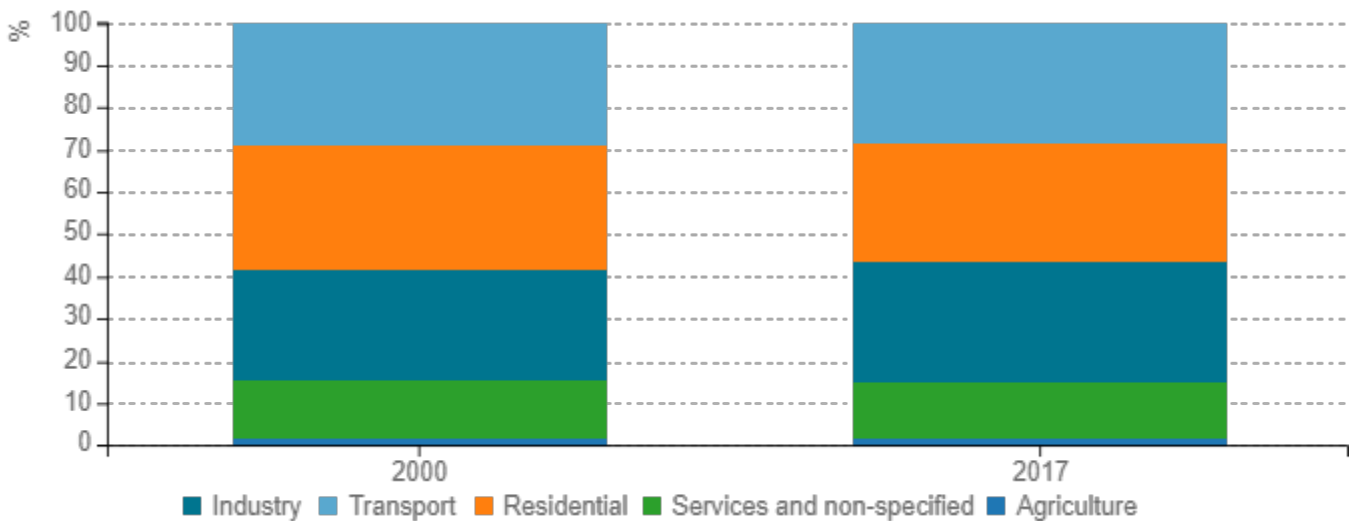


Energy efficiency trends and policies

Overview

Germany's total final energy consumption of 2017 was slightly above its 2000 level (+2.8 Mtoe, i.e. +1.3%). In 2017, the largest consuming sector is transport, representing 28.7% of total final energy consumption. The share of residential has slightly decreased from 29.2% to 27.7% in 2017, while industry increased its share from 26.2% to 28.6% (see Figure 1).

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



Source: ODYSSEE

Energy efficiency for final consumers, as measured by the so-called technical ODEX, has improved by around 1.3% per year since 2000. Larger gains have been registered for households (2.2 %/year), against 1.2 %/year for transport and 1 %/year for the services sector. Lower improvements have been registered in the industry sector (0.8 %/year).

With the Energy Concept from 2010, Germany set ambitious energy and Climate Targets for 2020 and 2050. In order to achieve the 2020 targets, the "Climate Action Programme 2020" was adopted in 2014. The Programme includes several measures to tap energy and GHG savings potentials, as e.g. the National Action Plan on Energy Efficiency (NAPE) and the climate-friendly building and housing strategy. The long-term strategy to achieve a climate neutral Germany in 2050 was set in 2016 with the "Climate Action Plan 2050". For the first time, the plan also includes sectoral GHG targets for 2020. With the "Climate Protection Programme 2030", the measures to achieve these 2030 targets are being concretised by a broad package of measures comprising innovations, funding, regulation, and a new pricing system for greenhouse gases. With the "Climate Action Law" from November 2019, the sectoral 2030 targets have been made legally binding. In addition, the "Energy Efficiency Strategy 2050" was adopted in December 2019. It defines a new energy efficiency target for 2030 and thereby contributes to the new EU target for 2030, bundles the necessary measures in a new "National Action Plan for Energy Efficiency" (NAPE 2.0) and contains specifications for the design of a dialogue process "Roadmap Energy Efficiency 2050".



Table 1: Sample of cross-cutting measures

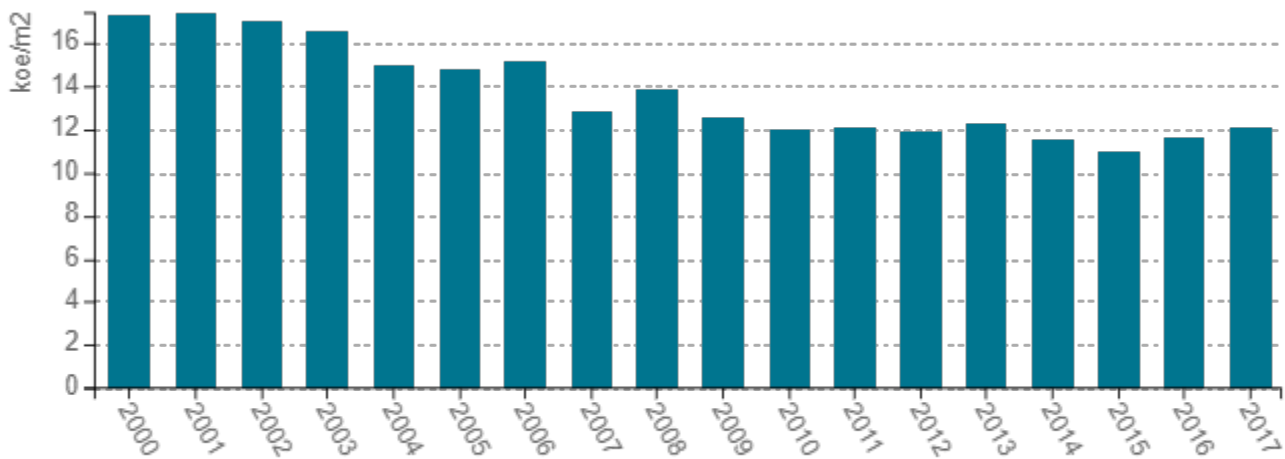
Measures	NEEAP measures	Description	Expected savings, impact evaluation	More information available
Energy Efficiency Fund	yes	Fund to promote rational and economical use of energy	2017: 12.2 PJ 2017: 1.2 Mt CO ₂ eq.	Link
Climate Action Programme 2020	yes	Program containing several components to push the achievement of the 2020 climate target	2020: 43 – 56 Mt CO ₂ eq.	Link

Source: MURE

Buildings

As shown in Figure 3 the household energy consumption per m² for space heating has decreased by 30% since 2000, from 17.4 koe/m² to 12 koe/m² in 2017. While the consumption per dwelling for water heating increased by 46 % from 2000 to 2017 (from 0.19 toe/dw to 0.27 toe/dw), while the consumption for appliances and cooking stayed almost constant.

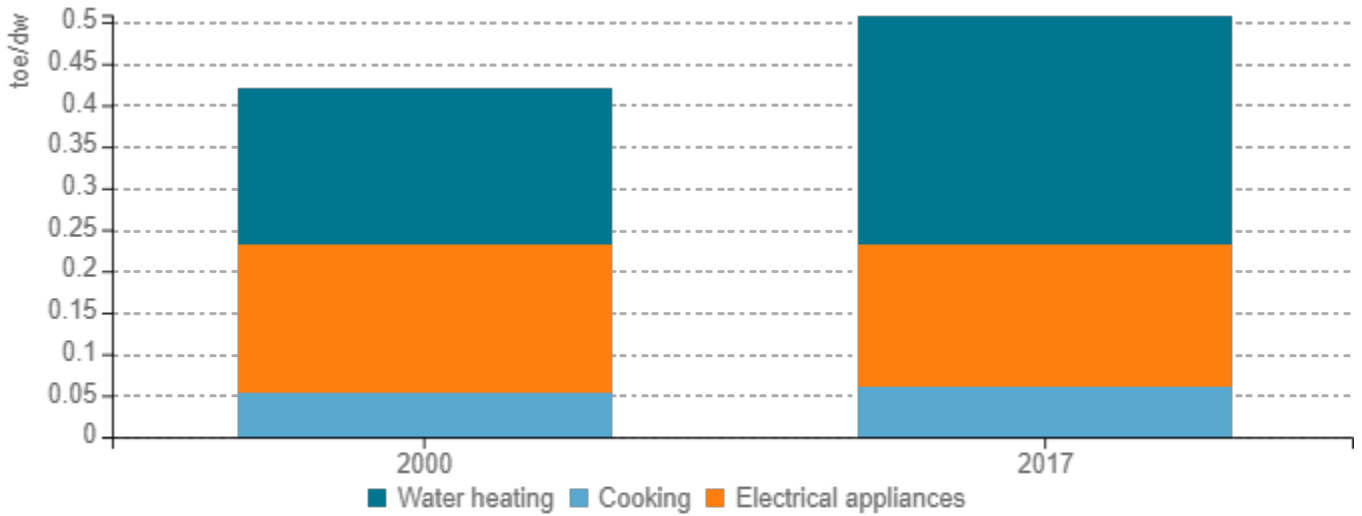
Figure 3: Energy consumption of space heating per m² (normal climate)



Source: ODYSSEE



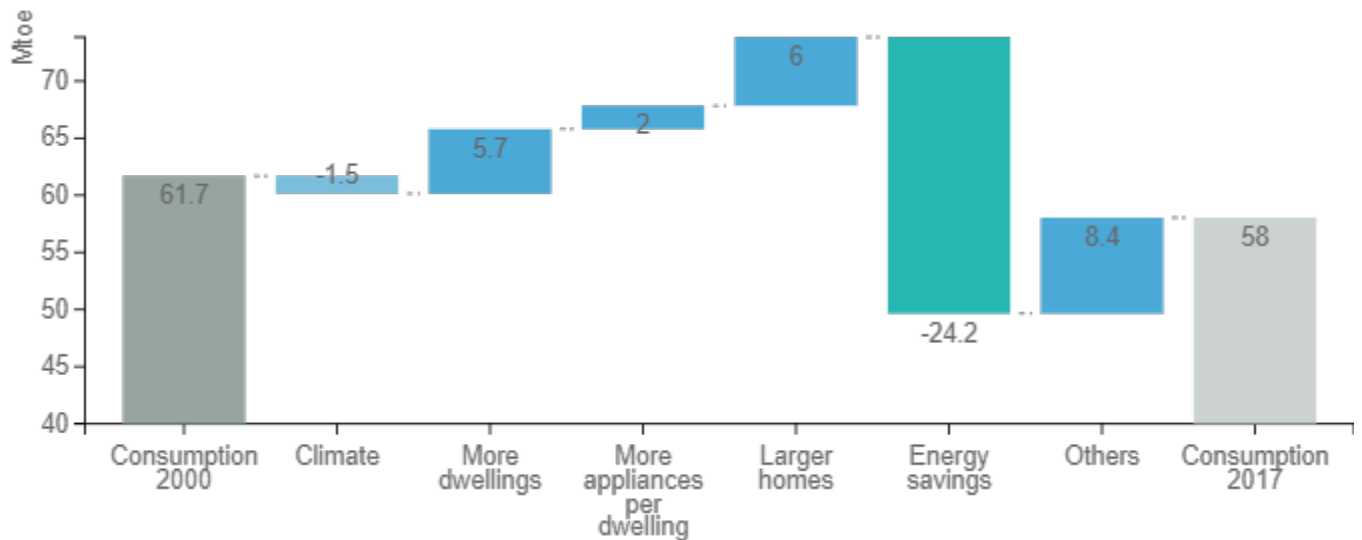
Figure 4: Energy consumption by end-uses per dwelling



Source: ODYSSEE

The total final energy consumption of households was around 4 Mtoe lower in 2017 than in 2000. Two main factors contributed to increase energy consumption – more dwellings (6 Mtoe) and lifestyles (8 Mtoe, due to larger home and more appliances per dwelling). On the opposite, energy savings decreased the consumption by around 24 Mtoe.

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

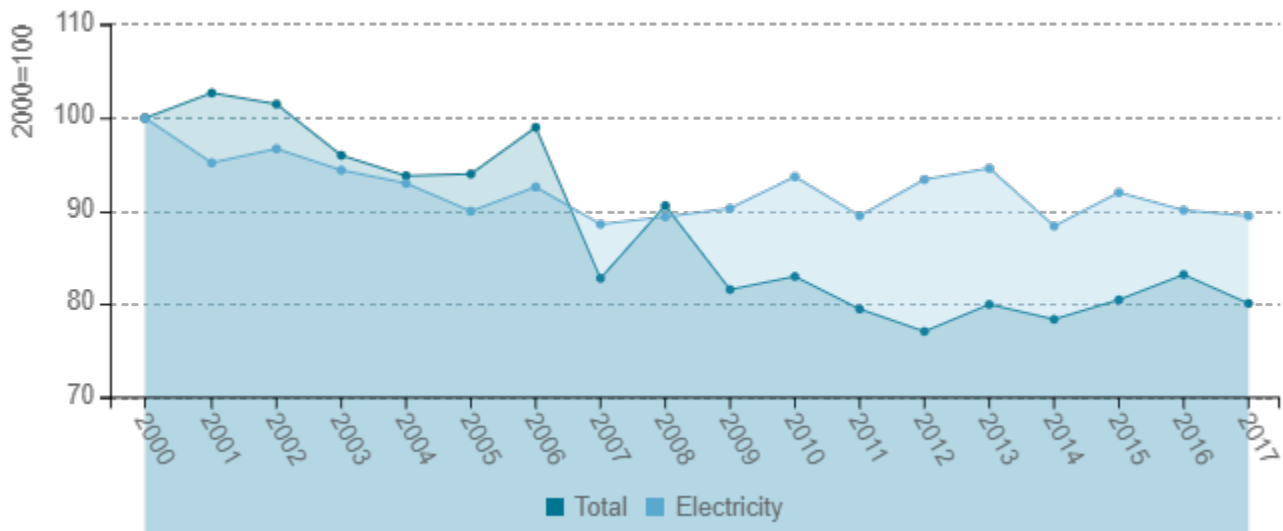


Source: ODYSSEE

The final energy consumption per employee is steadily declining at a rate of 1.3% per year from 2000 to 2017. The specific consumption of electricity decreased slower at 0.7% per year and stayed relatively constant over the last 10 years.



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



Source: ODYSSEE

To achieve the target of a virtually climate-neutral building stock in Germany by 2050, a set of programmes was established, of which some have already been in place for many years. As decided in the Climate Action Programme 2030, the funding conditions for these programmes are now improved and combined in a new "Federal Funding for efficient Buildings (BEG)" starting in 2020. It consists of several modules which come from the former funding programmes: (1) BEG Residential Buildings (former KfW programme for energy-efficient construction and renovation) (2) BEG Non-residential Buildings (former KfW programme for energy-efficient refurbishment of non-residential buildings) (3) BEG Individual Measures BAFA/ KfW Market incentive programme for renewable energies incl. Energy Efficiency Incentive Programme (APEE). As an alternative to the Federal funding, tax incentives for the energy-efficient renovation of residential buildings were also introduced from 2020. A draft bill for a new "Building Energy Act (GEG)" was adopted by the Federal Cabinet in October 2019. The act creates a new, uniform, and coordinated set of rules for the energy requirements for new buildings, for existing buildings and for the use of renewable energies in buildings. The new act will merge the previous Energy Savings Regulation (EnEV) and the Renewable Energy Heat Act (EEWärmeG).

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

Measures	Description	Expected savings, impact evaluation	More information available
Energy Efficiency Incentive programme (APEE)	Funding of modernisations of heating and ventilation systems	2020: 7 PJ 2030: 13 PJ	Link
Energy Saving Ordinance (EnEV)	Tightening of requirements for new buildings regarding primary energy consumption and thermal insulation	2020: 44.8 PJ 2030: 115.2	Link

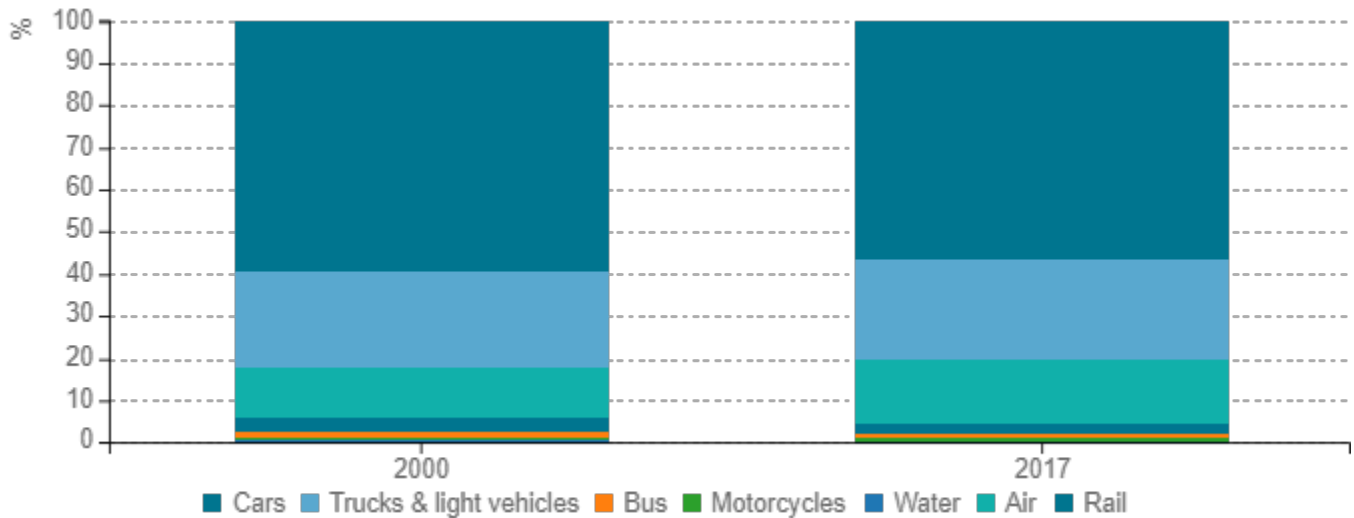
Source: MURE



Transport

Final energy consumption in transport is dominated by cars covering 56% of total consumption in 2017. The share of road freight stayed almost constant (24%), while rail transport dropped from 3.3% to 1.9%. In the same period the share of air traffic, including international transport, increased from 11.7% to 15.5%

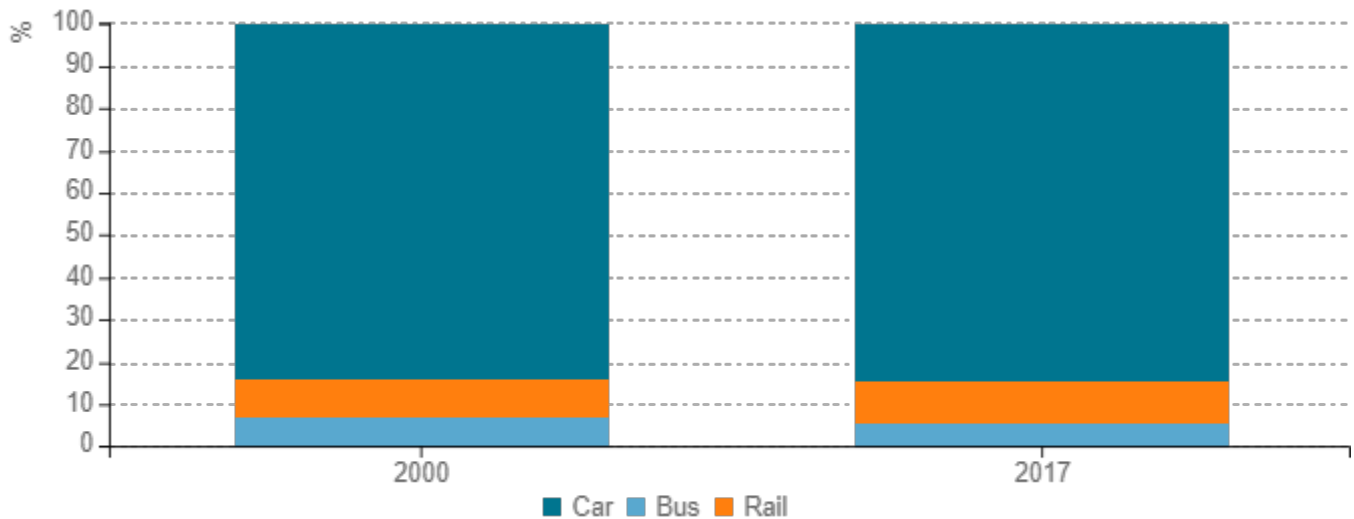
Figure 7: Split of the transport energy consumption by modes



Source: ODYSSEE

Cars represented 84.4% of passenger traffic in 2017, followed by rail with 10% and only 5.6% for bus. The share of cars stayed relatively constant in comparison to 2000, while the share of rail slightly increased by 1.1 % points.

Figure 8: Share of transport modes in passenger traffic

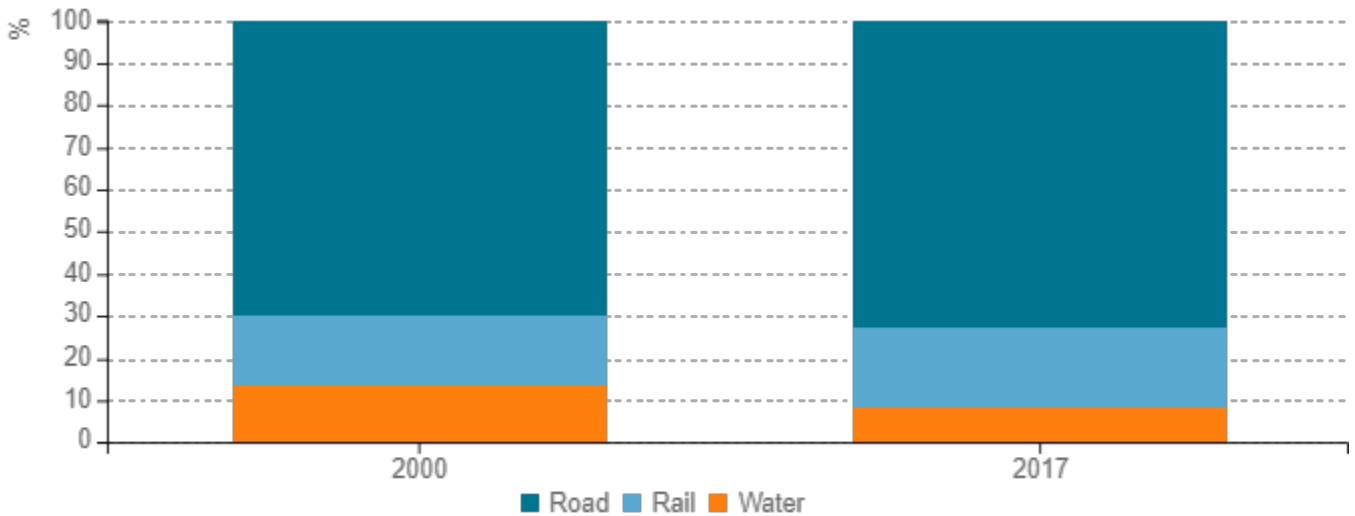


Source: ODYSSEE

Road freight transport represents 73% of total freight traffic in 2017, 2.5% points more than in 2000. The share of rail transport of freight increased strongly by 2.5% points, while the share of water traffic decreased by 5% points to 8%.



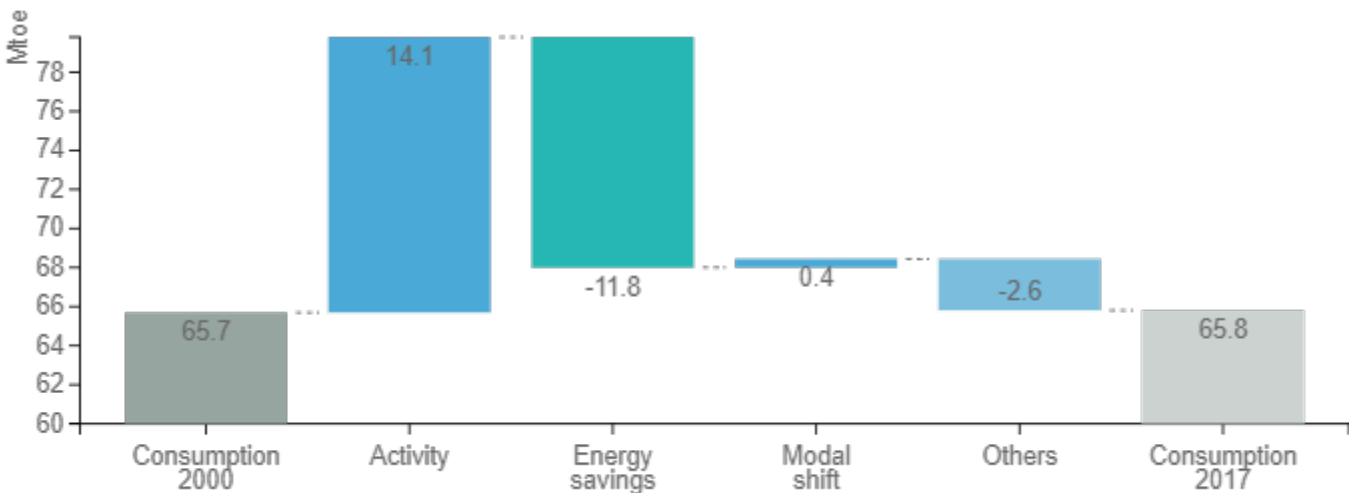
Figure 9: Share of modes in freight traffic



Source: ODYSSEE

Germany's total final energy consumption for transport was almost at the same level in 2017 as in 2000 (+0.1 Mtoe). The increasing traffic of passengers and freight contributed to increase the consumption by 14 Mtoe. This trend was counterbalanced by energy savings (12 Mtoe). Modal shift had a slightly increasing effect of 0.4 Mtoe, while other effects resulted in a decrease of almost 3 Mtoe.

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



Source: ODYSSEE

The Climate Action Programme 2030 includes several bundles of measures addressing different fields of action in the transport sector: (1) public transport, bicycle and pedestrian traffic (2) alternative fuels (3) Freight traffic (4) Private vehicles (5) Commercial vehicles (6) digitalisation. With regard to energy efficiency, especially the following measures are important: (a) Increase in the environmental bonus for the purchase of electric vehicles (b) Funding programme for the purchase of electric buses in local public transport (c) Promotion of energy-efficient and/or low-emission heavy goods vehicles in road haulage companies (d) Heavy goods vehicle toll charges with CO2 component (e) Reduction of value added tax for long-distance rail travel from 19% to 7% (f) Increase in the Aviation Tax (g) Electricity-based fuels.



Table 3: Policies and measures into force in the transport sector

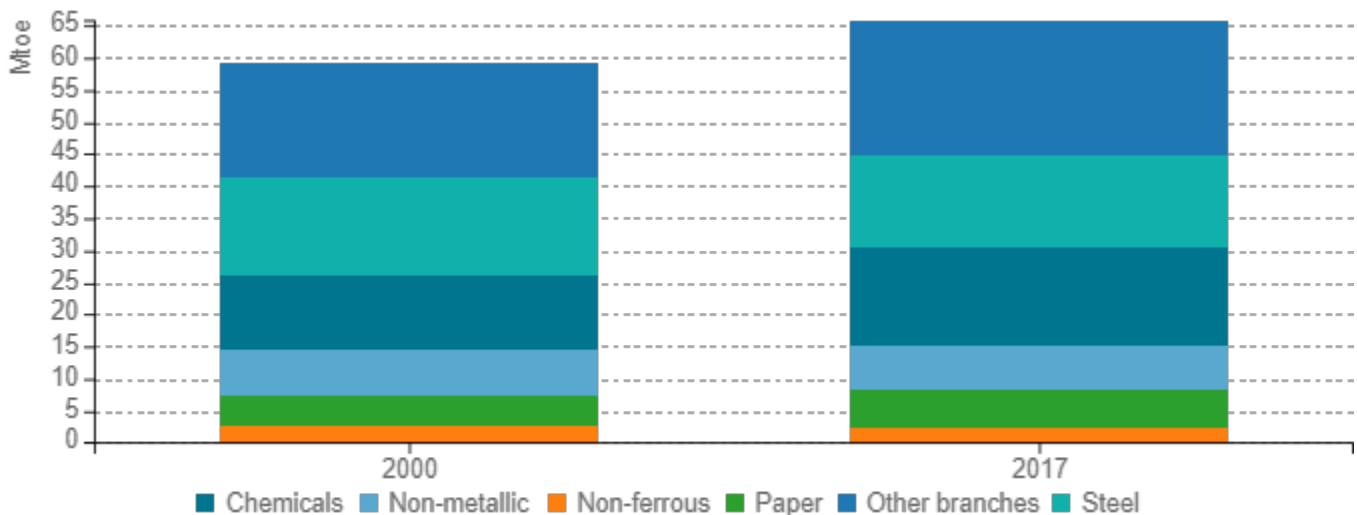
Measures	Description	Expected savings, impact evaluation	More information available
Environmental Bonus	Financial support for the purchase of BEV and PHEV.	2020: 0.5 MtCO ₂ eq. 2030: 0.2 MtCO ₂ eq. (direct emission reductions)	Link (in German)

Source: MURE

Industry

The total consumption of the industry sector increased from 59.3 Mtoe in 2000 to 65.7 Mtoe in 2017 (+11%). Consumption of chemical industry increased by 34 % in this time period, while the energy consumption of the pulp and paper sector increased by 22%. Other industries' energy consumption increased by 17%.

Figure 11: Final energy consumption by branch

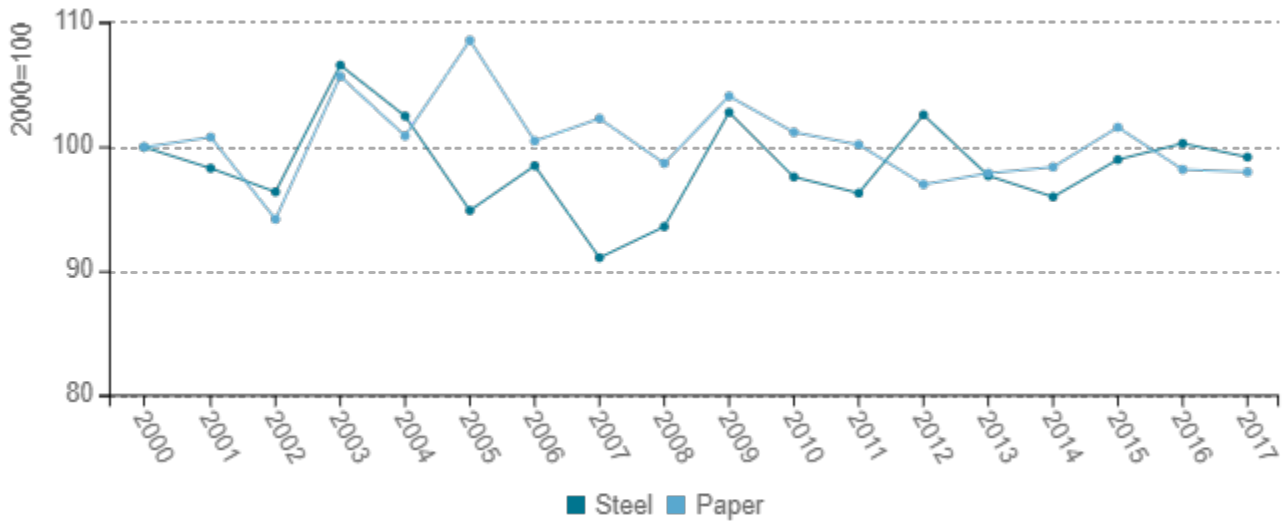


Source: ODYSSEE, steel including blast furnaces

Specific consumption of steel and paper production remained at the level of 2000 in 2017, with however some fluctuations, with an increase due to capacity effects during low utilization of production capacities.



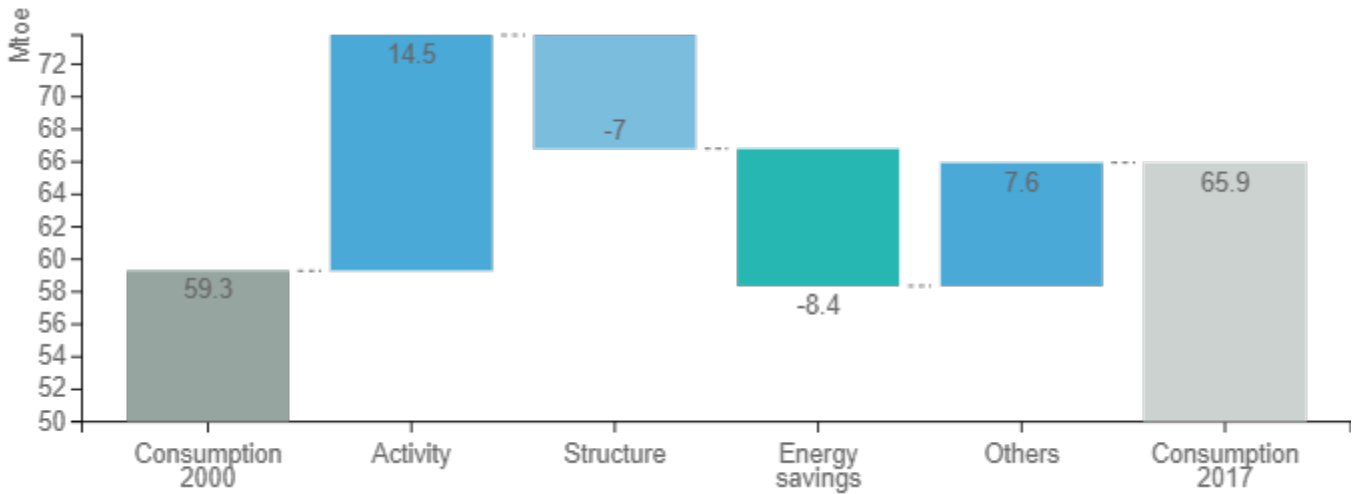
Figure 12: Unit consumption of energy-intensive products (toe/t)



Source: ODYSSEE

The increase of industry's energy consumption by 7 Mtoe between 2000 and 2017 was mainly driven by change in industrial activity (14.5 Mtoe). This effect was counterbalanced by energy savings (-8.4 Mtoe) and structural changes towards less intensive branches, which increased their contribution in industrial value added (-7 Mtoe).

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



Source: ODYSSEE

In 2019, the main funding programmes to improve energy efficiency in companies were improved and combined in two new programmes: (1) Federal Funding for Energy Efficiency in Companies - Grant and Loan, comprising 4 modules which take up previous funding programmes (2) Federal Funding for Energy Efficiency in Companies - Auctions. This aims at facilitating the access to these programmes for companies. In the new Energy Efficiency Strategy 2050, a further development of the Energy Efficiency Networks Initiative is announced.



Table 4: Policies and measures into force in industry

Measures	Description	Expected savings, impact evaluation	More information available
Energy consulting in SME	Funding of energy consulting in SME	2020: 34.5 PJ 2030: 40.1 PJ	Link
Energy Efficiency Networks Initiative	Introduction of 500 energy efficiency networks in industry, trade and commerce	2020: 15.8 PJ 2030: 54.3 PJ	Link

Source: MURE

