



## Energy Consumption in the UK (ECUK) 1970 to 2019

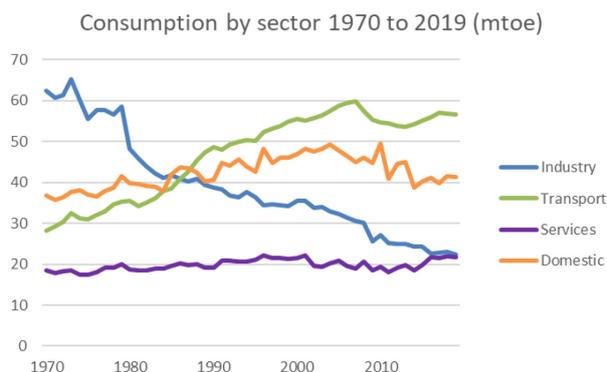
22 October 2020

National Statistics

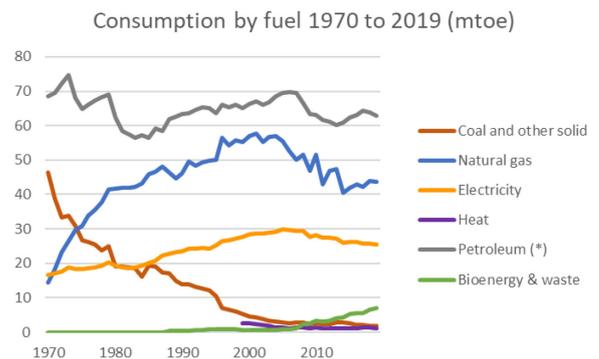
- Total energy consumption in the UK decreased by 1.4 million tonnes of oil equivalent (mtoe) (or 1.0 per cent) between 2018 and 2019 to 142.0 mtoe.
- All sectors saw a fall in consumption with almost half of the total decrease (45 per cent) being accounted for by the industrial sector with a further quarter by the domestic sector.
- With the exception of bioenergy and waste, all fuels saw a decrease particularly petroleum which fell by 0.9 mtoe (1.4 per cent).
- Bioenergy consumption increased by 0.5 mtoe (7.6 per cent) with three quarters of the increase being liquid biofuels consumed in transport offsetting to some extent the fall in petroleum in that sector. Overall, transport consumption fell by just 0.4 per cent.
- The energy ratio fell by 2.6 per cent (Table I1), meaning that increased efficiencies reduced the amount of energy needed to underpin each unit of Gross Domestic Product (GDP, £1 million).
- Figure 1 below shows the long-term trends in consumption by sector and fuel; by sector, the most notable element is the growth in transport consumption and fall in industrial. By fuel, coal has fallen considerably since 1970 (by 96 per cent) with gas consumption more than tripling (though has since fallen by a quarter since consumption peaked in 2001).

**Figure 1: Change in energy consumption by sector and fuel 1970 to 2019**

By sector.



By fuel.





## What you need to know about these statistics:

Energy Consumption in the UK (ECUK) is an annual publication that covers final energy consumption. It is of interest to a wide range of users including academics, energy industry experts, government policy users, and members of the public. These statistics provide additional insights and analysis of final energy consumption to complement the Digest of UK Energy Statistics (DUKES), which focuses on detailed energy balances.<sup>1</sup>

An [interactive tool](#) is published alongside this document which enables users to create and download charts and data tables on consumption according to interests and level of detail required. The tool will be updated for 2019 data on 29<sup>th</sup> October. Additionally, the Excel data tables also contain methodology notes and supporting information along with additional charts enabling users to see all relevant information in one place.

Consumption data are mostly sourced from DUKES and are of good quality. However, some of the modelled tables are based on research undertaken only periodically and have not been updated for some time. This is particularly relevant for end uses in the industrial sector but in the interest of providing a comprehensive picture of detailed consumption patterns, proportions obtained from historical modelling have been applied to updated consumption totals from DUKES. The proportions applied have now been included in the Excel tables marked as reference tables.

Secondly, although this publication covers the UK some of the modelling uses variables that do not have UK-wide coverage. For example, the English Housing Survey underpins some of the analysis in ECUK, but this survey is only for England. Where geographic coverage of variables used for modelling is not complete it has been assumed that characteristics apply to the whole of the UK.

The publication has been split into five themes: Energy Consumption; Energy Intensity; End Use; Primary Energy Equivalents; and Electrical Products.

Data are provided for the period 1970 to 2019 where possible though for some tables, updates are not yet available for 2019 and other series start more recently (e.g. industrial sub sector splits are only available from 1998).

The data are provisional and subject to revision. This year energy consumption data have been revised back to 2016 and the revisions are outlined in section IX of [Chapter 1 in DUKES](#). Table C1 is based on [DUKES Table 1.1.5](#) and revised values have been annotated with an “r” in that table. [Tables 1.1 to 1.3](#) show which values have been revised at a more disaggregated level.

For data sourced from other government departments which are all classified as National Statistics, the reader should refer to the respective publications’ revisions policy.

<sup>1</sup> <https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>

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# Introduction

Energy Consumption in the UK (ECUK) is a publication that complements the Digest of UK Energy Statistics (DUKES), also published by the Department for Business, Energy and the Industrial Strategy. Whilst DUKES provides detailed information on balances, including the supply side of energy to the UK, ECUK includes supplementary analysis of consumption data to provide additional insights into the use of energy by sector in the UK.

Data are presented under five key themes:

## **Energy Consumption**

Taking headline consumption data from the Digest of UK Energy Statistics (DUKES), this section examines energy use by fuel and sector (e.g. use of electricity, biofuels and petroleum products in transport).

## **Energy Intensity**

This section examines the relationship between energy used and output over time, for example the amount of fuel used in transport compared to the number of passenger numbers and miles travelled. Lower ratios can indicate improved energy efficiencies (among other effects) to achieve the same output using less energy.

## **End Use**

To further explore the use of energy in the UK, this section models consumption reported in DUKES by estimating the proportions of end uses for each fuel. An example would be the amount of gas used in the domestic sector for space heating, water heating and cooking.

## **Primary Energy Equivalents**

The above sections on consumption, end use and intensity examine final consumption of energy, which does not include use by the energy industry and losses. Primary demand includes these elements of demand and is therefore higher than final consumption. This section apportions energy on a primary demand basis to each sector. This is helpful to understand the total energy requirements to not only supply energy for final consumption, but also to generate the energy supplied to each sector.

## **Electrical Products**

Using modelled data, this section shows how much electricity was used by electrical appliances. Only certain electrical products have been modelled, meaning that total use here does not match electricity demand elsewhere in ECUK or in DUKES. These tables are shown in Gigawatt Hours (GWh) only because they are not comparable to these other statistics.

For comparison purposes across fuel types energy is quoted in thousand tonnes of oil equivalent (ktoe), unless stated; the electrical products tables are however, presented in Giga Watt hours (GWh) as these tables are not comparable with others in the publication. This is standard practice when considering electricity in isolation.

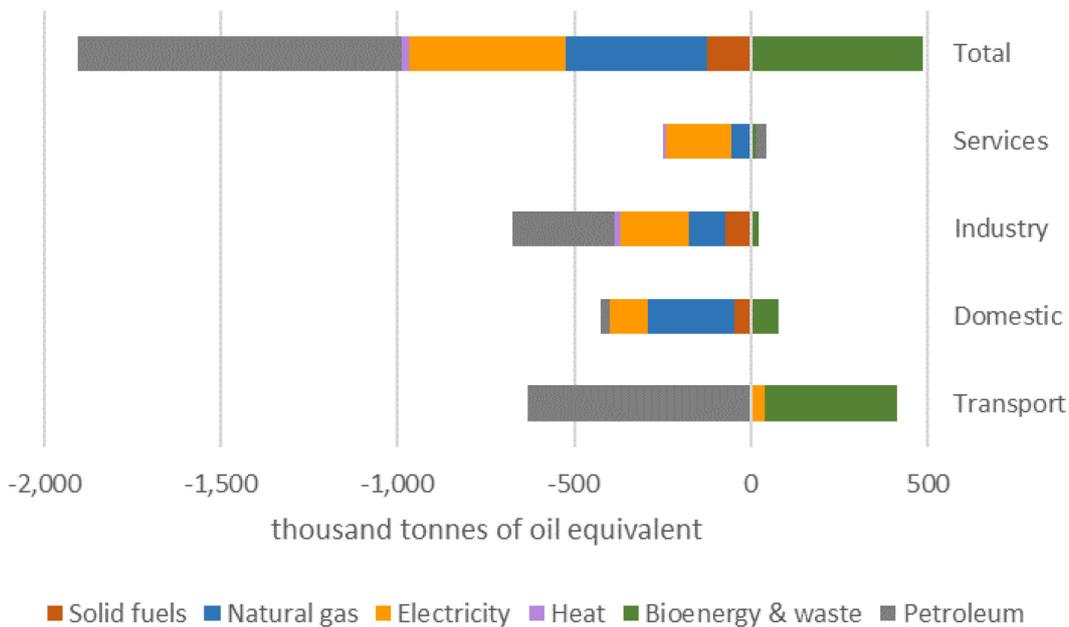
# Energy Consumption

Between 2018 and 2019, consumption (excluding non-energy use) decreased by 1.4 mtoe (1.0 per cent) to 142.0 mtoe, see [consumption tables](#) accompanying this publication, Table C1.

Figure 2 below shows changes in consumption by sector highlighting which fuels are driving the changes; it can be a useful way of tracking changing fuel preferences. For example, it shows that a large proportion of the fall in petroleum consumption is in the transport sector, much of which has been offset by an increase in liquid biofuels leaving a small decrease overall (0.4 per cent) in transport.

If a sector shows a fall in consumption for all fuel types, rather than highlighting possible fuel switching, it could reflect an overall reduction in activity or improving efficiencies, although impacts of the latter are more likely to be seen over a longer time frame (see section on energy intensity). The industrial sector showed such a decrease across fuel types with petroleum falling the most in both absolute and percentage terms (by 0.3 mtoe, or 11.2 per cent) and with electricity falling by 0.2 mtoe (2.4 per cent). Gas consumption fell slightly (by 0.1 mtoe or 1.2 per cent) and solid fuels also fell but to a lesser extent. Bioenergy and waste, however, increased slightly by 1.7 per cent and now represents 6.6 per cent of industrial consumption though this is lower than its share in 2018 (6.3 per cent).

**Figure 2: Change in consumption by sector and fuel, 2018 to 2019**



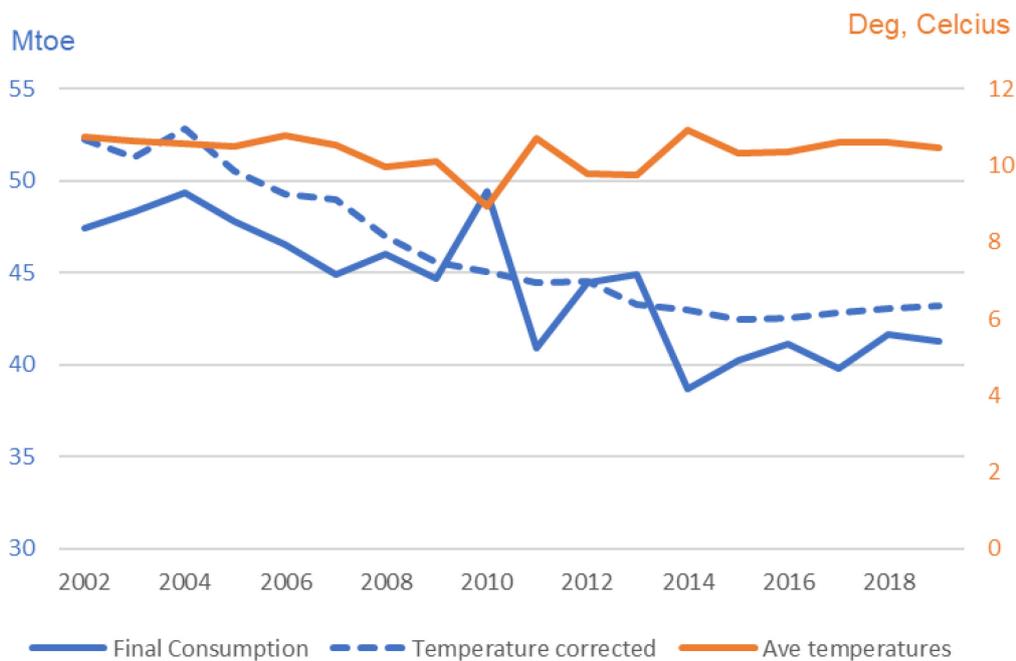
## Domestic

[Table C1](#) shows that consumption in the domestic sector decreased by 0.3 mtoe (0.8 per cent).

All fuels in this sector fell except for bioenergy which increased by 3.3 per cent.

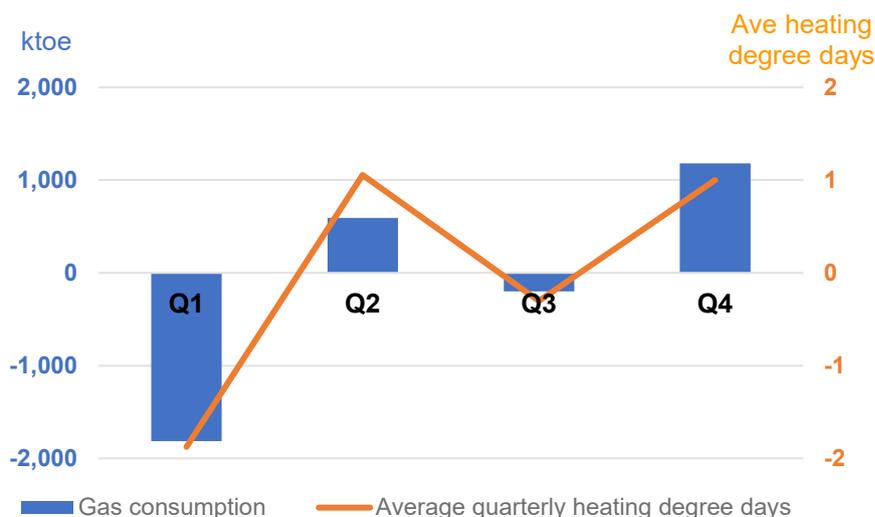
The domestic sector is the most responsive to temperature changes as a larger proportion of consumption is used for space heating. Between 2018 and 2019, the average temperature fell very slightly (from 10.6 degrees Celsius to 10.5 degrees Celsius) having a limited impact on consumption, which actually fell very slightly. Figure 3 shows the trend over a longer time frame and includes years with much larger year on year temperature changes, the effect of which can be more clearly seen in consumption behaviours.

**Figure 3: Domestic consumption, temperature-corrected consumption and average annual temperatures**



Average annual temperatures do not take account of the fact that a cooler summer will not necessarily impact on heating demand, comparing quarterly temperatures and consumption would be expected to show the dependency more clearly. Taking this a step further and considering heating degree days whereby on certain days, a small temperature difference could trigger a household switching on the heating and to what extent, a clearer pattern might emerge. In this case, changes in consumption would be in line with heating degree changes instead of opposing as in the case of average temperatures. Figure 4 below shows the difference in quarterly data for 2018 to 2019 compared with the difference in heating degree days.

**Figure 4: Change in quarterly domestic demand and heating degree days, between 2018 and 2019**



Source; Quarterly gas consumption [Energy Trends Table 4.1](#) Heating Degree Days [Energy Trends Table 7.1](#)

Quarter one (January to March, the key heating season) shows the largest impact on annual data which could explain why overall heating demand for the year due to this milder heating season was lower overall.

**Biomass** consumption (mostly wood combusted in stoves and open fires) increased 3.3 per cent (or 79 ktoe) reflecting the increasing contribution of renewables in the fuel mix. Its share is still relatively small (5.9 per cent) compared to gas consumption which accounts for 65 per cent of total domestic consumption, though this is less than its peak at 69 per cent in 2004. This compares to just 24 per cent in 1970 (before North Sea Gas came on line) and when solid fuels (coal, and other manufactured fuels) accounted for 49 per cent of domestic consumption (in the [consumption tables](#)).

### Additional BEIS Statistics on Consumption in the Domestic Sector.

#### [National Energy Efficiency Data Framework \(NEED\)](#)

Published 25<sup>th</sup> June 2020;

Mean and median consumption of domestic energy by property characteristics.  
Estimates of the impact on average consumption of energy efficiency measures.

#### [Household Energy Efficiency Statistics](#)

Published 17<sup>th</sup> September 2020 (headline release) and 19<sup>th</sup> March 2020 (detailed annual statistics);

Statistics relating to the Energy Company Obligation (ECO) and Green Deal.  
The detailed report presents annual updates (last updated 19<sup>th</sup> March 2020) on in-depth ECO statistics and insulation levels.

#### [Fuel Poverty Statistics](#)

Published 25<sup>th</sup> June 2020 covering the year 2018

**Sub-national consumption statistics** (published 19<sup>th</sup> December 2019).

#### [Sub-national electricity consumption data](#)

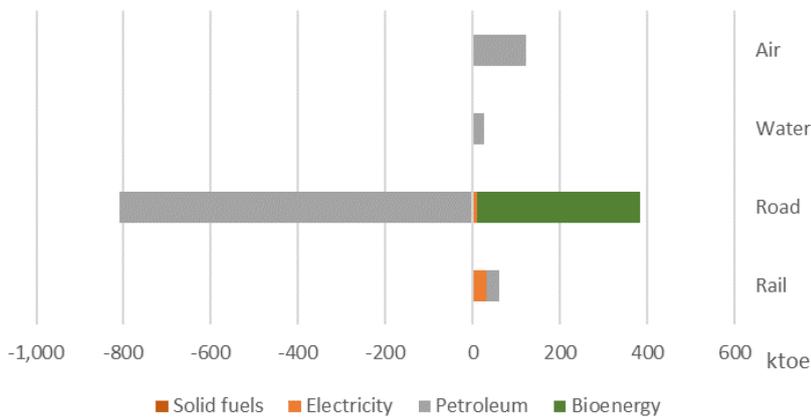
#### [Sub-national gas consumption data](#)

# Transport

Transport consumption decreased slightly in 2019 ([Table C1](#)), falling by 0.2 mtoe (0.4 per cent).

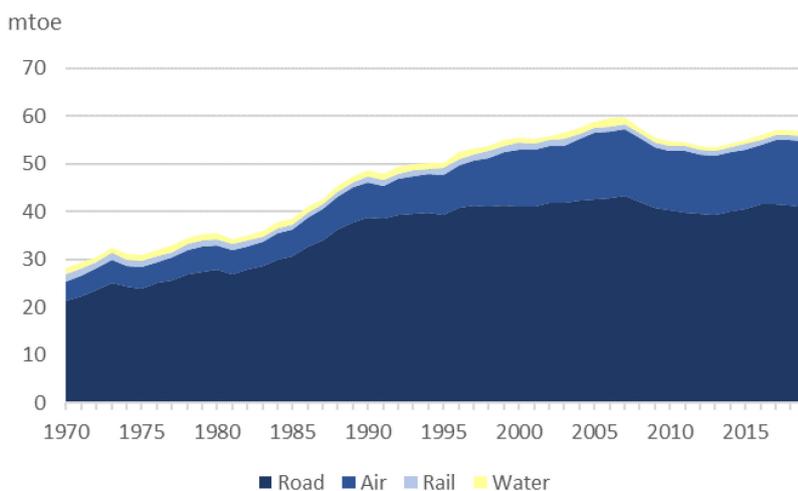
Although overall transport consumption remained broadly stable, Figure 5 shows the increase in the use of liquid biofuels (mostly biodiesel<sup>2</sup>), which partly offset a 1.1 per cent decrease in petroleum use in transport. There was a modest 0.1 mtoe (0.9 per cent) increase in petroleum use for air travel.

**Figure 5: Change in consumption in transport by travel mode and fuel, 2018 to 2019**



Road transport remains the dominant consumer in transport at 72 per cent (compared with 76 per cent in 1970). Figure 6 shows the increasing consumption in road and air transport; rail with water remaining comparatively small.

**Figure 6: Trends in transport consumption from 1970 by mode**

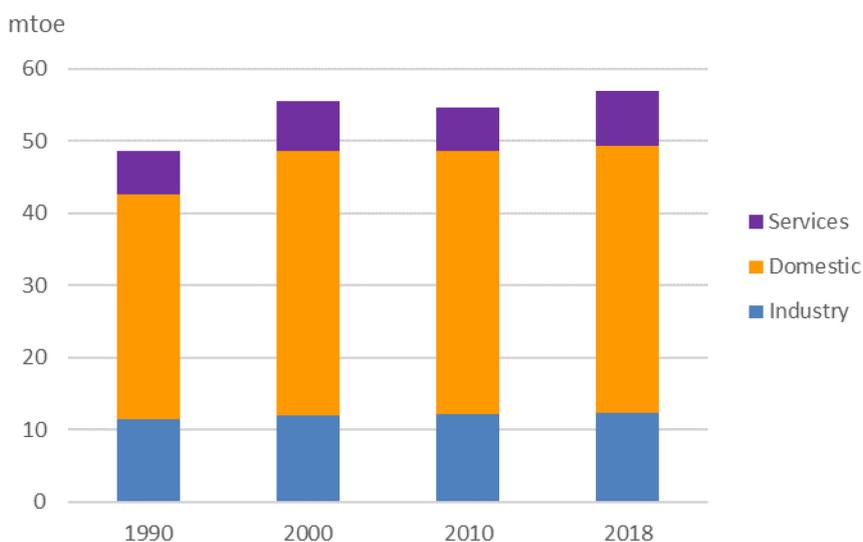


<sup>2</sup> See DUKES chapter 6, paragraphs 6.43 to 6.48; [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/736153/Ch6.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/736153/Ch6.pdf)

Although electricity in rail consumption has been a key component of rail travel since 1970, it has only recently seen increasing use in road transport; DUKES has been reporting this since 2004 with just 2 ktoe being consumed during that year. In 2019, this had increased to 32 ktoe; although increasing rapidly, electricity remains a small proportion (less than 0.1 per cent) of road transport consumption<sup>3</sup>.

[Table C7](#) in the data tables models transport consumption by consuming sector; although overall transport has increased since 1990, each sector's share has remained relatively stable from 1990 to 2018 (the latest year for which data are available). Industry's share has fallen from 24 per cent in 1990 to 22 per cent in 2018 while domestic's share has increased from 64 per cent to 65 per cent over the timeframe. The service sector's share increased by from 12 per cent in 1990 to 13 per cent in 2018.

**Figure 7: Trends in transport consumption from 1990 by consuming sector**



## Road Transport Consumption

Figure 8 highlights diesel's increasing share (for all vehicles), notably from the early 1990s onwards until 2017 when diesel<sup>4</sup> narrowly overtook petrol demand. Although diesel demand remained marginally higher in again in 2018, consumption fell, by 1.7 per cent due to increasing volumes of bio-diesel supplied.

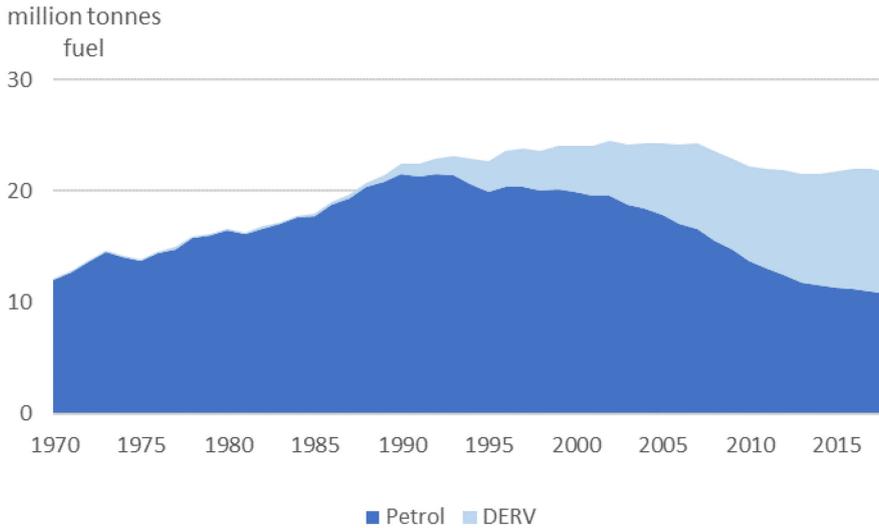
<sup>3</sup> See paragraph 5.18 of Chapter 5 of DUKES;

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/736152/Ch5.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/736152/Ch5.pdf)

<sup>4</sup> See Energy Trends article for a detailed analysis;

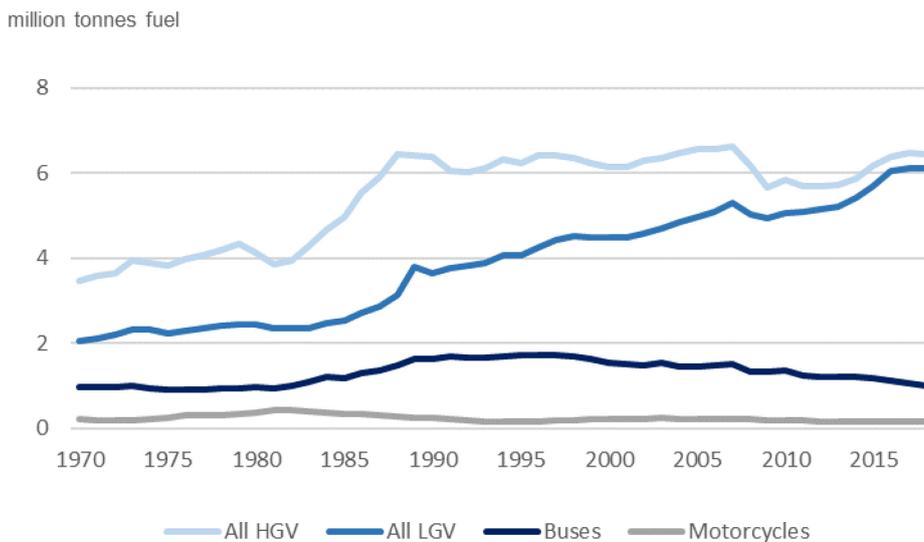
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/812622/Road\\_fuel\\_consumption\\_and\\_the\\_UK\\_motor\\_vehicle\\_fleet.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/812622/Road_fuel_consumption_and_the_UK_motor_vehicle_fleet.pdf)

**Figure 8: Petrol and Diesel (DERV) consumption for cars 1970 to 2018**



Cars represent the largest consumers in road transport consumption. Other road transport vehicles' consumption is shown in Figure 9.

**Figure 9: Consumption by other types of vehicles 1970 to 2018**



Growth in LGV consumption levelled off in 2018 and remains just below consumption for HGVs, although the stock of LGVs is increasing still with HGVs remaining stable.

More current data on liquid biofuel consumption in transport are available in Quarterly Energy Trends Renewables section which can be found at:

<https://www.gov.uk/government/statistics/energy-trends-section-6-renewables>

Table ET 6.2 shows that in 2019, total liquid biofuels increased by 24 per cent to 1.7 mtoe with much of the growth in biodiesel consumption. Further information can be found in the 'Highlights' sheet in Table ET 6.2.

**Additional BEIS Statistics on Consumption in the Transport Sector.**

[Road transport energy consumption at regional and local authority level](#)

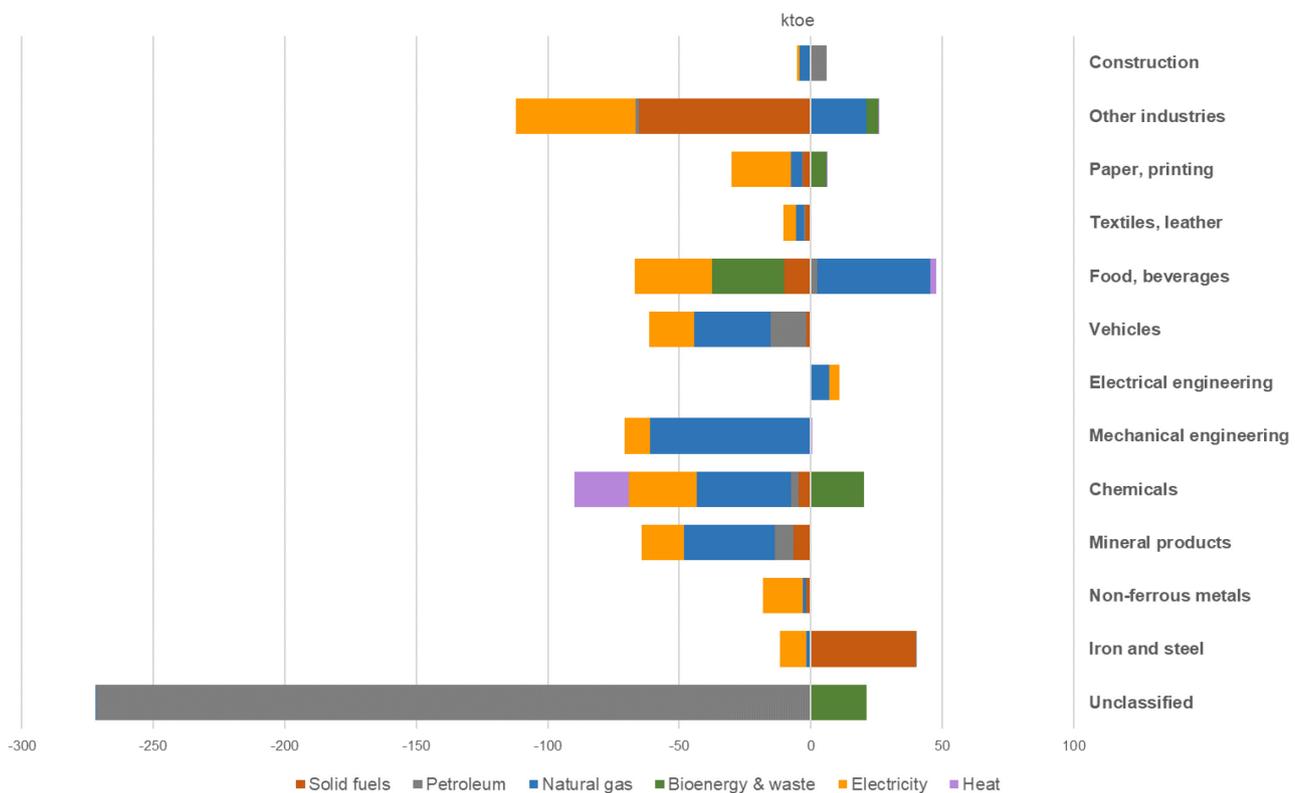
Published 25<sup>th</sup> June 2020

## Industry

Industrial consumption decreased between 2018 and 2019 ([Table C1](#)) by 0.6 mtoe (2.8 per cent).

The most notable trend highlighted in Figure 10 below is the decrease in unclassified petroleum consumption representing a continuation of improving data coverage which has enabled consumption to be allocated to other sectors. ([Table C2](#)).

**Figure 10: Change in Industrial consumption sub-sectors from 2018 to 2019 by fuel**



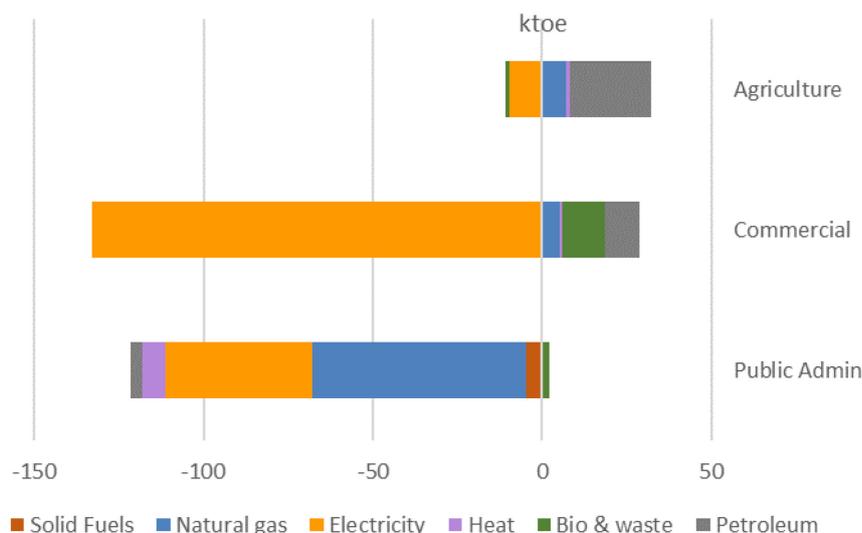
Most subsectors saw a decrease in overall consumption with the largest fall in 'Other Industries' (by 86 ktoe). Chemicals and mineral products also fell (by 70 ktoe and 64 ktoe respectively). Overall consumption in bioenergy and waste increased slightly (by 25 ktoe) though it fell in the food and drinks sector partially due to the volatility associated with a small number of sites, and also ongoing improvements in estimating final consumption (2015 was the first year sub sector splits for bioenergy and waste were included).

## Services

[Table C4](#) shows that consumption in the services sector decreased by 0.2 mtoe (0.9 per cent) between 2018 and 2019.

Figure 11 shows that both the public administration and commercial sectors saw a decrease in total consumption between 2018 and 2019, seen in gas consumption for the former and electricity consumption for the latter.

**Figure 11: Change in Services Consumption, 2018 to 2019**



Consumption in the commercial and public administration sectors is responsive to temperature fluctuations as a relatively high proportion of their energy use is for space heating. At 47 per cent, its share of space heating is not as high as the domestic sector (76 per cent), but it is considerably higher than the industrial sector at just 10 per cent<sup>5</sup>.

More information is provided in the end use section which provides an additional split for sub-sectors within the commercial and public administration sectors.

**Sub-national consumption statistics (last updated published 19<sup>th</sup> December 2019).**

[Sub-national electricity consumption data](#)

[Sub-national gas consumption data](#)

<sup>5</sup> Table U1 in the End Use data tables

**Consumption; [Accompanying Tables](#)**

C1	Final Energy Consumption by Sector and Fuel 1970-2019	table and charts
C2	Industrial Consumption by Sub-sector 1998 to 2019	table and charts
C3	Industrial Consumption by two digit SIC 2016 to 2019	table only
C4	Services Consumption by Sub-sector 1970 to 2019	table and charts
C5	Temperature Corrected Consumption by Sector 2002-2019	table and charts
C6	Temperature Corrected Consumption by Fuel 2002-2019	table and charts
C7	Transport Consumption allocated to consuming Sector	table and chart
C8	Road Transport Consumption by vehicle type	table and charts
C9	Domestic average gas and electricity consumption	table only
Reference Table 1	Industrial Consumption at 4 digit SIC 2007 (not updated)	
Reference Table 2	Proportions to estimate Industrial Consumption to 2 digit SIC	

# Energy Intensity

## What is Energy Intensity?

Energy Intensity is the amount of energy per unit of output. It includes (but is not limited to) energy efficiency changes. An example in the transport sector would be that if a train carries more passengers but uses the same amount of fuel to travel the same distance, then the energy intensity would fall (the output has increased in terms of number of passengers who travelled, but the fuel used has remained the same).

Units of output vary depending on the sector and sub-sector and relate to such economic activity as number of passengers and distance travelled for the transport sector, whilst changes in the ONS' Index of Production data are used to estimate trends in the output for the industrial sector.

The 'Methodology and Quality' sheet in the data tables include a comprehensive list of output factors used for each sub-sector.

[Table 16](#) in the data tables allocates changes in energy consumption by sub-sector to changes in both output and energy intensity.

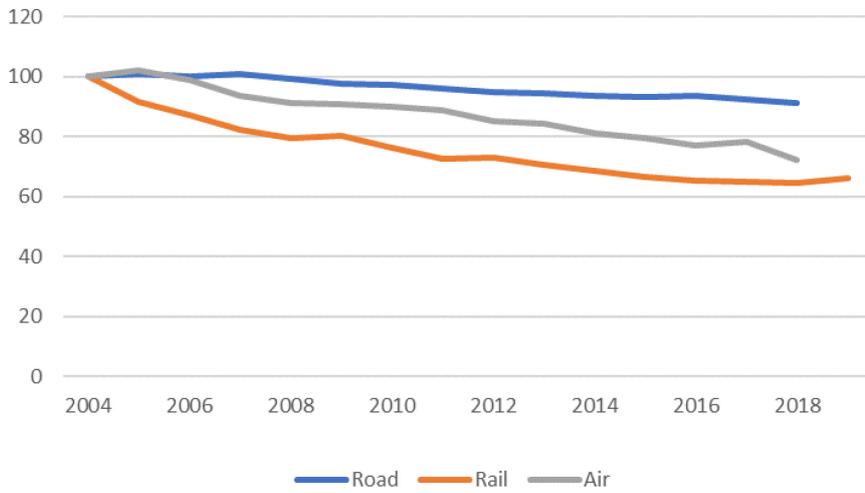
The energy ratio fell by 2.6 per cent in 2019 compared to 2018, meaning that the energy used to obtain the same output decreased in 2019 (see Table I1 in the [Intensity Tables](#) accompanying this publication).

## Transport

Energy intensity for passenger transport has fallen for the key modes of transport; road, rail and air with the largest decrease in rail passenger transport (see Figure 12) which has fallen by more than a third (36 per cent). The timeframe considered is from 2004 to 2018; 2004 has been selected as the start of the series in this instance as there was a step change in consumption by rail transport when energy consumption for providing building services was reallocated from transport to the commercial sector. Although transport consumption is available up to 2019, some of the transport factors are currently only available up to 2018.

Energy intensity in air transport fell by more than a quarter (28 per cent) and by 8.7 per cent in road passenger transport.

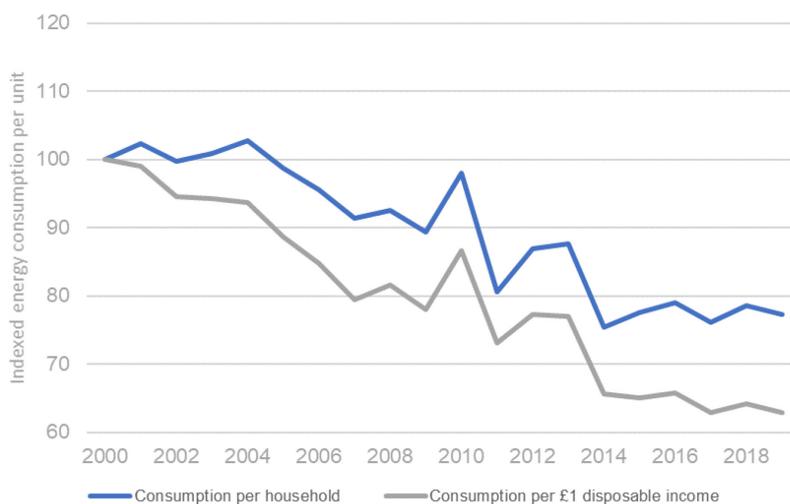
**Figure 12: Change in energy intensity for passenger transport, 2004 to 2018 (2019 for rail transport)**



## Domestic

Within the domestic sector energy intensity decreased both on a per household basis (down by 23 per cent) and disposable income (more than one-third at 37 per cent) basis since 2000. Consumption per household is highly correlated with consumption per person so follows the same trends. The improvements to energy intensity in this sector are likely related to higher energy efficiency of homes resulting from improvements to insulation measures, boiler, and other appliance efficiencies<sup>6</sup>.

**Figure 13: Indexed change in energy intensity per household and on disposable income basis, 2000 to 2019**

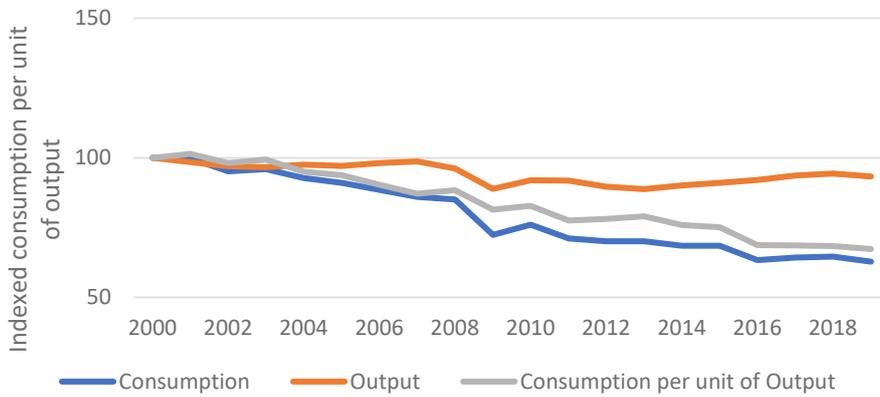


<sup>6</sup> For further information on the impact of energy efficiency measures see: <https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-report-summary-of-analysis-2019>

## Industry

The industrial sector has shown decreases in the energy used to produce a unit of output since 2000 by a third. The improvements were driven particularly by improvements to intensity in the vehicle manufacturing, chemicals, and iron & steel sectors.

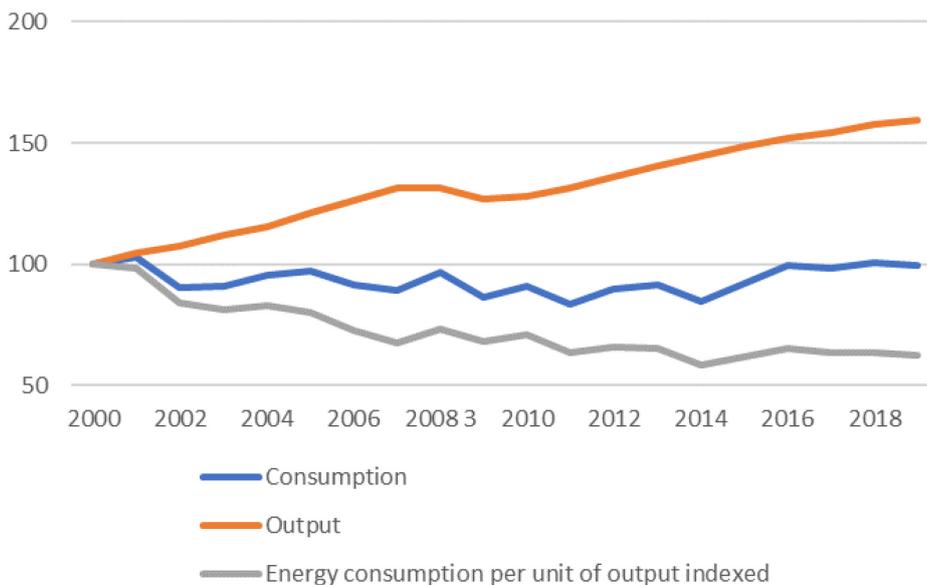
**Figure 14: Indexed change in industrial consumption, output and intensity, 2000 to 2019**



## Services

Again, in the Services sector improvements to energy intensity can be seen. Between 2000 and 2019 the energy used to achieve the same output in the services sector (excluding agriculture) declined by more than one-third (38 per cent), reflecting improved efficiencies in this sector. The energy intensity of agriculture increased by (11 per cent) between 2000 and 2019 reflecting a larger increase in consumption relative to output for this sector.

**Figure 15: Indexed change in services consumption, output and intensity, 2000 to 2019**

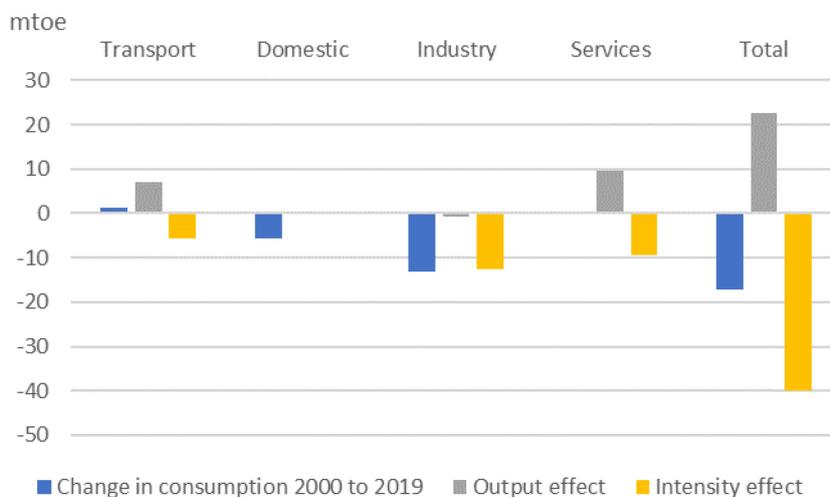


## Output and Intensity Factors

[Table I6](#) in the data tables shows a comparison of the effects on consumption due to output and intensity changes between 2000 and 2019 (2018 for transport). The output effect is the change in consumption which would have occurred had all other factors remained constant, specifically intensity changes. The remaining difference is then the intensity effect.

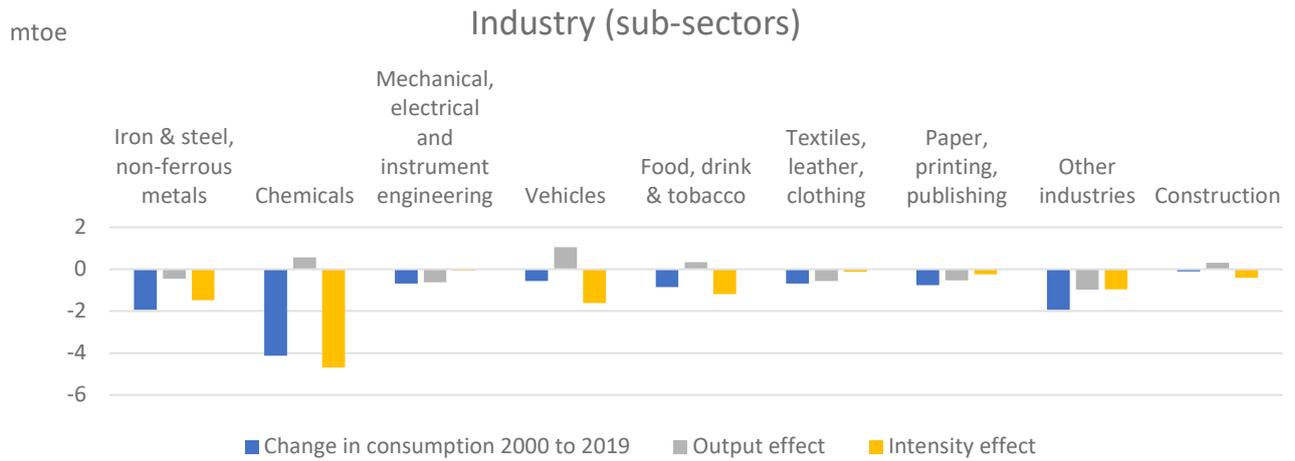
In Figure 16, all sectors saw a fall in energy consumption over the timeframe and an improvement in energy intensity. Industry was the only sector where most of the total change in consumption was down to intensity effects with negligible change in output effects.

**Figure 16: Output and Intensity Effects by sector 2018**



However, when considering the impacts at the industrial sub-sector level, there was some variation (see Figure 17); some showed an increase in output with improvements in energy intensity more than offsetting any potential increase in consumption due to the increase in output. This is notable in the chemicals sector which saw the largest relative impact of intensity improvements. The vehicle sector saw the largest increase in the output factor (in absolute terms) and, although this was more than offset by intensity effects, this was to a lesser extent than in the chemicals sector (relative to actual consumption).

**Figure 17: Output and Intensity Effects for Industrial Sub-sectors 2019**



For all sectors of the impacts of changes in output and intensity between 2000 and 2019; the change in consumption due to the output effect is what would have been the expected change in consumption had outputs remained constant, and the intensity effect is difference between total change in consumption and the output effect.

**Energy Intensity; [Accompanying Tables](#)**

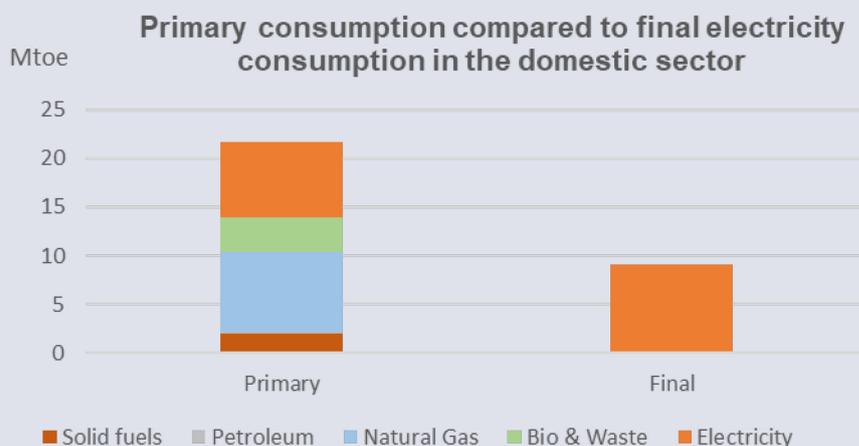
11	The Energy Ratio 1970-2019	table and chart
12	Transport Energy Intensities 1970-2018	table and charts
13	Domestic Energy Intensities 1970-2019	table and charts
14	Industrial Sub-sector Energy Intensities 1990-2019	table and charts
15	Services Energy Intensities 1970 to 2019	table and charts
16	All Sectors Impact of Output and Intensity Changes 2000-2019	table and charts
17	Domestic Sector; Specific Energy Consumption 1990-2014	(not updated)

# Primary Energy Consumption

## What is Primary Energy Consumption?

Primary Energy Consumption is the amount of fuel used prior to any loss of energy through conversion or transformation. The primary energy equivalent includes the losses incurred during the transformation process.

If a particular sector consumes only one fuel type for direct combustion say for heat and no other fuel, then primary energy will equal final energy consumption where it is assumed there are no conversion losses. However, if that sector also consumes electricity from the grid, then the primary energy will reflect the fuel input used for thermal electricity generation (gas, biomass, coal, and petroleum); only primary electricity generation is included (hydro, solar, nuclear, and wind). Consequently, primary consumption is larger than final consumption. The example below shows how final electricity consumption in the domestic sector maps to primary equivalents for 2019.



Primary consumption data are calculated by taking the final consumption fuel mix and apportioning to the fuel input required to produce the final unit of consumption. Most of the conversion losses are in generating electricity from combustible fuels so those sectors with a high proportion of electricity consumption have a relatively large absolute primary equivalent value.

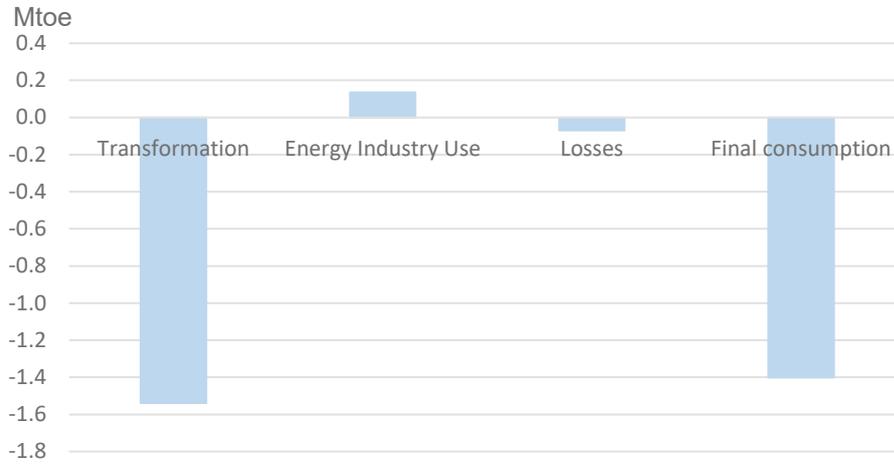
Similarly, large consumers of petroleum products, such as the transport sector, primary energy is the crude oil input some of which is used in the refining and manufacturing process before it is available for final consumption.

## All sectors 2018 to 2019

In the primary equivalent tables, primary consumption fell by 2.9 mtoe (1.5 per cent) Although final electricity consumption was stable between 2018 and 2019, the fuel mix going into generation shifted further away from combustible fossil fuels to primary renewables (which have no conversion losses). Figure 18 below shows how the 2.9 mtoe change in consumption is down

to changes in fuel input to the transformation sector, energy industry use, conversion losses and final consumption.

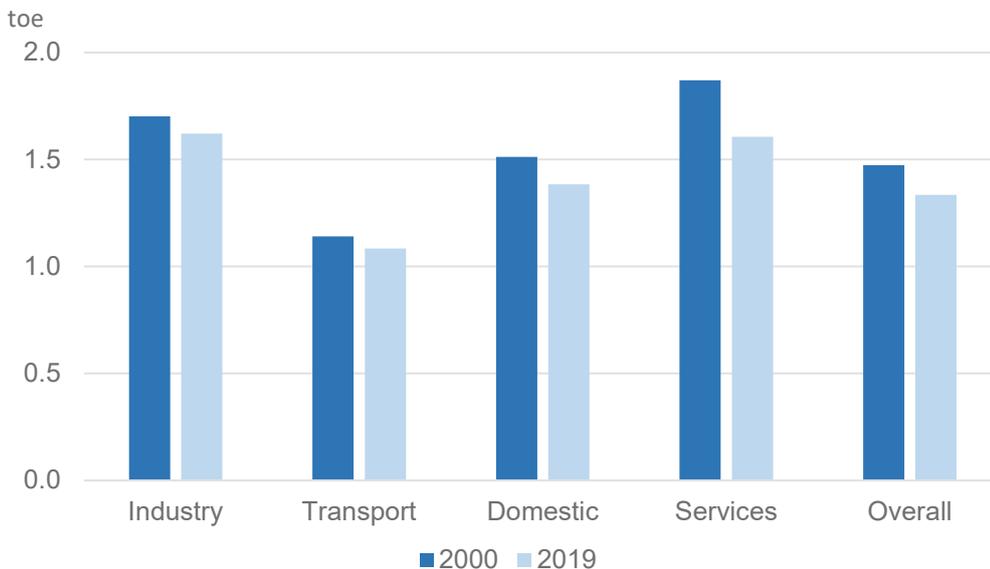
**Figure 18: Impact on Primary Energy Consumption 2018-2019**



## All sectors 2000 to 2019

Conversion factors are a measure of the efficiency of transformation calculated as the ratio of primary energy and final energy consumption. These factors are presented in [Table P3](#) the Excel data tables and represent how many tonnes of oil equivalent are required to produce one tonne of oil equivalent final consumption. A comparison of factors across the sectors between 2000 and 2019 is shown in Figure 19 below.

**Figure 19: Changes in conversion factors from 2000 to 2019**



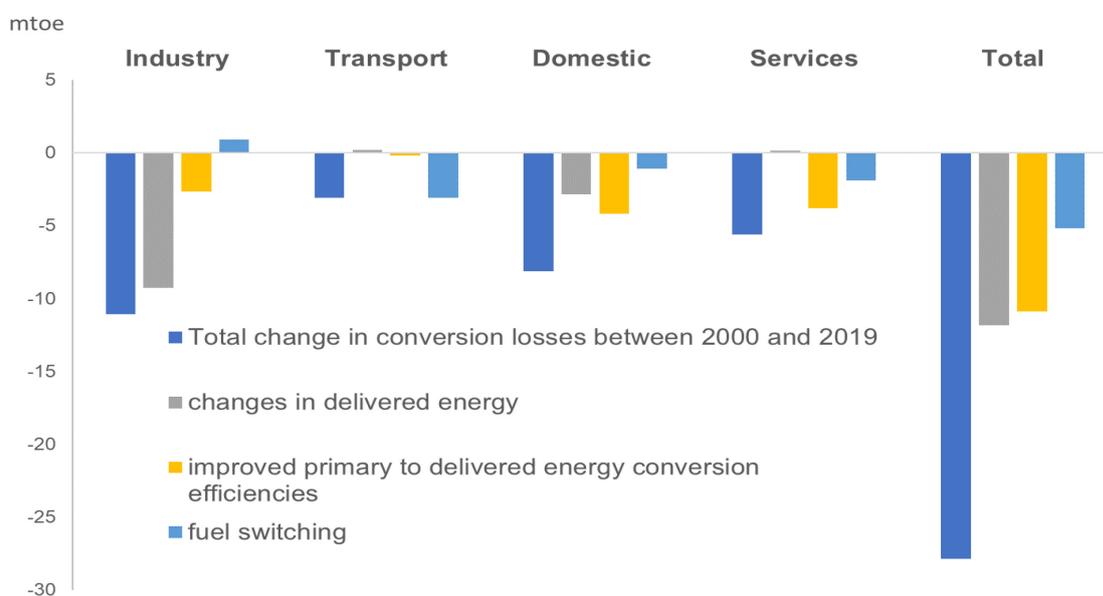
All sectors show a reduction in conversion factors over the time period indicating improvements in efficiency in the transformation sector but also includes the effects of fuel switching whereby consumers shift from fuels requiring transformation to direct consumption which also includes

the effect of the increasing proportion of primary electricity generation particularly renewables such as wind, and solar.

[Table P5](#) in the Excel data tables quantifies actual changes in conversion losses due to changes in final consumption (conversion losses will fall if less fuel is being converted), efficiency improvements and fuel switching. All sectors show a reduction in final consumption (see figure 20 below) and most show a reduction in losses due to efficiency improvements and fuel switching effects except for the industrial sector which, shows an increase in losses due to fuel switching. This reflects the increasing share of electricity in the industrial final consumption mix which increased from 28 per cent in 2000 to 35 per cent in 2019.<sup>7</sup>

**Figure 20: Changes in conversion losses 2000 to 2019**

The [data tables](#) include more detailed information on the services and domestic sectors whereby the methodology to estimate final consumption to primary energy equivalents has been applied to produce end use by primary equivalent;



**Primary Energy Equivalents; [Accompanying Tables](#)**

P1 Primary Energy Consumption and Temperature Corrected	1970-2019
P2 All Sectors Primary Consumption by Sector and Fuel	1970-2019
P3 Primary Energy Required to Produce 1 toe of Final Consumption	1970-2019
P4 Factors Affecting Change in Primary Energy	2000-2019
P5 Factors Affecting Conversion Losses between	2000-2019
<b>Additional Sectoral Splits</b>	
P6 Domestic End Use	
P7 Services by Sub-Sector and fuel	
P8 Services by End Use	

<sup>7</sup> Source: Table C1 in the Excel data tables published alongside this release.

# Energy End Uses

Understanding what energy is eventually used for is useful in assessing consumer behaviours which in turn contributes to developing policies and establishing future strategies.

Estimating end uses is notoriously difficult though some sectors are more challenging than others, due to data availability. Most estimates are modelled and use assumptions.

## Transport

The consumption tables published alongside this publication provide detailed data on energy consumption split by mode of transport and fuel type within the first section on consumption. There are detailed statistics published by The Department for Transport on transport usage within the series '[Transport Statistics Great Britain](#)'. The Department for Transport also conducts an annual '[National Travel Survey](#)' which also includes data on journey purpose and traveller characteristics. Data are used from both series to contribute to the section on Energy Intensity.

## Domestic

End use estimates for residential consumers are now based on bespoke analysis using data collected by The Ministry for Housing, Communities and Local Government (MHCLG) for the [English Housing Survey](#). The research is conducted by The Building Research Establishment (BRE) for the production of BEIS' [Fuel Poverty Statistics](#). The methodology used to derive the end use splits (which for this publication are applied to DUKES' energy consumption for the domestic sector) can be found via the following link:

<https://www.bre.co.uk/page.jsp?id=3176>

## Industry

End uses in the industrial sector are perhaps the most difficult to estimate considering the varied characteristics ranging from heavy industry such as iron and steel and those sub-sectors requiring lower grade heat for processing. There are also end uses relating to building services which are difficult to differentiate from processing related consumption.

Historic estimates for the end use splits were undertaken some time ago and have not been updated. Over this time, industry characteristics have evolved along with the fuel mix. For example, when the initial research was conducted, there was negligible or no bioenergy use and some sub-sectors such as paper, printing and publishing are now consuming a sizable proportion of bioenergy in their energy mix.

The updates for 2019 are based on historic estimates and the proportions estimates applied to updated DUKES consumption data. For reference, the actual percentages are included in the End Use tables as Reference Table 1.

Totals in the end use tables exclude some elements where there is a lack of data. Please see the Methodology and quality worksheet of the End use Excel data tables for details.

## Services

Up until 2015, the end use split was derived by The Building Research Establishment and modelled using a methodology:

[http://projects.bre.co.uk/PDF\\_files/CarbonEmissionsFromNon-domesticBldgs%202000andBeyond.pdf](http://projects.bre.co.uk/PDF_files/CarbonEmissionsFromNon-domesticBldgs%202000andBeyond.pdf)

Since 2015, estimates have been used based on the BEIS Building Energy Efficiency Survey (BEES). The proportions used are applied to DUKES energy consumption data.

<https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees>

## End Use: [Accompanying Tables](#)

U1 Sectors Excluding Transport	
U2 All Sectors	1990, 2000, and 2010-2019
U3 Domestic	1990-2019
U4 Industry by 2 digit SIC code	
U5 Services (excl agriculture)	2016-2019
U6 Services (excl agriculture), detailed	2016-2019

### Reference Tables

Reference Table 1; Proportions used to derive industrial split

# Electrical Products

## What you need to know about these statistics

Data in the electrical products tables are the results of modelling against a prescribed but quite wide-ranging set of electrical products used in the home and workplace. The model provides estimates of the total stock ([Table A2](#)) of these products and their per unit consumption ([Table A3](#)) consumption. For the majority of products, total consumption ([Table A1](#)) is calculated by multiplying the stock of appliances by the average per product consumption. The resulting outputs are a sub-set of energy consumption in the home and workplace which can be used to assess trends in consumption.

[The tables](#) are presented with the first row showing the last update of the model.

The modelled estimates are produced in support of the European framework setting ecodesign and energy labelling requirements for energy related products:

<https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32009L0125>

The Ecodesign Directive provides the overall framework through which implementing measures for specific energy-related products or product groups are introduced requiring improved energy and environmental performance. These are constantly being reviewed in line with technological progress. The Energy Labelling Regulation provides the overall framework through which delegated acts for specific energy-related products or product groups are introduced to require accurate energy labels. The purpose of the labels is to encourage consumers to buy more energy efficient products. The European Commission has published guidance on the labelling requirements.

[https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign\\_en](https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign_en)

This website also shows an overview of the legislation relating to both ecodesign and energy labelling:

[https://ec.europa.eu/growth/industry/sustainability/ecodesign\\_en](https://ec.europa.eu/growth/industry/sustainability/ecodesign_en)

On this page there are two links to comprehensive lists of the relevant legislative measures for both the ecodesign products and labelling regulations. More detailed definitions for products are included in each piece of legislation should users require more detail than provided in the methodology sheet contained in the associated workbook.

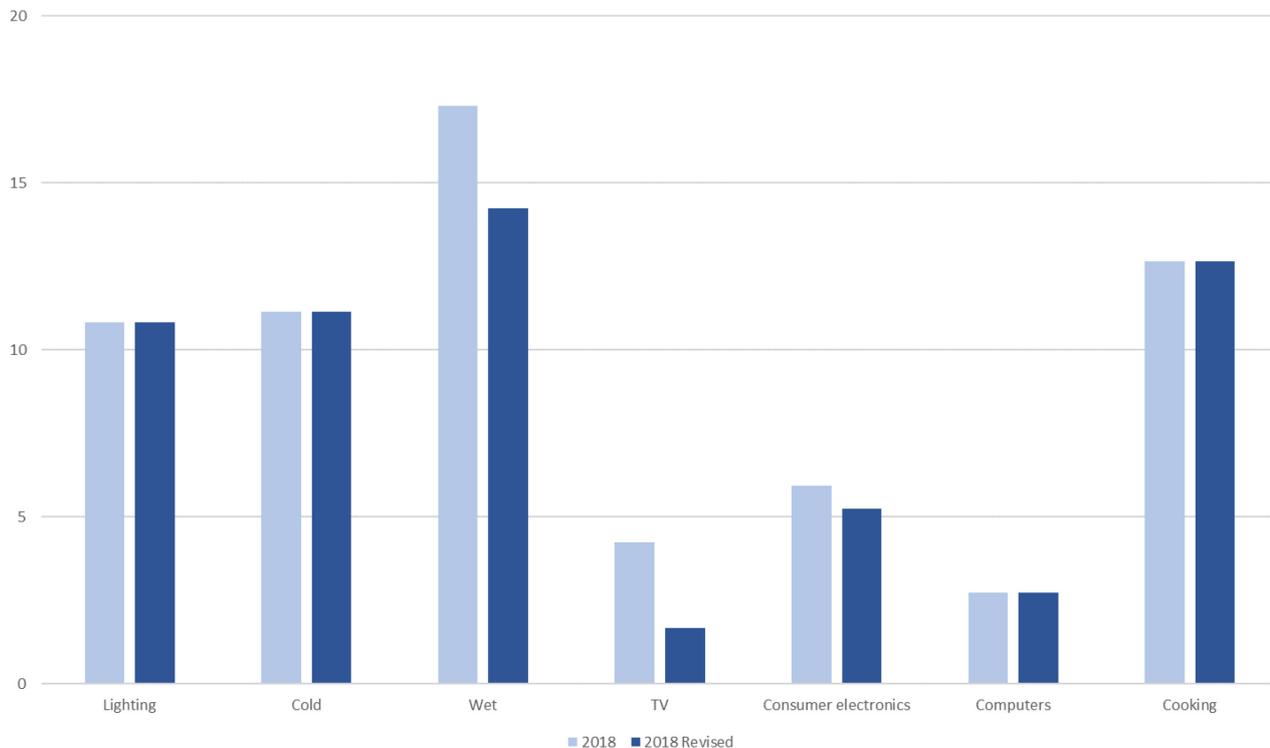
## Introduction

In the [2019 edition of ECUK](#), a detailed analysis of lighting was included demonstrating the impact of the removal of incandescent light bulbs from the market, in addition to consumption by computers and certain electrical products whilst in stand-by mode. Although this year, the section focusses on the impact of using updated assumptions for wet appliances, televisions,

and consumer electronics, the [data tables](#) relating to the products featured last year have been updated for 2019.

Some assumptions have been updated this year for wet appliances (e.g. washing machines and dishwashers), televisions and consumer electronics. Figure 21 below shows the impact of these changes to 2019 estimates for 2018 data.

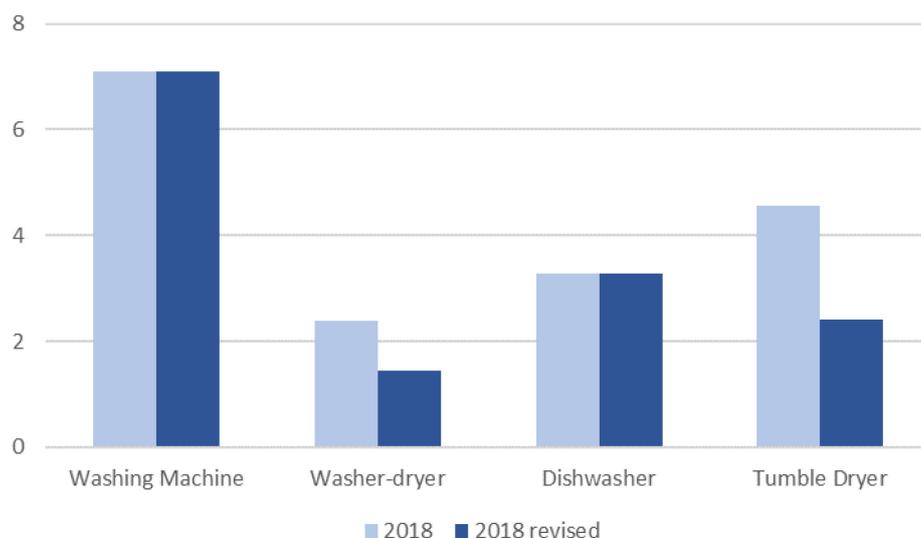
**Figure 21: Impact of revised assumptions on consumption in 2018 (TWh)**



The largest change in absolute terms was for wet appliances where consumption fell by 3.1 TWh (18 per cent) mostly accounted for by changes in assumptions for tumble dryers. In percentage terms, the largest impact was in television consumption which fell by 61 per cent (2.6 TWh). The impact for consumer electrics was more muted falling by 0.7 TWh, or 12 per cent.

## Wet Appliances

This category includes washing machines, washer-dryers, dishwashers, and tumble dryers. A detailed chart showing the effect of modelling changes for 2018 data is shown below in Figure 22.

**Figure 22: Impact of revised assumptions for wet products in 2018 (TWh).**

### Washer-dryers

The stock of washer-dryers was estimated using ONS' UK household statistics and the 2018 Mintel survey<sup>8</sup> results which indicated that 12 per cent of households owned a washer dryer. Until this year, it was assumed that ownership rates increased from 12 per cent in 1990 to 15 per cent in 2019. However, the Mintel survey now estimates that ownership rates have remained in the region of 12 per cent, which has in turn resulted in a downward revision for the stock of washer-dryers in [Table A2](#).

The per unit annual energy demand was sourced from the 2017 Ecodesign Review study<sup>9</sup>. These values account for 'real-life' capacities, operational mode use, operation of washer / dryer mode, so are lower than estimates published in ECUK 2019.

### Tumble dryers

Data sources for tumble dryers are the same as outlined above for washer-dryers with additional data sourced from 'The Association of Manufacturers of Domestic Appliances (AMEDA)<sup>10</sup>'. This additional data source confirmed that ownership rates should remain constant at 40 per cent from 2010 onwards whereas previously, it had been assumed to continue to increase.

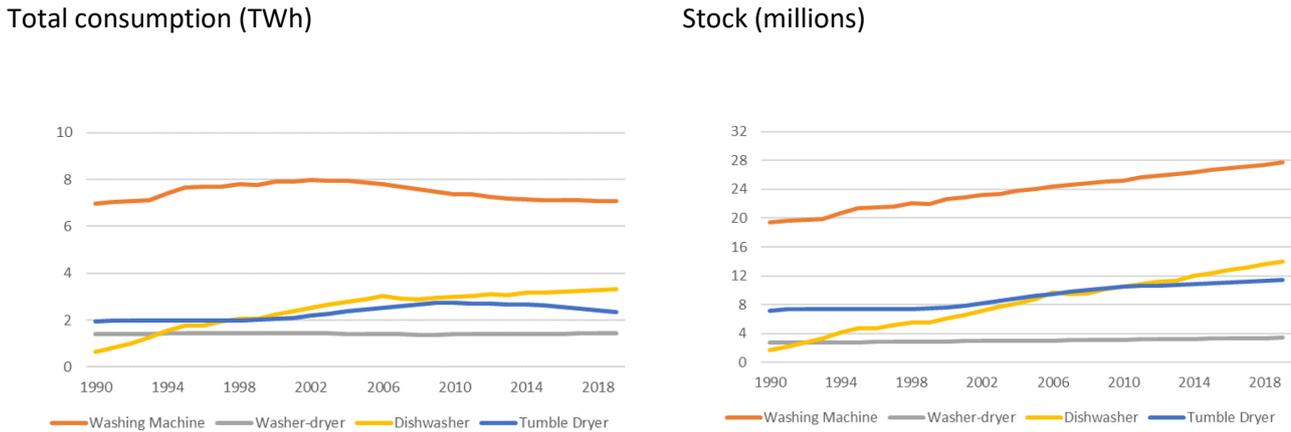
Figure 23 below shows that for all wet appliances, the stock has increased over the time horizon being considered (from 1990), particularly for dishwashers which increased by a factor of eight to around 14 million in 2019. However, due to continuing product efficiency improvements and changes to usage assumptions, consumption increased to a lesser extent, by a factor of five.

<sup>8</sup> <https://reports.mintel.com/display/859057/>

<sup>9</sup> <https://susproc.jrc.ec.europa.eu/product-bureau/>

<sup>10</sup> [https://www.applia-europe.eu/images/Library/Review\\_study\\_on\\_tumble\\_dryers\\_06-2019.pdf/](https://www.applia-europe.eu/images/Library/Review_study_on_tumble_dryers_06-2019.pdf/)

**Figure 23: Trends in consumption by wet products compared with stock 1990 to 2019.**



## Televisions

The stock of televisions is estimated using data sourced from the Broadcasters Audience Research Board (BARB)<sup>11</sup>. Total consumption is then calculated using the stock and typical energy demand which are based on The Energy Star database<sup>12</sup> combined with viewing hours sourced from BARB. Previously the typical energy demand was sourced from a GfK dataset<sup>13</sup> and based on 2011 estimates projected forwards in the models. The revised assumptions reflect the improving robustness of newer products and that replacement rates have increased since then. These revised assumptions combined with lower stock numbers have led to a fall in consumption for all televisions from 2010. In addition, model outputs have been updated from 1990 to produce a consistent time series.

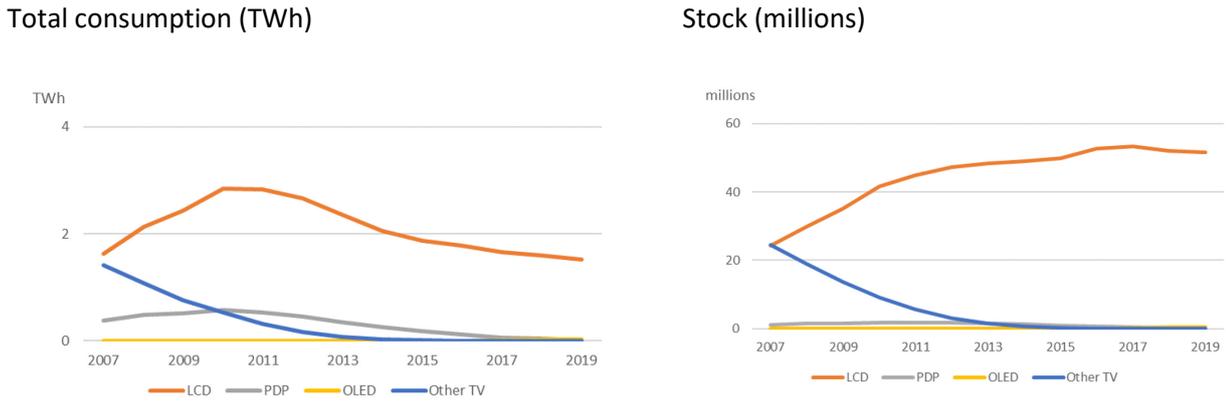
Since 2007, overall consumption for televisions increased to reach a maximum in 2010 but has since declined. The decrease is due to a combination of both reduced usage and also the number of appliances. The trends have been dominated by the impact of the replacement of cathode ray tube televisions with LCD devices. Figure 24 shows how consumption for LCDs reached a peak in 2010 and has since declined whilst the number of appliances increased rapidly to 2016 after which the growth has slowed and finally declined for the first year in 2019.

<sup>11</sup> <https://www.barb.co.uk/>

<sup>12</sup> <https://www.energystar.gov/productfinder/product/certified-televisions/results>

<sup>13</sup> <https://www.gfk.com/en-gb/insights>

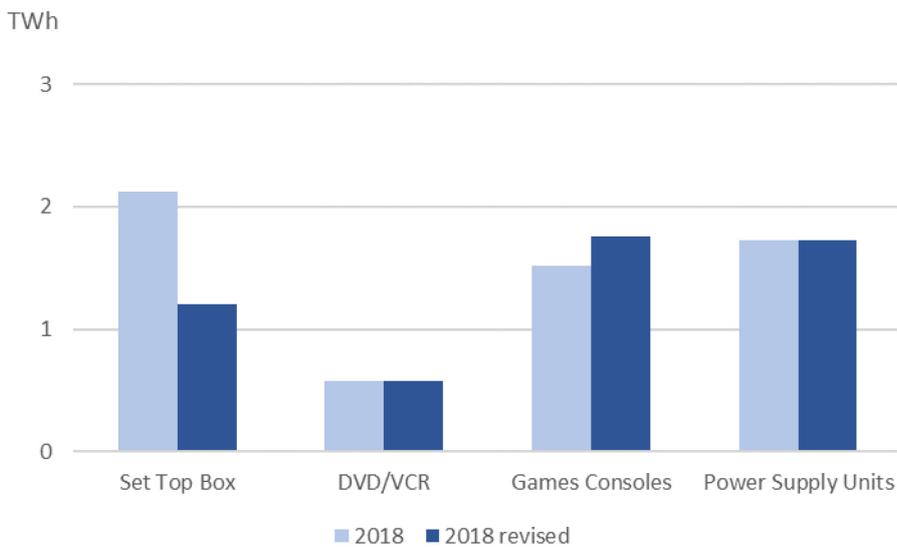
**Figure 24: Trends in consumption and stock for televisions 2007 to 2019**



### Consumer Electronics

Products included in this category are; set top boxes, DVD and VCR players, games consoles, and power supply units, though only assumptions for set top boxes and games consoles have been updated, the impact on consumption in 2018 is shown below in Figure 25;

**Figure 25: Impact on consumption of new assumptions for consumer electronics in 2018.**



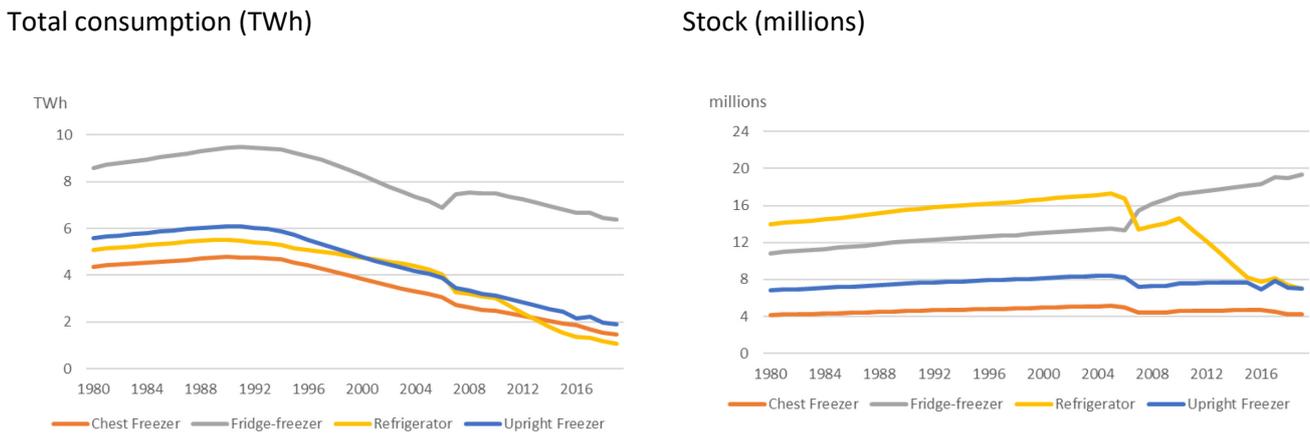
A downward revision of 0.9 TWh in consumption by set top boxes has been offset slightly by a 0.2 TWh uplift in consumption for games consoles. The stock of these appliances was estimated using data sourced from BARB and additionally, in the case of set top boxes, from the Office of Communications (Ofcom). Typical energy demand values were based on data sourced from Lot 26 Network Standby Preparatory study carried out on behalf of the European Commission<sup>14</sup>. This is a new data source included in the modelling and reflects a more up to date assumption for average product usage.

<sup>14</sup> <https://www.eceee.org/ecodesign/products/lot26-networked-standby-losses/>

## Cold Appliances

Products included in this category are refrigerators, fridge freezers, chest freezers and upright freezers. Since 1980, stocks for all categories increased steadily up until 2007 when the number of refrigerators began to decline whilst at the same time, fridge-freezers began to increase sharply suggesting a substitution effect. At around this time, there was also a shift in total consumption though the underlying trend since has been decreasing with falling annual usage. Figure 26 below shows total consumption compared to stock of appliances.

**Figure 26: Trends in consumption and stock for cold appliances 1980 to 2019**



### Electrical Products; [Accompanying Tables](#)

A1	Domestic; appliance consumption 1970 to 2019	table and charts
A2	Domestic; stock of appliances 1970 to 2019	table and charts
A3	Domestic; average consumption 1970 to 2019	table and charts
A4	Domestic; consumption appliances on standby 2000 to 2019	table
A5	Domestic; consumption of new appliances (not updated)	table
A6	Domestic; stock of appliances by energy rating band 1970 to 2019	table
A7	Non-domestic; appliance consumption 1970 to 2019	table
A8	Non-domestic; stock of appliances 1970 to 2019	table

# Technical information

This year, for user convenience, the methodology notes have been separated out and included in a separate tab within each Excel workbook which are now grouped by theme rather than sector. Background information is therefore easier to access whilst browsing the data tables.

## Definitions

<b>DUKES glossary</b>	This covers definitions commonly used in energy statistics reporting. The majority of terms used in this publication are covered here; <a href="https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/729427/AnxB.pdf">https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/729427/AnxB.pdf</a> Definitions specific to this article are shown below;
<b>Energy Intensity</b>	The amount of energy required to produce one unit of output. A reduction in energy intensity could imply an improvement in energy efficiency.
<b>Energy Ratio</b>	Temperature corrected total inland consumption of primary energy per £1 million Gross Domestic Product (GDP) at market prices; it is a measure of how much energy is consumed per unit of economic activity (in this case £1m GDP).
<b>Final Consumption</b>	Energy consumed by final users after transformation
<b>Freight Moved</b>	The weight moved and by how far, measured in tonne kilometres
<b>Passenger Kilometres</b>	This measure is based on how far each passenger travels; i.e. it is dependent not only on how many passengers, but also how far each one has travelled.
<b>Primary Energy Equivalents</b>	Final consumed plus energy in the transformation sector and losses incurred during conversion and transformation.
<b>Temperature Corrected Consumption</b>	Energy consumption adjusted for changes due to fluctuations in the weather, to allow underlying trends to be identified. Details of the methodology can be found here; <a href="http://webarchive.nationalarchives.gov.uk/20130109092117/http://www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx">http://webarchive.nationalarchives.gov.uk/20130109092117/http://www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx</a>
<b>Tonne of oil equivalent (toe)</b>	A common unit of energy measurement which enables different fuels to be directly compared and aggregated. One tonne of oil equivalent is set equal to 41.868 Giga Joules (GJ) or 11,630 kilo Watt hours (kWh). Quantities in this report are generally quoted in thousand tonnes of oil equivalent (ktoe) apart from the electrical products tables where comparison with other tables is not relevant and the more usual GWh are provided.
<b>Train Kilometres</b>	The number of kilometres a train travels.

## Further information

### Related statistics

Details of any related statistics are provided within this document alongside the relevant section.

A set of [supplementary tables](#) are also included with this publication. These tables contain data which is either not produced by BEIS or feed into any calculations but may be of interest to users looking for supporting information on energy consumption trends. A summary of the data included.

#### [Supplementary Tables](#)

S1	Overall drivers of energy consumption 1970 to 2017
S2	Standard Assessment Procedure (SAP) rating 1970 to 2017
S3	Internal and external temperatures 1970 to 2012 (not updated)
S4	Housing characteristics, heat loss parameters 2008 to 2012 (not updated)
S5	Installed central heating type in the UK 1970 to 2014 (not updated)
S6	Boiler types in the UK 1975 to 2017
S7	Housing characteristics, boiler efficiencies 2008 to 2012 (not updated)
S8	Installed hot water tank insulation in the UK 1976 to 2012 (not updated)
S9	Installed double glazing in the UK 1976 to 2016 (not updated)
S10	Ownership of loft insulation in the UK 1976 to 2018
S11	Ownership of cavity wall insulation in the UK 1976 to 2018
S12	Ownership of solid wall insulation in the UK 2008 to 2018
S13	Number of energy efficiency measures installed and energy savings (not updated)
S14	Number of measures delivered by suppliers (not updated)
S15	Detailed industrial energy consumption by fuel 2007 (not updated)
S16	Display Energy Certificates (DEC) for each government department 2013 (not updated)
	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](#).

### Uses of these statistics

These statistics contribute to international reporting such as The International Energy Agency Energy Efficiency submission along with Eurostat's Final Energy Consumption in Households.

The data are also of interest to a wide range of users from individuals, academics, energy industry experts, and government.

## 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](mailto: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](#).

This year **we are seeking feedback on the [new 'app'](#)** which we have developed for the first time. This is an interactive tool enabling users to view charts and download data in machine readable format depending on selected boundaries specifically fuels and consuming sector. As this is a first launch, we have included consumption data only, however, we intend to develop this further in terms of both scope and usability and user feedback will contribute to future functionality.

## National Statistics designation

National Statistics status means that our statistics meet the highest standards of trustworthiness, quality and public value, and it is our responsibility to maintain compliance with these standards.

The continued designation of these statistics as National Statistics was confirmed in February 2015 following a compliance check by the Office for Statistics Regulation. The statistics last underwent a full assessment against the Code of Practice for Statistics in 2014<sup>15</sup>.

## Pre-release access to statistics

Some ministers and officials receive access to these statistics up to 24 hours before release. Details of the arrangements for doing this and a list of the ministers and officials that receive pre-release access to these statistics can be found in the [BEIS statement of compliance](#) with the Pre-Release Access to Official Statistics Order 2008.

## Contact

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- Email: [energy.stats@beis.gov.uk](mailto:energy.stats@beis.gov.uk)
- Media enquiries: 0207 215 1000
- Public enquiries: 0207 215 5000

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<sup>15</sup> <https://www.statisticsauthority.gov.uk/publication/statistics-on-energy-and-climate-change/>



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