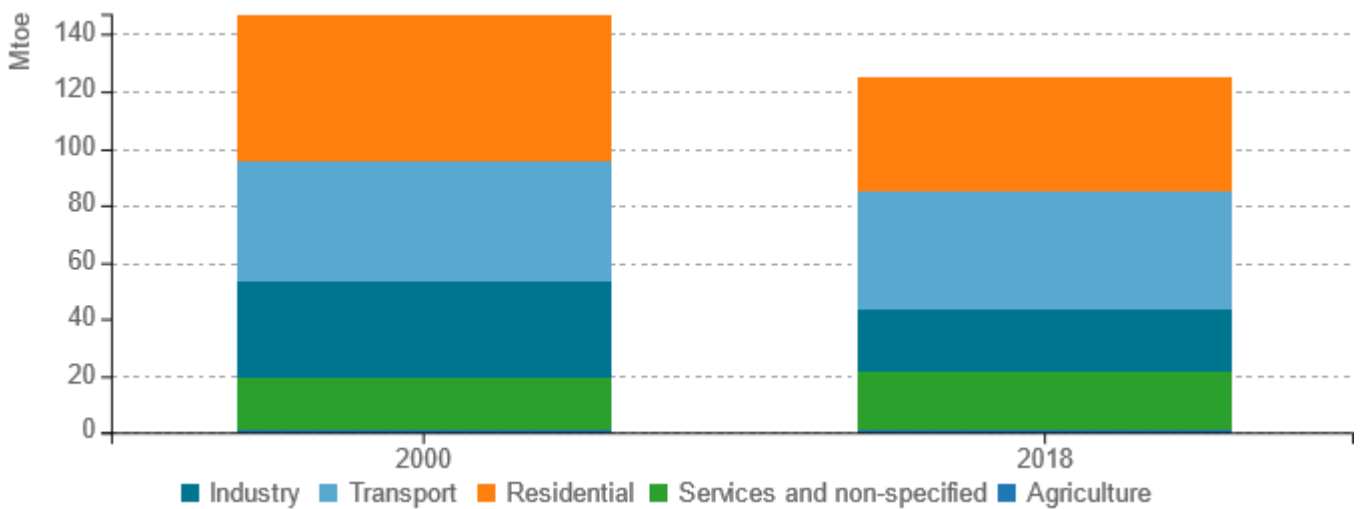


Energy efficiency trends and policies

Overview

In 2018, UK final energy consumption was around 137 Mtoe, 15% below its level in 2000. Transport is the largest energy consuming sector and makes up just over 33% of the total, followed by the residential sector (32%), industry (17%), the services (including non-specified sector) (16%) and finally agriculture (1%). Final energy consumption is below 2000 levels in transport (-1%), industry (-35%) and residential (-23%). However, final energy consumption has risen in agriculture (+30%) and services and others (+11%).

Figure 1: Final energy consumption by sector (normal climate)

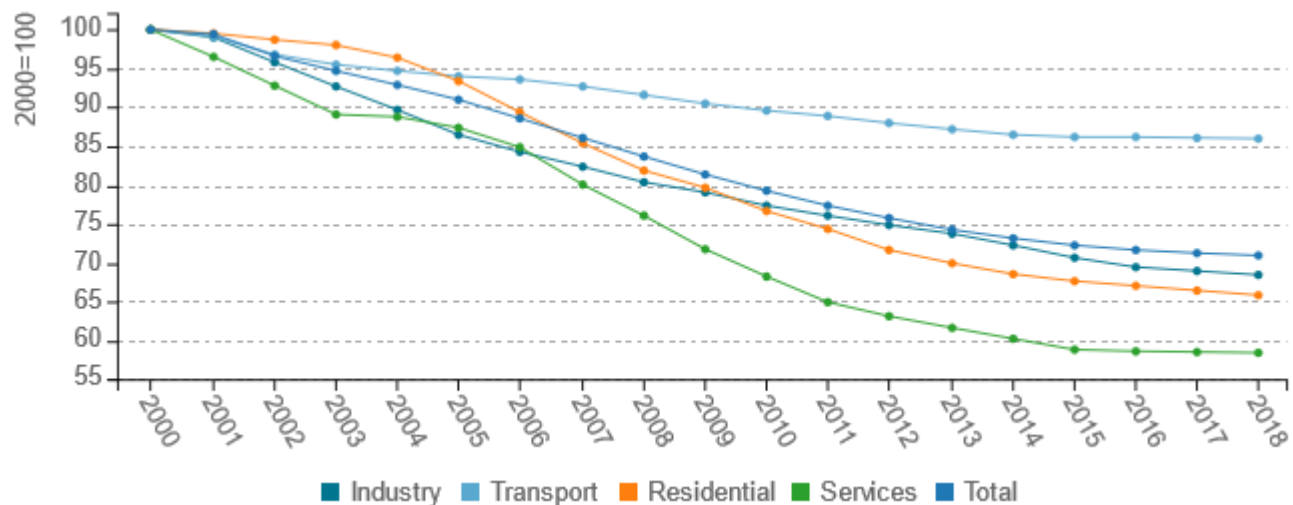


Source: ODYSSEE

Energy efficiency for final consumers, as measured by ODEX, has improved by circa 30% between 2000 and 2018 or around 1.6% per year. The improvements have been made year-on-year across all sectors. Industry and residential sectors have improved consistently over the period, averaging 1.8% and 1.9% respectively per year. Services' trajectory was more uneven, but saw the sharpest improvement in efficiency, at around 2.3% per year. Transport followed a shallower trajectory with the improvement in ODEX averaging circa 1% per year. The financial crisis and resulting recession affected the UK between 2007-09 but did not appear to have had a significant impact on the ODEX efficiency index trend lines given in Figure 2.



Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

Under Article 3 of the Energy Efficiency Directive, the UK’s 2020 energy efficiency target was set at the level of 129.2 Mtoe for final energy consumption. In 2018, the Clean Growth Strategy (CGS) set out policies to promote clean growth, including improving energy efficiency of business, industry and UK homes. In 2021, the government set new targets for domestic energy efficiency: by 2025, homes should produce 75-80% less CO₂ compared to current levels. In the household sector, a succession of Energy Efficiency Obligations (first implemented in 1994) have delivered retrofitting insulation measures and promoted energy efficient heating systems and appliances. The Energy Company Obligation has run since 2013 and underwent significant amendments in recent years (see table below). The EU Emissions Trading Scheme (EU-ETS) was a key measure driving energy efficiency improvements in the industry sector. Following the UK's exit from the EU, a UK-ETS will be established. In addition, companies in certain energy intensive sectors can adopt a Climate Change Agreement (CCA) and large consuming but non-energy intensive businesses may fall under the Energy Savings Opportunity Scheme (ESOS). In the transport sector, the UK Government focus on supporting the early market for ultra-low emission vehicles (ULEV).

Table 1: Sample of cross-cutting measures

Measures	NEEAP measures	Description	Impact evaluation	More information available
Energy Savings Opportunity Scheme (ESOS)	yes	ESOS is a mandatory energy assessment scheme for organisations in the UK qualified as having 'large undertakings' The Environment Agency is the UK scheme administrator. It is a mandatory programme that requires energy audits for 'large enterprises'. These audits are of the energy used by buildings, industrial processes and transport to identify cost effective energy saving measures.	High	https://www.gov.uk/guidance/energy-savings-opportunity-scheme-esos



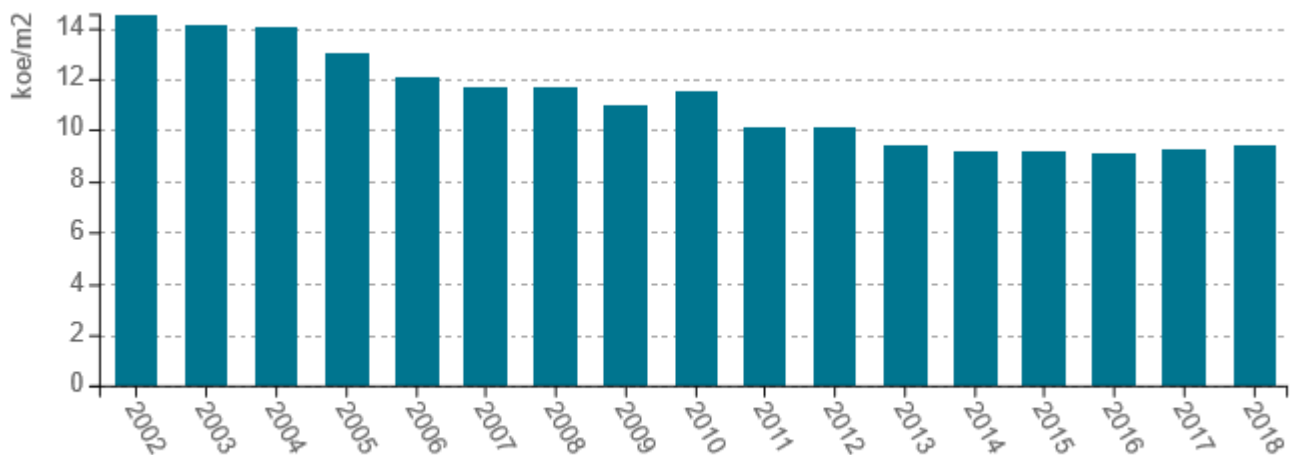
Supplier Obligations - Energy Company Obligation (ECO)	yes	The Energy Company Obligation (ECO) is an energy efficiency obligation. The basic concept of ECO is that central government imposes an obligation on large energy suppliers (gas and electricity) to deliver energy efficiency (for example, solid wall insulation, loft insulation) and heating measures to domestic households in Great Britain. The new ECO3 scheme came into force on 2018 and will run until March 2022. The new scheme focuses on providing support to low income, vulnerable and fuel poor households. As part of this change, the carbon focused Carbon Emissions Reduction Obligation (CERO) has been removed. The scheme's target now relates to energy efficiency, fuel poverty and bill savings.	High	https://www.ofgem.gov.uk/environmental-programmes/eco
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Source: MURE

Buildings

Space heating unit consumption has decreased by circa 35% since 2002 (Figure 3). However, between 2016 - 2018, space heating unit consumption has increased slightly from 9.11 to 9.4 koe/m². Figure 4 demonstrates that over the period 2002 to 2018 energy consumed by water heating decreased by 26%, cooking by 29% and electrical appliances by 15%. The overall downward trend is due to improved insulation, heating system upgrades, and more efficient electrical and gas appliances. For reference, data from 2000 is available for water, cooking and electrical appliance energy consumption.

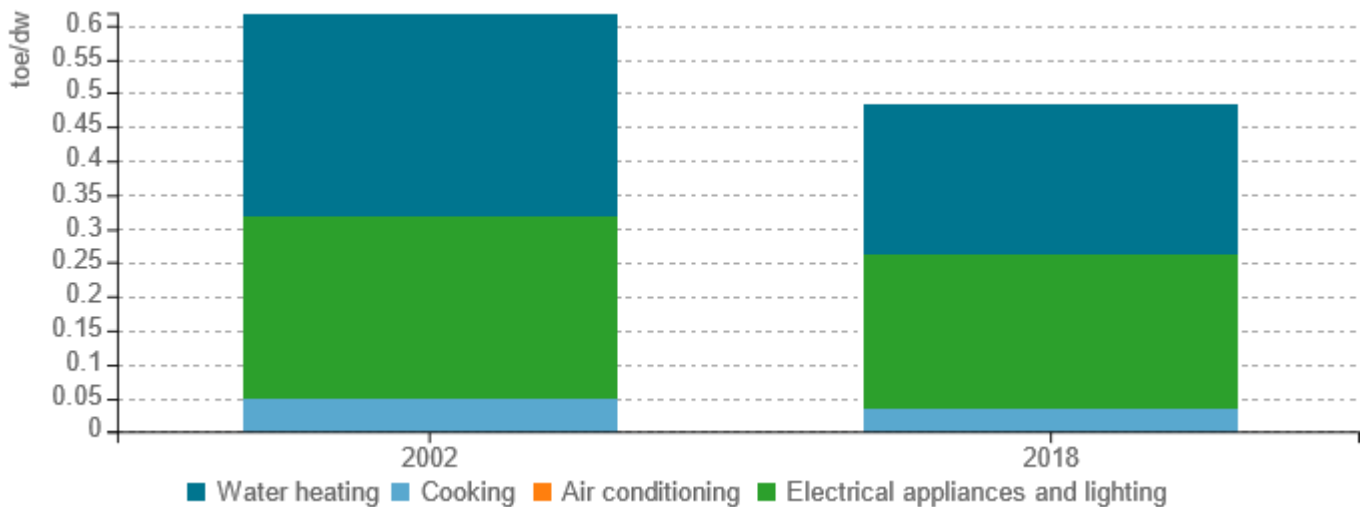
Figure 3: Energy consumption of space heating per m² (normal climate)



Source: ODYSSEE



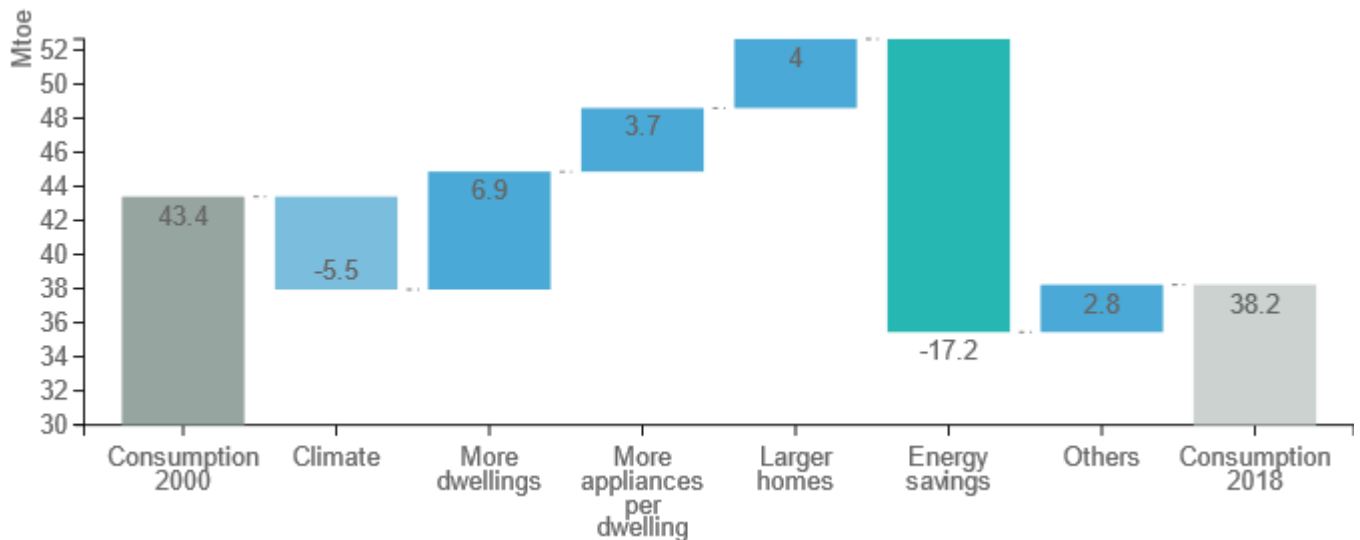
Figure 4: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

Final energy consumption for UK residential buildings was 38.2 Mtoe in 2018, which represents a decrease of circa 5.2 Mtoe in 2018 relative to 2000. Decomposition analysis attributes decreased consumption to both energy savings from improved efficiency (-17.2 Mtoe), and to climatic conditions (-5.5 Mtoe) between 2000 and 2018, counter-balanced by additional demands of 6.9 Mtoe from an increase in the number of dwellings, 4 Mtoe from a shift to larger homes, 3.7 Mtoe due to an increase in the number of electrical appliances, and 2.8 Mtoe attributed to other factors such as lifestyle changes (e.g., increased heating temperature).

Figure 5: Main drivers of the energy consumption variation of households

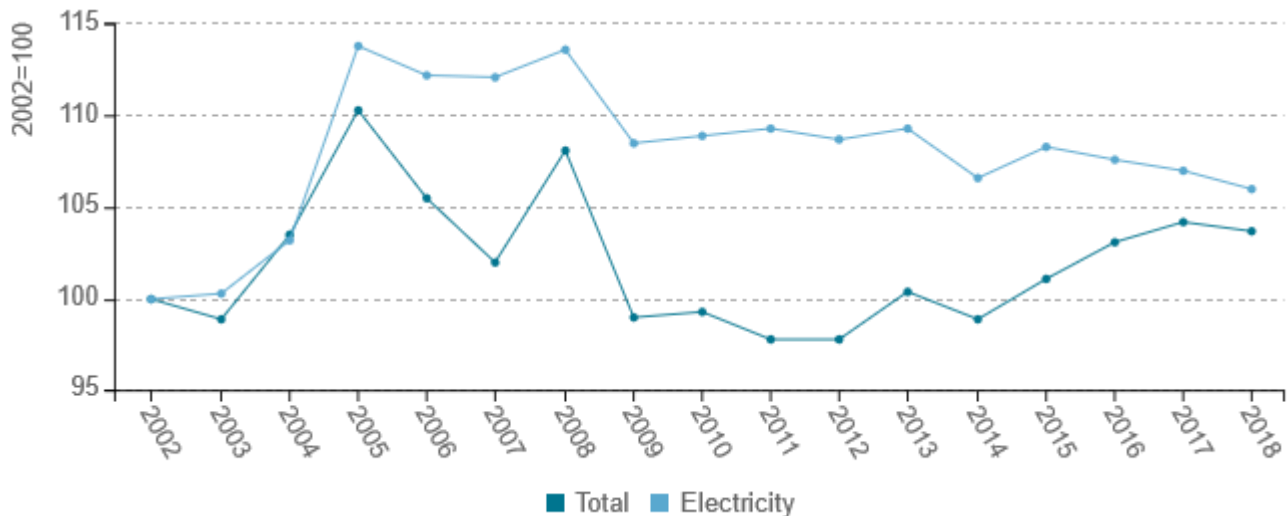


Source: ODYSSEE



Between 2002-2018, total energy and electricity consumption per m² has risen by 4% and 6% respectively. Between 2002 and 2008, consumption rose significantly for both factors, by 8% and 14% respectively. Following 2008, there was a sharp decline in consumption for both, most likely caused by the recession. Between 2009 and 2018, consumption of total energy and electricity rose steadily.

Figure 6: Energy and electricity consumption per m² (normal climate)



Source: ODYSSEE

Historically, the UK has relied on building regulations, Supplier Obligations and EU Product standards to deliver energy savings in buildings sector. The UK Building Regulations have provided a means of driving energy efficiency improvements and energy savings in homes and non-domestic buildings since building regulations were introduced in the 1970s. Energy Efficiency Obligations have been operational from 1994 (see overview section) and require domestic energy suppliers to promote and install domestic energy efficiency measures. This scheme has focused on fitting every home in the UK with a Smart Meter by 2020. The Clean Growth Strategy aims for homes to be EPC B and C by 2035. Following the coronavirus pandemic, improving energy efficiency in homes will form a core part of the UK government's economic recovery. The Green Homes Grant is a £2 billion scheme providing grants to homeowners and local government to retrofit homes. The Green Homes Grant Skills Training Competition aims to support this scheme by improving the quality and accessibility of training for the skills needed to retrofit homes.

Table 2: Sample of policies and measures implemented in the building sector

Measures	Description	Impact	More information
Building Regulations 2016	The building regulations apply to extensions, conversions, renovation of the building envelope and replacement boilers and windows. These require new buildings to meet a minimum standard for thermal transmittance for walls, roofs, windows and doors, together with efficient heating systems. Existing buildings must meet similar standards, when extensions are planned together with standards for replacement heating systems.	High	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1943



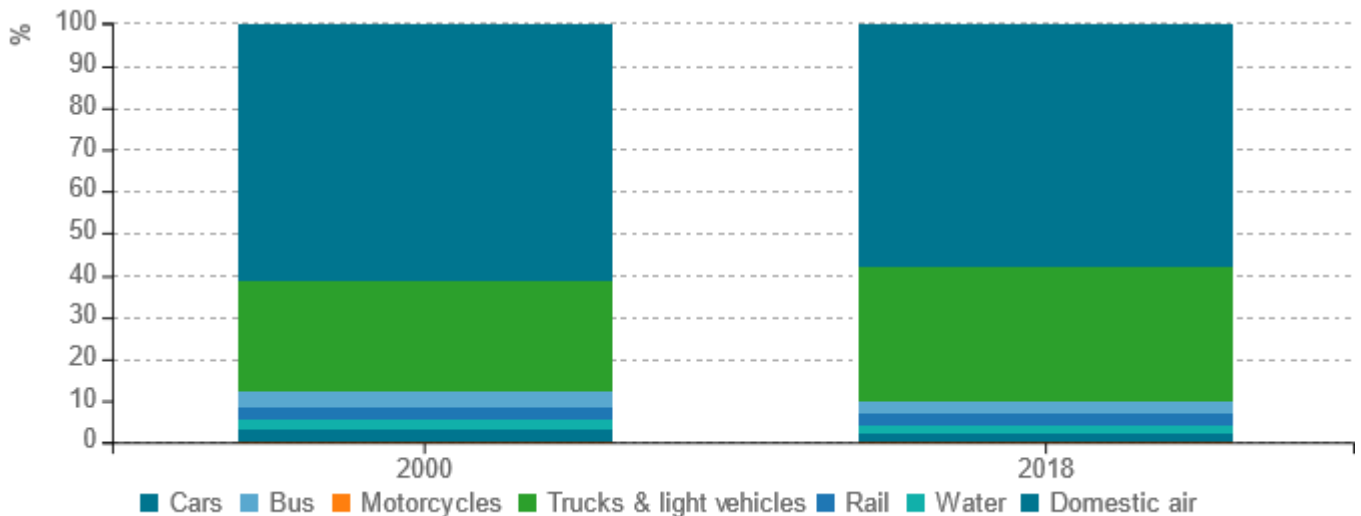
Smart metering and Billing (for households and SMEs)	The Department for Business, Energy and Industrial Strategy (BEIS) is leading a rollout of smart meters with support from the industry regulator, Ofgem. The Smart Metering Programme is being delivered in two phases. The first phase was the Foundation Stage, during which the Government engaged with the energy industry, consumer groups and other stakeholders to put commercial and regulatory frameworks in place to support smart metering. The second phase is the main roll-out stage.	High	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1013
The Green Homes Grant	To stimulate economic recovery from the coronavirus pandemic, and to meet national net zero targets, the UK government introduced the Green Homes Grant. The grant scheme is worth a total of £2 billion, and provides local authorities and homeowners with funds to retrofit or renovate homes with energy efficient and low-carbon technologies.		

Source: MURE

Transport

In 2018 cars accounted for 58% of the UK transport sector’s energy consumption. The next highest energy consumption in transport originates from road freight transport (trucks/light vehicles) (32%). The remaining energy consumption is split among bus (2.7%), rail (2.6%), water (2.3%), air (1.6%) and motorcycles (0.5%).

Figure 7: Transport energy consumption by mode

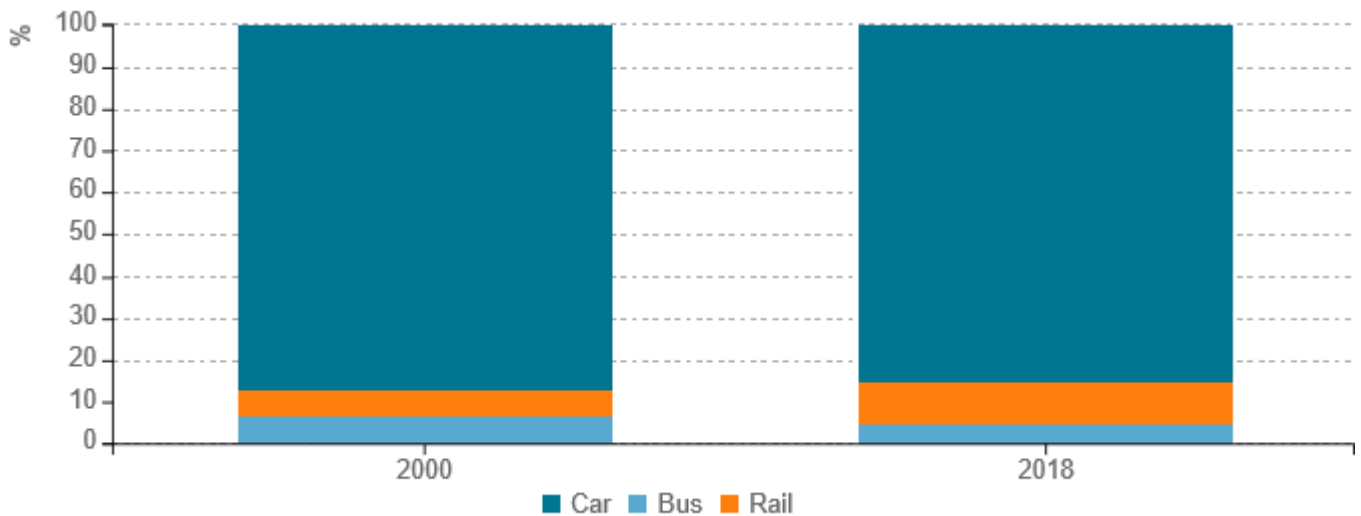


Source: ODYSSEE



Passenger traffic in 2018 was dominated by private cars, which accounted for 85% of passenger-kilometers (87% in 2000). The share of public transport in total traffic increased by 2 points from 12.8% in 2000 to 14.7% in 2018. There was a 59% increase in rail transport pkm, counter-balanced by a reduction in bus traffic of around 30%.

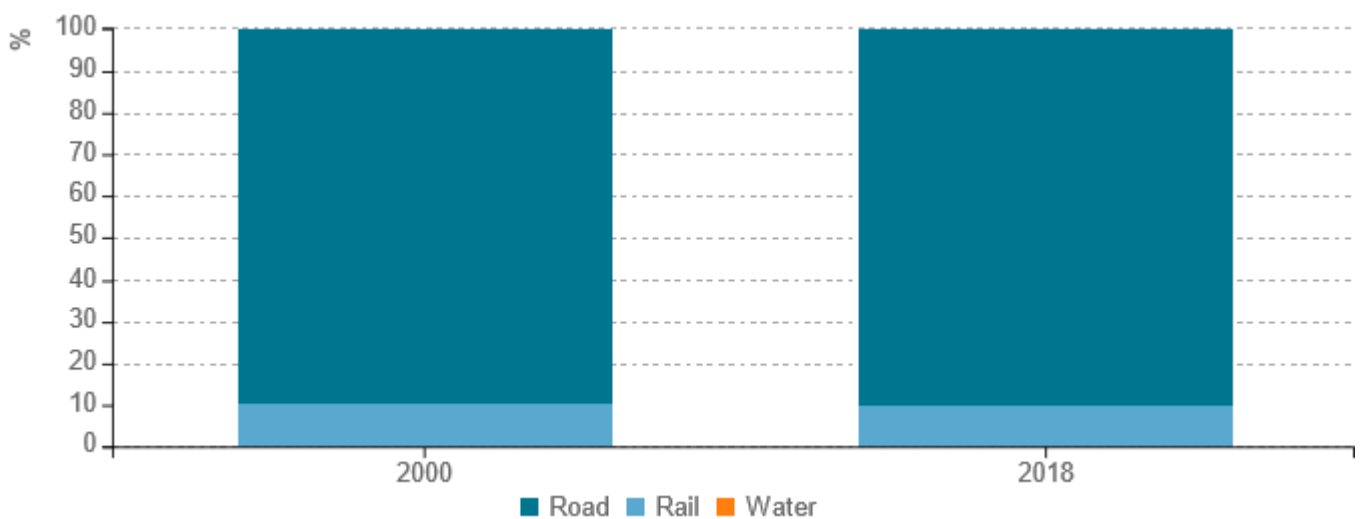
Figure 8: Modal split of inland passenger traffic



Source: ODYSSEE

In comparison to passenger traffic, the modal split for UK freight traffic tonne-kilometre (tkm) has remained largely the same between 2000 to 2018. Road freight traffic accounts for circa 90% of tkms and rail 10%. Other modes such as water (river) are negligible by comparison.

Figure 9: Modal split of inland freight traffic

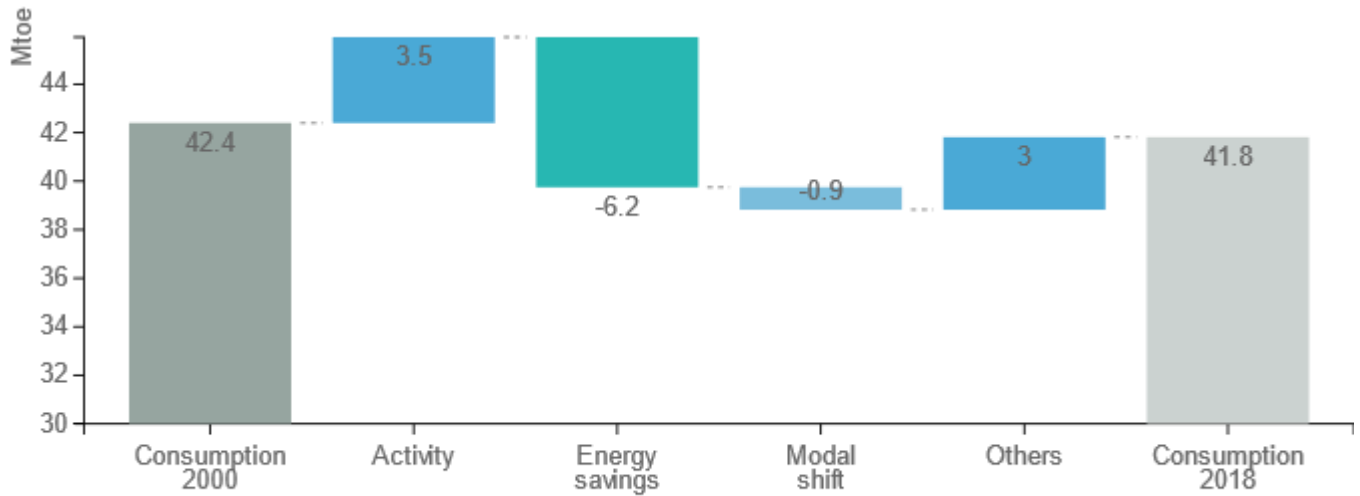


Source: ODYSSEE



Final energy consumption in transport has decreased by circa 0.6 Mtoe in 2018 relative to 2000. Decomposition analysis in Figure 10 shows that while there have been energy savings from improved transport efficiency (-6.2 Mtoe), and a minor contribution of modal shift of -0.9 Mtoe (i.e. from private to public transport), there was growth of 3.5 Mtoe due to higher volume of passenger and freight traffic, and 3 Mtoe from 'other' effects.

Figure 10: Main drivers of the energy consumption variation in transport



Source: ODYSSEE

Complementing EU Vehicle emission performance standards, there are a number of national measures aimed at increasing energy efficiency in the transport sector. Focus has been placed on supporting the growing ultra-low emission vehicle (ULEV) market. For example, customer grants are provided to encourage ULEVs purchases and installations of charging points under the Plug-in Car Grant, Plug-in Van Grant, Workplace Charging Scheme, Electric Vehicle Homecharge Scheme and On-street Residential Chargepoint Scheme. In addition, taxes, including Vehicle Excise Duty, company car tax and enhanced capital allowances have further promoted the use of LEVs and further supported infrastructure development. In public transport, further schemes and associated funding for the electrification of parts of the existing rail network will bring energy efficiency benefits. In freight, measures support modal shift from road to rail and to support zero emission last mile deliveries.

Table 3: Sample of policies and measures implemented in the transport sector

Measures	Description	Expected savings, impact evaluation	More information available
Low Emission Vehicle policies (Plug-in car and van grants)	The Plug-In Car Grant commenced in January 2011 to help both private consumers and businesses purchase an electric, plug in hybrid or hydrogen fuelled car. Motorists purchasing a qualifying ultra-low emission car are currently able to receive a grant of 35% of the vehicle price, up to a value of £4,500 depending on the model. For vans, grants are available for 20% of the cost of a van, up to a maximum of £8,000.	Medium	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1013



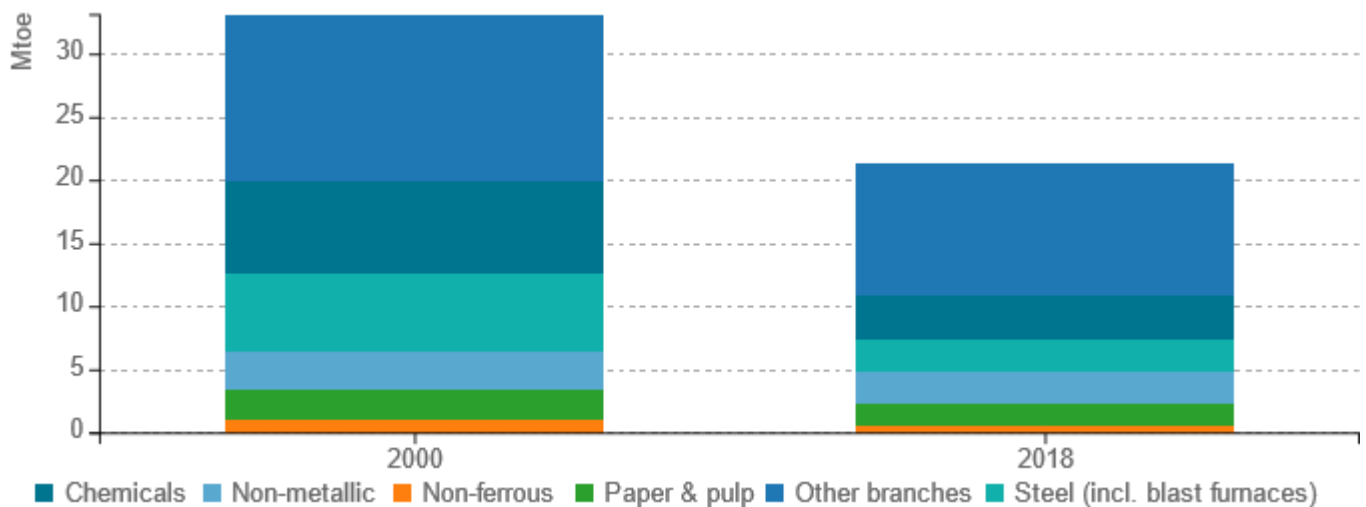
<p>Renewable Transport Fuels Obligation (RTFO)</p>	<p>The Renewable Transport Fuel Obligation places an obligation on fuel suppliers to ensure that either a certain amount of biofuel is supplied or that a substitute amount of money is paid. This obligation is assessed according to who owns the fuel when it crosses the duty point (the point when a fuel becomes chargeable for duty). Only those organisations that supply 450,000 litres or more of any road transport or non-road mobile machinery fuel for use in the UK during the course of a given year are obligated. The Renewable Transport Fuels Obligation (RTFO) was increased from 4.75% by volume to 9.75% for 2020, rising to 12.4% in 2032.</p>	<p>Medium</p>	<p>https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/2478</p>
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Source: MURE

Industry

During the period 2000 to 2018, final energy consumption of industry decreased by 35%. Nearly 50% of energy consumption is concentrated in five energy-intensive sectors comprising steel, chemicals, non-ferrous metals, non-metallic minerals and paper. Important industry sectors captured in 'Other branches' include food and drink and ceramics.

Figure 11: Final energy consumption of industry by branch

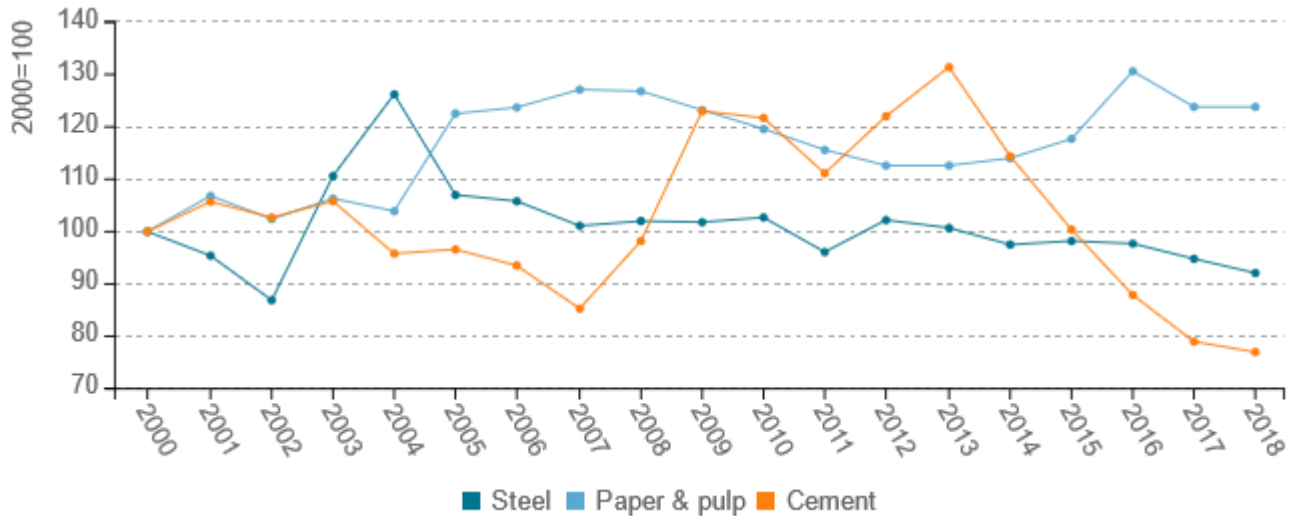


Source: ODYSSEE



The financial crisis 2007-2009 had a negative effect on this sector, which resulted in the loss of previous efficiency gains made in cement, although there have been improvements since. Unit consumption in cement, steel and paper remained stable over 2008-2013, and then dropped from 2016-2018 suggesting utilisation of higher capacity in industrial growth (rebound effect).

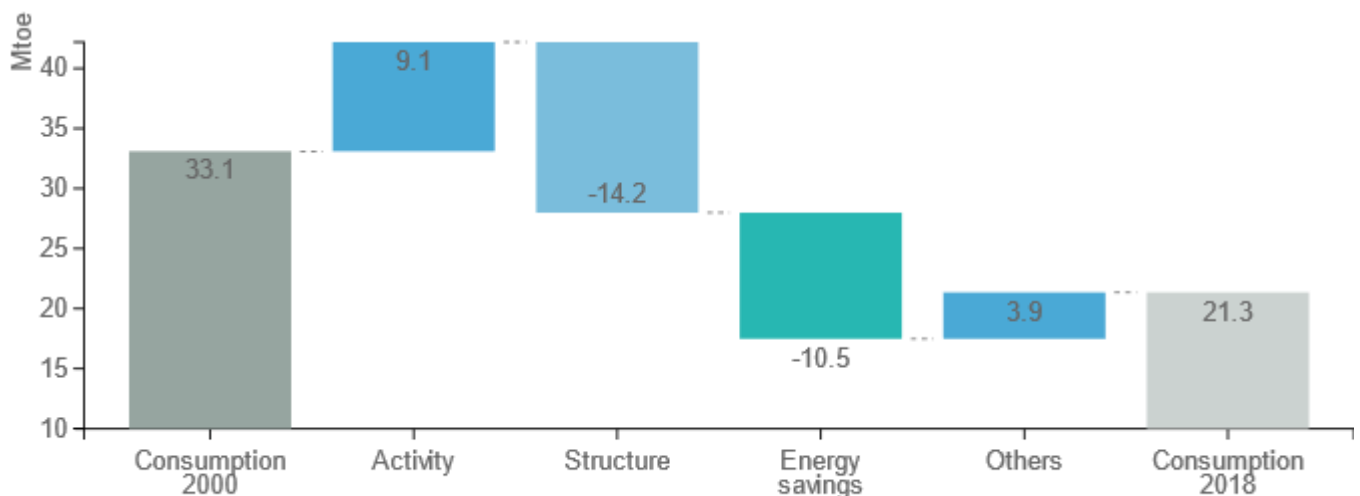
Figure 12: Unit consumption of energy-intensive products (toe/t)



Source: ODYSSEE

Final energy consumption in industry decreased by 11.8 Mtoe in 2018 relative to 2000. Decomposition analysis has attributed this to, in equal measure, changing industry structure (-14.2 Mtoe) – such as the loss of some types of energy intensive production overseas – and energy savings resulting from improvements in energy efficiency (-10.5 Mtoe). The reduction in energy consumption from these two factors has been partly offset by other causes including an increase in some industrial activity over this period.

Figure 13: Main drivers of the energy consumption variation in industry



Source: ODYSSEE



Policies targeting energy efficiency within the UK industry include a mix of market-based instruments, fiscal incentive and co-operative measures. Measures targeting energy efficiency and carbon emissions of industry include The Energy Savings Opportunity Scheme (ESOS, see overview section), Climate Change Agreements (CCA), Climate Change Levy (CCL) and Enhanced Capital Allowances (ECA), and the UK ETS. Meeting UK's 2050 target for deep decarbonisation of industry will require innovative policies beyond energy efficiency (e.g. Carbon Capture, Usage and Storage (CCUS)).

Table 4: Sample of policies and measures implemented in the industry sector

Measures	Description	Expected savings, impact evaluation	More information available
Climate Change Levy	The Climate Change Levy (CCL) is a tax on the use of energy in the industry, commerce and the public sector. The revenue from the levy is recycled back to business through cuts in employers' National Insurance Contributions (NICs) and additional support for energy efficiency schemes and low carbon technologies.	High	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1362
Climate Change Agreements	The Climate Change Agreements (CCAs) allow a part exemption from the Climate Change Levy for businesses within certain energy-intensive sectors. A discount from the levy is provided for those sectors that agree to ambitious targets for improving their energy efficiency or reducing CO2 emissions under their CCA.	High	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1365
Green Distilleries Competition	The green distilleries competition will provide funding for developing technologies that enable the use of low carbon fuel in a distillery.	Low	https://www.gov.uk/government/publications/green-distilleries-competition
UK Emissions Trading Scheme	At the end of 2021, the UK will transition from using the EU ETS to operating its own carbon market.	High	https://www.gov.uk/government/publications/participating-in-the-uk-ets/participating-in-the-uk-ets
Energy Companies Obligation: brokerage	Energy Company Obligations providers can sell 'lots' to energy companies in return for ECO subsidy, what are the rules and who can trade.		https://www.gov.uk/guidance/energy-companies-obligation-brokerage

Source: MURE

