



# Energy Consumption in the UK (ECUK) 1970 to 2021

## About this release

Information on energy consumption in the UK by sector and end use.

## In this release

Energy Consumption	2
Energy Intensity	10
Primary Energy Consumption	16
Additional Tables	18
Technical information	19
Further information	20

## Data tables

Consumption

Energy intensity

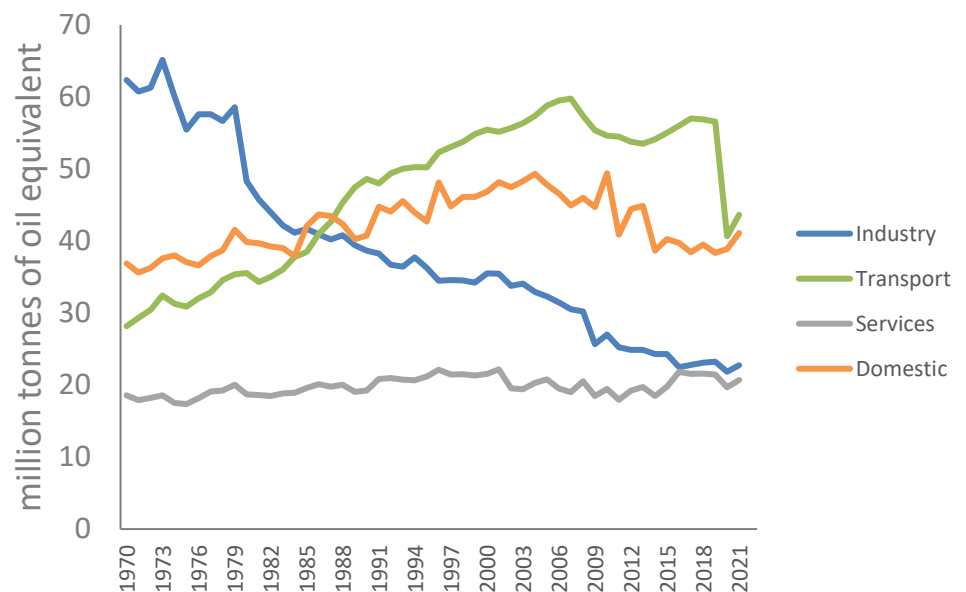
Primary energy consumption

End uses

Electrical products

- Total energy consumption increased by 4.6 per cent between 2020 and 2021 from 128 to 134 million tonnes of oil equivalent but remained well below pre-pandemic levels (including non-energy use).
- Transport consumption increased by 3.0 million tonnes of oil equivalent (7.3 per cent) reflecting the loosening of travel restrictions.
- Energy consumption in industry increased by 4.2 per cent spread across most industrial sectors with the increase mostly coming from gas.
- Domestic energy consumption increased by 2.2 million tonnes of oil equivalent again most of the increase came from natural gas as average temperatures were lower in 2021 than 2020.
- Consumption in services was up 5.2 per cent to 20.7 million tonnes of oil equivalent as hospitality reopened following the relaxation of pandemic restrictions.
- The energy ratio fell 5.0 per cent (Table I1) and has fallen every year since 1999. Primary energy consumption increased by 2.1 per cent but GDP increased by 7.4 per cent due to a recovery from some of the impacts of Covid-19 pandemic and associated restrictions.
- Long-term trends of energy consumption by sector are shown below. Post-pandemic rebounds can be seen in transport, industry and services.

Energy consumption by sector, 1970 - 2021



# Chapter 1: Energy Consumption

## Final energy consumption

Final energy consumption is the direct consumption of fuels compared to primary consumption which relates to the fuel input.

In contrast to primary energy where a unit of electricity in final consumption would be allocated to the fuel input used to generate the unit of electricity (for example gas, or biomass).

Core final consumption data are sourced directly from that section of the energy balances as published in [The Digest of UK Energy Statistics](#).

## Key headlines

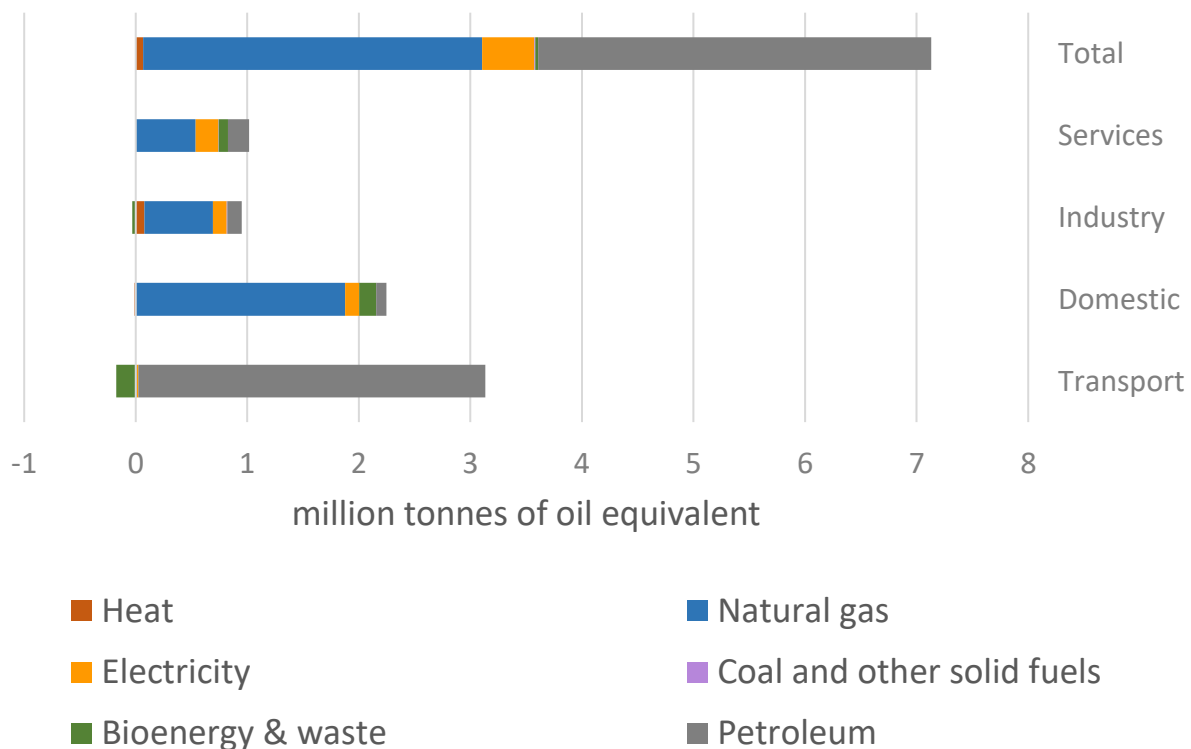
Between 2020 and 2021, consumption (including non-energy use) increased by 5.9 mtoe (5.0 per cent) to 134.1 mtoe (see consumption tables accompanying this publication, [Table C1](#)).

Fuel consumption increased in industry by 0.9 mtoe (4.2 per cent) of which 0.6 mtoe was gas and increased in services by 1.0 mtoe (5.2 per cent) with just over half being gas.

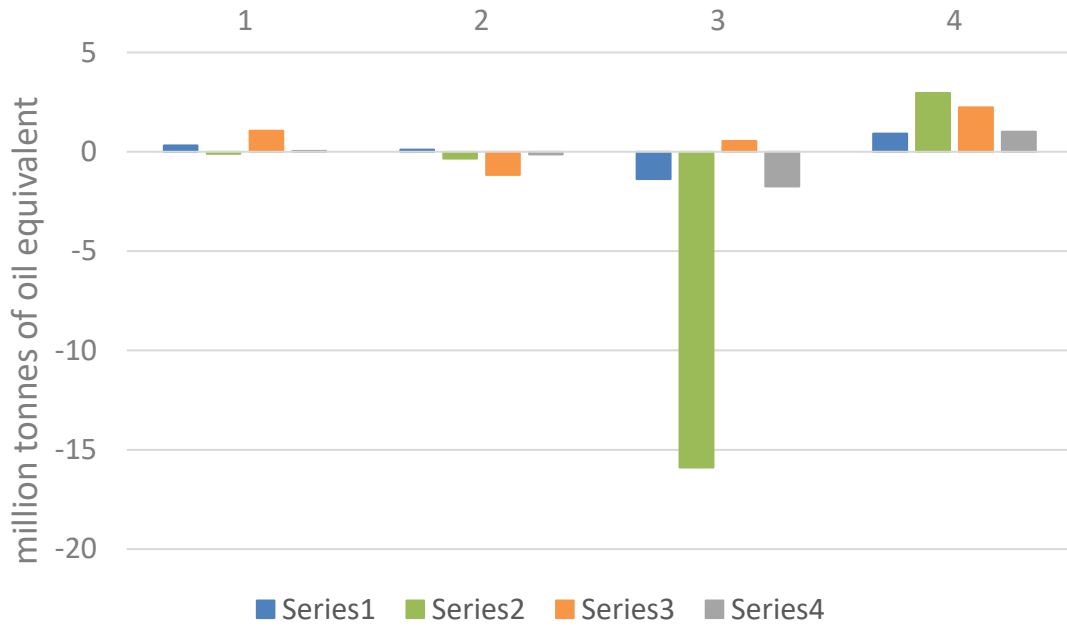
Chart 1.2 shows the magnitude of the change compared to changes seen in recent years.

Chart 1.1 below shows changes in consumption by sector highlighting which fuels are driving the changes. Between 2020 and 2021 the biggest changes are increased oil consumption in transport reflecting a relaxing of Covid-19 travel restrictions and increased gas consumption in the domestic sector due to lower temperatures in 2021 compared to 2020.

**Chart 1.1: Change in consumption by sector and fuel, 2020 to 2021**



**Chart 1.2 Annual change in consumption by sector for the last 4 years**



**Domestic**

Energy consumption in the domestic sector increased by 2.2 mtoe (5.8 per cent) but temperature corrected energy consumption was very similar to 2020 levels which were 5.2 per cent higher than 2019. This can be attributed to people continuing to be at home more due to Covid-19 restrictions and increased remote working.

**Chart 1.3 Domestic consumption, temperature-corrected consumption and average annual temperatures**

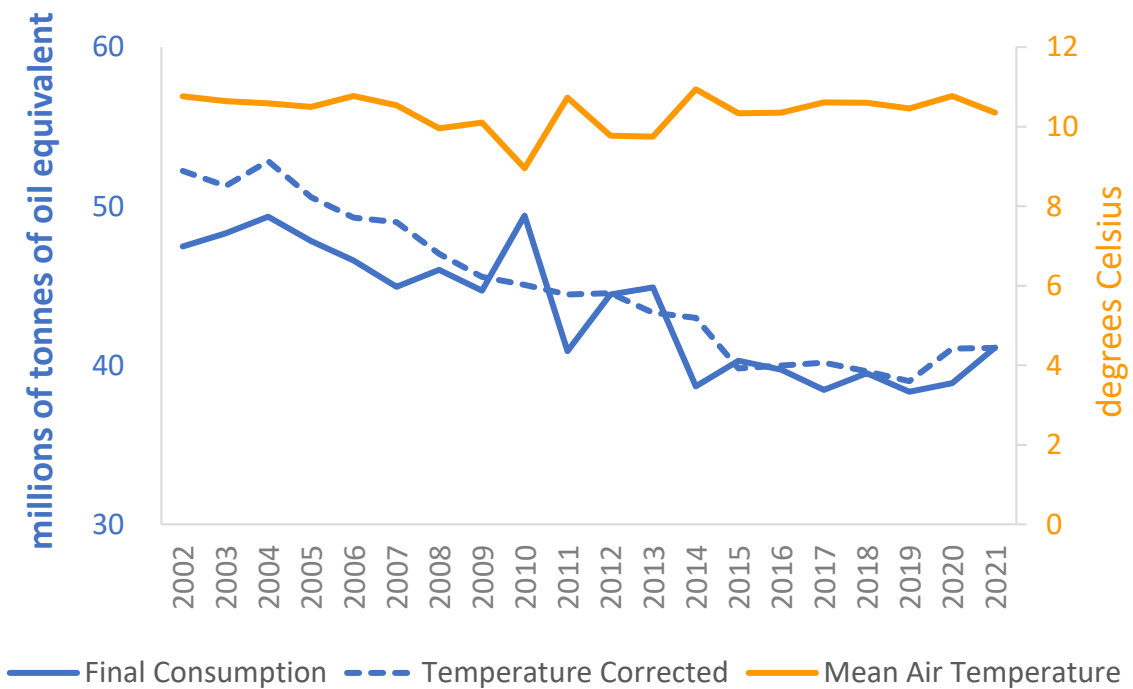
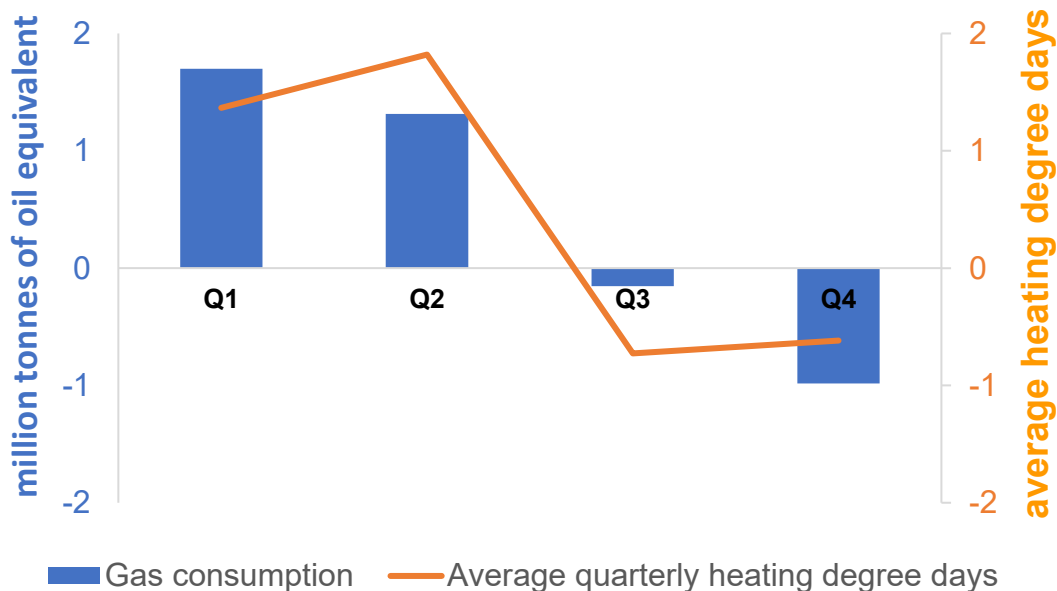


Chart 1.4 below shows the difference in quarterly data for 2020 to 2021 compared with the difference in heating degree days. In the first and second quarters gas consumption was higher due to lower temperature relative to 2020 whereas in the second half of the year temperatures were higher and consumption was lower.

**Chart 1.4 Change in quarterly domestic demand and heating degree days, between 2020 and 2021**



Source: Quarterly Gas Consumption - [Energy Trends Table 4.1](#), Heating Degree Days - [Energy Trends Table 7.1](#)

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

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

Published 24 June 2021;

Mean and median consumption of domestic energy in 2019 by property characteristics.  
Estimates of the impact on average consumption of energy efficiency measures.

NEED was not updated in 2022 owing to improvement work around the statistics.

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

Last updated 25 August 2022;

Statistics relating to the Energy Company Obligation (ECO) and Green Deal.

The detailed report presents annual updates (last updated 18<sup>th</sup> March 2021) on in-depth ECO statistics and insulation levels.

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

Published 24<sup>th</sup> February 2022 covering the year 2020

**Sub-national consumption statistics** (published 23<sup>rd</sup> December 2021);

[Sub-national electricity consumption data](#)

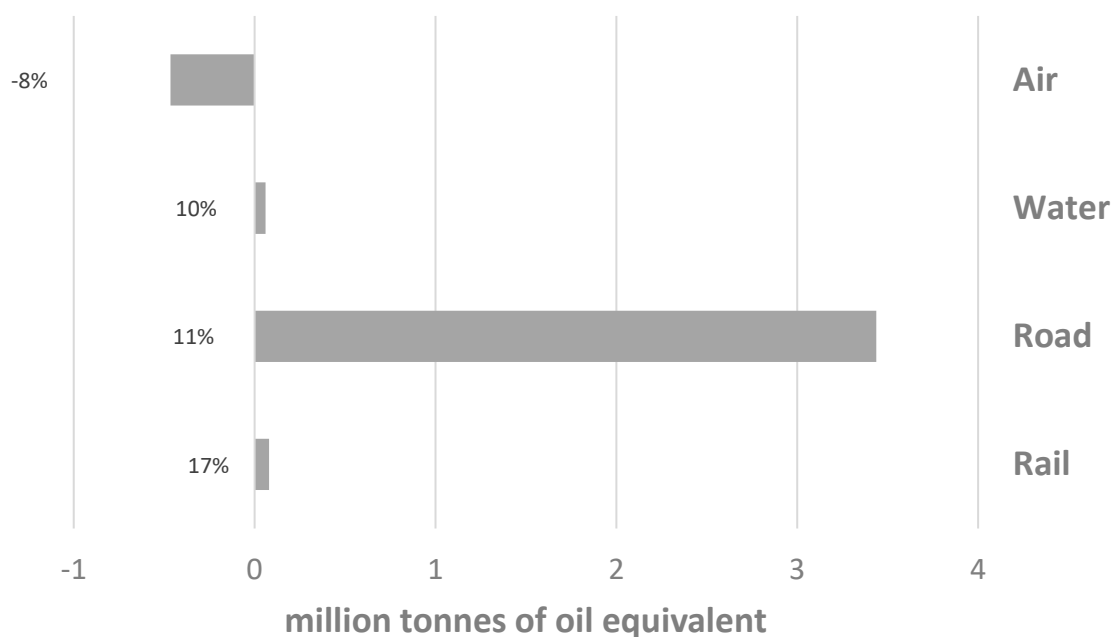
[Sub-national gas consumption data](#)

## Transport

Chart 1.5 shows petroleum use in road transport increased by 3.4 mtoe (excluding biofuel mixed with petrol and diesel) between 2020 and 2021 reflecting a relaxation of restrictions on travel within the UK though this is still 10 per cent below 2019 levels due in part to Covid-19 restrictions in the first quarter of the year. Petroleum consumption in aviation was 62 per cent lower than 2019 and even lower than 2020 as international travel restriction remained in place.

Consumption data with detailed breakdown by vehicle type is only available up to 2020. In 2020 we saw large drops in consumption across all vehicle types with the biggest decrease in cars and buses. In 2020 biofuels met 6.3 per cent of road fuel energy demand compared to 4.4 per cent in 2019. These estimates do not account for electricity consumption in road transport.

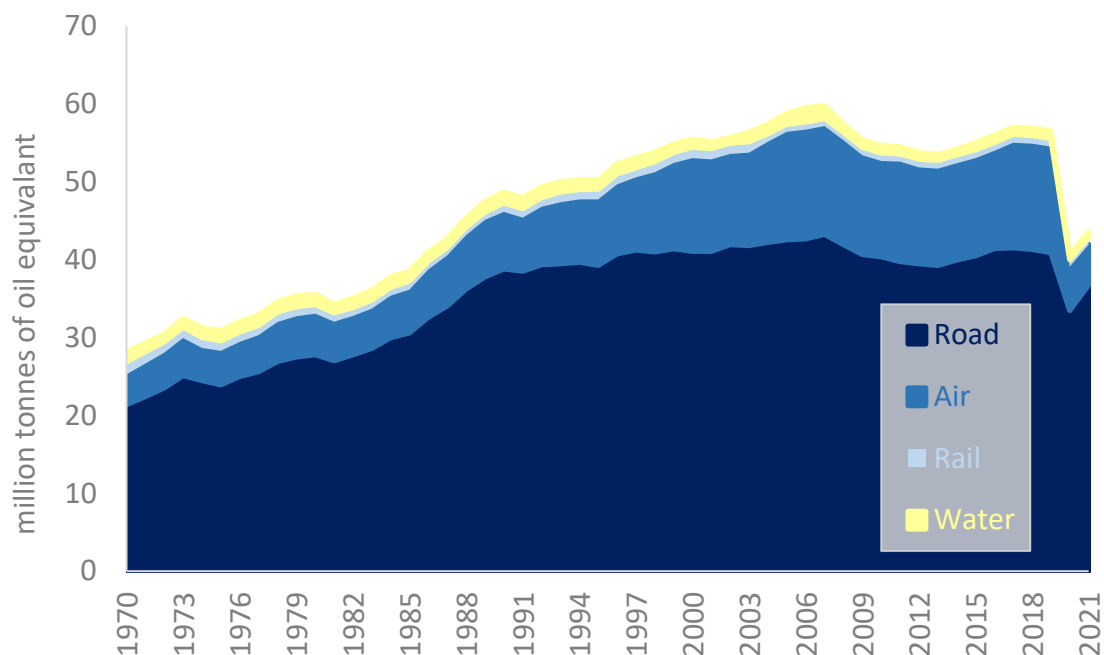
**Chart 1.5 Change in petroleum consumption in transport by travel mode, 2020 to 2021**



Transport remains the biggest component of energy consumption in the UK though this share was almost 6 percentage points lower in 2021 than in 2019.

The scale of the rebound consumption compared to long terms trends can be seen in Chart 1.6.

Chart 1.6 Trends in transport consumption from 1970 by mode



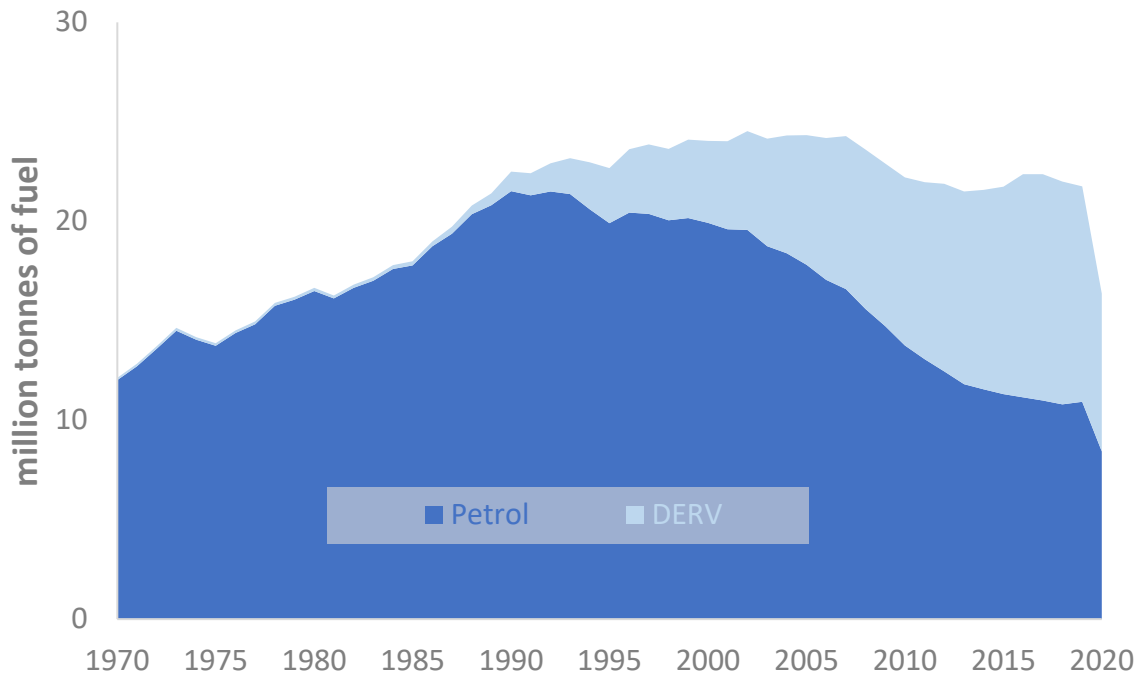
Electricity consumption remains a small component of overall road transport use at 0.07 out of 36.8 mtoe but increased by 67.4 per cent between 2020 and 2021. According to the Department for Transport over 304 000 plugin cars were registered for the first time in 2021 compared to 175 000 in 2020<sup>1</sup>.

Cars represent the largest consumers in road transport consumption and consume over 90 per cent of petrol. Although, consumption by vehicle type is not yet available for 2021, overall petrol consumption was 11.1 per cent in higher 2021 than in 2020<sup>2</sup>. Consumption for other road vehicles is shown in Chart 1.8.

<sup>1</sup> [See Department for Transport - Vehicle licensing statistics data tables](#)

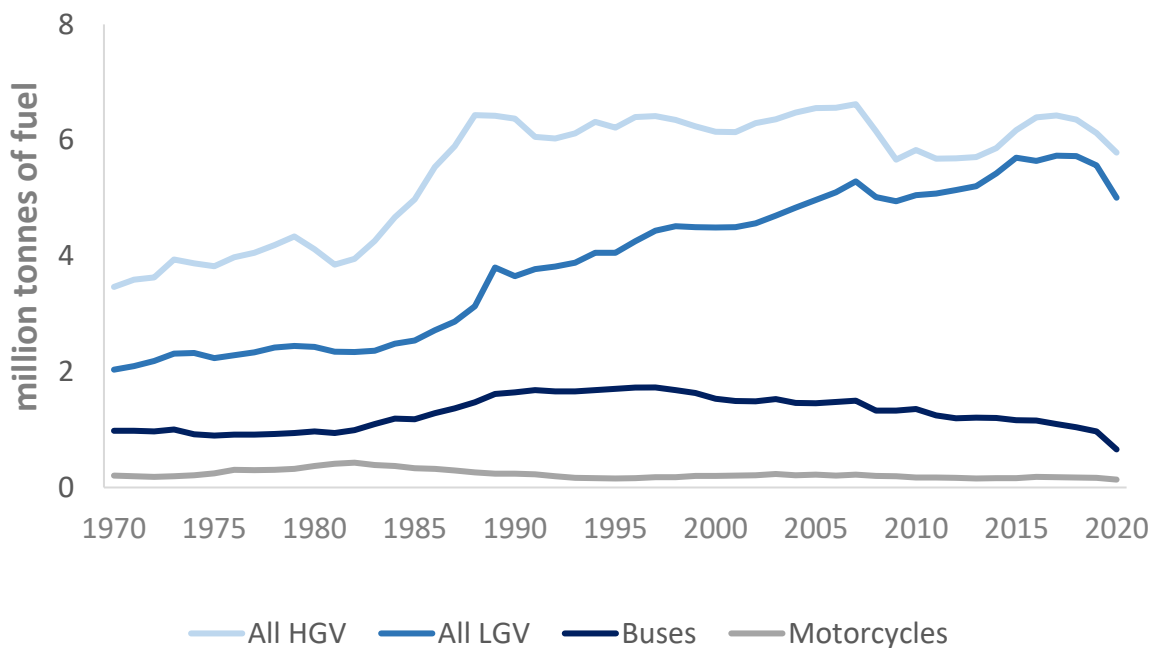
<sup>2</sup> [See Energy Trends: UK oil and oil products](#)

**Chart 1.7 Petrol and Diesel (DERV) consumption for cars 1970 to 2020**



Consumption in LGVs fell 10 per cent between 2019 and 2020 and in HGVs fell 5.6 per cent in the same period. Fuel consumption in buses fell proportionally more than in any other road vehicle type and was over 32 per cent down compared to 2019 in 2020. Data for 2021 is available for road fuel consumption in groups of vehicle types. Petrol consumption in cars, taxis and LGVs increased by 1.0 mtoe (11.1 per cent) between 2020 and 2021. For diesel the equivalent percentage increase was slightly higher at 1.8 mtoe (13.5 per cent).

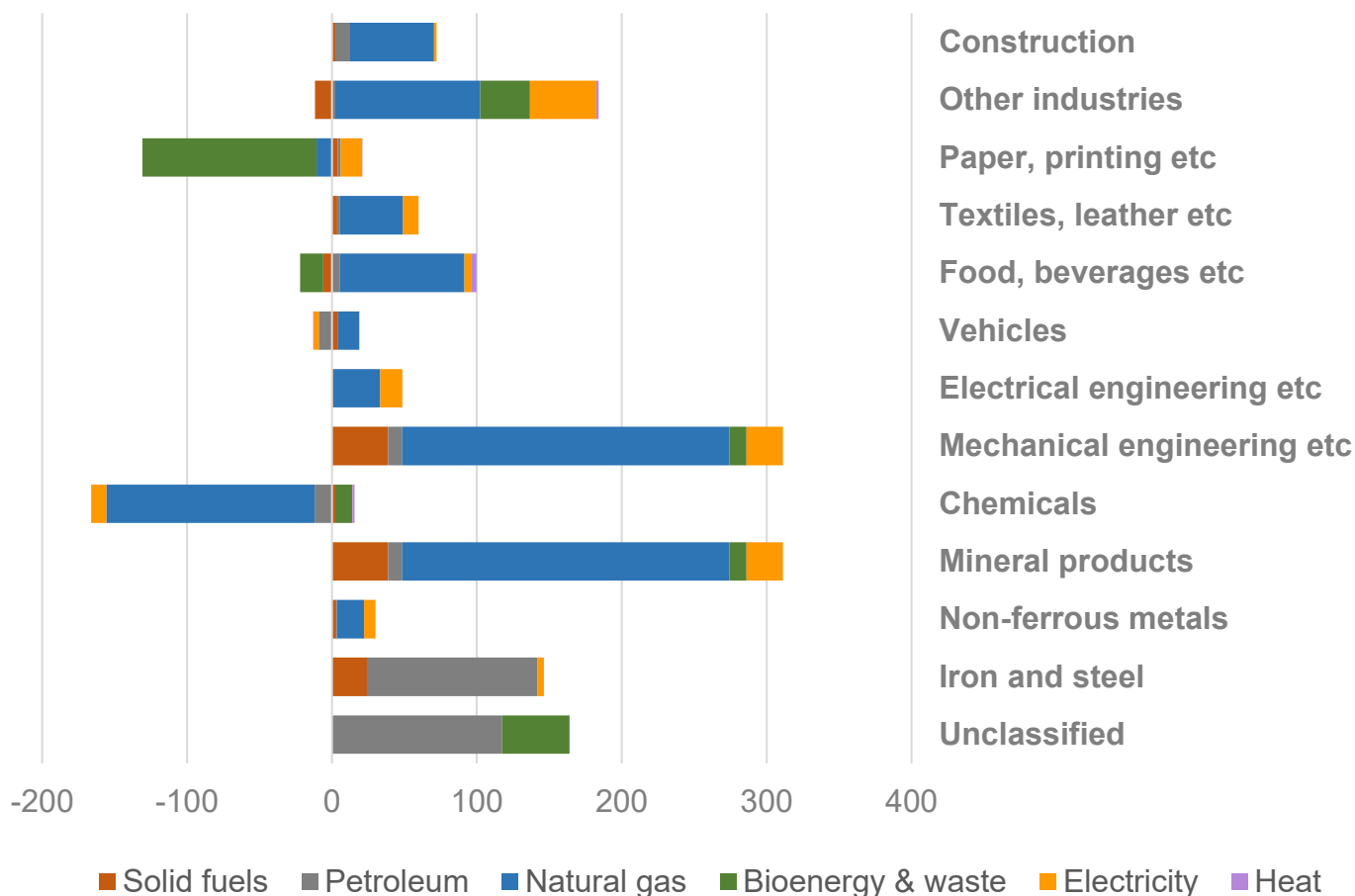
**Chart 1.8 Consumption by other types of vehicles (excluding electricity) 1970 to 2020**



## Industry

There is a mixed picture in energy consumption across industrial sectors when comparing 2021 to 2020. Mechanical engineering saw the biggest drop in 2020 but the biggest increase in 2021. Mineral products also saw an increase of over 0.3 mtoe. In both cases the increases are dominated by natural gas. Output and energy consumption in the manufacture of vehicles is little changed between 2020 and 2021 but remain over 20 per cent below 2019 levels.

**Chart 1.9 Change in Industrial consumption sub-sectors from 2020 to 2021 by fuel (ktoe)**



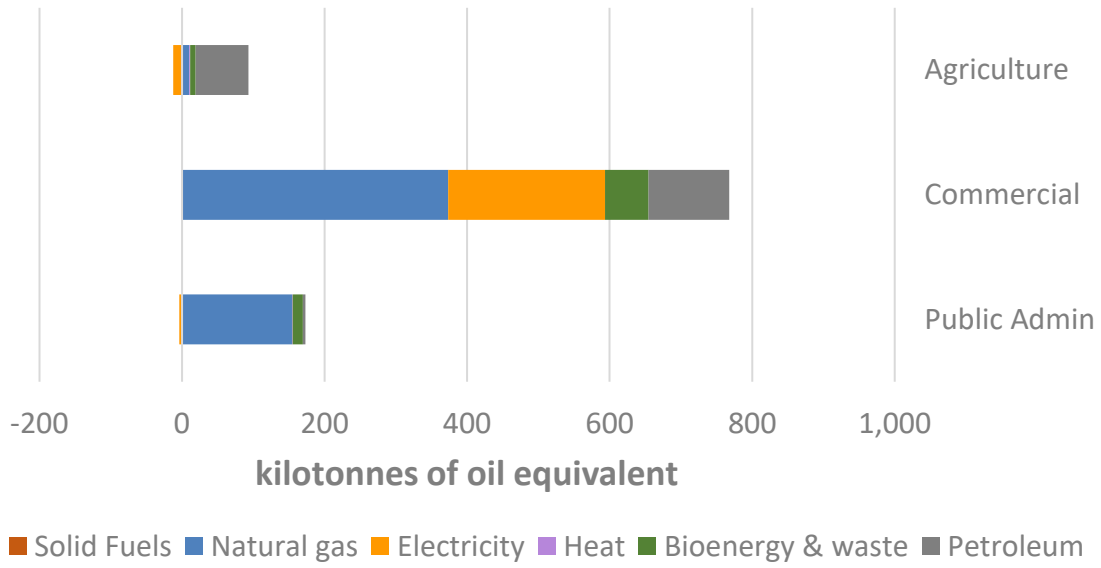
## Services

Table C4 shows consumption in services increased by 1.0 mtoe (5.2 per cent) between 2020 and 2021 following a decrease of 1.2 mtoe in the previous year. Just over half, 0.5 mtoe, of the increase came from gas.

Chart 1.10 shows increased energy consumption of gas, electricity and petroleum in commercial services, increased gas consumption in the public administration sector and increased oil consumption in agriculture.



Chart 1.10 Change in Services Consumption, 2020 to 2021



# Chapter 2: 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. 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.

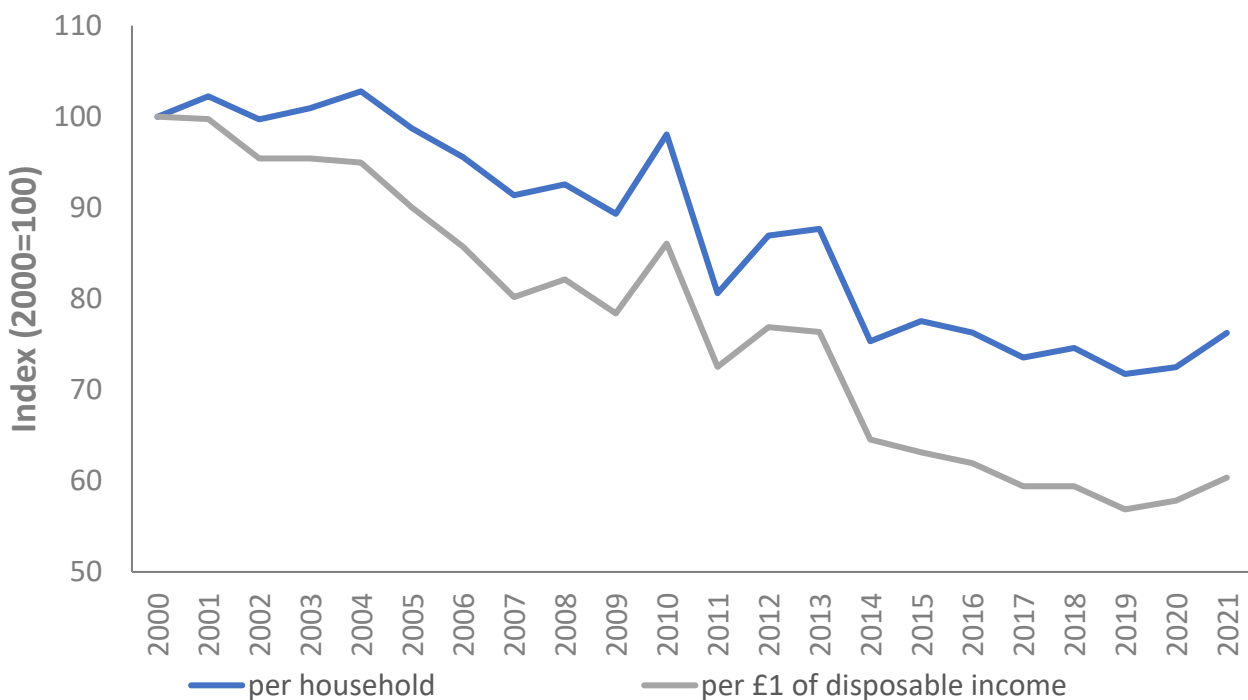
The 'Methodology and Quality' sheet in the data tables include a comprehensive list of output factors used for each sub-sector.

## Domestic

On a per household basis domestic energy consumption increased by 5 per cent in 2021, the biggest relative increase since 2011 when a particularly cold winter drove up demand for heating.

The long-term trend in energy consumption per household is downwards over the last 21 years. Average consumption per household between 2018 and 2021 was 26.8 per cent lower than the average between 2000 and 2003. Spikes in intensity are attributable to colder weather apparent in Chart 1.3. These improvements are likely to be attributable to improved insulation and more efficient boilers.

**Chart 2.1 Indexed change in energy intensity per household and on disposable income basis, 2000 to 2021**



## Transport

In 2021 it is estimated 32.5 billion passenger kilometres were travelled by rail in 2021, up from 26.1 billion in 2020 but still well below the 67.0 billion in 2019. Energy consumption in rail transport was only 2 per cent lower in 2021 than in 2019. This means the apparent energy consumption per passenger kilometre is more than double the pre-pandemic value as trains were travelling with fewer passengers aboard.

The latest traffic data available on passenger and freight transport by road and air is for the year 2020 so we are not yet able to see the impacts of loosening travel restrictions on the number of passenger kilometres or the number of tonne kilometres for freight.

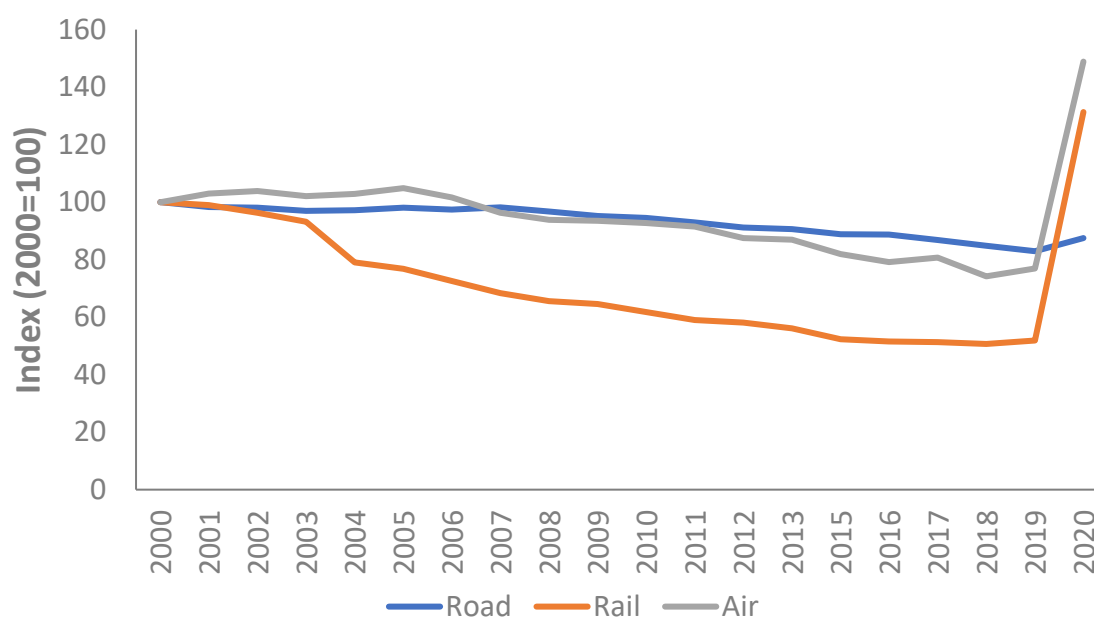
Energy consumption per passenger kilometre increased by 5 per cent in 2020. This could be due to fewer passengers being in each car owing to reduced mixing between households and travel restrictions limiting the number of leisure outings more than commutes. A significant proportion of energy consumption in road transport is used for the transportation of freight. Tonne kilometres is a standard measure of activity in freight transport. The energy intensity of road freight transport was much less affected by the pandemic than passenger transport.

The percentage increase in consumption per tonne of freight was very close to that on a per passenger basis.

According to the National Road Traffic Survey the number of kilometres driven by cars and taxis was 80 per cent of 2019 levels in 2020. The number of passenger kilometres driven by car, taxis and vans was 70 per cent<sup>34</sup>. These data are not directly comparable because of the inclusion of vans in the passenger kilometres data but it does support the idea that reduced vehicle occupancy increased the energy intensity of road passenger transport.

The story for air travel is similar to that for rail with the number of passenger kilometres in 2020 well below 2019 levels but with energy consumption not falling by quite the same proportion, consumption per passenger kilometre remains much higher, almost double that in 2019. According to data published by the Department for Transport and sourced from the Civil Aviation Authority the number of aircraft kilometres flown in 2020 was 33.6 per cent of 2019 levels but the number of passenger kilometres was 21.4 per cent<sup>5</sup>.

**Chart 2.2 Change in energy intensity for passenger transport, 2000 to 2020**



## Industry

Manufacturing output remains below pre-pandemic levels though energy consumption has returned very close to the level seen in 2019. Despite quite large changes in output between sectors over the last 21 years, indicating quite big changes in the economic composition of UK manufacturing, energy consumption per unit of

<sup>3</sup> See [Department for Transport – passenger transport by mode](#)

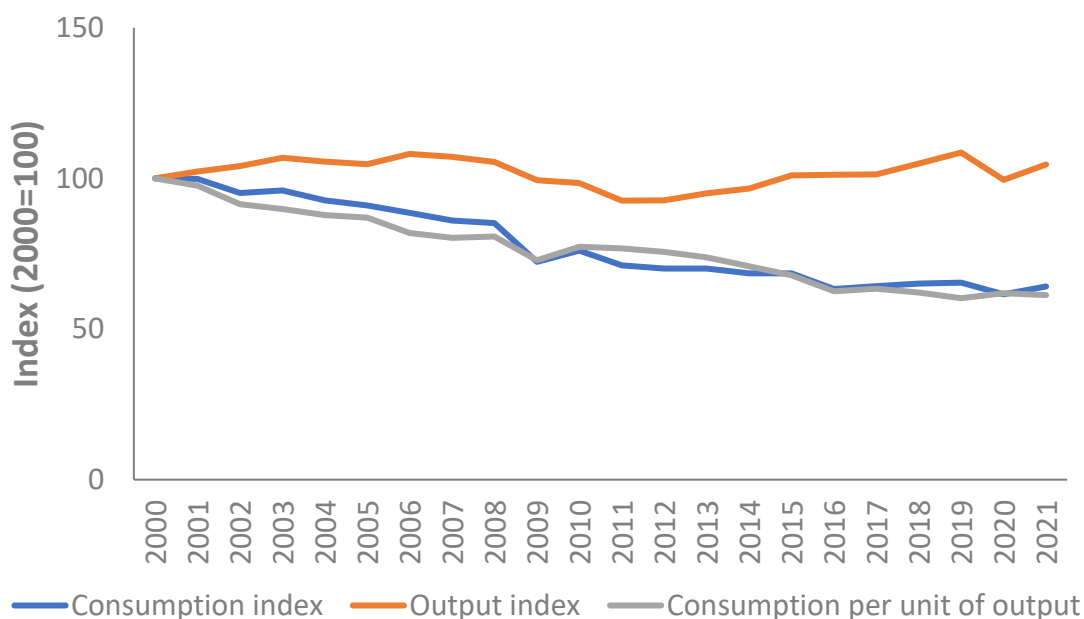
<sup>4</sup> See [Department for Transport - road and traffic statistics](#)

<sup>5</sup> See [Department for Transport - aviation statistics](#)

output has followed a decreasing trend except for a small dip in the financial crisis. In 2021 energy intensity of manufacturing was 0.9 per cent lower than in 2020.

There have been quite large changes in the output of different industrial sectors over the last 21 years indicating significant changes in the composition of UK manufacturing. It is also worth noting that using GVA as a measure output for sectors may not show what kinds of products are being manufactured. Energy consumption per unit of output stands at 61.3 per cent of 2000 levels which could be attributable to increased process efficiency and changes in the mix of products being manufactured.

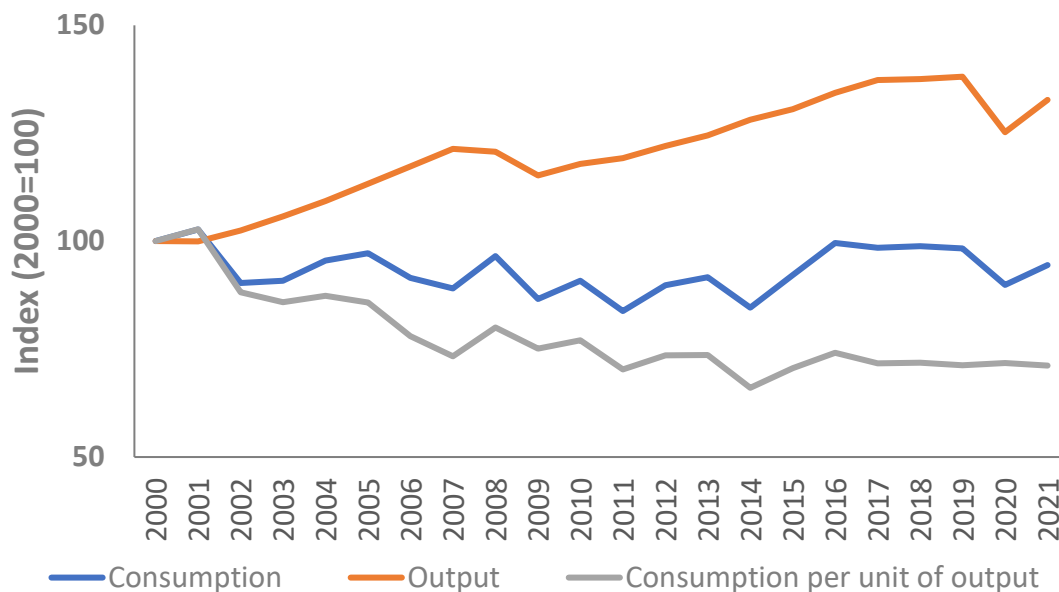
**Chart 2.3 Indexed change in industrial consumption, output and intensity, 2000 to 2021**



## Services

There was a sizable recovery of economic activity in the services sectors in 2021, 6.0 per cent up on 2020 but still 3.8 per cent down on 2019. These changes in economic output have been closely matched by changes in energy consumption leaving energy consumption flat, which it has been since 2016.

**Chart 2.4 Indexed change in services consumption (excluding agriculture), output and intensity, 2000 to 2021**



### Output and Intensity Factors

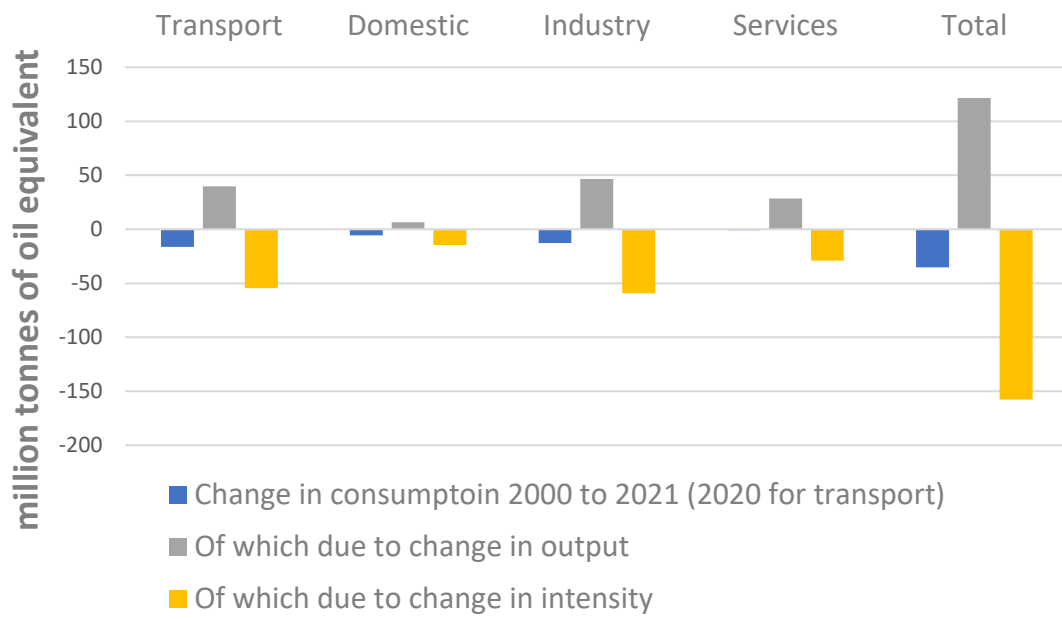
Table 16 in the data tables shows a comparison of the effects on consumption due to output and intensity changes between 2000 and 2021 (2020 for transport). The output effect is the change in consumption which would have occurred had all other factors remained constant, specifically intensity changes. The remaining difference is then the intensity effect.

Chart 2.5 shows the contributions of changes in output and changes in intensity to changes in energy consumption since 2000.

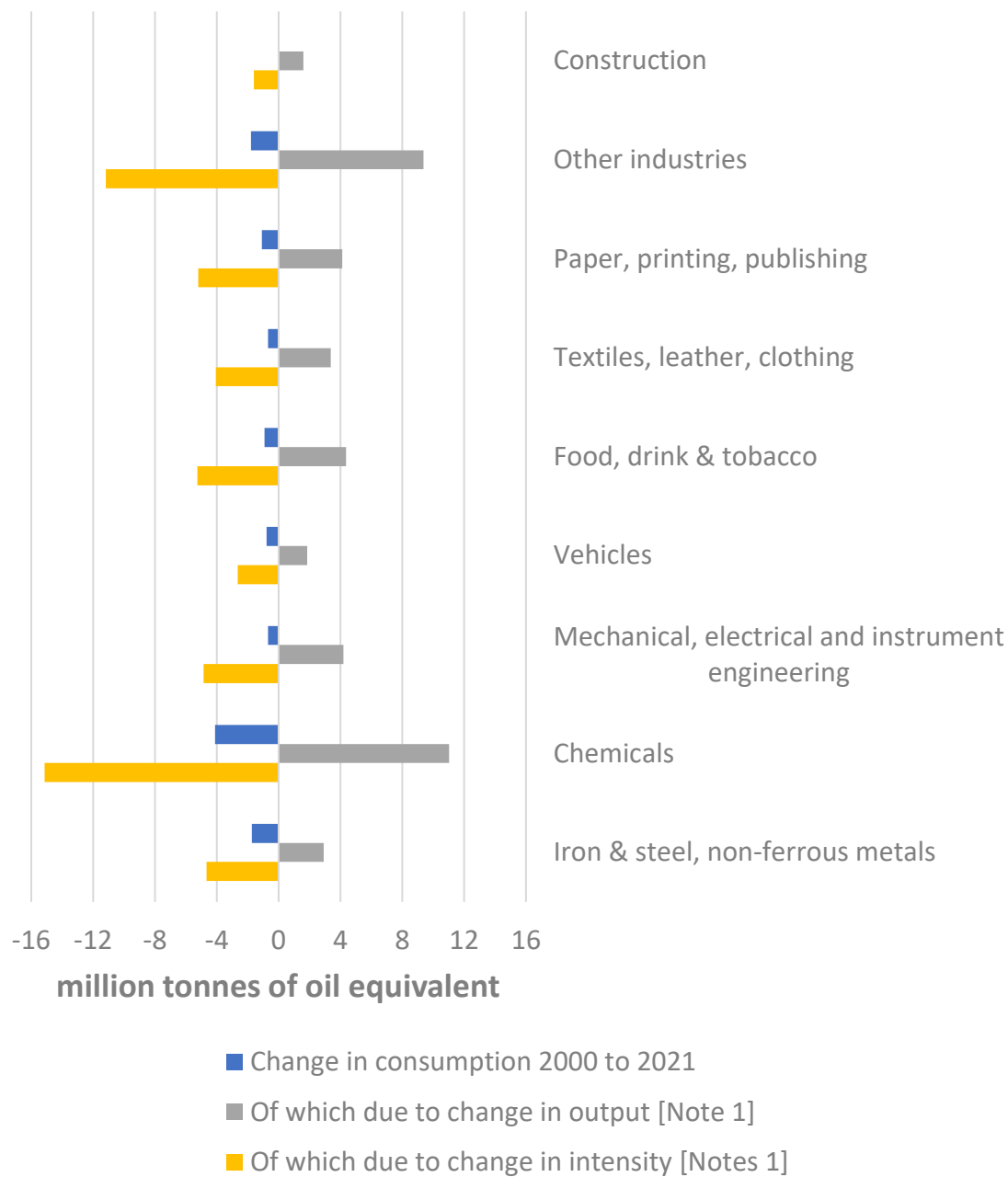
In transport, where the number of passenger kilometres has been used as a measure of activity across all of transport, the large drop in intensity since 2000 has been partly offset by increased levels of activity. Calculations suggest fuel consumption in transport would be 21.3 mtoe below 2000 levels had activity levels remained constant but efficiency improvements still made. This compares to the 16.2 mtoe reduction we have seen.

Improved efficiency has offset almost all the increased consumption we would have seen due to economic growth in services. In Industry reduced energy requirements per unit of output have more than offset energy demand increase driven by growth.

Chart 2.5 Output and Intensity Effects by sector 2000 to 2021



**Chart 2.6 Output and Intensity Effects for Industrial Sub-sectors 2000 to 2021**



All industry sub-sectors except construction saw reductions in energy consumption between 2000 and 2021 and energy intensity decreased in all sub-sectors.

# Chapter 3: 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.

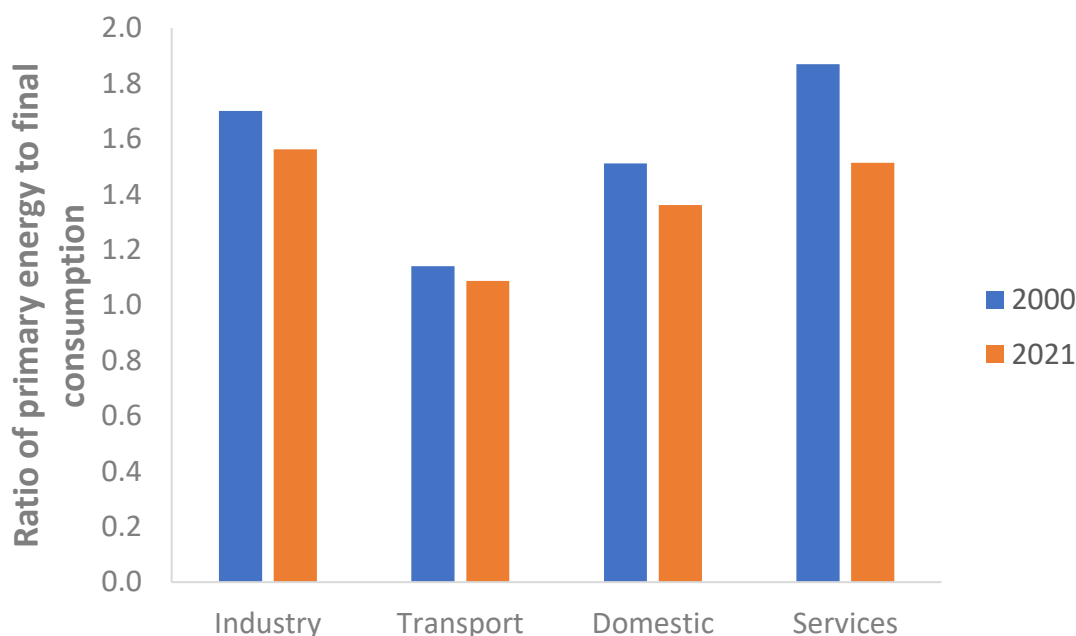
Primary consumption data are calculated by taking the final consumption fuel mix and apportioning to the fuel input required to produce the final unit of consumption. Most of the conversion losses are in generating electricity from combustible fuels so those sectors with a high proportion of electricity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

### All sectors 2020 to 2021

Primary energy consumption (excluding non-energy use) increased by 7.6 mtoe to 163 mtoe between 2020 to 2021 largely driven by an increase in final energy consumption. These forms of renewable generation are considered primary electricity and have no conversion losses.

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 in the 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 2021 is shown in Chart 3.1 below.

**Chart 3.1 Changes in conversion factors from 2000 to 2021 final**



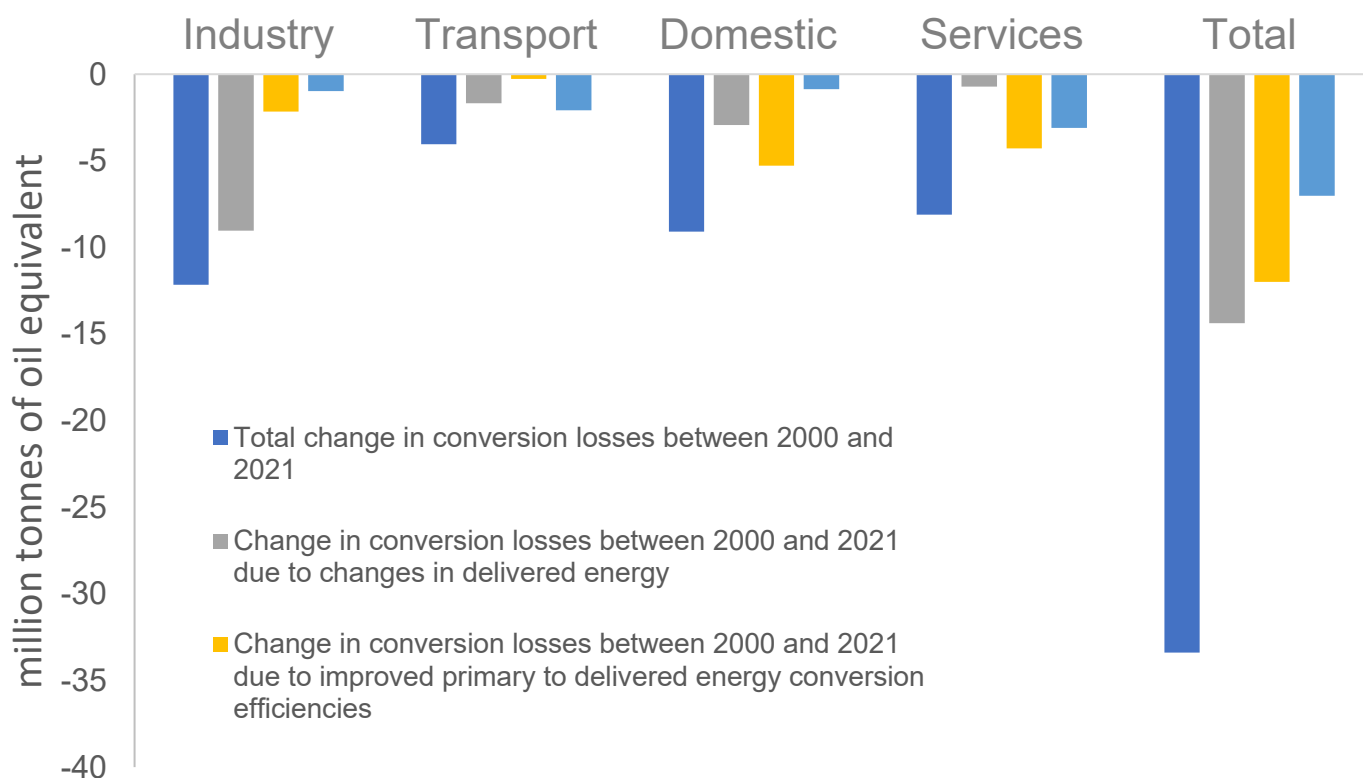
All sectors show a reduction in conversion factors over the period indicating improvements in efficiency in the transformation sector but also includes the effects of fuel switching whereby consumers shift from fuels requiring transformation to direct consumption which also includes the effect of the increasing proportion of primary electricity generation particularly renewables such as wind, and solar.



[Table P5](#) in the 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 Chart 3.2 below). Reductions in final consumption, reductions in conversion losses and fuel switching have reduced primary energy consumption attributed to all sector except for services where increased final demand partly offset reductions in primary consumption delivered by reduced conversion losses and fuel switching.

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.

**Chart 3.2 Changes in conversion losses 2000 to 2021**



# Chapter 4: Additional Tables

## End Use

The end use tables show how energy is being used, for example for space or water heating. Final consumption data are sourced from [table C1](#) and proportions are applied to estimate end uses. For the domestic sector ([Table U3](#)) the proportions are updated each year using data collected for the English Housing Survey and modelled. For the industry sector, end use splits are based on estimates last updated in 2014. The splits for the services sector are sourced from the Building Energy Efficiency Survey (BEES) which was undertaken by BEIS in 2015. The transport sector is only included in [table U1](#) for completeness' sake. For further information, see methodology note in the End Use data tables workbook.

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 difficult and some sectors are more challenging than others, due to data availability. Most estimates are modelled and use assumptions.

## Electrical Products

The electrical products tables show the stock of certain domestic and non-domestic appliances, including electricity consumption and efficiency bands. The data are derived from modelling individual products and are therefore not representative of total electricity consumption in the domestic and non-domestic sectors. See product information sheet for a list of products included and the commentary for more background.

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.

Table A6 has not been updated with the new labelling scheme. Details of the changes made to the labelling of electrical products and links to further information on relevant legislation can be found on the [Label 2020 website](#).

[The tables](#) are presented with the first row showing the last update of the model. The modelling has not been updated since 2018 so will not capture impacts resulting from the Covid-19 pandemic.

# Chapter 5: Technical information

## Definitions

<b>DUKES glossary</b>	This covers definitions commonly used in energy statistics reporting. The majority of terms used in this publication are covered in the <a href="#">DUKES glossary</a> ;
<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>Tonne Kilometres</b>	The measure of how much freight has been moved using weight and distance.
<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. BEIS and the ONS have published <a href="#">methodology notes</a> on temperature adjustments.
<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.

# Chapter 6: Further information

## National statistics

This is a National Statistics publication. 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 United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the UK Statistics Authority: Code of Practice for Statistics.

The continued designation of these statistics as National Statistics was confirmed in September 2018 following a compliance check by the Office for Statistics Regulation. The statistics last underwent a full assessment against the Code of Practice in June 2014.

Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs.
- are well explained and readily accessible.
- are produced according to sound methods, and
- are managed impartially and objectively in the public interest.

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

## Pre-release

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

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



Crown copyright 2022

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit [nationalarchives.gov.uk/doc/open-government-licence/version/3](https://nationalarchives.gov.uk/doc/open-government-licence/version/3) or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: [psi@nationalarchives.gsi.gov.uk](mailto:psi@nationalarchives.gsi.gov.uk).

Where we have identified any third-party copyright information you will need to obtain permission from the copyright holders concerned.

<https://www.gov.uk/government/statistics/energy-consumption-in-the-uk>

If you need a version of this document in a more accessible format, please email [energy.stats@beis.gov.uk](mailto:energy.stats@beis.gov.uk). Please tell us what format you need. It will help us if you say what assistive technology you use.