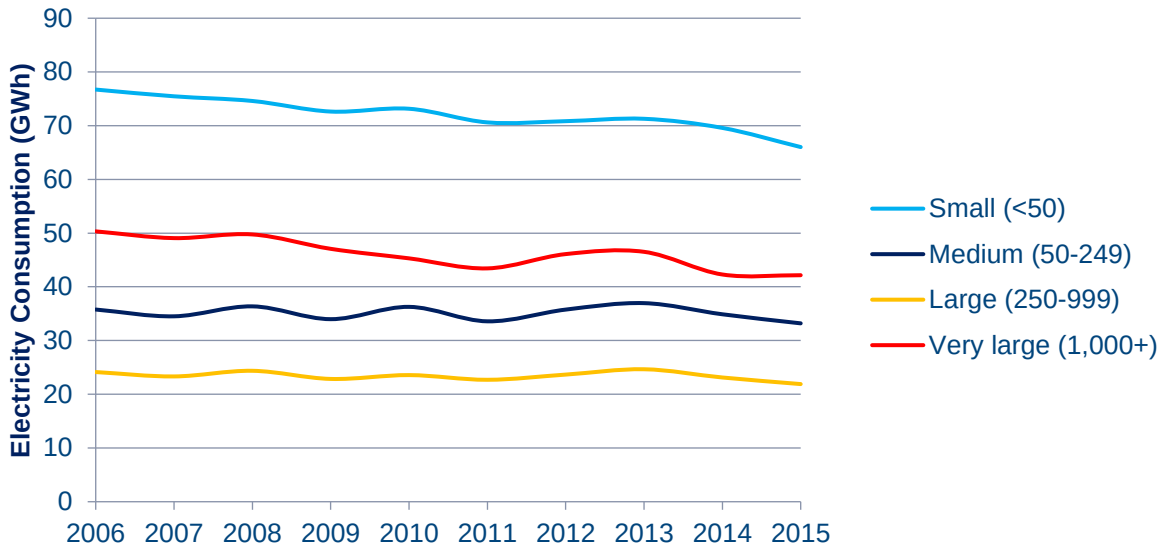
[4] https://www.gov.uk/government/statistics/the-non-domestic-national-energy-efficiency-data-framework-nd-need

[5] https://www.gov.uk/government/collections/business-population-estimates

From 2006 to 2015, electricity and gas consumption has decreased; electricity consumption has dropped by 13 per cent and natural gas consumption has dropped by 16 per cent. For other non-electrical fuels such as oil and solid fuel, ND-NEED does not have consumption figures, so these are not included in this comparison.

These declines are reflected over each of the business size categories. For electricity, the greatest decline in consumption was in small sized businesses with a 14 per cent reduction. The largest proportional reduction was for very large businesses with 16 per cent.

Chart 1.2: Electricity consumption in UK by company size description: 2006-2015

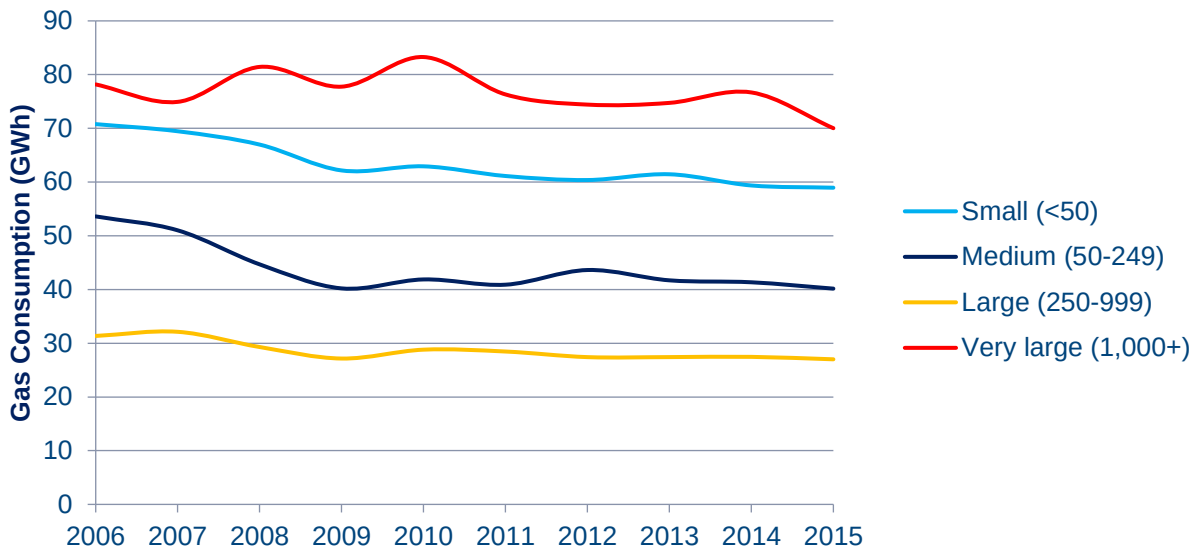


Source: Non-domestic National Energy Efficiency Data-framework 2014 with meter point data updated to 2015.

Very large businesses saw the smallest proportional fall in gas consumption with 11 per cent. Medium business saw the greatest drop of 25 per cent. There are several reasons for this, including long term increases in energy efficiency driven by building policies; for example, buildings and product standards policies.

It is important to look at the trends rather than specific years for energy consumption as variation can occur for a variety of reasons. This includes weather, changes in the fundamentals of energy demand, energy efficiency, but also limitations of the data (outlined in more detail in the 2014 ND-NEED publication[6]).

Chart 1.3: Natural gas consumption in UK by company size description: 2006-2015



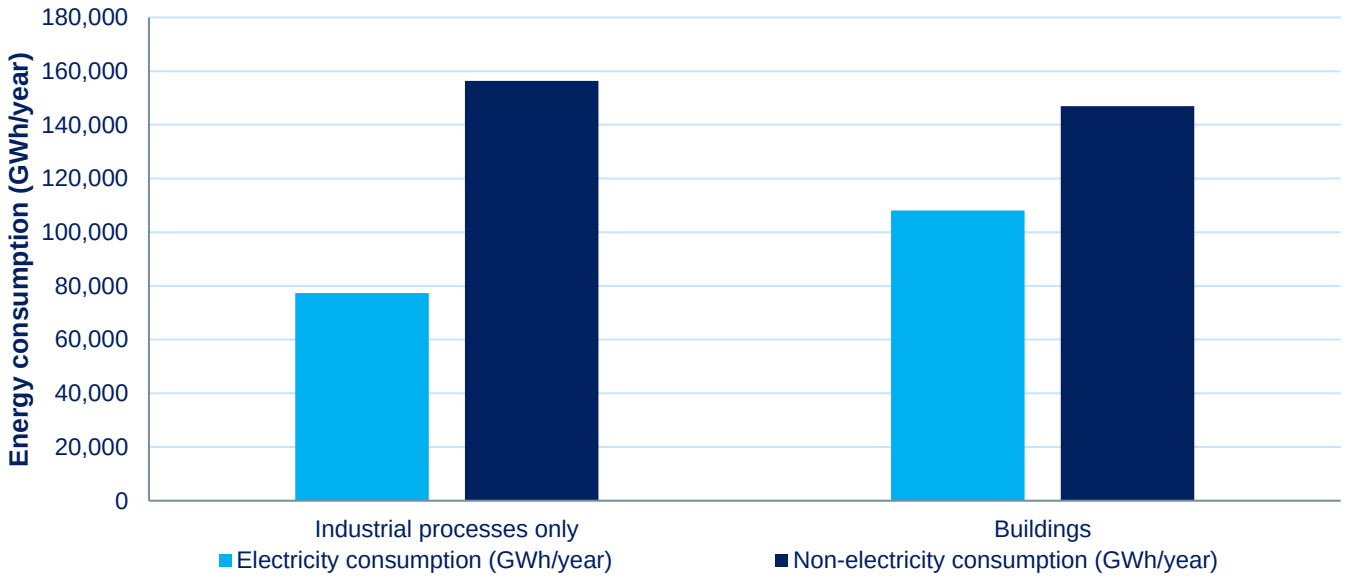
Source: Non-domestic National Energy Efficiency Data-framework 2014 with meter point data updated to 2015.

[6] https://www.gov.uk/government/statistics/the-non-domestic-national-energy-efficiency-data-framework-nd-need.

Business energy use by sector

In 2014-15, the total UK estimated annual amount of energy consumed by the non-domestic buildings stock is 255,000 GWh/year (52 per cent). The total estimated annual amount of energy consumed by industrial processes is 234,000 GWh/year (48 per cent). Overall, non-electricity energy sources (such as natural gas, oil and LPG) are used more than electricity, with 62 per cent of energy consumption coming from these sources.

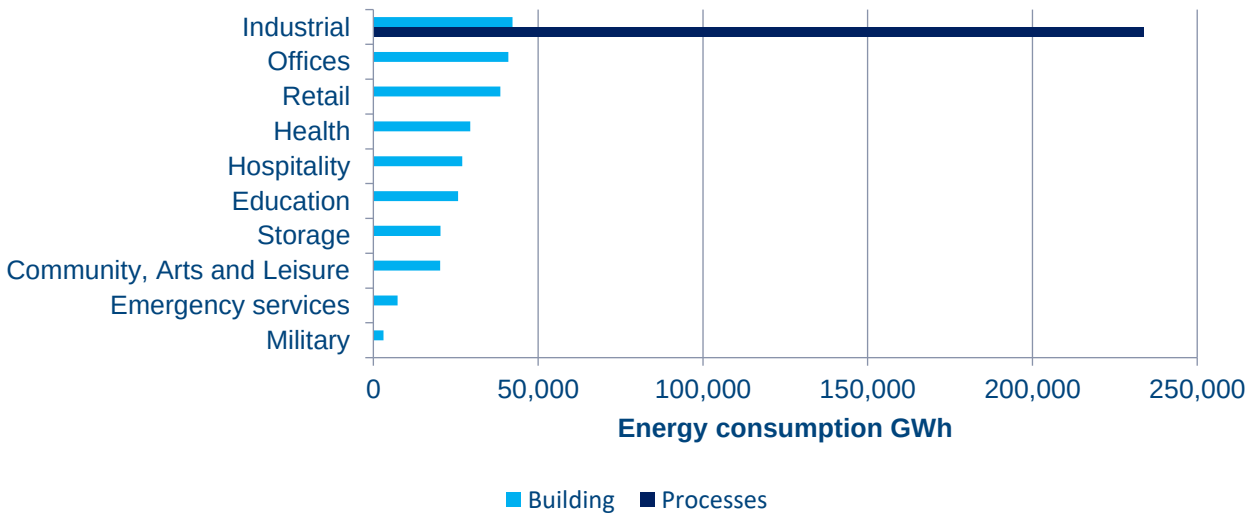
Chart 1.4: Energy consumption for industrial processes and buildings: 2014-2015



Source BEES 2016 and DUKES 2017

The four sectors with the largest energy consumption are industrial, offices, retail, and health which account for 59 per cent of total energy consumption.

Chart 1.5: Total consumption in UK by sector: 2014-2015

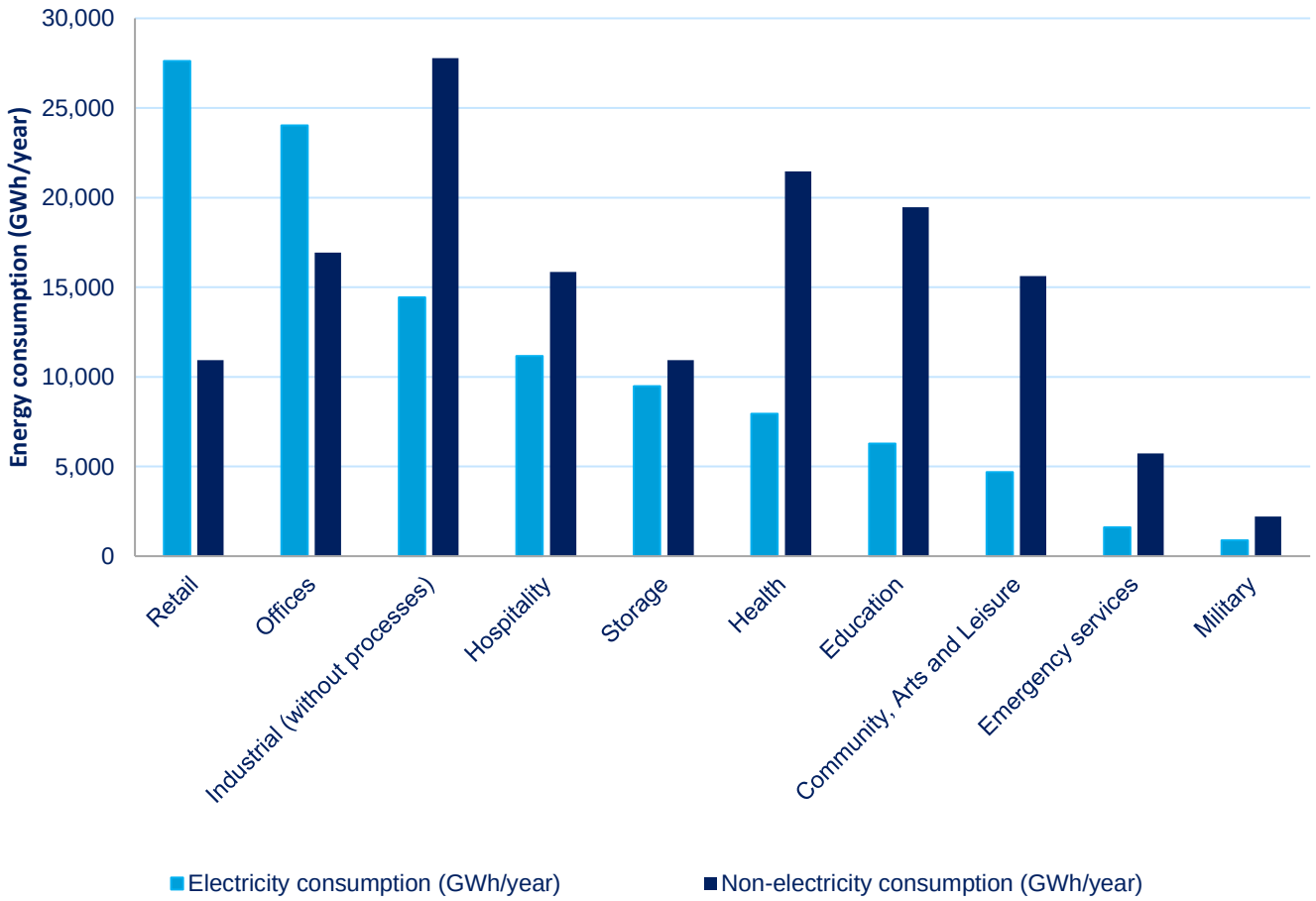


Source: BEES 2016 and DUKES 2017

Focusing on energy consumption for buildings, there is more non-electrical use across the sectors which makes up 58 per cent of energy use. The sector with the largest non-electrical consumption is industrial (excluding processes) at around 27,800 GWh/year. The sectors that use the highest proportion of non-electrical energy are emergency services (78 per cent), community, arts and leisure (77 per cent) and education (76 per cent).

Electricity use is dominant in two sectors: retail (72 per cent) and offices (59 per cent). Two of the most common electrical end uses may indicate why retail and offices are electricity dominant; lighting is 25 per cent of electrical energy use and Information and Communication Technology (ICT) equipment is 9 per cent.

Chart 1.6: Energy consumption by sector (excluding industrial processes): 2014-2015



Source BEES 2016 and DUKES 2017

Section 2: How businesses use energy

Introduction

This section distinguishes between energy used in buildings and energy used in industrial processes. This split is a useful segmentation because the types of energy uses in these two segments are very different and often the businesses and government policies which affect these types of energy use are also very different.

Buildings

The reason energy is used within a building is important when considering the opportunities for energy efficiency and for understanding how a business might consider energy use in general. For example, moderating temperature in an office, lighting a shop or cooking food at a restaurant.

Another important dimension to a building's energy use is the ownership of the building itself; whether a building is rented or owned will affect the incentives to use energy efficiently. The owner or user of a premises may have different abilities, interest or incentives in managing energy used within a building.

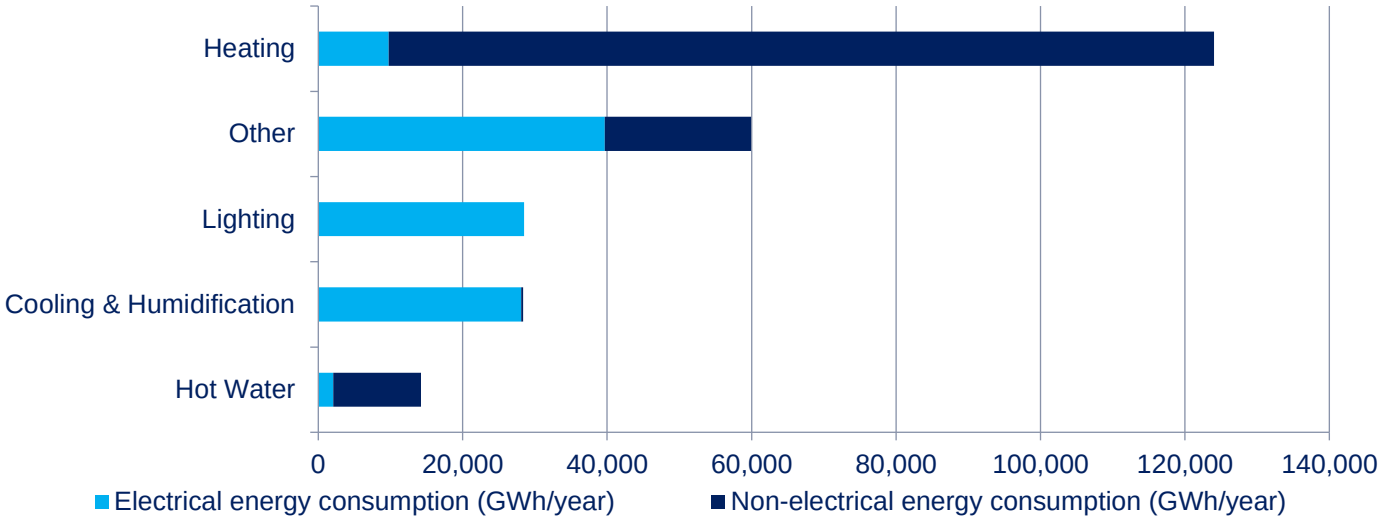
What are buildings using energy for?

Space heating was the most dominant end use in buildings in the UK, accounting for 49 per cent of the non-domestic stock's energy consumption. This was followed by lighting and cooling and humidification, both at 11 per cent.

The most common end uses of electrical energy were internal lighting and cooling and humidification at 26 per cent.

The most significant non-electrical energy end use was space heating at 78 per cent followed by hot water at 8 per cent.

Chart 2.1: Building energy consumption by end uses excluding industrial processes: 2015[7]



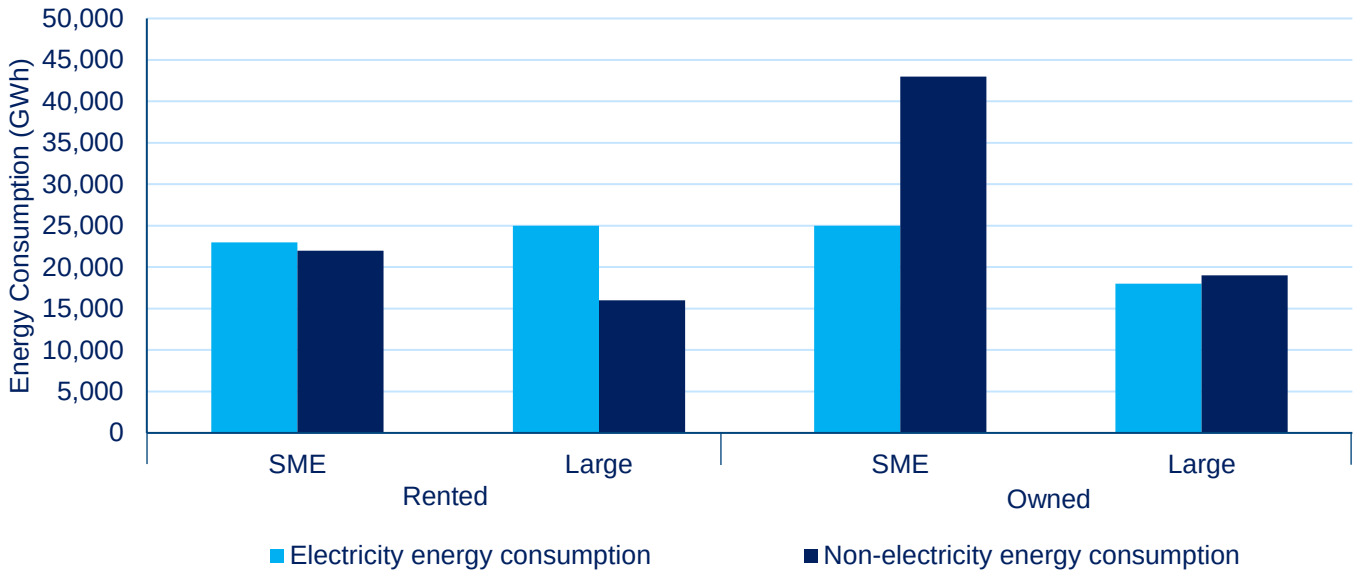
Source: BEES 2016 (data for England and Wales –scaled to UK using DUKES 2017)

[7] Other includes ICT equipment, cooled storage, catering, full details of all energy use can be found in the Building Energy Efficiency Survey

How are business buildings owned?

Overall, owned buildings use more energy than rented and this varies across size of business as shown in the chart 2.2.

Chart 2.2: Energy consumption by tenure excluding industrial processes & public sector: 2015



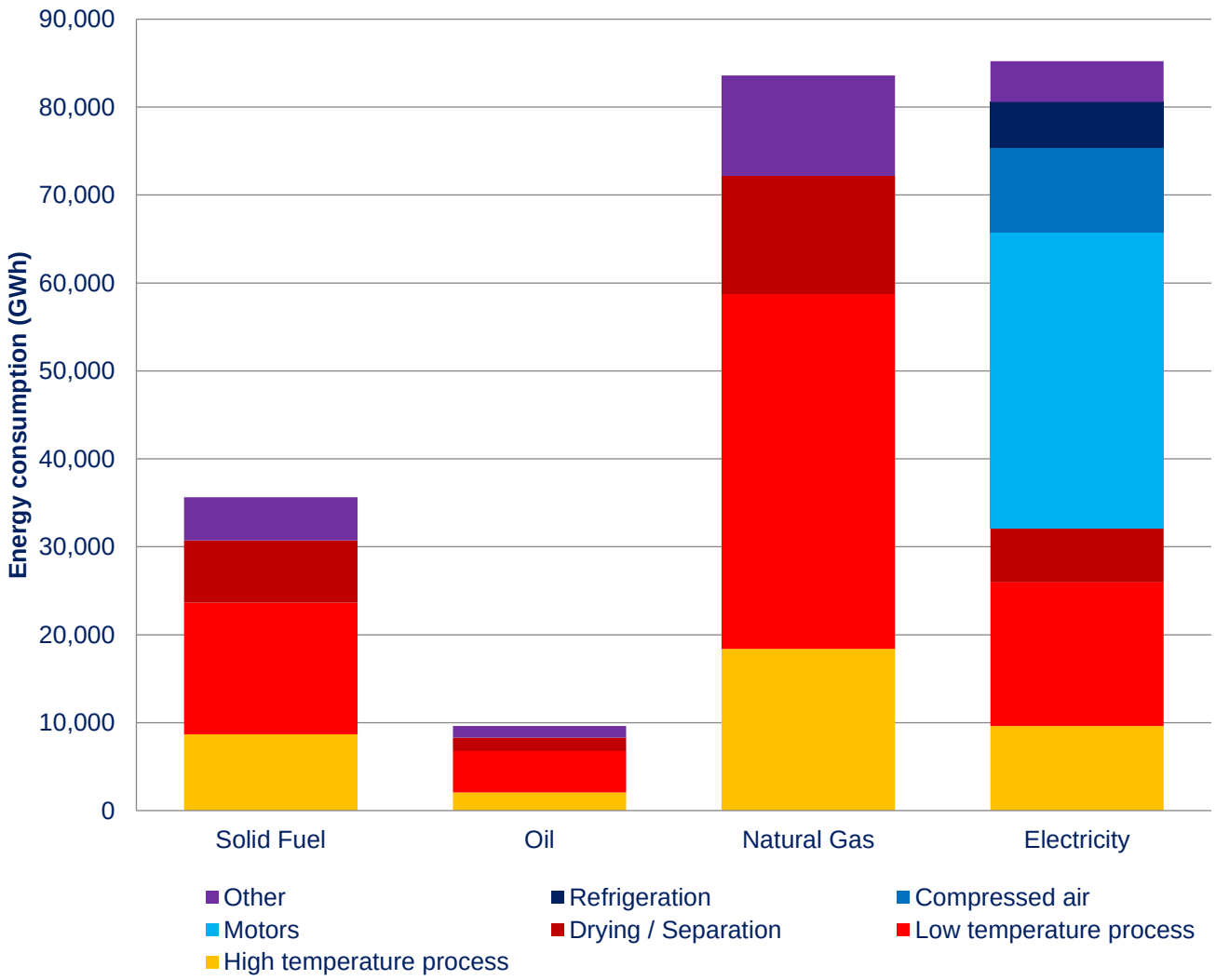
Source: BEES 2016 (data for England and Wales – scaled to UK using DUKES 2017)

Industrial Processes

Energy use for industrial processes is similarly diverse as in buildings. A process could be a blast furnace delivering very high temperature heat for melting iron ore/creating steel, or for motors on a production line moving components from one area of a factory to another.

Most energy is used for heat related processes such as low/high temperature processes and drying (a combined total of 59 per cent). Electricity is the only fuel source for motors, compressed air and refrigeration[8].

Chart 2.3: Energy consumption by industrial processes: 2016

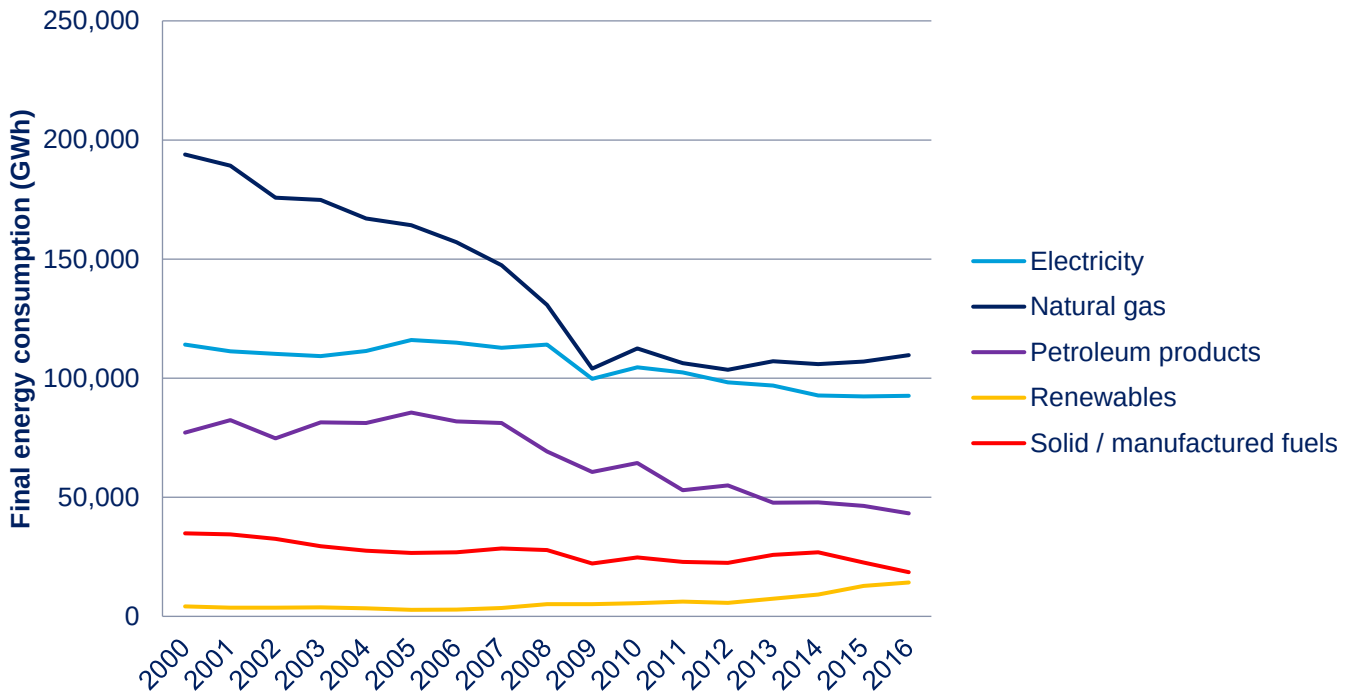


Source: ECUK 2017 analysis

[8] Full definitions of these categories can be found in the Energy Consumption in the UK user guide: https://www.gov.uk/government/statistics/energy-consumption-in-the-uk

The following chart 2.4 shows the levels of energy type consumption over time. All energy types have seen a reduction since 2000 particularly natural gas; improvements in energy efficiency within the industrial sector have played an important role in this reduction. The exception to this is renewables which has increased in the given period. This is possibly the result of various drives to reduce reliance on fossil fuels and production of greenhouse gasses[9].

Chart 2.4: Industrial final energy consumption split by energy type 2000-2016



Source: DUKES 2017 and ECUK 2017 analysis

[9] For more information on renewable energy, go to BEIS' renewable statistics home page; https://www.gov.uk/government/collections/renewables-statistics.

Section 3: Business Energy Bills

Introduction

Businesses face a variety of costs for the energy they use to deliver goods and services. These costs vary significantly depending on the business and their situation. This section looks at the total amount businesses spend on energy, the extent to which energy is a significant cost compared to other operating costs.

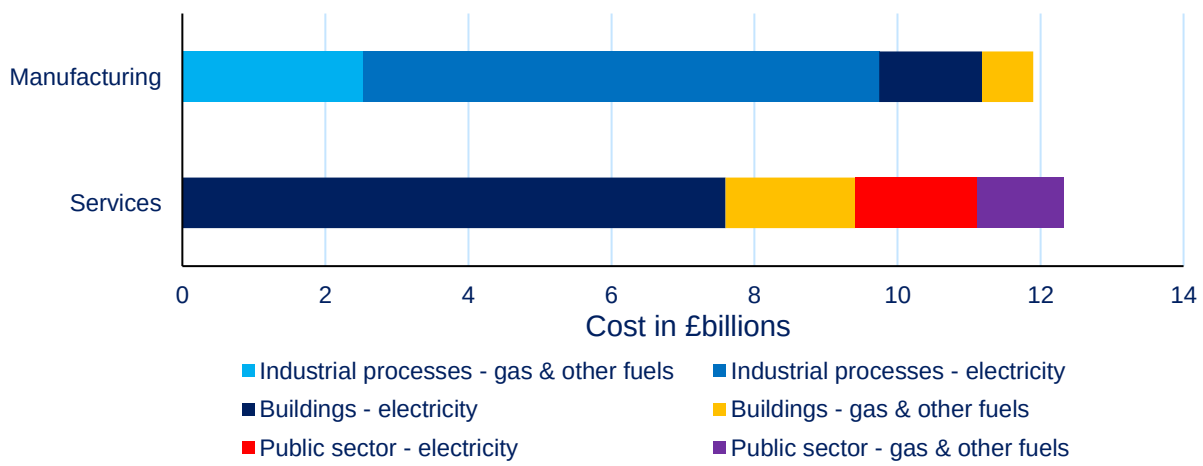
Total energy costs

UK businesses[10] spend around £24 billion a year (based on 2015 data) on energy:

- 48 per cent on energy used in buildings - £11.6bn
- 40 per cent on energy used in industrial processes - £9.7bn
- 12 per cent on energy used in public sectors - £2.9bn

This expenditure is largely comprised of spend on electricity (£17.9bn) compared to other fuel sources (£6.3bn). The price per unit of final energy from electricity is higher, for example than natural gas. This is explored in more detail in https://www.gov.uk/government/statistics/quarterly-energy-prices-march-2018.

Chart 3.1: Final energy expenditure (£billion): 2015



Source: BEES 2016 and DUKES 2017

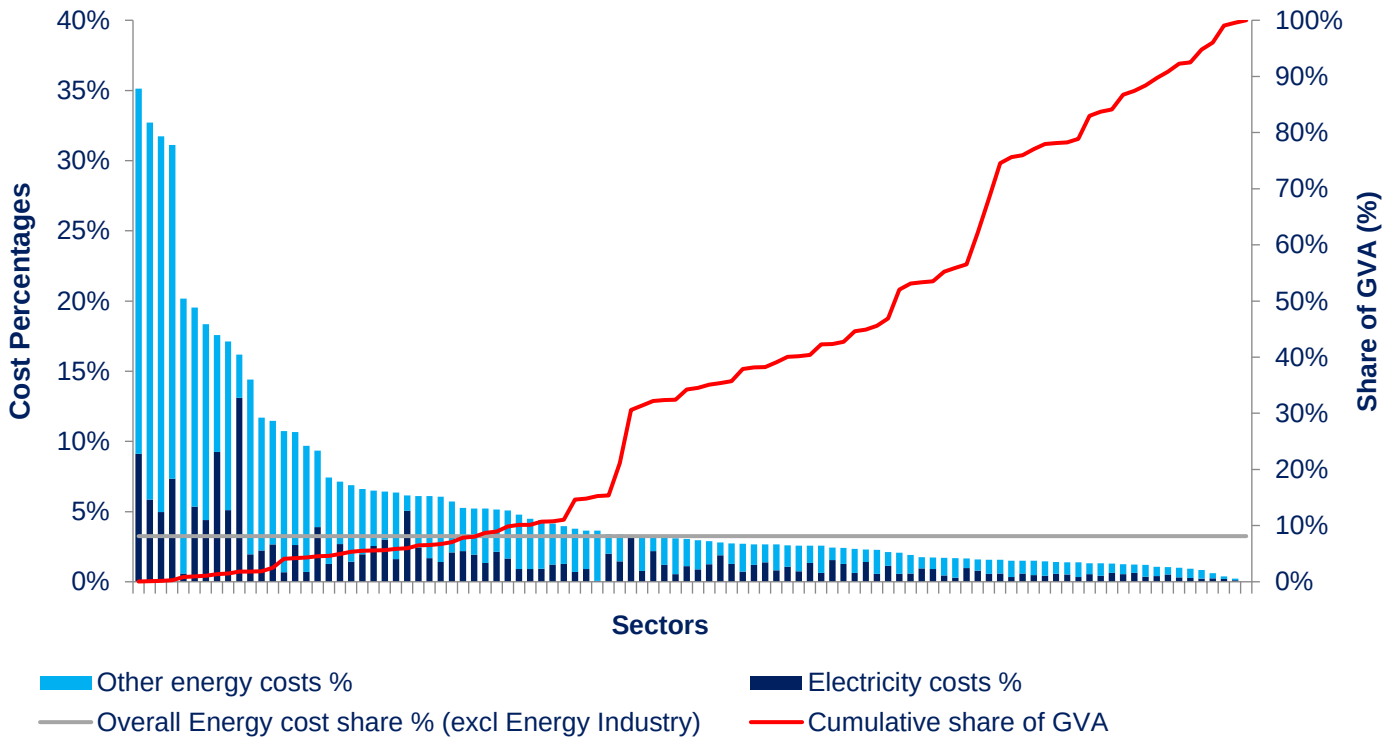
[10] This excludes business expenditure for transport end-use purposes. Transport Final Consumption data from DUKES is not included within the scope of this report and buildings in the transport sector were excluded in BEES data.

Energy as a part of total business costs

Energy is only one cost of many which businesses face to operate. For some firms who are particularly energy intensive, for example the iron and steel sector, energy costs are a large proportion of total costs (32 per cent of expenditure). For other sectors such as retail, they are significantly smaller.

Chart 3.2 shows the energy costs as a share of total costs for different sectors within the UK. It also shows the contribution each sector makes to UK gross value added (GVA). There are sixteen sectors (nine of which are Energy Intensive Industries) where energy costs account for more than 10 per cent of their expenditure; these 16 sectors account for 4 per cent of the UK's total GVA. For most sectors, energy costs account for 3 per cent of their expenditure.

Chart 3.2: Share of cost for energy use: 2014



Source: ONS Supply Use tables 2016

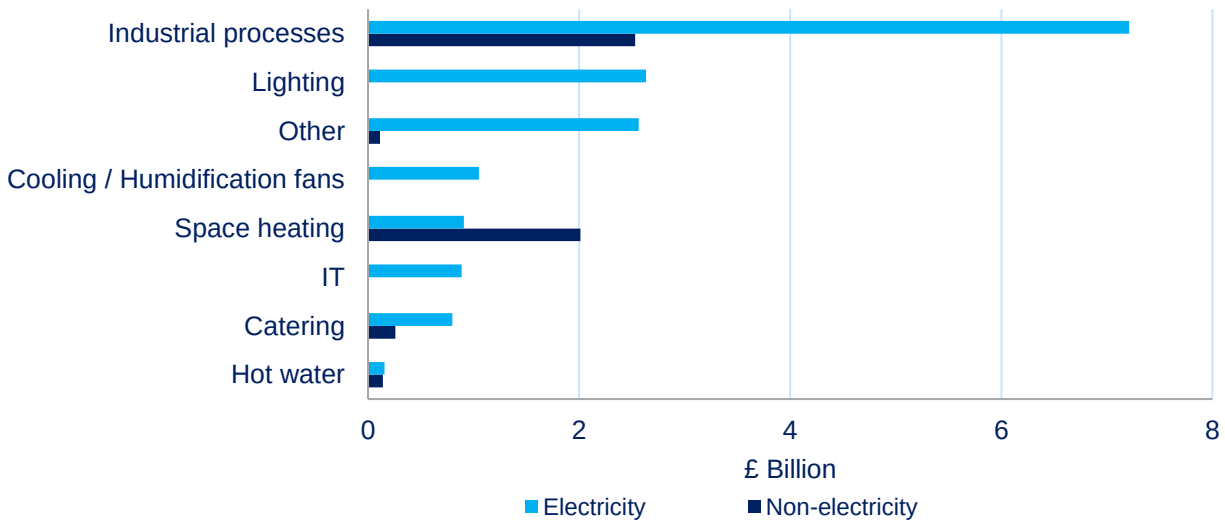
What uses of energy are businesses spending money on?

Chart 3.3 looks at the electricity and non-electricity bills for different end uses. For electricity, the largest is industrial processes, which includes any energy consumption within industrial premises which is not building-related use. It costs 44 per cent of the total electricity bill, followed by lighting at 16 per cent.

For non-electricity bills, the largest end use is also industrial processes with 50 per cent of the total bill. Space heating, which is gas dominant, is the second largest bill with 40 per cent whereas it's only 6 per cent of the total electricity bill.

Collectively, in terms of end uses, industrial processes make up 46 per cent of the total bill. The next largest proportion of costs goes on space heating at 14 per cent.

Chart 3.3: Electrical and non-electrical energy costs by end uses: 2015

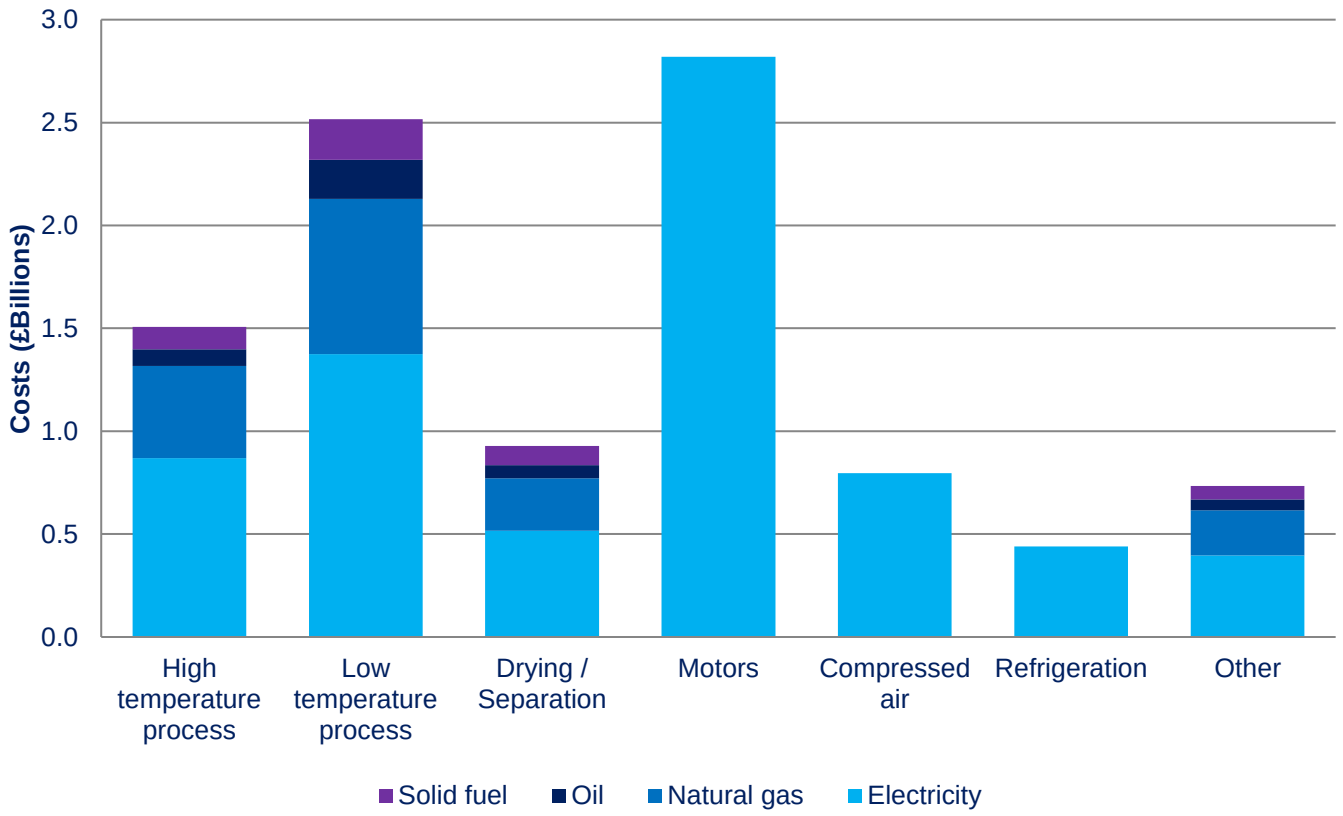


Source: BEES 2016 and DUKES 2017

Industrial energy bills for processes are approximately £9.7 billion, 74 per cent of the industrial processes bill is accounted for by electricity as shown in Chart 3.4. Motors are the biggest contributors to the total bills, accounting for £2.8bn (29 per cent), despite motors accounting for only 15 per cent of energy consumption for industrial processes (see chart 2.3). In contrast, high temperature processes account for £1.5bn (15 per cent) but account for 20 per cent of energy consumption.

The reason for this is that electricity is the only energy input for motors. Electricity is more expensive than solid fuel, oil and natural gas which explains why motors has a large cost despite a smaller energy consumption. High temperature processes rely less on electricity and therefore have a smaller cost.

Chart 3.4: Total industry bills (£Billions): 2015

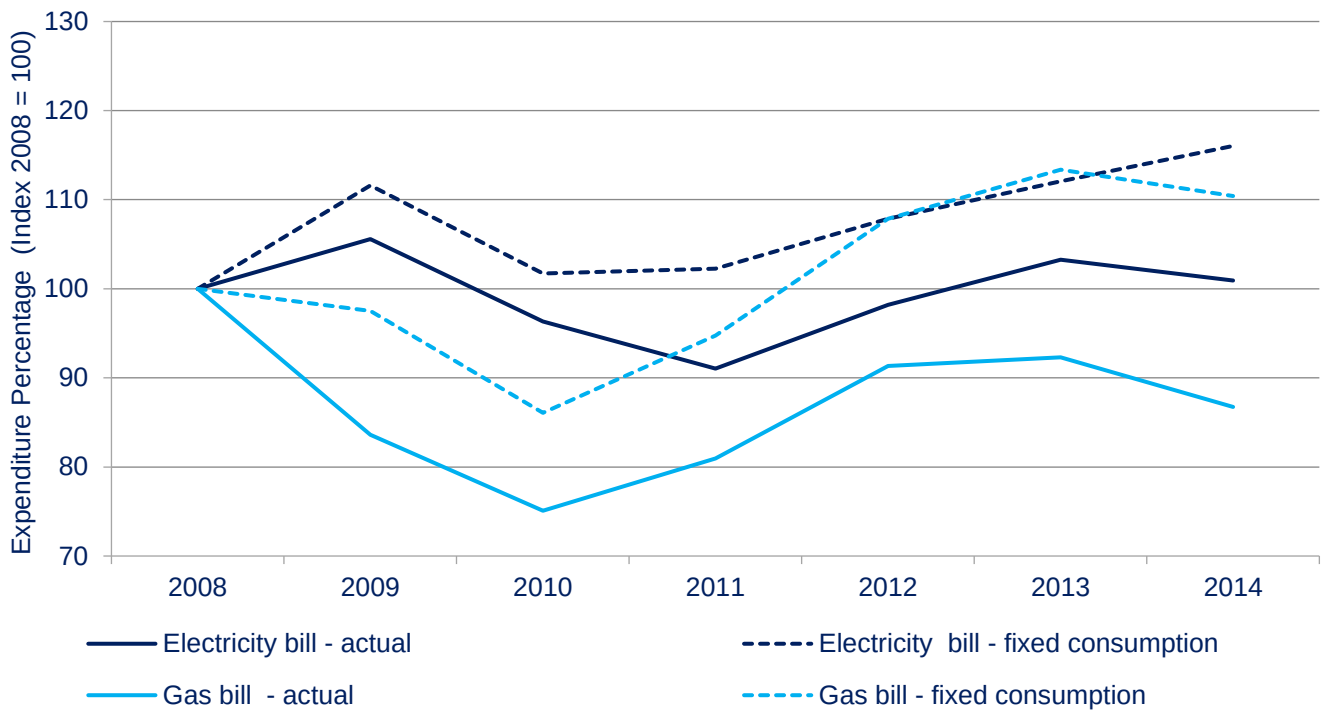


Source: DUKES 2017

Chart 3.5 shows the actual electricity and gas bills for businesses; these are affected by both changes in energy prices and levels of consumption. The dotted lines represent a constant level of consumption for all years and this means we can clearly see the effect of the change in energy prices. For both gas and electricity, the dotted lines are higher than the actual bills, showing that the levels of consumption have fallen since 2008. Electricity prices have risen by 17 per cent between 2008 to 2014 and gas by 10 per cent. These changes in consumption and energy prices have resulted in a 1 per cent rise in electricity bills from 2008 to 2014 and a fall of 13 per cent for gas bills.

The chart gives an indication that electricity expenditure in 2014 is at a similar level as it was in 2008. This reflects that the impact on expenditure of higher electricity prices has been offset by lower consumption since 2008. Despite an increase in gas expenditure between 2010 and 2013, gas expenditure in 2014 is lower than it was in 2008, which is positive.

Chart 3.5: Trend in real business energy expenditure: 2008-2014



Source: Analysis from ND-NEED 2014 and Quarterly Energy Prices 2015

Section 4: Emissions

Overall emissions

The Clean Growth Strategy[11] (CGS) sets out our proposals for decarbonising all sectors of the UK economy through the 2020s. It explains how the whole country can benefit from low carbon opportunities, while meeting national and international commitments to tackle climate change. It outlines the significant opportunity for reductions in emissions for businesses, industry and the public sector. This section outlines current emissions levels and the pathway to 2050.

This section distinguishes a difference between emissions in the business and industry sector and emissions in the public sector; there are divergent considerations and constraints that make this separation suitable.

[11] https://www.gov.uk/government/publications/clean-growth-strategy

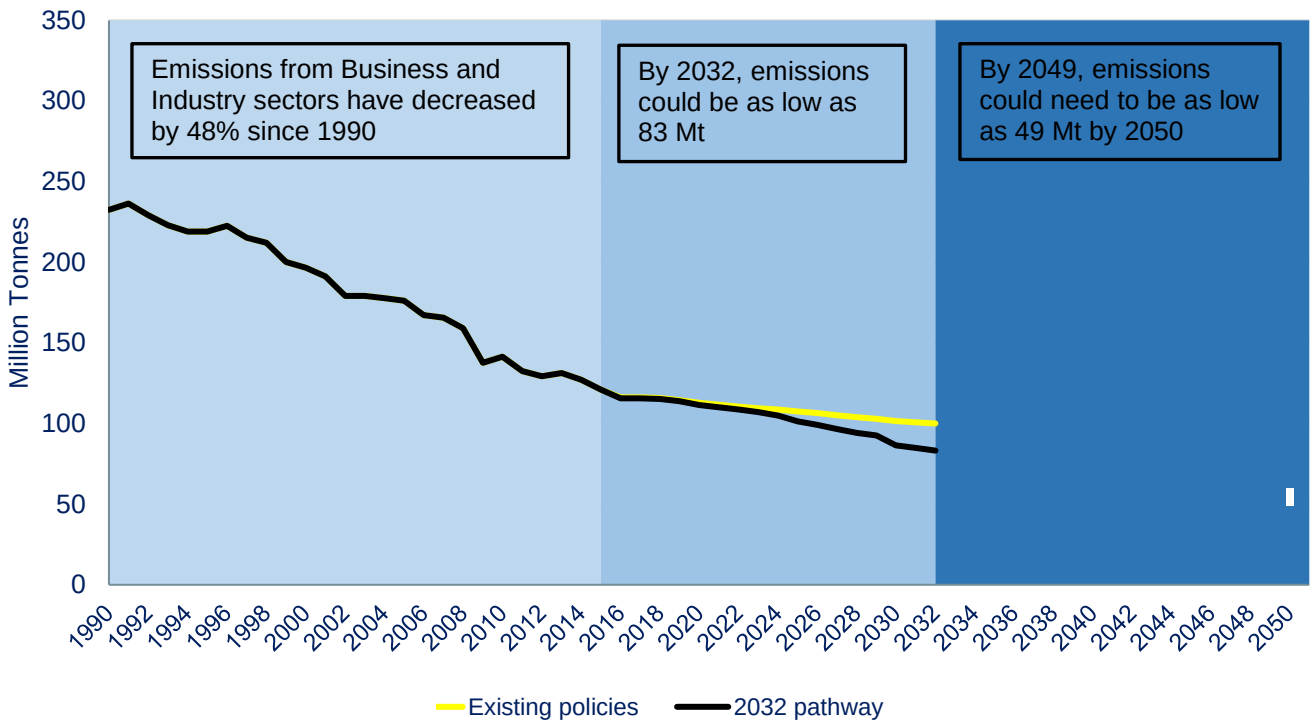
Businesses and Industry

Since 1990, emissions from businesses and industry have almost halved, mainly due to efficiency gains and a shift in manufacturing to cleaner fuels, as well as changes to the industrial structure of the UK economy. Much of this reduction has taken place in the most energy intensive industries.

For instance, each tonne of steel produced in the UK requires 40 per cent less energy to produce than 40 years ago[12]. In addition, we have also improved the energy efficiency of non-domestic buildings since 1990 with emissions 18 per cent lower in 2015[13].

Overall, businesses and industry now account for approximately 25 per cent of the UK's emissions (excluding fluorinated gases or F-gases), with around two thirds of industrial emissions coming from a small number of energy intensive sectors (for example chemicals, iron and steel).

Chart 4.1: Time series of emissions for businesses and industry: 1990-2050[14]



Source: Clean Growth Strategy 2017

[12] WSP and Parsons Brinckerhoff & DNV GL (2015) Report prepared for DECC & BIS: Industrial Decarbonisation & Energy Efficiency Roadmaps to 2050 https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050

[13] BEIS (2017) Final UK greenhouse gas emissions national statistics: 1990-2015 https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015

[14] These are direct emissions only and excludes indirect emissions.

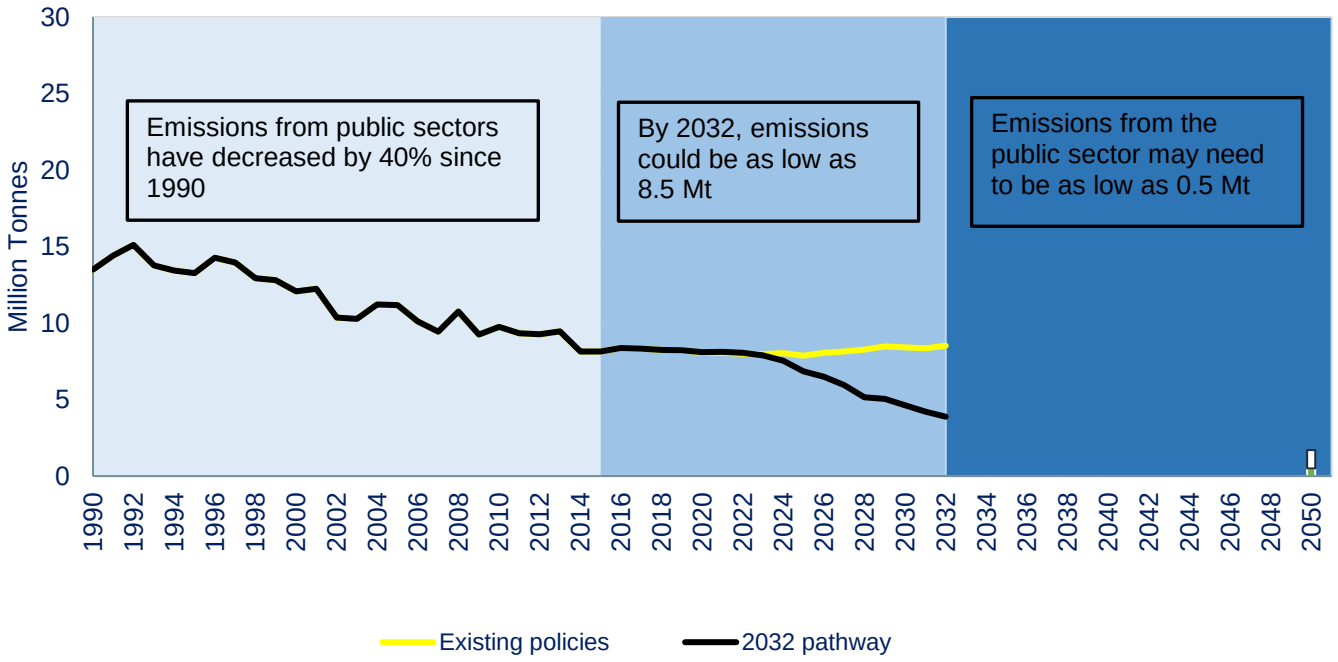
Public sector

Since 1990, the public sector – including central and local government, health, education and emergency services – has reduced its emissions by 40 per cent because of energy efficiency and rationalisation of the central government estate.

To meet the UK's 2050 target, emissions from the buildings and activities of the public sector will need to be near zero. As with businesses and industry, this means improving energy efficiency, energy management and decarbonising the temperature management of buildings as far as possible.

The CGS pathway to 2032 sees emissions from the public sector falling by around 50 per cent compared to today.

Chart 4.2: Time series of emissions for the public sector: 1990-2050[15]

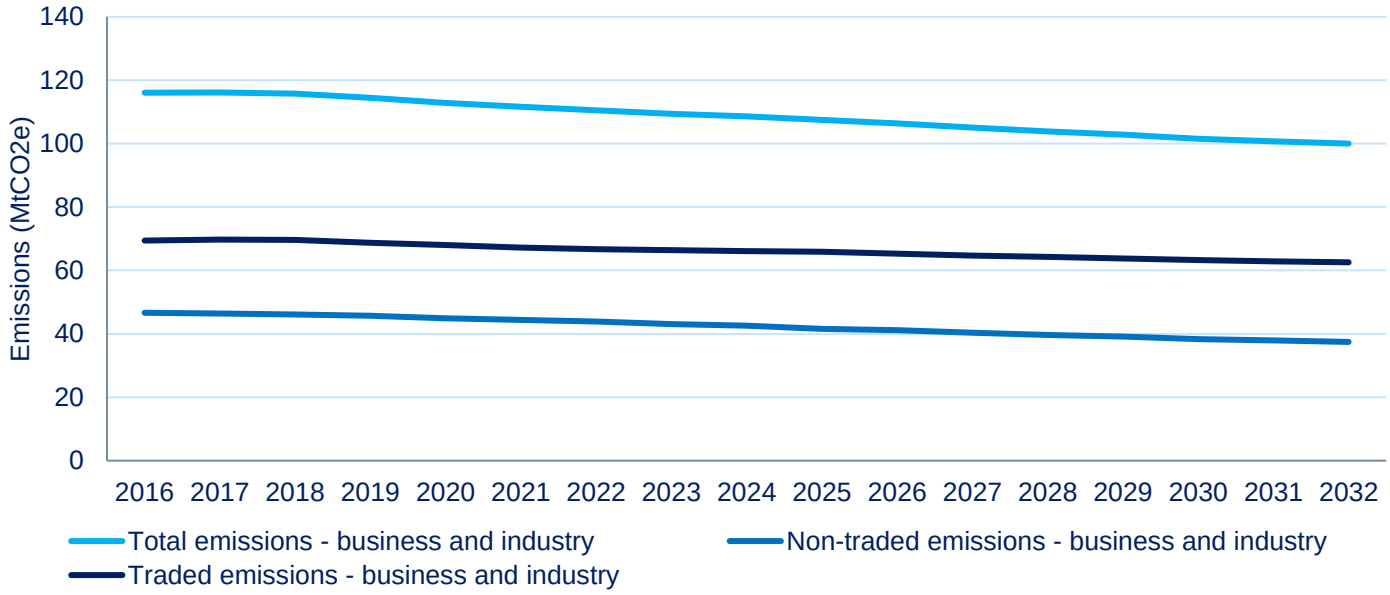


Source: Clean Growth Strategy 2017

[15] These are direct emissions only and excludes indirect emissions.

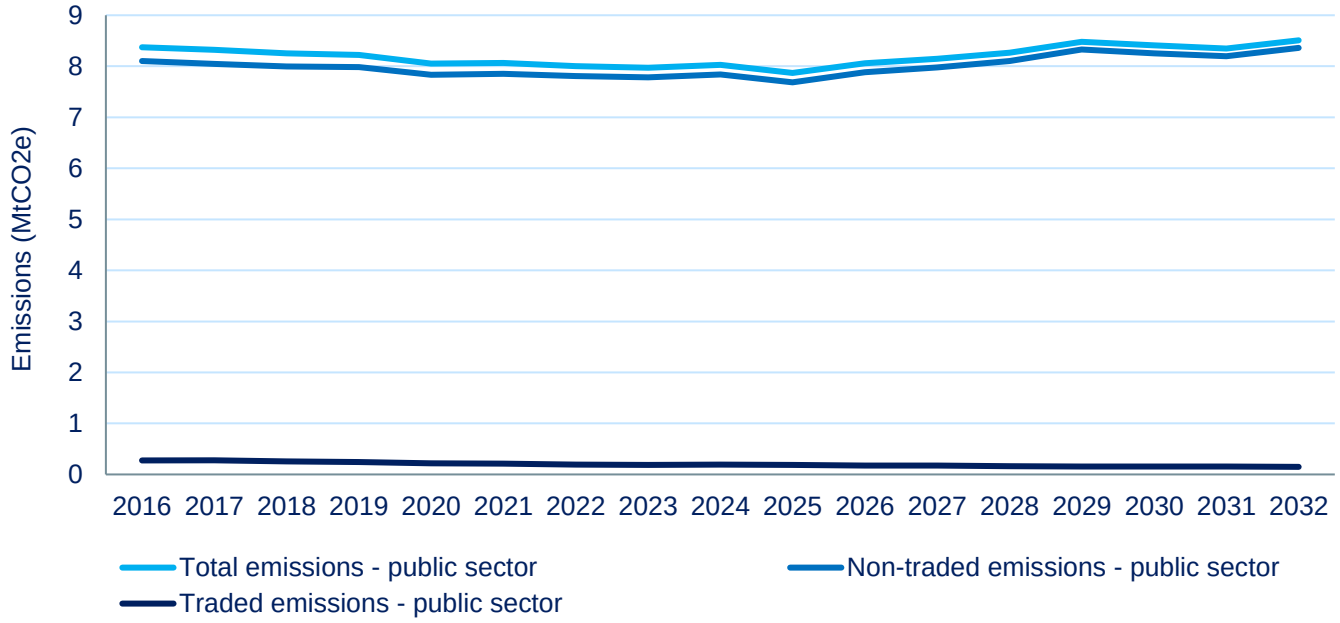
Charts 4.3 and 4.4 show projected emissions for businesses and industry and the public sector respectively. Whilst the public sector total emissions will remain relatively the same, businesses and industry is projected to see a 14 per cent reduction in total emissions. The charts split emissions in businesses and industry and the public sector by traded (within the EU ETS) and non-traded (outside the EU ETS). Generally, electricity uses, and larger emitters are within the EU ETS such as industrial processes, whereas building related energy use for heating and cooling is within the non-traded sector.

Chart 4.3: Traded and non-traded emissions for businesses and industry: 2016-2032[16]



Source: Clean Growth Strategy 2017

Chart 4.4: Traded and non-traded emissions for the public sector: 2016-2032[16]



Source: Clean Growth Strategy 2017

[16] These are direct emissions only and excludes indirect emissions.

Section 5: Energy savings potential

The Clean Growth Strategy outlines significant energy savings potential for the business and industry sector from a variety of measures, for example, energy efficiency in buildings through improved lighting or ventilation systems; and energy efficiency in industry through heat recovery or developing more efficient industrial processes. This section outlines the potential and evidence for energy savings.

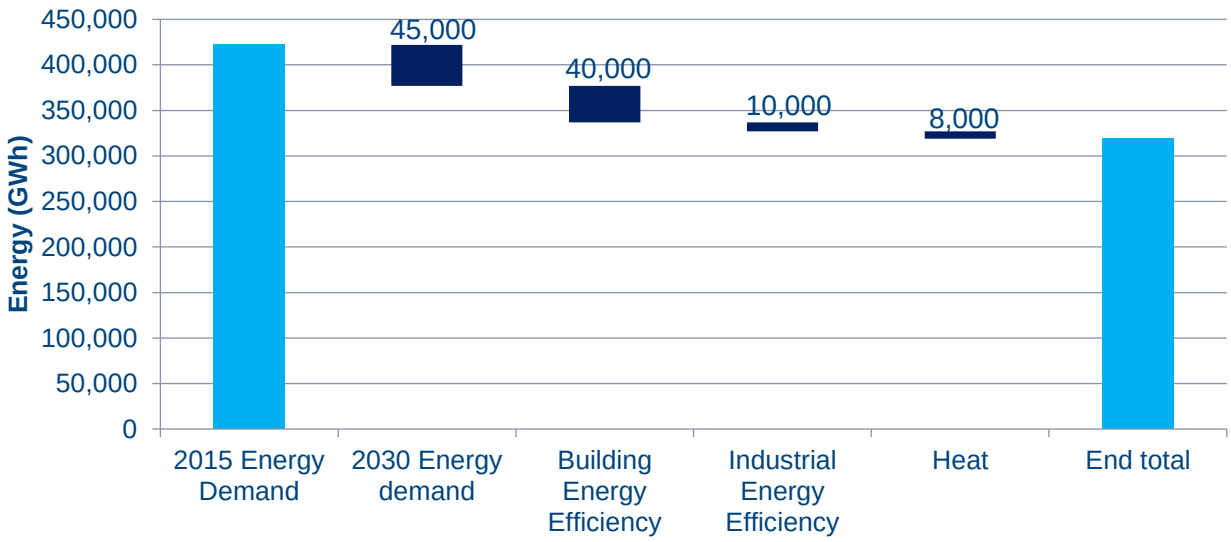
Overall potential

The energy efficiency potential identified in the CGS could reduce energy use in the business and industry sector by over 100,000 GWh by 2030. This comes from several sources:

a. **Current trends & existing policies:** Current policy and changes to business energy demands because of wider economic trends are estimated to deliver 45,000 GWh of energy savings over the period to 2030.
b. **Building energy efficiency:** There is significant energy efficiency potential, 40,000 GWh from measures such as improved insulation, ventilation and lighting. On average, they have a payback period of less than 7 years.
c. **Industrial process energy efficiency:** There is also some energy efficiency potential in the industrial process sector,10,000 GWh, where technologies such as heat recovery could improve industrial energy efficiency.
d. Heat decarbonisation: This could provide significant carbon savings typically by fuel switching to electricity or other low carbon sources. These tend not to generate large energy savings but can deliver large carbon savings.

Chart 5.1 shows almost half of the potential can be achieved from existing policies and projected trends in energy demand. The remainder will need to be found through new action, which is discussed in the call for evidence.

Chart 5.1 Business and Industry energy demand: 2015-2030



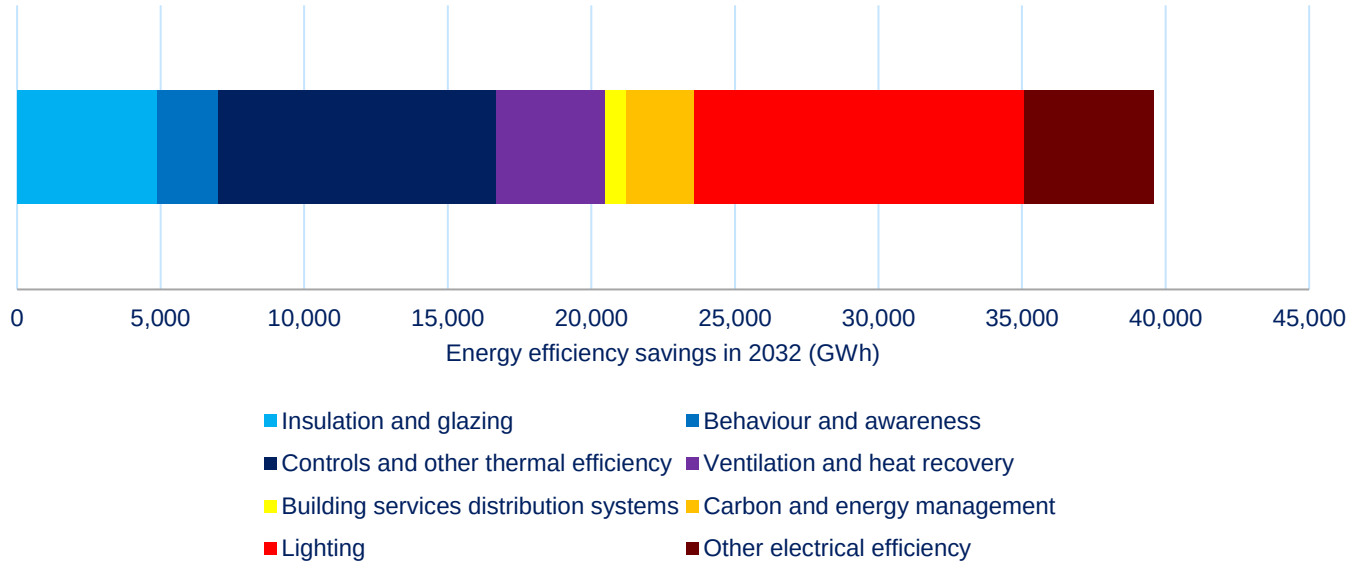
Source: Energy emissions projections 2017 (EEP) and Clean Growth Strategy 2017

Building energy efficiency

The energy efficiency potential comes from a variety of different technologies and approaches for businesses. This includes improving heating, ventilation and control systems to ensure that buildings deliver the right level of comfort to occupants. Lighting also plays a key role, including replacing the lighting system and use of control and systems.

Chart 5.2 outlines the potential energy savings by technology[17]. There is a significant amount of potential energy reductions and these could be delivered across the business buildings sector. To achieve this level of savings, action would be required in businesses of all sizes, sectors and tenure status.

Chart 5.2 Energy efficiency potential identified in the CGS for the business buildings sector (GWh): 2032



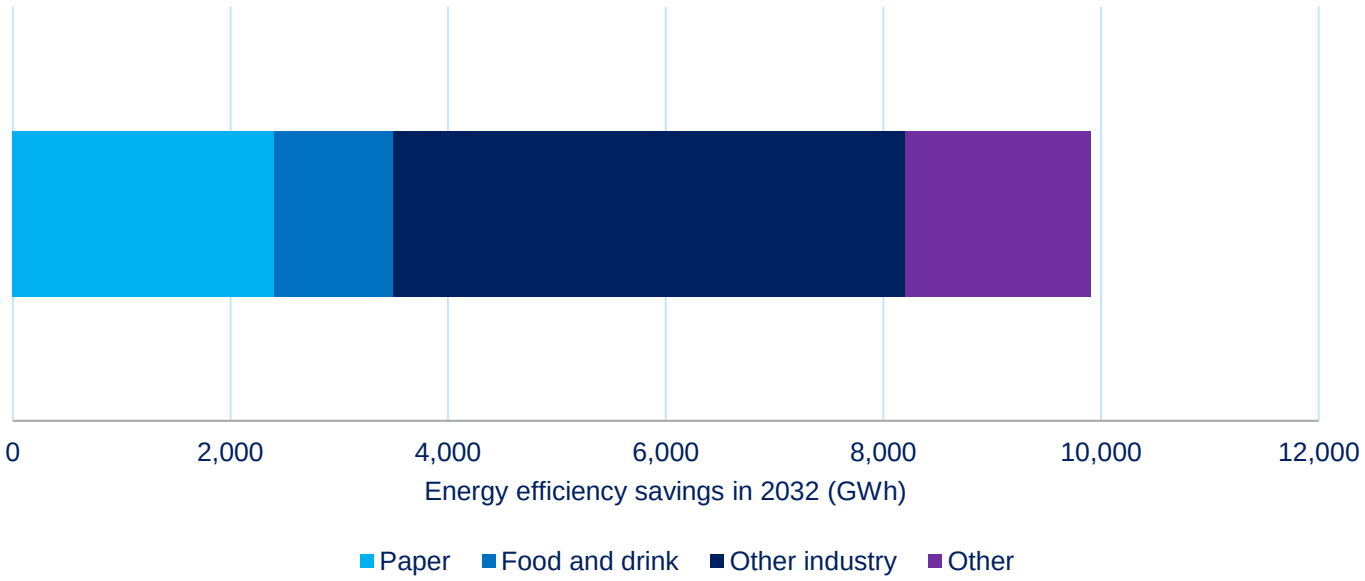
Source: Clean Growth Strategy 2017

[17] This analysis was based on the BEIS non-domestic building model using evidence from DUKES, Energy and Emissions Projections, ECUK and the Building Energy Efficiency Survey (BEES) & products analysis to estimate heating, cooling and ventilation demand.

Industry Energy Efficiency

Energy efficiency savings in the Industrial Process sector can come from several different sources, from improved heat recovery, to technical improvements in process efficiency. The Clean Growth Strategy considered a few different improvements focusing on energy efficiency which could be accessed relatively easily (as identified in the Roadmaps[18] and other sources). Further energy efficiency improvements are likely to be available from optimisation of plant level efficiency, optimisation of motors and applying bespoke technologies to specific processes. Uncertainty exists in the non-roadmap sectors.

Chart 5.3 Energy efficiency potential identified in the CGS for the industrial processes sector (GWh): 2032[19]



Source: Clean Growth Strategy 2017

The remaining sectors (other chemicals, non-metallic minerals, non-ferrous metals, food and drink and 'other' industry) are split into the different energy service demand categories such as high/low temperature heat. Generic technologies that produce these types of energy are modelled. Assumptions for these sectors are mainly based on UK MARKAL. Evidence from the Government's 2050 'Industrial Decarbonisation and Energy Efficiency Roadmaps', published in 2015, was incorporated into the modelling.

[18] https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050

[19] The 2032 pathway was developed using BEIS industry pathways models, split into eight industry sectors. Using evidence from the usable energy database, actual production steps are modelled for iron and steel, paper, cement and a part of chemicals.

We would welcome additional evidence about the energy efficiency potential in industrial processes, particularly in those sectors which were not covered by the Government's 2050 'Industrial Decarbonisation and Energy Efficiency Roadmaps'.

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Section 6: International comparisons

There are many metrics for international comparisons. For example, the International Energy Agency (IEA) uses energy consumption per unit of GDP produced[20] and the American Council for an Energy Efficient Economy (ACEEE)[21] which assesses energy efficiency through qualitive metrics of both energy efficiency and policy measures in place.

A helpful way to measure performance of the UK energy efficiency is to compare energy intensity in different sectors of the economy relative to other countries. Intensity is a commonly used metric because data is usually available and easy to understand.

This section covers each of the main consuming sectors based on data published by the ODYSSEE European energy efficiency indicators project[22]. These indicators are designed to make meaningful comparisons between countries; however, care must be taken when making comparisons regarding efficiency. This is due to differences in the types of energy uses in different countries as well as differences in heating demand, building type and the structure of industry that cannot be fully controlled for.

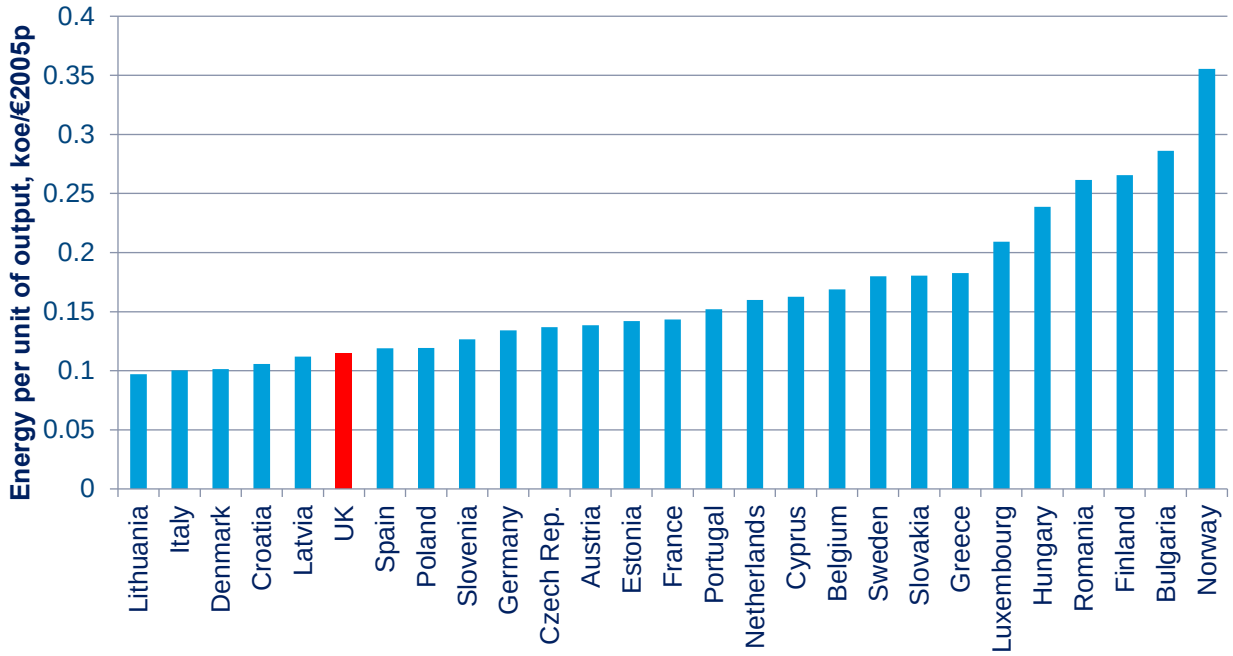
Indicators used are energy intensities, which is energy consumption divided by either floor area or gross value added (GVA). Whether floor area or GVA is being used will be indicated in the charts and analysis.

Manufacturing intensity can either be measured relative to the GVA to the gross domestic product of the sector or to the amount of production.

Chart 6.1 shows that the UK has the sixth lowest overall manufacturing intensity relative to GVA in Europe.[23]

[20] IEA Energy Efficiency Database https://webstore.iea.org/energy-efficiency-indicators-2017-highlights
[21] The 2018 International Energy Efficiency Scorecard http://aceee.org/research-report/i1801
[22] ODYSSEE European energy efficiency indicators project (www.odyssee-mure.eu/)
[23] Data for manufacturing intensity at the EU structure has not been reported for Malta. *Manufacturing intensity data adjusted at EU structure is calculated by taking actual sub-sectoral intensities of the country and the share of each branch in the value added of manufacturing of the EU. Data for Romania are for 2011, Malta, Luxembourg and Hungary for 2012 and Portugal for 2013.*

Chart 6.1 Manufacturing energy consumption per unit of GVA: 2015[24]



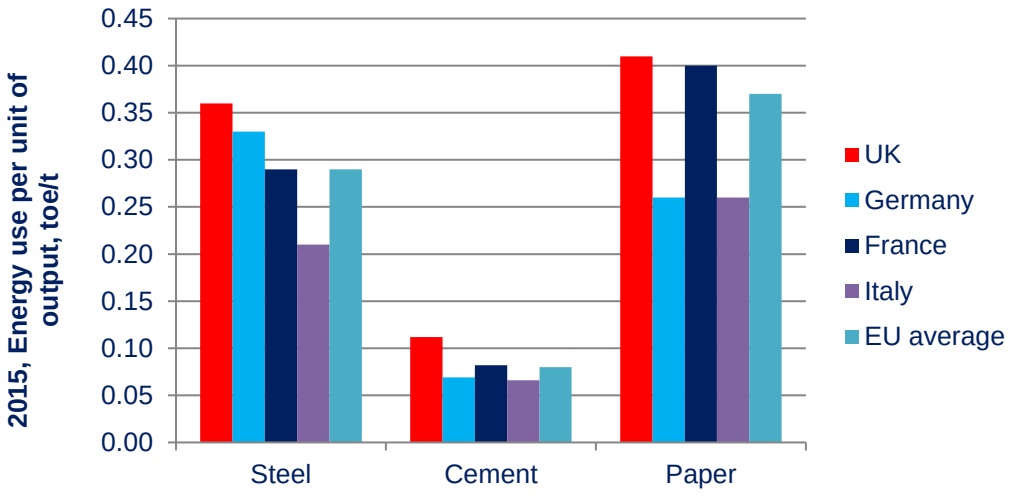
Source: ODYSSEE European energy efficiency indicators project 2015

While it is important to compare the broad indicator of manufacturing intensity, it is also interesting to compare relative efficiencies of manufacturing sub-sectors across countries. Care should be taken whilst making international comparisons of manufacturing because the type and quality of products produced varies between countries. For example, in the steel industry, energy intensity will vary depending on the share of coke that is manufactured on-site compared to the share that is purchased.

[24] Countries have been compared using purchasing power parity (PPP). It is an alternative to using market exchange rates. The purchasing power of a currency refers to the quantity of the currency needed to purchase a given unit of a good, or common basket of goods and services.

Energy intensity in the cement, steel and paper sectors is measured by energy consumption by physical output (tonnes). Using this measure for these energy intensive sectors, the UK is generally shown to be more energy intensive as shown in chart 6.2. This could be for a variety of reasons, including age of plants and types of products produced.

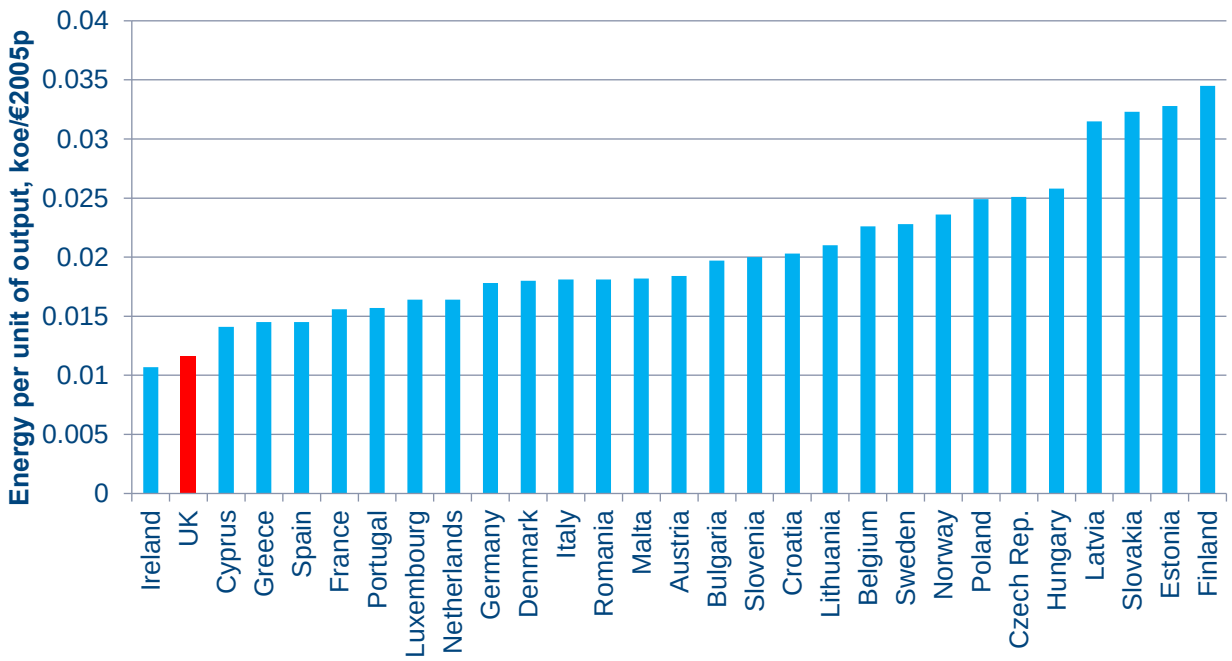
Chart 6.2: International sector comparison: 2015



Source: ODYSSEE European energy efficiency indicators project 2015

The UK has the second least energy intensive service sector in the EU as measured by energy consumption per unit of GVA, shown in Chart 6.3. The UK performs particularly well on this indicator due to the high-value professional services that generate high GVA for relatively low energy use.

Chart 6.3: Service sector energy consumption per unit of GVA: 2015[25]

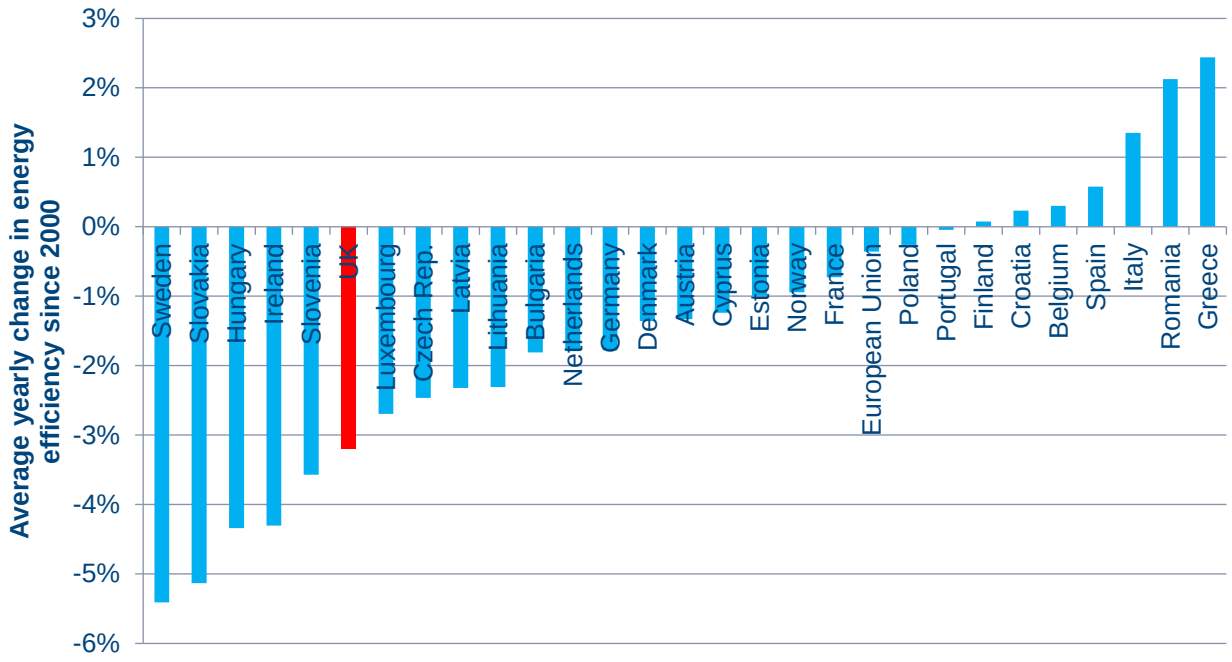


Source: ODYSSEE European energy efficiency indicators project 2015

[25] Countries have been compared using purchasing power parity (PPP). It is an alternative to using market exchange rates. The purchasing power of a currency refers to the quantity of the currency needed to purchase a given unit of a good, or common basket of goods and services.

UK service sector has seen some of the biggest improvements in energy efficiency since 2000 in the EU as shown in chart 6.4.

Chart 6.4: Service sector average yearly change in energy efficiency since 2000



Source: ODYSSEE European energy efficiency indicators project 2015

We would welcome views and additional evidence about why UK perform better on the metrics discussed in this section.

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Section 7: Policy overlaps

There are a range of policies in the non-domestic sector promoting the uptake of energy efficiency measures. This section covers the energy use and policy overlaps.

Venn diagram assumptions

Summary of Venn diagram method and assumptions:

All figures are derived for England and Wales and the scope is consistent with non-domestic NEED[26].

Energy saving opportunity scheme (ESOS)
This is all energy used by large organisations. This has been modelled in ND-NEED as all energy use in a parent company where any of the companies has 250 employees or more. Consumption is derived for electricity & gas based on records in ND-NEED with consumption & Experian data and grossed using Experian weights. The public sector has been excluded based on the Experian premises type variable. For more information, please click on this link.
CRC energy efficiency scheme (CRC)
This is all energy use by significant group undertakings with 6 GWh of electricity use. A) Total consumption has been derived through phase one registration of electricity meters excluding CCA exemptions (based on meter point data for England and Wales and not ND-NEED; therefore, it is more complete). B) The consumption interacting with other policies (such as ESOS) is based on these matches to ND-NEED derived as shares of consumption. The result for electricity and gas are grossed up to match the CRC total in A). For more information, please click on this link.

[26] Non-domestic National Energy Efficiency Data-Framework (ND-NEED) 2014. https://www.gov.uk/government/statistics/the-non-domestic-national-energy-efficiency-data-framework-nd-need.

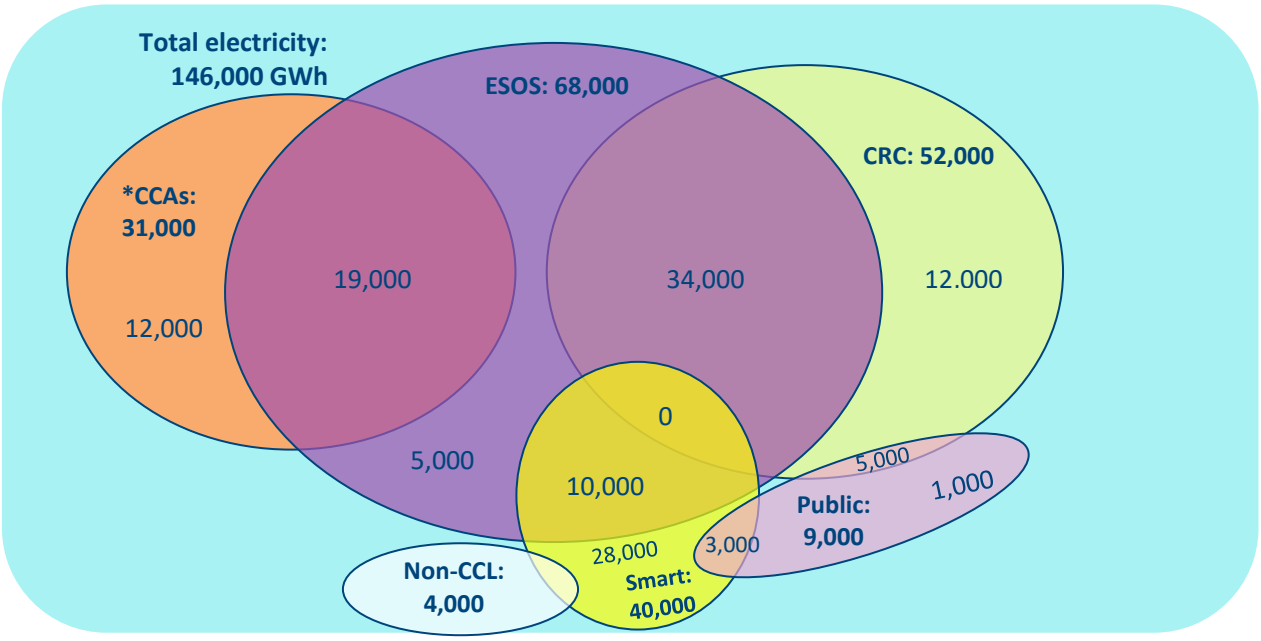
Climate change agreements (CCA)
A voluntary participatory scheme providing CCL relief for eligible sectors. The total consumption in scope is provided based on HMRC analysis. Shares of CCA within ESOS are derived using ND-NEED based on the energy consumption within the main DUKES sectors. This would imply most of that energy use is covered by CCA. It is assumed CCL does not overlap with smart metering and cannot overlap with CRC based on the exemptions to CRC. For more information, please click on this link.
Climate change levy (CCL)
All energy use above the thresholds of 12 MWh of site electricity and 52.8 MWh of gas is assumed to be included. There are a few other exemptions. This has been applied as a filter to the database crossed with all other schemes. For more information, please click on this link.
Smart metering (SM)
Business smart metering covers SMEs for electricity profile class 3 and 4 and gas consumption for meters consuming less than 732 MWh. These have been directly plotted and filtered using ND-NEED. For more information, please click on this link.
Public sector
While the public sector is not a policy, it provides specific exclusion from ESOS so needs to be modelled. This has been calculated from ND-NEED based on the Experian premises type most likely to fall within the public sector. The exclusion of offices from this may contribute to an overlap between the public sector and non-CCL.

The ND-NEED data is used in conjunction with various policy specific data to estimate the final energy use covered by different policies. CRC registration data is used to identify meters in ND-NEED that are covered by the CRC and by CCAs. The total energy use covered by CCAs is estimated based on CCA sector information and data on CCL receipts.

Figure 7.1 and 7.2 show the estimates of business energy use which are covered by ESOS, CRC and CCAs. EU ETS energy use is assumed to be covered by CCAs or in consumption by the fuel industry. The data from ND-NEED are only available for electricity and gas use in England and Wales in 2015, so they provide only a partial estimate of the energy in scope of large businesses. This analysis is therefore supplemented with data from EEP to provide projected energy use over time, and to provide coverage of energy use not captured by ND-NEED, such as use non-metered fuels, consumption from the fuel industry and UK-wide business energy use.

The figures show that ESOS has the largest coverage of energy use, followed by CRC and CCA. 47 per cent of the total electricity use by policy coverage is through ESOS users and 56 per cent of gas use. CRC users have a higher proportion of electricity use (35 per cent) than gas use (15 per cent) whereas CCA users have a higher proportion of gas use (45 per cent) than electricity use (21 per cent).

Figure 7.1: Electricity use by policy coverage for England and Wales: 2015[27]

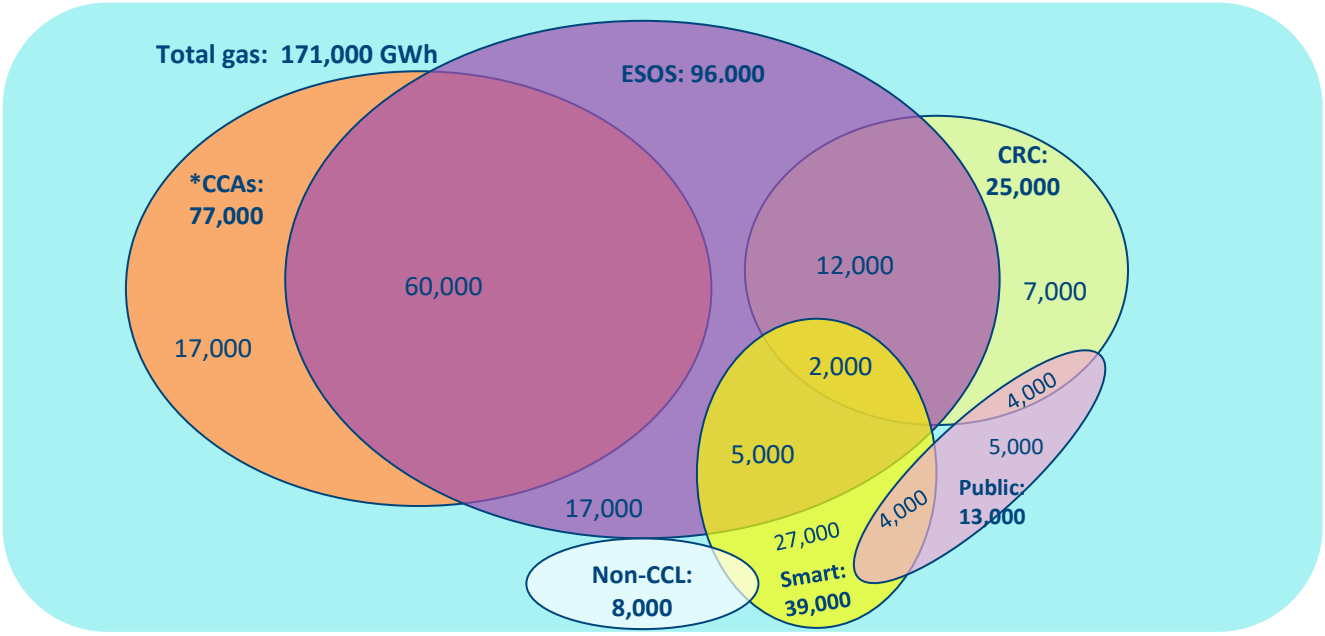


**CCA energy consumption expressed here is an estimate of 'eligible facility' consumption that is eligible for the reduced rate of CCL.*

Source: ND-NEED 2014 and various policy specific sources

[27] Comparisons for the public sector are challenging between BEES data and ND-NEED data. This is partly because predominately the public sectors (education, health, emergency services & military) were not sampled from ND-NEED. In total 1,970 (53%) of electricity records and 828 (28%) of non-electricity records are included. The lower non-electricity coverage reflects the sectors excluded the public sector where non-electricity is more widely used. Given these issues it is not surprising that some premises have quite significant differences between BEES and ND-NEED.

Figure 7.2: Gas use by policy coverage for England and Wales: 2015[28]



**CCA energy consumption expressed here is an estimate of 'eligible facility' consumption that is eligible for the reduced rate of CCL.*

Source: ND-NEED 2014 and various policy specific sources

[28] Comparisons for the public sector are challenging between BEES data and ND-NEED data. This is partly because predominately the public sectors (education, health, emergency services & military) were not sampled from ND-NEED. In total 1,970 (53%) of electricity records and 828 (28%) of non-electricity records are included. The lower non-electricity coverage reflects the sectors excluded the public sector where non-electricity is more widely used. Given these issues it is not surprising that some premises have quite significant differences between BEES and ND-NEED.