



Energy Consumption in the UK (ECUK) 1970 to 2022

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	15
Additional Tables	17
Technical information	18
Further information	19

Data tables

Consumption

Energy intensity

Primary energy consumption

End use

Electrical products

Total consumption of fuels (for both energy and non-energy purposes) decreased marginally in 2022, down 0.9 per cent to 133 million tonnes of oil equivalent. This is some 10 per cent below pre-pandemic (e.g. 2019) levels.

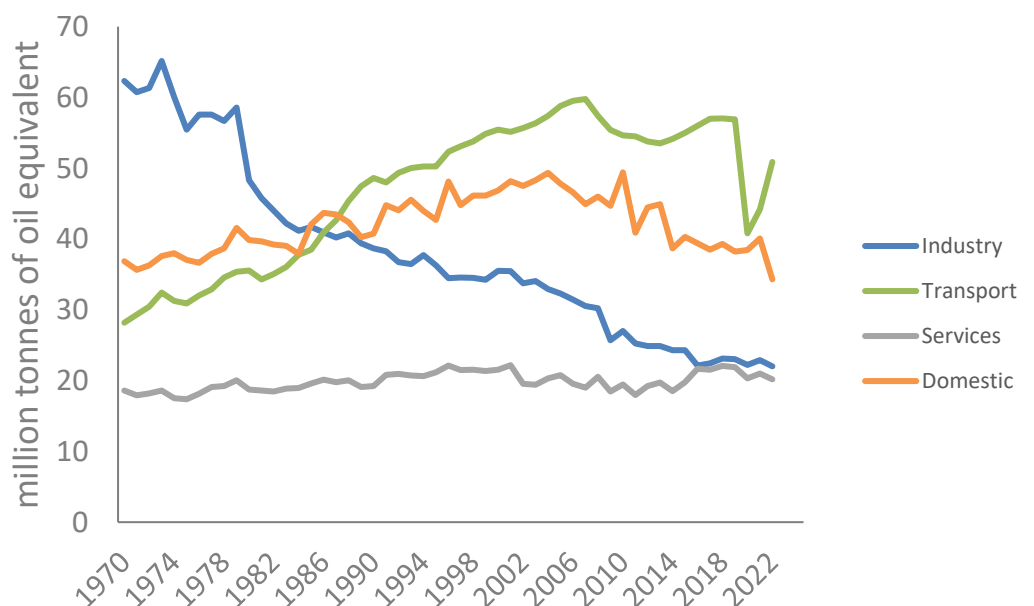
Energy consumption in 2022 varied by sector. For transport, energy consumption increased 15 per cent driven in the main by increased demand for aviation fuel. Despite this increase, and as seen in the chart below, transport demand remains down on pre-pandemic levels.

In contrast, domestic consumption hit a record low, dropping 14 per cent in 2022 as a result of record warm temperatures during the year and increased energy and other prices leading to behaviour changes for energy users. Gas consumption in domestic households dropped 18 per cent and electricity consumption 10 per cent.

Changes to consumption in the services and industrial sectors were less pronounced, however consumption dropped in both sectors in 2022 by nearly 4 per cent.

Primary energy consumption increased by 0.9 per cent. The ratio of primary energy consumption per unit of gross domestic product (GDP) fell 3.1 per cent (Table I1).

Energy consumption by sector, 1970 – 2022 (Table C1)



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

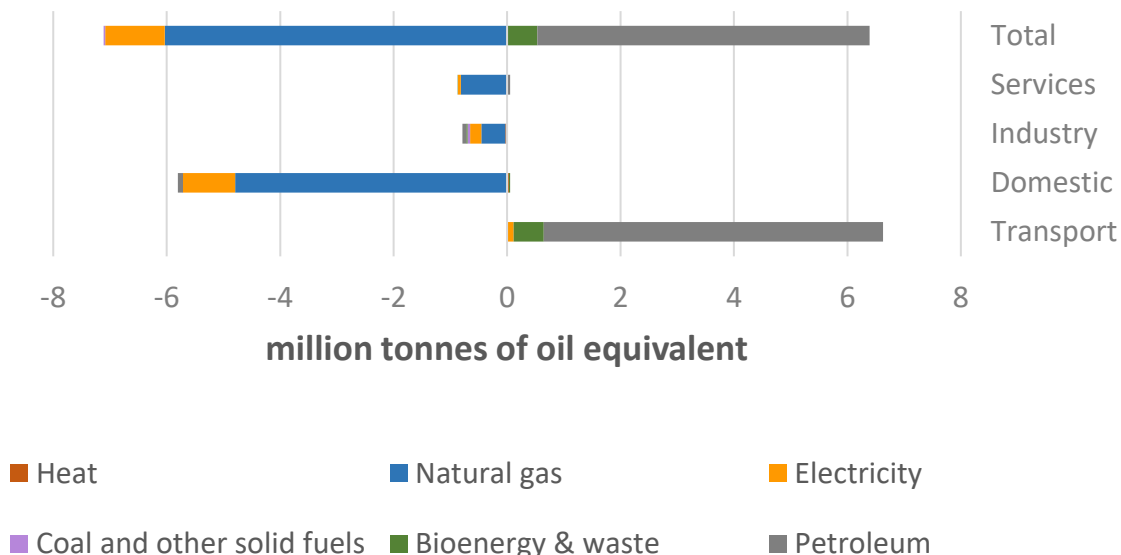
Between 2021 and 2022, consumption (including non-energy use) decreased by 1.2 mtoe (0.9 per cent) to 132.6 mtoe, which was driven by decreases in all sectors except transport (see consumption tables accompanying this publication, [Table C1](#)).

An increase in energy and other prices impacted fuel consumption in the industry and services sectors in 2022. Consumption in the industry sector fell by 0.9 mtoe (3.8 per cent) of which 0.4 mtoe was gas and in the services sector consumption decreased 0.8 mtoe (3.9 per cent) with just over half being gas.

The domestic sector had the largest decrease in consumption (14 per cent) with average temperatures in 2022 reaching a record high and an increase in energy and other prices. In contrast, transport consumption increased by 15 per cent, which driven by an increase in consumption by all transport modes, especially aviation, which nearly doubled from 2021 to 2022.

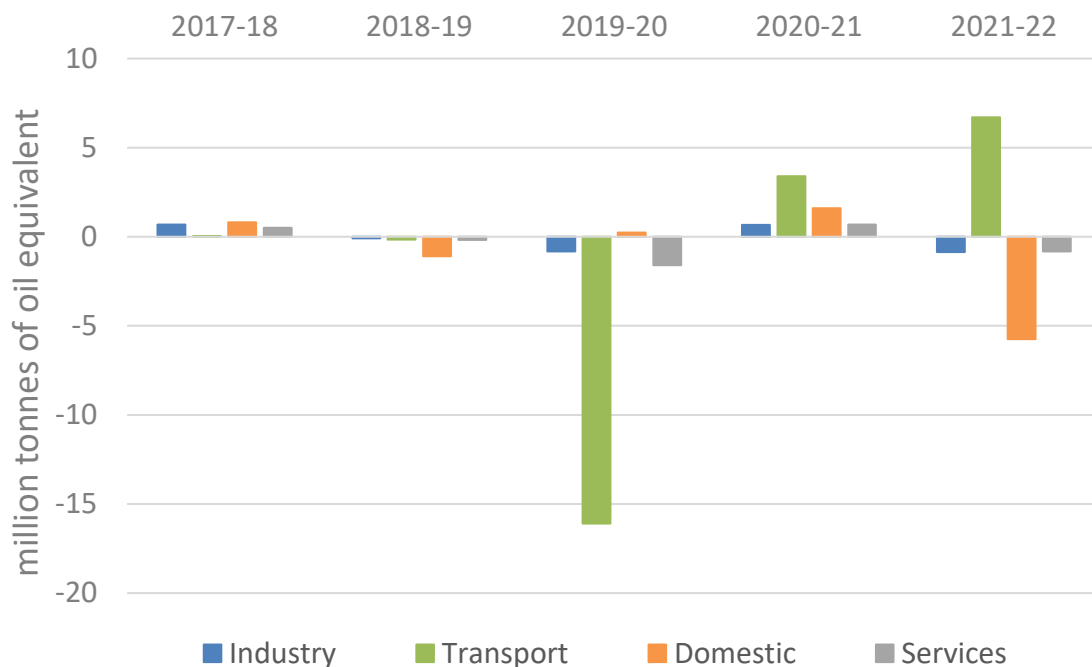
Chart 1.1 below shows changes in consumption by sector highlighting which fuels are driving the changes. Between 2021 and 2022 the biggest changes are increased oil consumption in transport reflecting a relaxing of Covid-19 travel restrictions and decrease gas consumption in the domestic sector due to higher temperatures in 2022 compared to 2021.

Chart 1.1: Change in consumption by sector and fuel, 2021 to 2022 ([Table C1](#))



Error! Reference source not found. shows the magnitude of the change compared to changes seen in recent years. The big drop in transport consumption in 2020 and the subsequent increases are the most obvious developments. In 2022 consumption in the domestic sector dropped to levels not seen since at least 1970 (see chart on opening page).

Chart 1.2 Annual change in consumption by sector for the last 5 years ([Table C1](#))



Domestic

With record high temperatures in 2022, domestic consumption fell by 14 per cent. On a temperature corrected basis (i.e. removing the weather effects), consumption fell by 11 per cent indicating other external influences such as increases in energy and other prices. The remaining decrease could be attributable to behavioural changes driven by other factors such as an increase in energy and other prices.

Chart 1.3 Domestic consumption, temperature-corrected domestic consumption and average annual temperatures (Table C5)

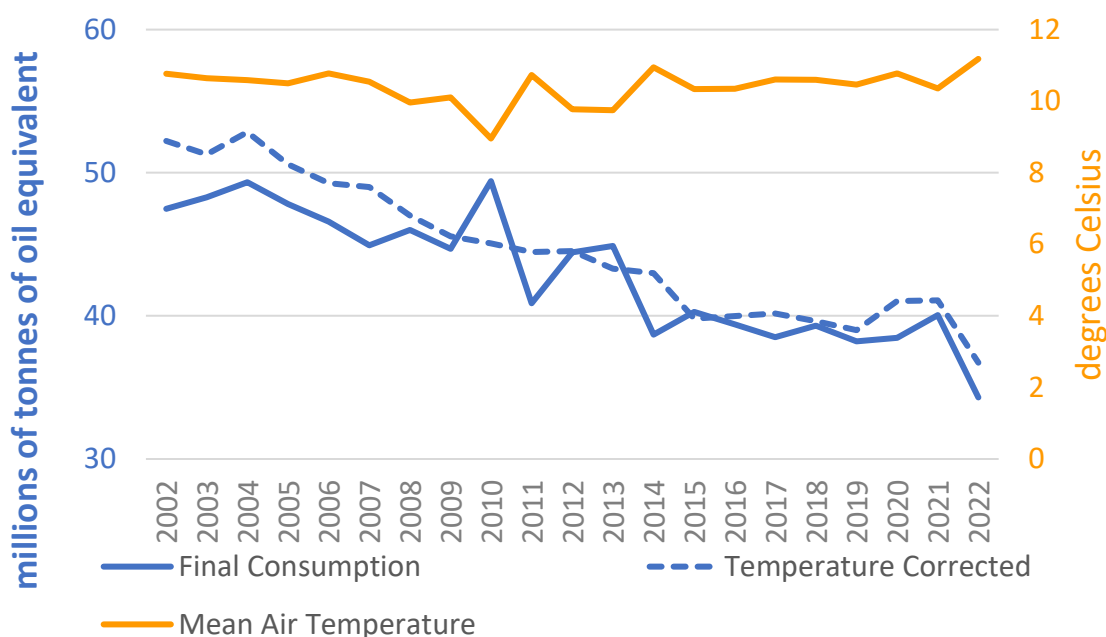
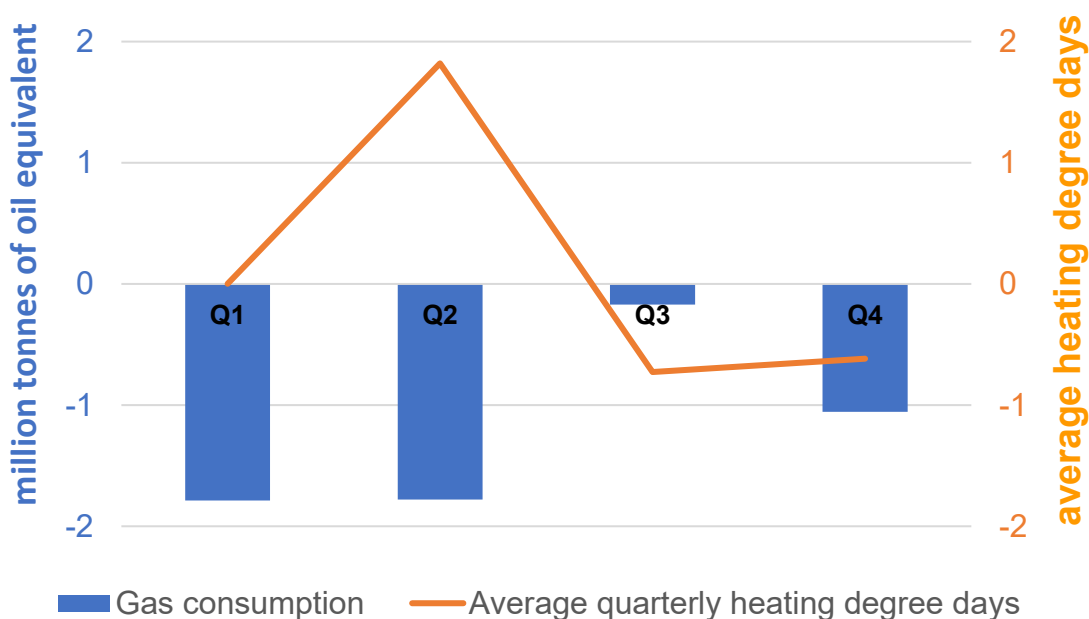


Chart 1.4 below shows the difference in quarterly domestic energy consumption for 2021 to 2022 compared with the difference in heating degree days. The second quarter of 2022 had more heating degree days than the same quarter in 2021 but lower consumption.

Chart 1.4 Change in quarterly domestic demand and heating degree days, between 2021 and 2022 (Table C1)



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

Additional Statistics on Consumption in the Domestic Sector from the Department of Energy Security and Net Zero.

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

Published 29 June 2023;

Mean and median electricity and gas consumption of domestic properties in 2021 by property characteristics and household attributes.

Estimates of the impact of installing energy efficiency measures on energy consumption

[Household Energy Efficiency Statistics](#)

Last updated 21 September 2023;

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

The detailed report is published monthly, with more detailed quarterly and annual updates.

[Fuel Poverty Statistics](#)

The main report is published 28 February 2023 covering the year 2022

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

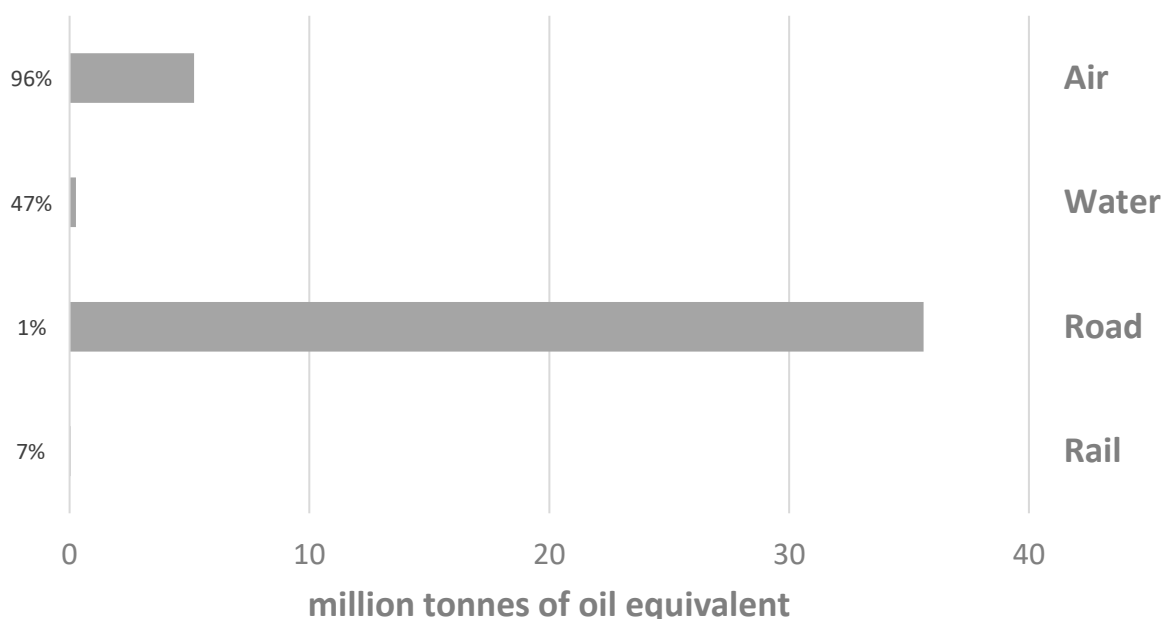
Published 22 December 2022;

Estimates of consumption at the subnational level. Number of electricity and gas meters, total, mean and median consumption by fuel.

Transport

Chart 1.5 shows petroleum use in road transport increased by 0.5 mtoe (excluding biofuel mixed with petrol and diesel) between 2021 and 2022 though this is still 9.0 per cent below 2019. Petroleum consumption in aviation nearly doubled in 2022 from 2021 but like road consumption remains considerably lower (22 per cent) than in 2019.

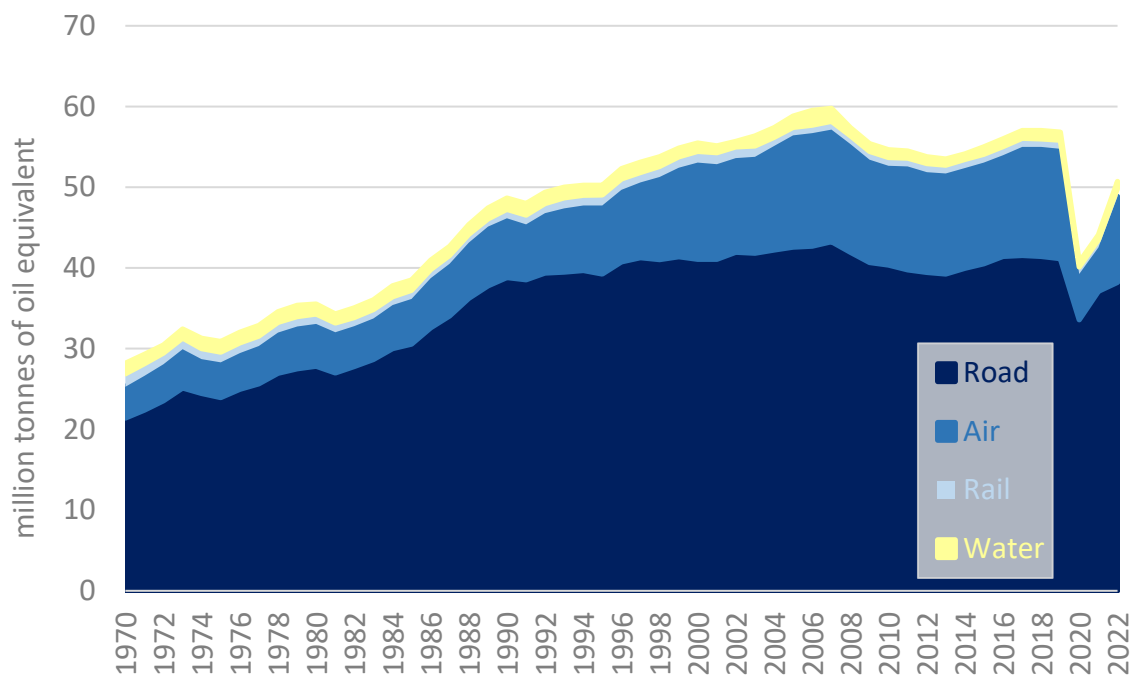
Chart 1.5 Change in petroleum consumption in transport by travel mode, 2021 to 2022 ([Table C1](#))



Transport remains the biggest component of energy consumption in the UK and this share is now almost equal to that of 2019 following significant drops when Covid related travel restrictions were imposed in 2020 through to the first quarter of 2021. Despite road and air consumption increasing substantially, air consumption remains notably lower than pre-pandemic values. 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 between 1970 and 2022 by mode

(Table C1)



Consumption data with detailed breakdown by vehicle type is only available up to 2021. In 2021 we saw an increase in consumption across all vehicle types following the large drops in consumption in 2020. The biggest increase was in motorcycles. In 2021 biofuels met 6.0 per cent of road fuel energy demand compared to 4.6 per cent in 2019. These estimates do not account for electricity consumption in road transport which is ~ 1 per cent of the total.

Electricity consumption remains a small component of overall road transport use at 0.3 out of 38 mtoe (0.8 per cent) but increased by 56 per cent between 2021 and 2022. According to the Department for Transport, over 395,000 plugin cars were registered for the first time in 2022 compared to 326,000 in 2021 (21 per cent increase)¹.

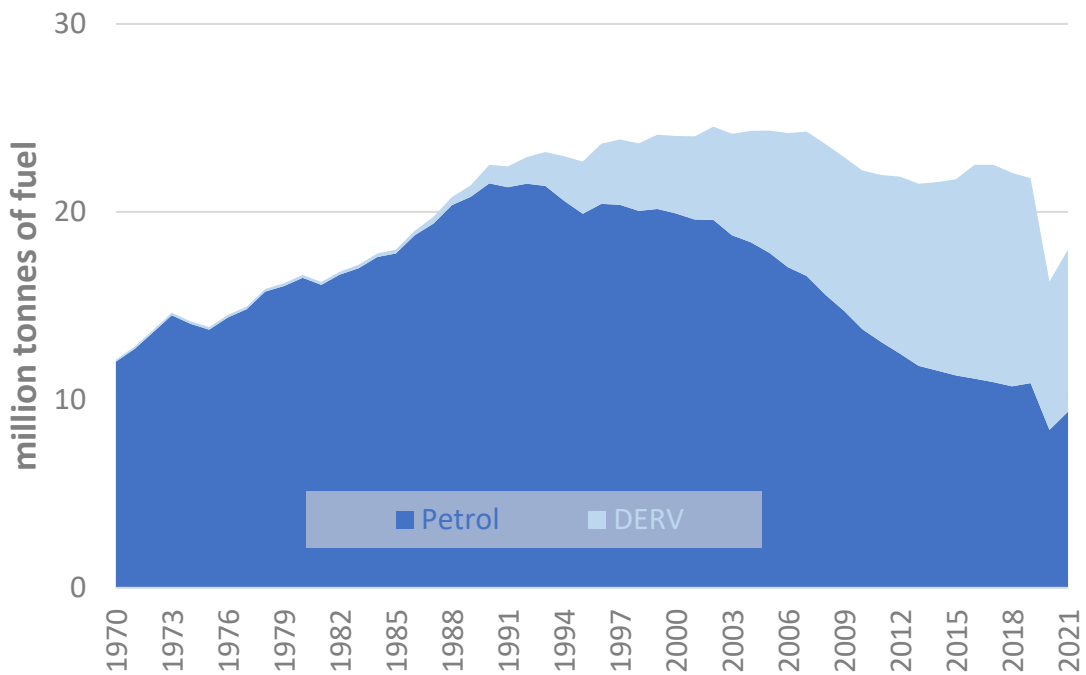
Cars are the largest consumers in road transport consumption and consume over 90 per cent of petrol. In Chart 1.7 the increases of 11 per cent in petrol and 9.2 per cent in diesel consumption in 2022 are shown. The slightly faster increase in petrol consumption can be attributed to increased numbers of petrol and decreasing number of diesel cars². Although, consumption by vehicle type is not yet available for 2022, overall petrol consumption was 1.4 per cent higher in 2022 than in 2021³. Consumption for other road vehicles is shown in Chart 1.8.

¹ See [Department for Transport - Vehicle licensing statistics data tables – Table VEH1153b](#)

² [Vehicle licensing statistics data tables](#)

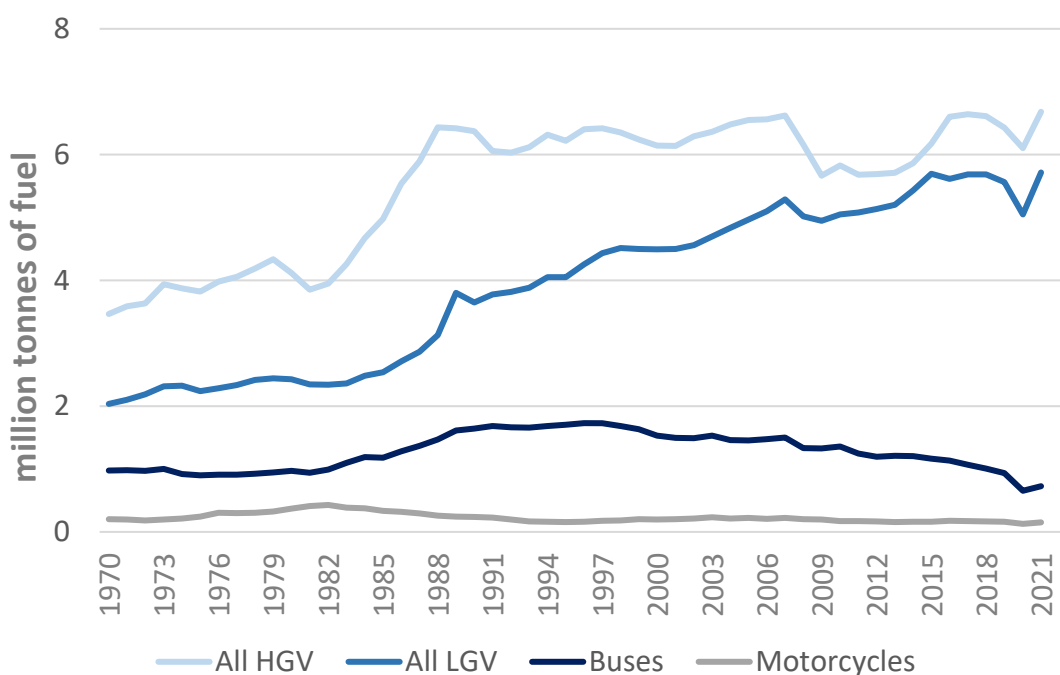
³ See [Energy Trends: UK oil and oil products](#)

Chart 1.7 Petrol and Diesel (DERV) consumption for cars 1970 to 2021 ([Table C8](#))



Consumption in light goods vehicles (LGV) increased by 13 per cent between 2020 and 2021 and in heavy goods vehicles (HGV) increased 9.5 per cent in the same period. Fuel consumption increased for all vehicles, but has not reached fuel consumption levels in 2019, except in HGV and diesel LGV vehicles. Buses fell proportionally more than in any other road vehicle type and was over 18 per cent down compared to 2019 in 2021. 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 (12 per cent) between 2020 and 2021. For diesel the equivalent percentage increase was slightly lower at 1.4 mtoe (11 per cent).

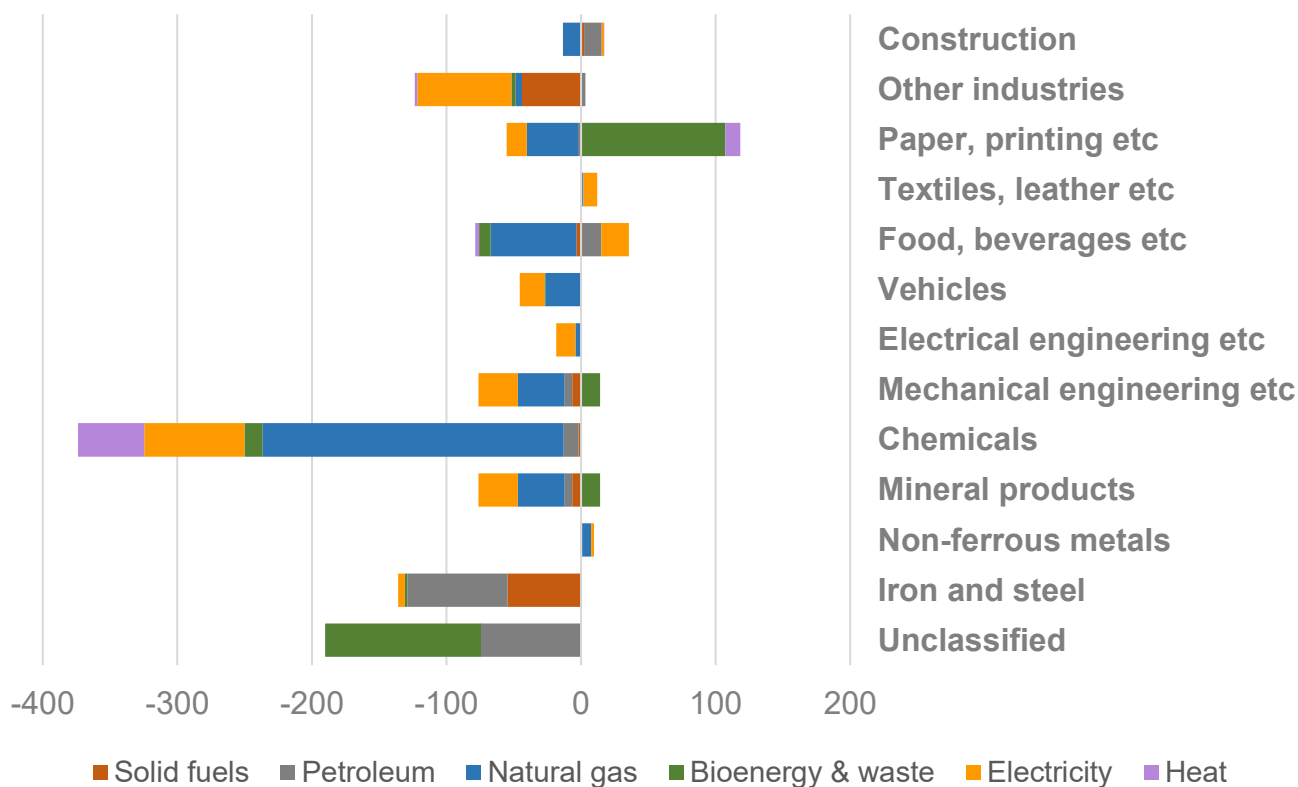
Chart 1.8 Consumption by other types of vehicles (excluding electricity) 1970 to 2021 ([Table C8](#))



Industry

There was a drop in energy consumption across most industrial sectors from 2021 to 2022. Chemicals saw the biggest drop at 10 per cent with a 12 per cent decrease in gas consumption. Paper and printing saw the biggest increase with an increase of 4 per cent. Construction had the least change and was essentially static on last year.

Chart 1.9 Change in Industrial consumption sub-sectors from 2021 to 2022 by fuel (ktoe) ([Table C2](#))

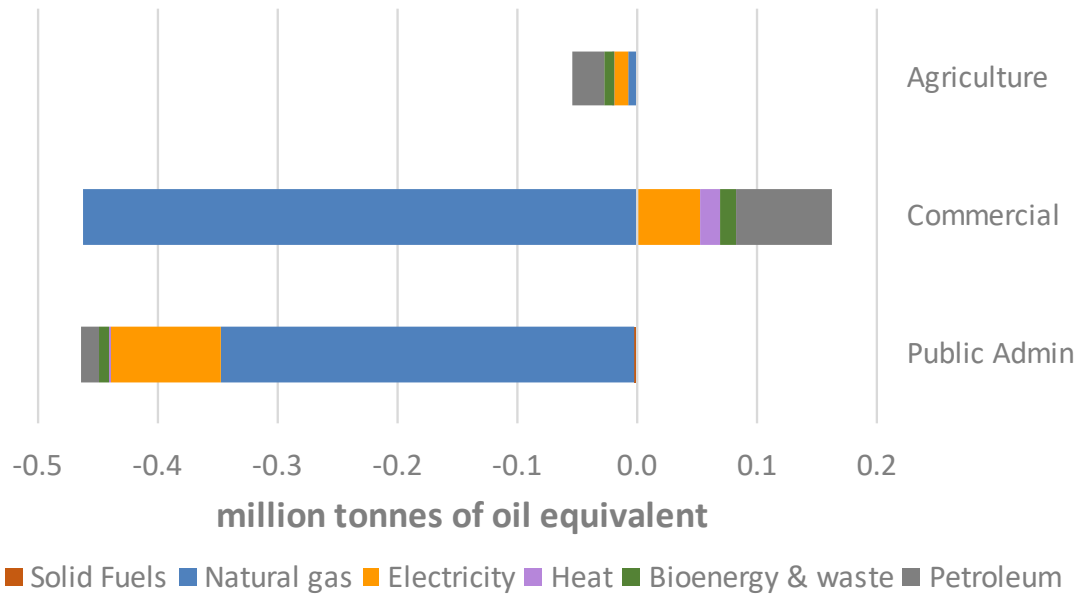


Services

Consumption in the service sector decreased by 0.6 mtoe on last year with warmer temperatures likely to have contributed to reduced consumption, especially for space heating. In the commercial sector, the drop was relatively modest - 3.7 per cent - likely the result of increased activity in the sector in 2022 following Covid restrictions in 2021, particularly during the first quarter. The drop in public administration was more pronounced and more closely follows the temperature impacts.

Chart 1.10 shows a decrease energy consumption of gas, and an increase of electricity and petroleum in commercial services. Gas and oil consumption decreased in public administration and also marginally in agriculture from 2021 to 2022.

Chart 1.10 Change in Services Consumption, 2021 to 2022 (Table C4)



Chapter 2: Energy Intensity

What is Energy Intensity?

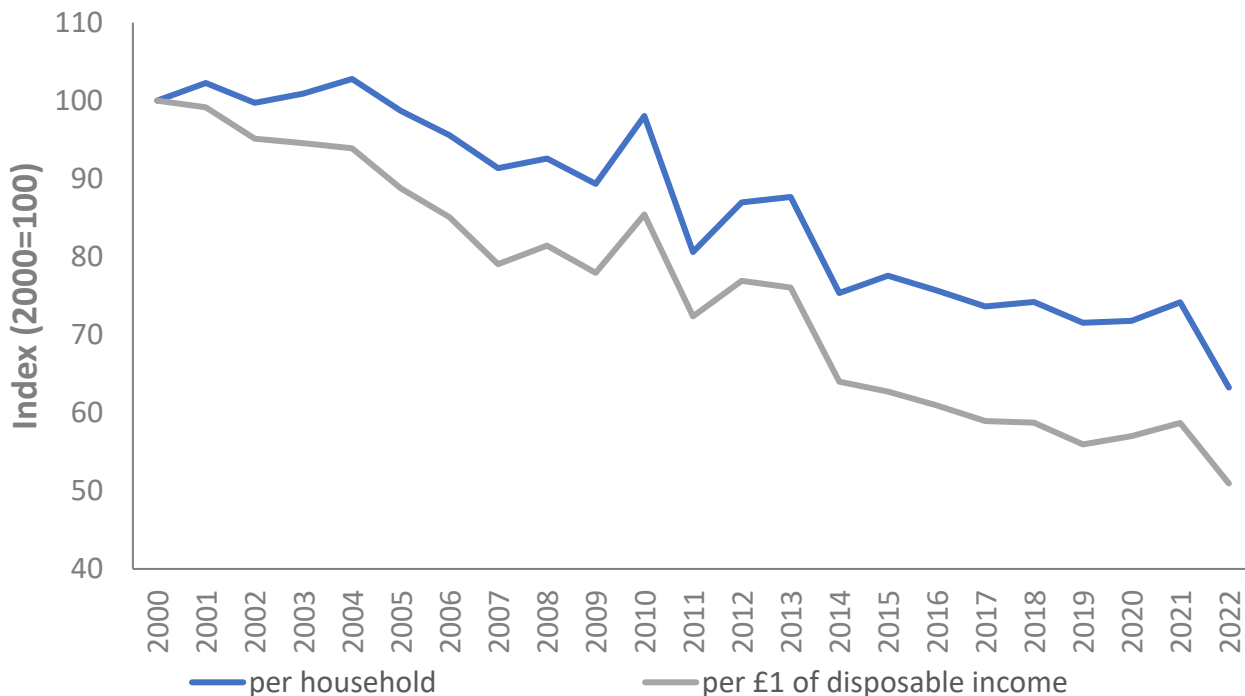
Energy Intensity is the amount of energy per unit of output. It includes (but is not limited to) energy efficiency changes. Units of output vary depending on the sector and sub-sector and relate to economic activity such as number of passengers and distance travelled for the transport sector, whilst changes in the Office for National Statistics 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

The long-term trend starting this century has been a reduction in energy consumption per household attributable to improved insulation and more efficient boilers, though there have been spikes due to extreme weather. Spikes in intensity are attributable to colder weather apparent in Chart 1.3. Consumption per household dropped 15 per cent in 2022 compared to 2021, the largest drop in the last ten years, reflecting warmer weather and higher energy and other prices in addition to longer-term factors. National population statistics from ONS run up 2021 at the time of writing⁴.

Chart 2.1 Indexed change in energy intensity per household and on disposable income basis, 2000 to 2022 (Table I3)



⁴ [ONS population estimates](#)

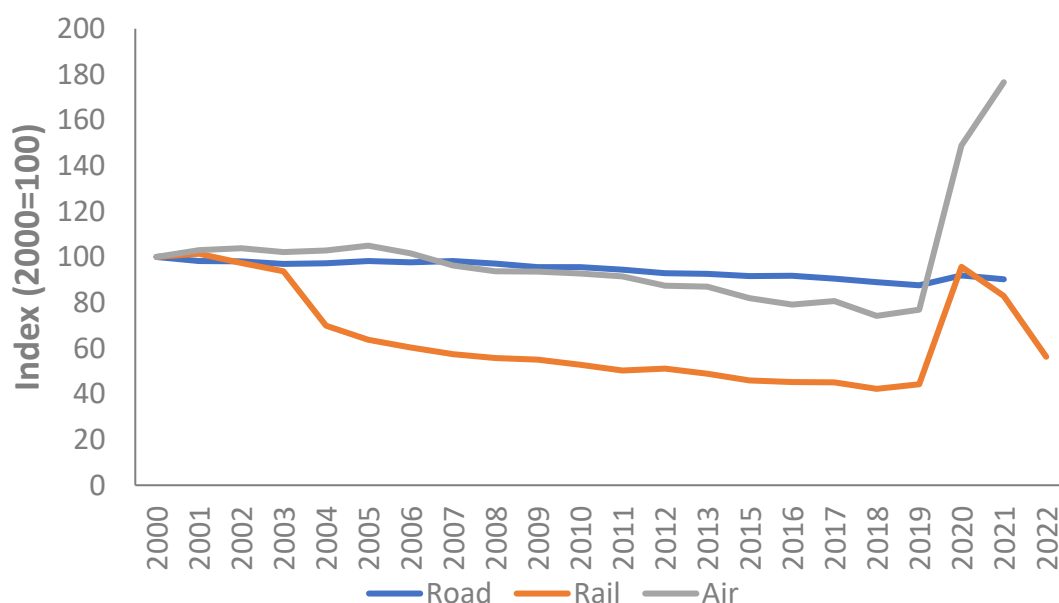
Transport

The latest traffic data available on passenger and freight transport by road and air is for the year 2021. Road passenger kilometres in Great Britain were estimated at 595 billion in 2021 up from 531 in 2020 but still well below the pre-pandemic high of 741 in 2019⁵. Energy consumption per passenger kilometre remains higher than pre-pandemic levels having only fallen slightly compared to 2020. A significant proportion of energy consumption in road transport is used for the transportation of freight. The latest data for freight transport by road is for 2020. Tonne kilometres, a standard measure of activity in freight transport, was 11 per cent down on 2019 in 2020. The energy intensity of road freight transport was much less affected by the pandemic than passenger transport.

Air passenger travel in 2021 was still well below pre-pandemic levels at only 17.4 per cent of 2019 levels which is even lower than in 2020. Energy consumption per passenger kilometre reached levels not seen since at least the 1980s due to planes flying with low passenger loads. The passenger kilometre measure used for this intensity calculation is for UK airlines worldwide rather than for aircraft taking off from UK airports as is used for energy consumption⁶.

Provisional data from the Office for Rail and Road indicates 49.8 billion passenger kilometres were travelled by rail in 2022 in Great Britain⁷. Recovery of passenger rail passenger travel has continued since 2021 but has not recovered to the pre-pandemic levels of 67.0 billion passenger kilometres. Increasing occupancy of trains is leading to a drop in energy intensity of 41 per cent for rail travel compared to the spike seen in 2020.

Chart 2.2 Change in energy intensity for passenger transport, 2000 to 2021 (2022 for rail) (Table I2)



Industry

Estimates of manufacturing output have been revised by the ONS since ECUK 2022 and data now indicates there was only a small drop in output during the pandemic and value added by the manufacturing sector in the UK was 8.8 per cent higher than in 2019 but fell by 3.0 per cent the following year⁸. Consumption per unit of output was 1.0 per cent lower in 2022 than in 2021, a continuation of a long-term falling trend which sees energy consumption per unit of output in 2022 at 55 per cent of levels seen in 2000 though this is attributable to changes in the kinds of products being manufactured as well as increased process efficiency.

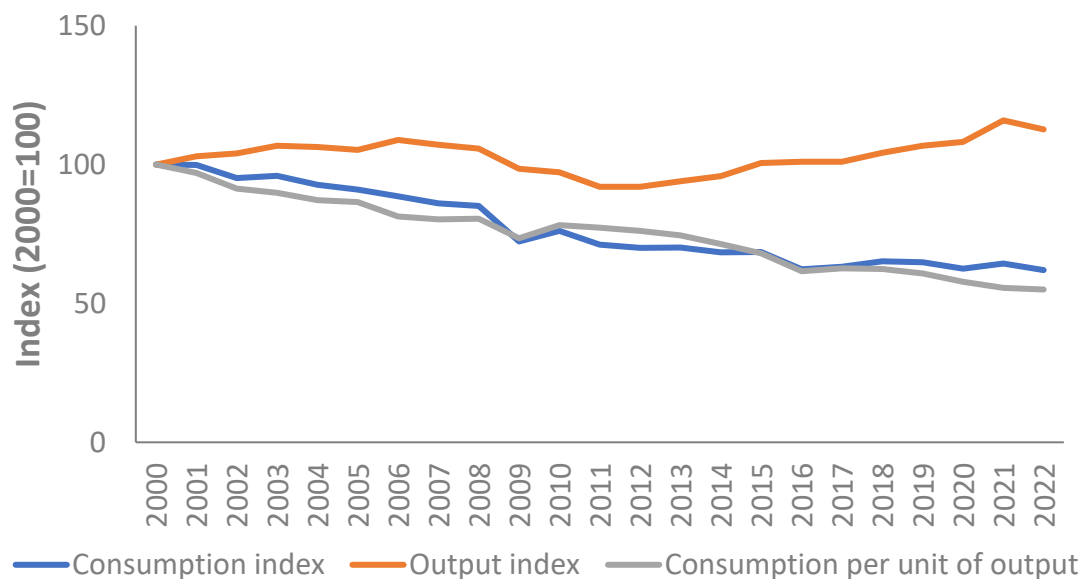
⁵ [Department for Transport – Modal comparisons](#)

⁶ [Main outputs for UK airlines by type of service: UK airlines](#)

⁷ [Office for Rail and Road Table 1230 - Passenger kilometres](#)

⁸ [Office for National Statistics – Economic output data](#)

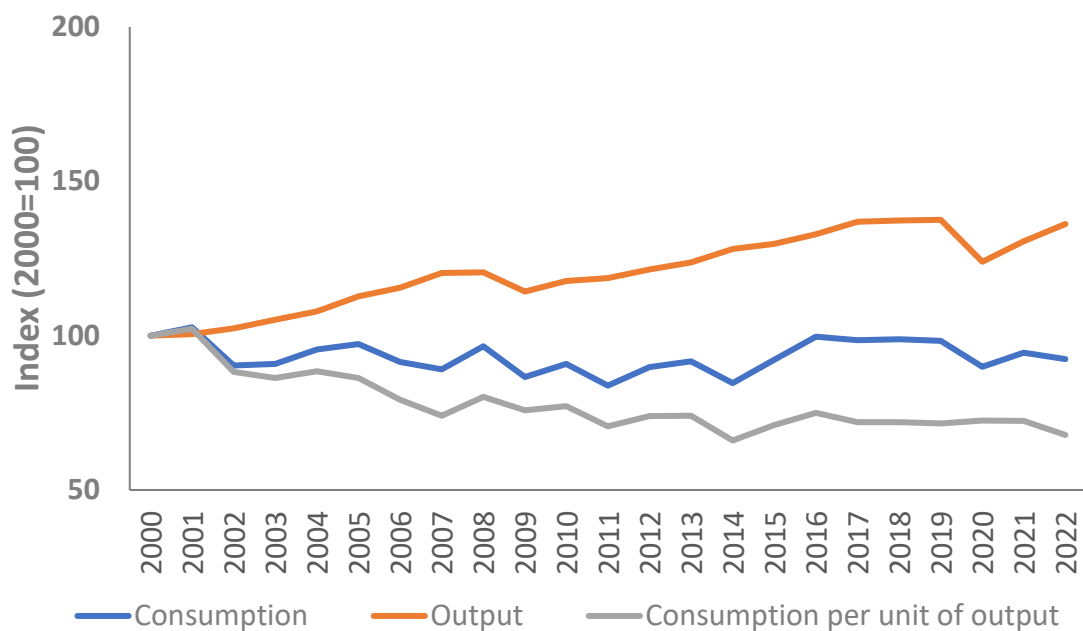
Chart 2.3 Indexed change in industrial consumption, output and intensity, 2000 to 2022 (Table I4)



Services

Economic activity in services has yet to reach pre-pandemic levels but has shown increases over the last two years for which we report data, increasing 5.4 per cent in 2021 and 4.3 per cent in 2022 year-on-year. In 2022 there was a drop in intensity which over the preceding 5 years was largely flat. Recent increases in economic activity were reflected in energy consumption in 2021 but in 2022 energy consumption dropped by 2.3 per cent because of both warmer temperatures and likely some behavioural changes as a rise in energy prices motivated tighter control of energy use.

Chart 2.4 Indexed change in services consumption (excluding agriculture), output and intensity, 2000 to 2022 (Table I5)



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 2022 (2021 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.

Decreased energy intensity has more than offset all the increased consumption we would have seen due to economic growth in services and industry. Similarly, in the domestic sector energy consumption has decreased despite increasing numbers of households.

Chart 2.5 Output and Intensity Effects by sector 2000 to 2022 (2021 for transport) (Table I6)

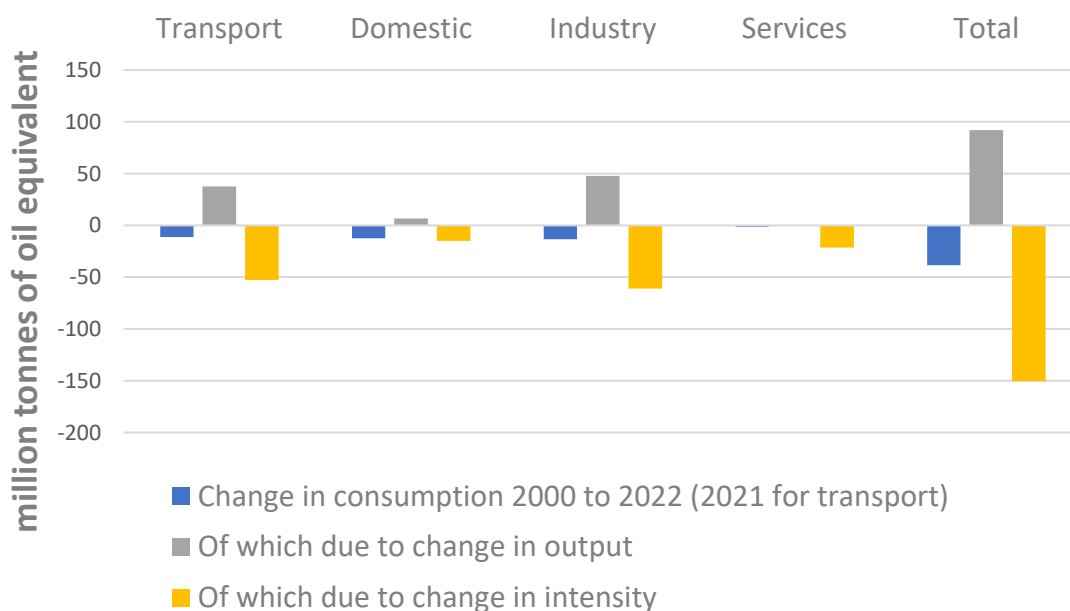
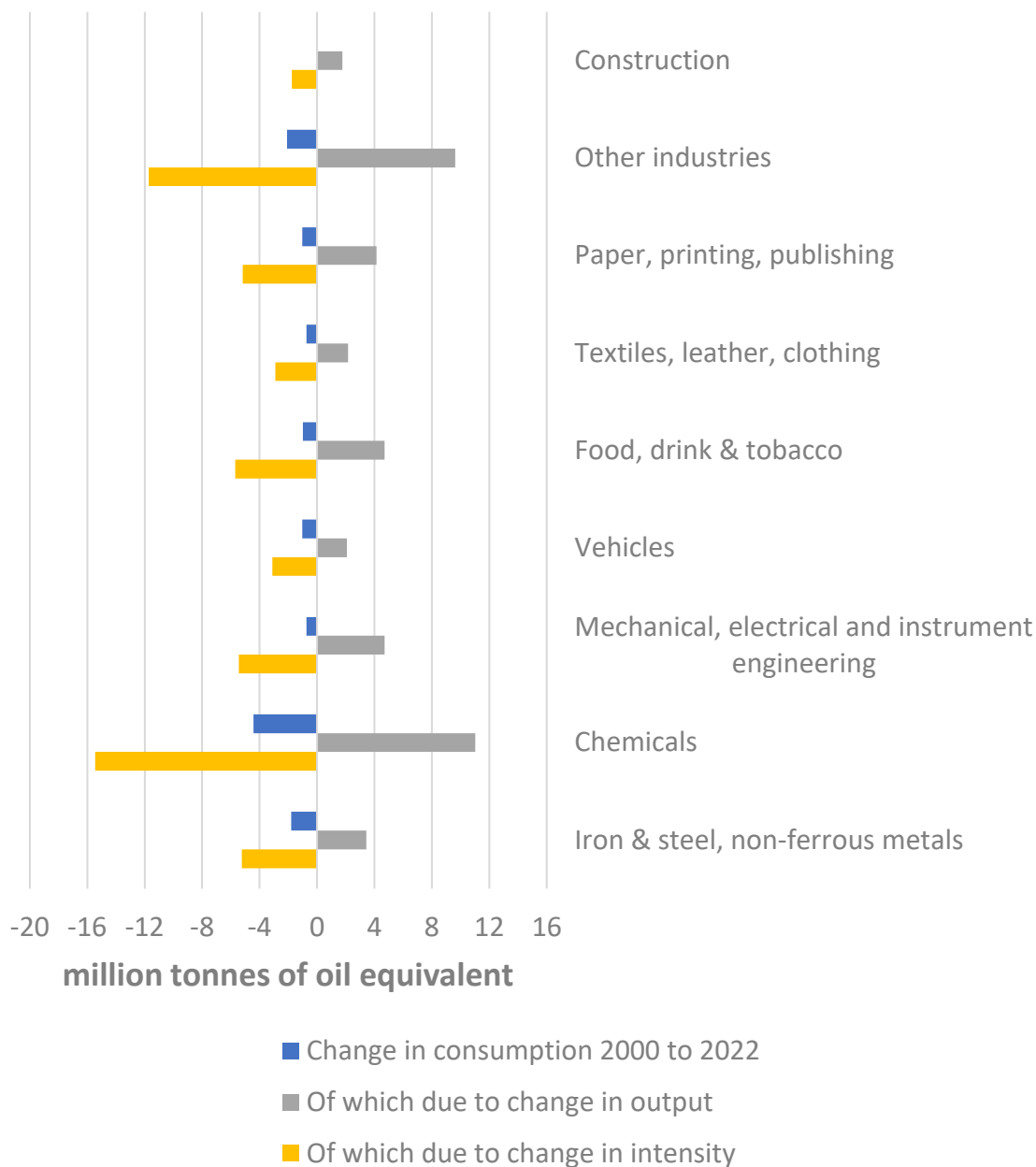


Chart 2.6 shows changes in industrial energy intensities by sector, again comparing 2000 with the most recent 2022 data. All sectors of industry, except construction, which was broadly flat, saw reductions in energy consumption between 2000 and 2022. Energy intensity decreased in all sub-sectors.

Chart 2.6 Output and Intensity Effects for Industrial Sub-sectors 2000 to 2022 ([Table 16](#))



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.

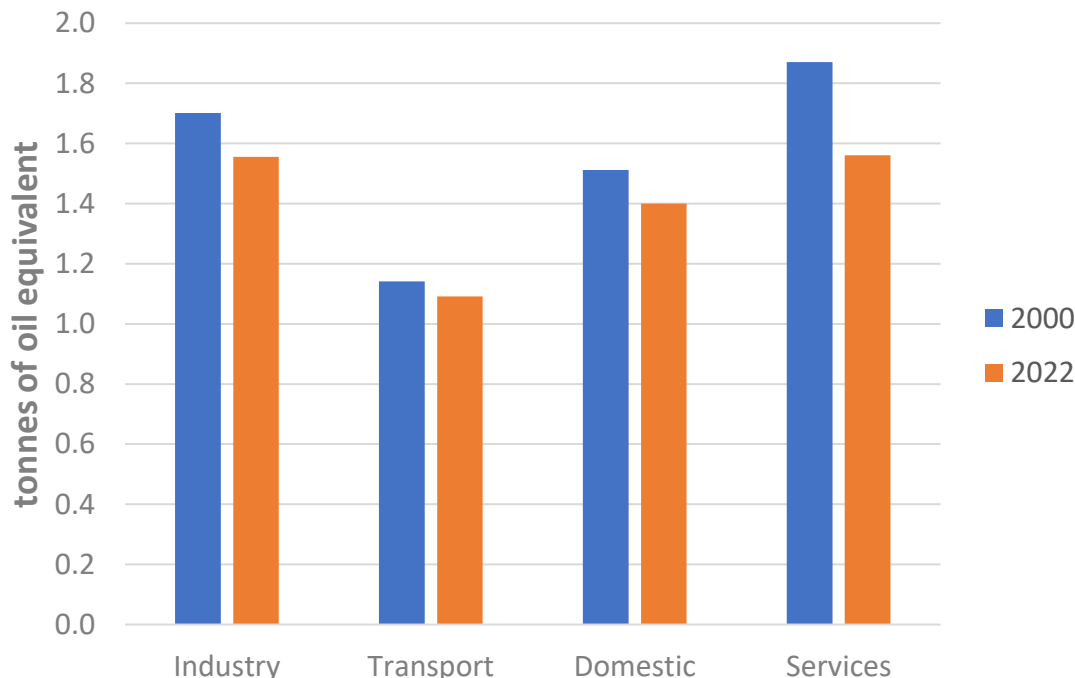
Primary consumption data are calculated by taking the final consumption fuel mix and apportioning to the fuel input required to produce the final unit of consumption. Most of the conversion losses are in generating electricity from combustible fuels so those sectors with a high proportion of electricity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

All sectors 2021 to 2022

Primary energy consumption dropped slightly in 2022 largely driven by the slightly larger decrease in final energy consumption.

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 2022 is shown in Chart 3.1 below.

Chart 3.1 Changes in conversion factors from 2000 to 2022 final (Table P3)

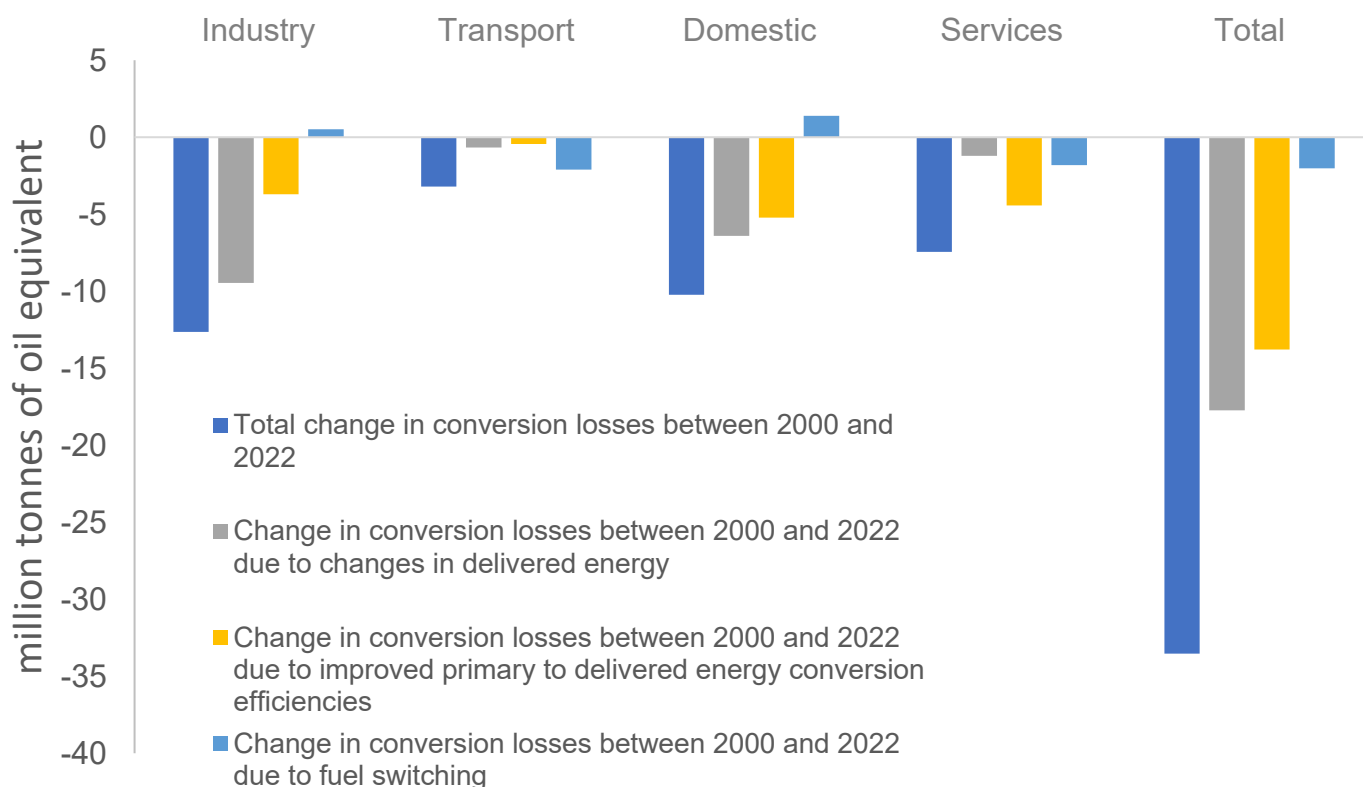


All sectors show a reduction in conversion factors over the period indicating conversion efficiency improvements but also the effects of fuel switching whereby consumers shift from fossil fuels, increasing the proportion of primary electricity generation, particularly renewables such as wind, and solar which are treated as having no conversion losses.

[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 sectors 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 2022 ([Table P5](#))



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 the Department for Business, Energy and Industrial Strategy (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.

[The tables](#) are presented with the first row showing the last update of the model. New modelling developed to inform updated Ecodesign policy has been used for lighting in tables A1 – A3.

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](#).

Chapter 5: Technical information

Definitions

DUKES glossary	This covers definitions commonly used in energy statistics reporting. The majority of terms used in this publication are covered in the DUKES glossary (PDF, 103 KB) ;
Energy Intensity	The amount of energy required to produce one unit of output. A reduction in energy intensity could imply an improvement in energy efficiency.
Energy Ratio	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).
Final Consumption	Energy consumed by final users after transformation.
Tonne Kilometres	The measure of how much freight has been moved using weight and distance.
Passenger Kilometres	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.
Primary Energy Equivalents	Final consumed plus energy in the transformation sector and losses incurred during conversion and transformation.
Temperature Corrected Consumption	Energy consumption adjusted for changes due to fluctuations in the weather, to allow underlying trends to be identified. DESNZ and the ONS have published methodology notes on temperature adjustments.
Tonne of oil equivalent (toe)	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.

Our statistical practice is regulated by the Office for Statistics Regulation (OSR).

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

OSR sets the standards of trustworthiness, quality and value in the [Code of Practice for Statistics](#) that all producers of official statistics should adhere to.

You are welcome to contact us directly with any comments about how we meet these standards.

Alternatively, you can contact OSR by emailing regulation@statistics.gov.uk or via the [OSR website](#).

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 [DESNZ statement of compliance](#) with the Pre-Release Access to Official Statistics Order 2008.

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

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