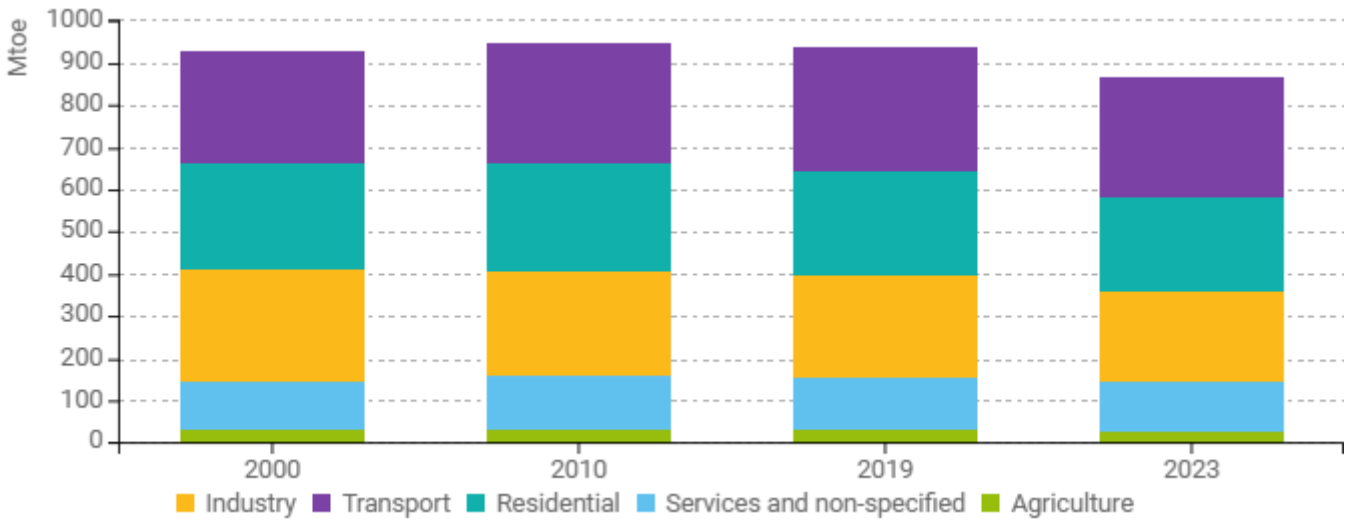
Energy efficiency trends and policies

Overview

Final energy consumption in the European Union has been declining since 2018 (-1.6%/year), reaching its lowest level since 2000 in 2023, at 868 Mtoe. It had risen until 2008 (+0.7%/year over 2000-2008) and declined between 2008 and 2014 because of the economic crisis (-1.4%/year). It had then rebounded until 2018 (+1.3%/year). The share of transport in final energy consumption has increased, from 30% in 2010 to 33% in 2023. In contrast, the share of industry has decreased by over 2 percentage points, from 26% in 2010 to 24% in 2023. The share of energy consumption attributed to households and services declined by 1 percentage point compared to 2010, accounting for 26% and 13%, respectively, in 2023. The share of agriculture is fairly stable (3%).

Figure 1: Final energy consumption by sector (with climatic corrections)



Source: ODYSSEE

Energy efficiency of final consumers, as measured by ODEX indicator, improved by 1.4%/year between 2010 and 2023, i.e. by 16% over the period. Households, industry and services achieved larger gains (1.6%/year), with a marked acceleration since 2019 (2.4%/year for households against 1.2%/year over 2010-2019, 2.4%/year for industry and 2.2%/year for services). The transport sector has achieved the least progress: 11% since 2010, i.e. 0.9%/year.

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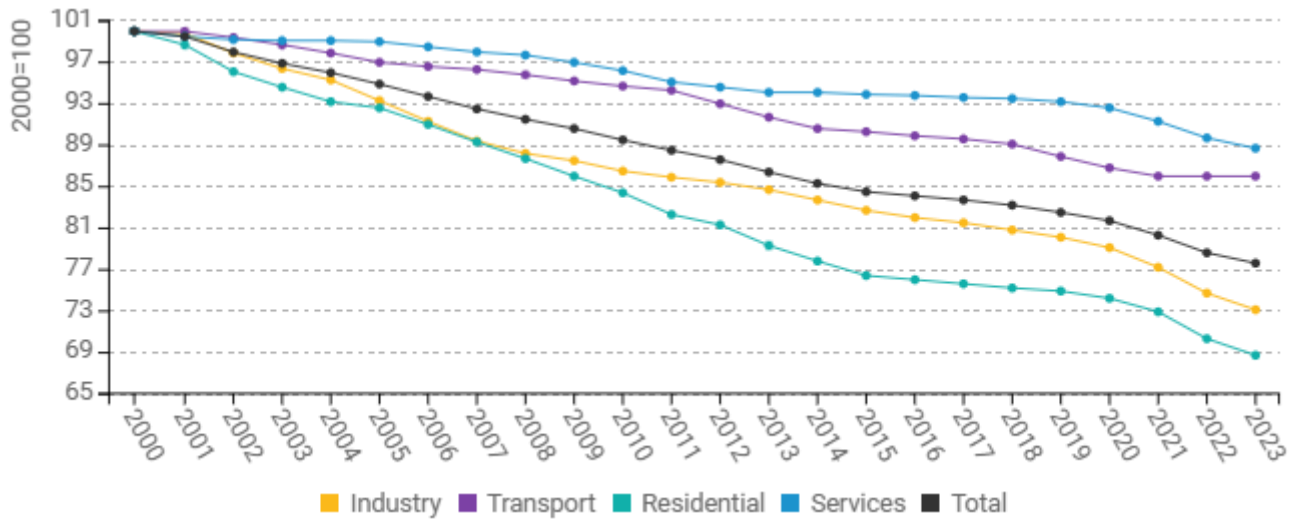
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

Energy efficiency is a key pillar within the EU's long-term strategy to achieve climate neutrality by 2050. Consequently, the revision of the Energy Efficiency Directive (EED) was an important part of the "Fit for 55" package under the European Green Deal, aiming at delivering additional GHG emissions reductions by revising the key EU energy legislation. In mid 2024, all Fit for 55 proposals from the European Commission have been adopted by the Euroopean Parliament. Besides the EED recast (DIRECTIVE (EU) 2023/1791 of 13 September 2023), several other Directives have an impact on energy efficiency, as e.g. the reform of the EU-ETS, the new ETS for building and road transport fuels, the Social Climate Fund, the CO2 emissions standards for cars and vans, the Energy Performance of Buildings Directive and the Renewable Energy Directive. With the Commission's priorities for the period 2024-2029 with a strong focus on EU's security and competitiveness, further adjustments to this regulation are to be expected. First steps were the agreement to postpone the start of the new ETS2 from 2027 to 2028 and the proposed revision of the regulation on CO2 standards for cars and vans from December 2025.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
Energy Efficiency Directive (EED) - Directive (EU) 2023/1791 (as amended 2023)	No	The revised Directive (EU/2023/1791) establishes a common framework of measures to promote energy efficiency within the Union in order to ensure that the Union's targets on energy efficiency are met and enables further energy efficiency improvements. The aim of that common framework is to contribute to the implementation of Regulation (EU) 2021/1119 of the European Parliament and of the Council and to the Union's	High impact

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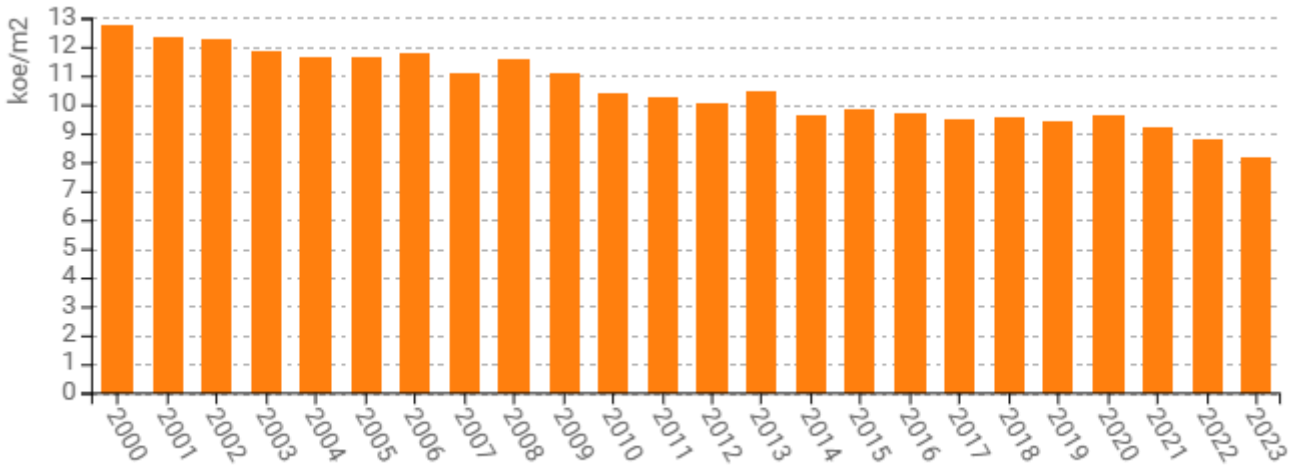
		security of energy supply by reducing its dependence on energy imports, including fossil fuels. The Directive lays down rules designed to implement energy efficiency as a priority across all sectors, remove barriers in the energy market and overcome market failures that impede efficiency in the supply, transmission, storage and use of energy. It also provides for the establishment of indicative national energy efficiency contributions for 2030. The Directive contributes to the implementation of the energy efficiency first principle, thus also contributing to the Union being an inclusive, fair and prosperous society with a modern, resource-efficient and competitive economy.	

Source: MURE

Buildings

Heating is by far the largest end-use for households (62% in 2023). The heating consumption of households per m² has decreased by 1.1%/year over 2010-2023 thanks to the tightening of building codes, coupled with financial incentives to promote thermal retrofitting of existing dwellings and the adoption of more efficient heating systems. The decrease has shown a marked acceleration since 2020, with a 4.8%/year decrease from 2020 to 2023. The energy consumption per dwelling decreased less than the consumption per m² (by 1.7%/year and 1.8%/year over 2010-2023 respectively) due to an increase in the average dwelling size (+0.1%/year since 2000). The shares water heating is decreasing (40% in 2022, -2 percentage points since 2010) while electrical appliances and lighting is increasing (40% in 2023, + 1.4 points since 2010); the share of cooking is stable at 18% and that of air conditioning (AC) remains marginal.

Figure 3: Energy consumption of household space heating per m2 (with climatic corrections)



Source: ODYSSEE

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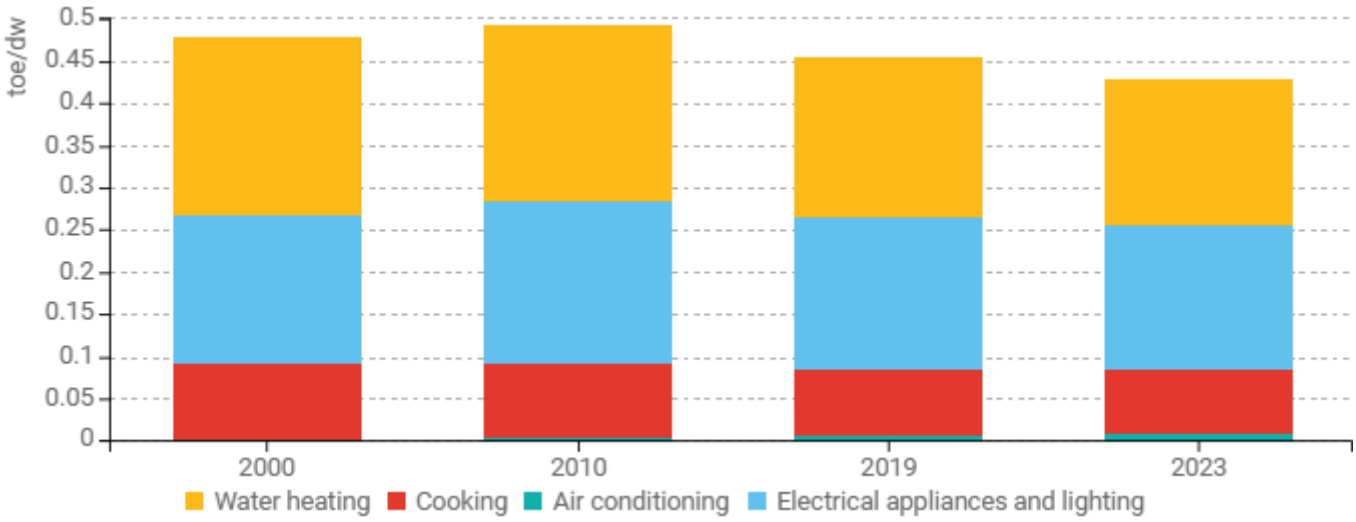
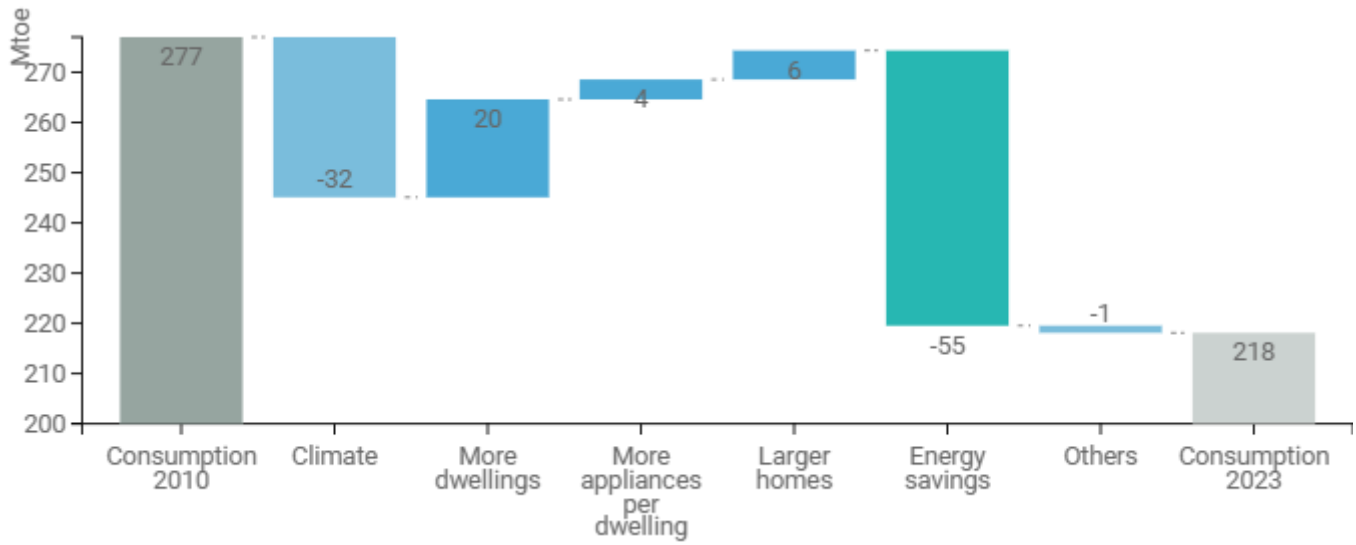
Figure 4: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

In 2023, energy consumption of households reached 218 Mtoe, around 21% (59 Mtoe) lower than its 2010 level. Despite a growing number of dwellings (+20 Mtoe), larger homes (+6 Mtoe), an increasing number of appliances (+4 Mtoe), the energy consumption decreased over the period thanks to energy savings, which offset all these growth factors (-55 Mtoe). Additionally, a warmer climate in 2023 than in 2010 also contributed to this decrease (-32 Mtoe). "Others" (-1 Mtoe) results mostly from consumption reduction due to behavioural changes, linked to price increases since 2021 and sufficiency.

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



Source: ODYSSEE

The energy consumption per employee in services has overall been decreasing since 2010 (-2.0%/year) and stands below its 2000 level in 2023 (0.73toe/emp). It remained stable during the period of low economic growth (2007-

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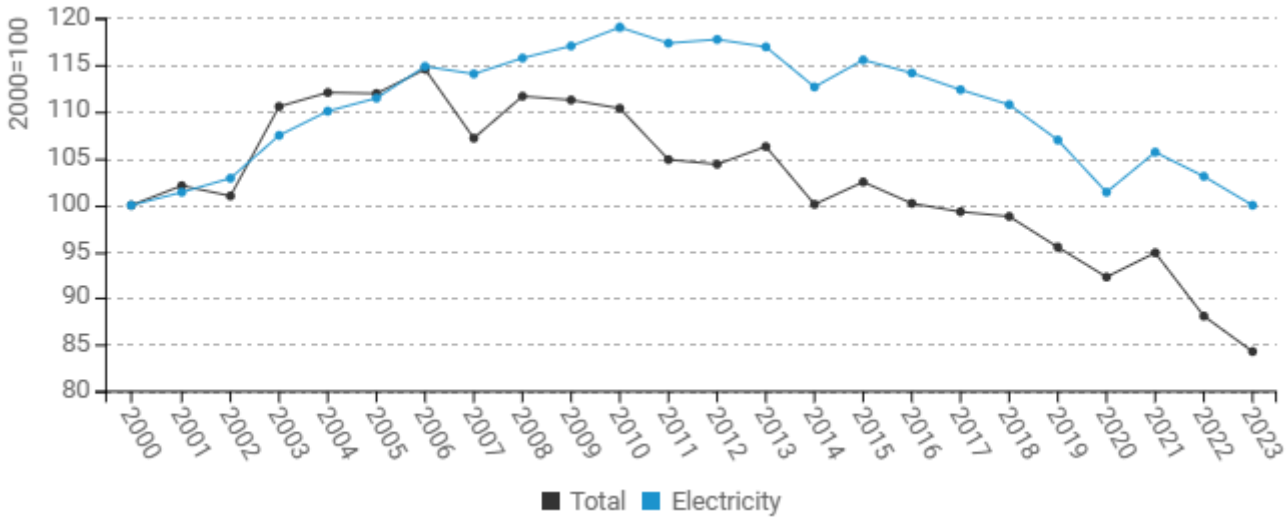
2010) (+0.1%/year) as the consumption decrease did not follow the activity slowdown. The electricity consumption per m² increased by 1.8%/year until 2010 and has been decreasing afterwards (-1.2%/year), down to around 4471 kWh/emp in 2023.

Figure 6: Energy and electricity consumption per employee in services (with climatic corrections)



Source: ODYSSEE

The legislative framework for the European building sector is set by two key regulations. The Energy Performance of Buildings Directive (EPBD) was first introduced in 2010 (2010/31/EU), the Energy Efficiency Directive (EED) in 2012 (2012/27/EU). Both Directives were last revised as part of the implementation of the Green Deal and the Fit for 55 package of the EU (revised EPBD: EU/2024/1275; revised EED: EU/2023/1791). The revised EPBD focuses on increasing the rate of renovation in the EU, particularly for the worst-performing buildings and covers 4 focus areas: (1) Renovation (2) Decarbonisation (3) Modernisation and digitalisation (4) Financing and technical assistance.Additionally, as part of the 2023 revision of the EU ETS Directive, a new emissions trading system for buildings, road transport and additional sectors (ETS 2) was created, separate from the existing EU ETS. This new system should have started in 2027. In December 2025, however, EU institutions and Member States agreed to postpone the start of of the ETS 2 to 2028. Alongside the ETS 2, the Social Climate Fund (SCF) was established. The SCF aims to ease the social and economic effects of ETS2 and ensure a fair transition to climate neutrality by supporting vulnerable groups.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Energy Performance of	No	The Energy Performance of Buildings Directive (EPBD) contributes to the goal of achieving a fully decarbonized building stock by 2050,	High impact

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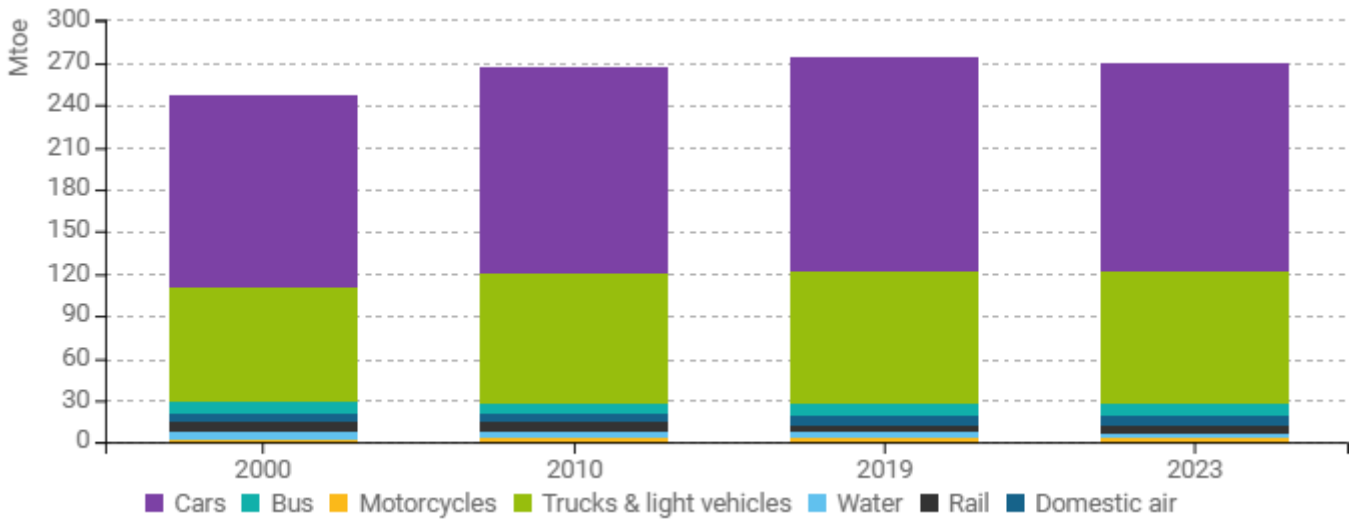
Buildings EPBD Recast (EU/2024/1275)		thereby directly contributing to the EU's energy and climate goals. The directive promotes policies that help to achieve an energy efficient building stock, create a stable environment for investment decisions, and enable consumers and businesses to make more informed choices to save energy and money. The EPBD was first introduced in May 2010 and has since been revised two times, with the last time being in May 2024. The 2024 recast especially focuses on the following areas: (1) Renovation (2) Decarbonisation (3) Modernisation and digitalisation (4) Financing and technical assistance	

Source: MURE

Transport

The energy consumption of transport reached 270 Mtoe in 2023, marking a 0.7% increase compared to the 2010 level. The sector has nearly returned to pre-pandemic levels, with 2023 consumption just slightly below 2019 figures. Its distribution by mode has remained stable since 2010, road transport accounting for around 94%, same level as in 2010. Cars represent 55% of the sector's consumption and road freight transport (trucks and light duty vehicles) 35% in 2023.

Figure 7: Transport energy consumption by mode



Source: ODYSSEE

Passenger traffic stood at 5200 Gpkm in 2023 (i.e. 11640 km/capita), 2% lower than its pre-pandemic level, after an increase by 0.8%/year between 2010 and 2019. The share of public transport has almost returned to its pre-pandemic level (18% in 2023). It had remained relatively stable between 2000 and 2019 (around 18%), but fell significantly in 2020 and 2021 due to the Covid pandemic (14%).

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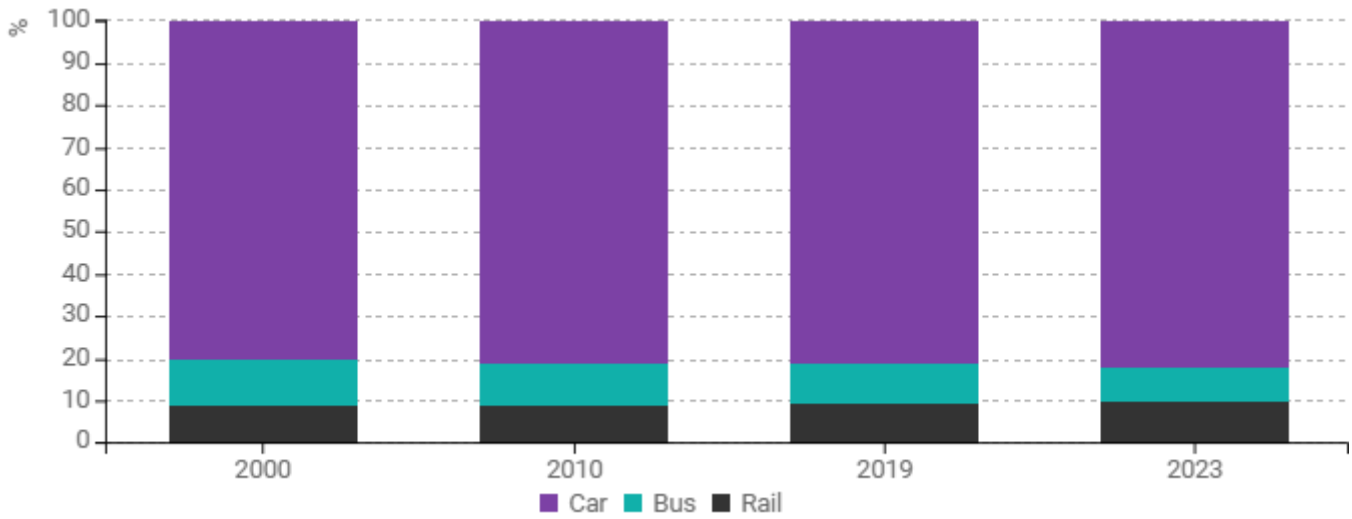
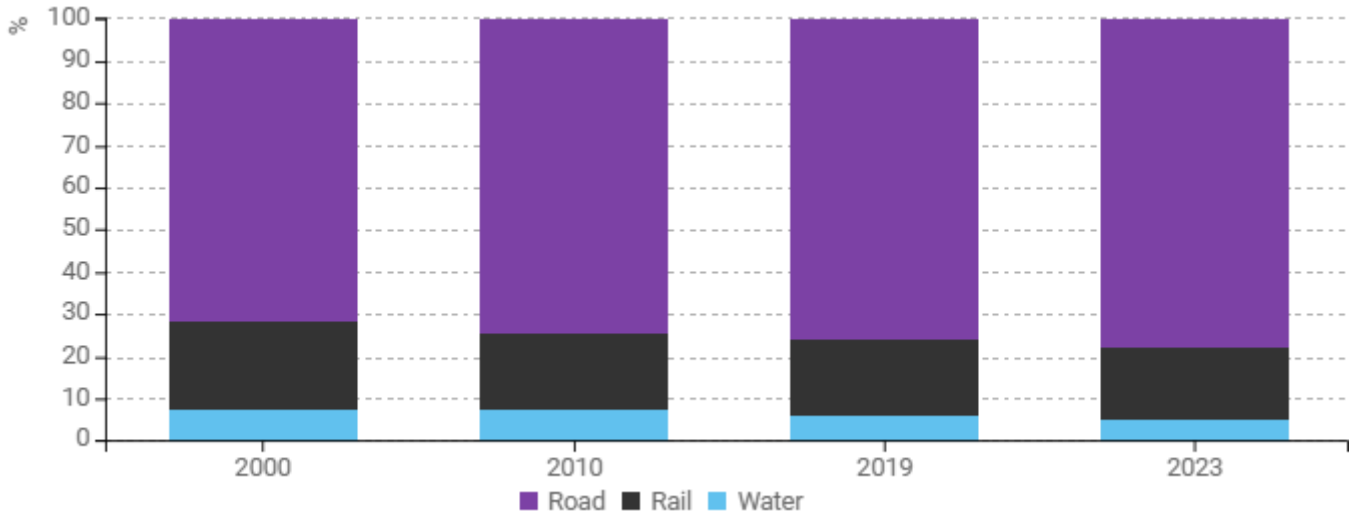
Figure 8: Modal split of inland passenger traffic



Source: ODYSSEE

Freight traffic has increased by 11% since 2010. Despite a decline of 2.9% in 2020, it has returned to its pre-pandemic level since 2021, reaching around 2320 Gtkm in 2023. The share of rail and water traffic (22% in 2023) has decreased at EU level (-3 percentage points since 2010), despite the policies implemented to promote these modes.

Figure 9: Modal split of inland freight traffic



Source: ODYSSEE

The consumption of transport only increased by 2 Mtoe since 2010, despite the growth in passenger and freight traffic, which contributed to increase energy consumption by 21 Mtoe; modal shift and other effects increased it by a further 4 Mtoe. Energy savings (i.e. efficiency improvement of cars, trucks, etc.) offset around 92% of this increase, reducing energy consumption by 23 Mtoe.

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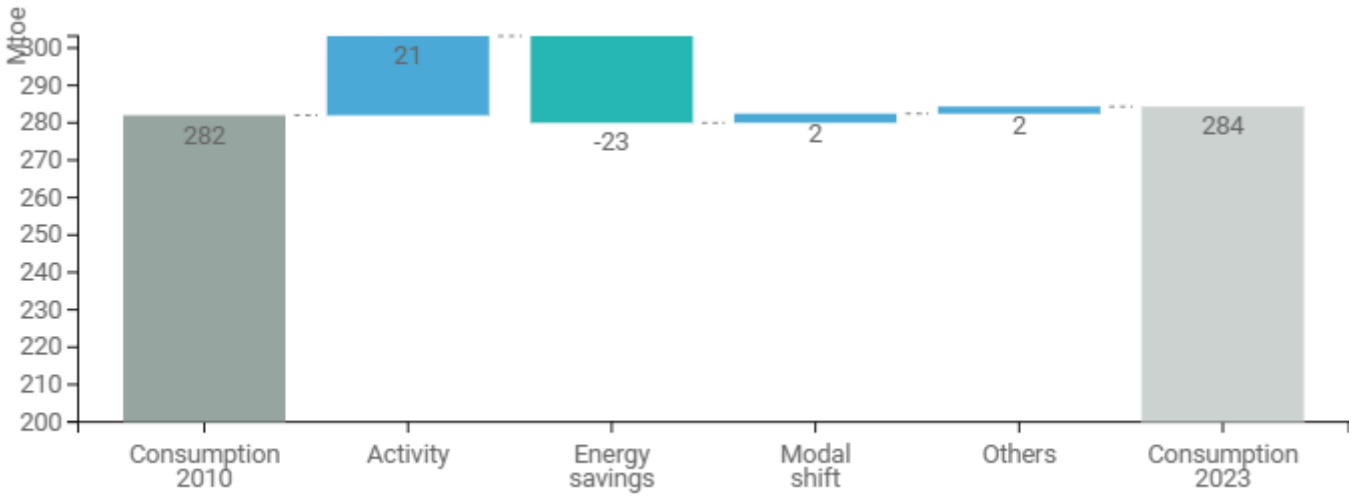
Figure 10: Main drivers of the energy consumption variation in transport



Source: ODYSSEE

The key Directives to increase energy efficiency and reducing CO2 emissions in road transport are mandatory emission reduction targets for new vehicles. For new cars, such targets have been set since 2009 (Regulation 443/2009/EC), for vans since 2011 (Regulation 510/2011/EU). The last revision was adopted in April 2023 (Regulation (EU) 2023/851), as part of the "Fit for 55" legislative package. It introduced a 100% emission reduction target for new passenger cars and vans from 2035 onwards. In December 2025, the Comission presented the Automotive Package, which also includes a proposal for a review of these standards. A new emissions trading system for buildings and road transport was also part of the "Fit for 55" package, expected to start in 2028.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
CO2 emission performance standards for new passenger cars and vans (Regulation (EU) 2019/631, revised by Regulation (EU)	No	The regulation from 2019 sets stricter CO2 emission performance standards for new passenger cars and vans. The revision from 2023 introduced a 100% emission reduction target for new passenger cars and vans from 2035 onwards.	High impact

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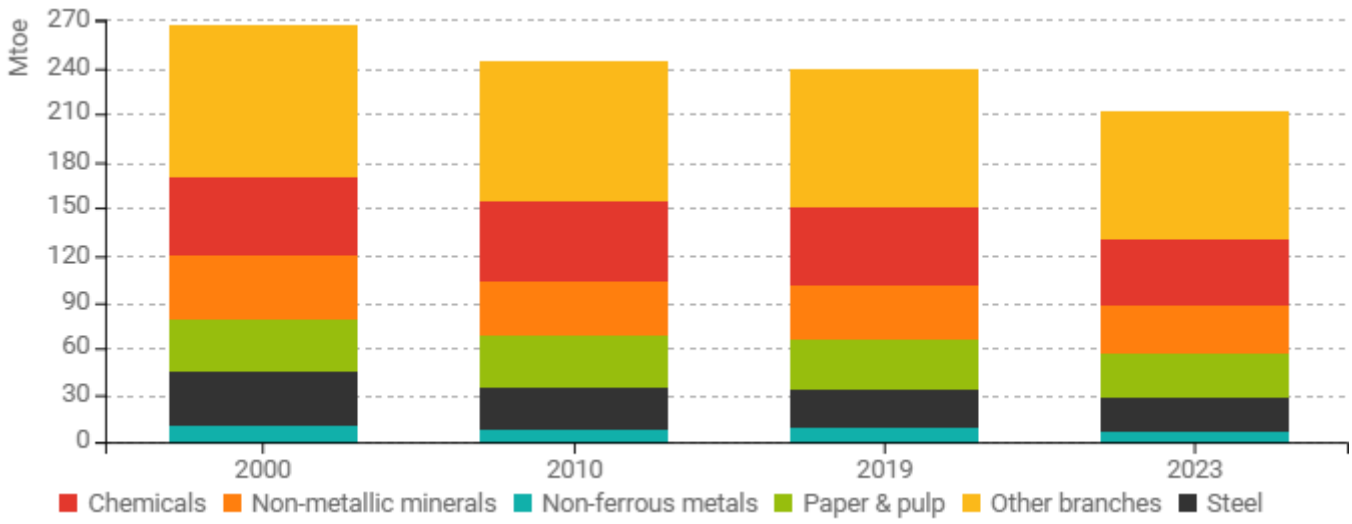
2023/851)			
CO2 emission performance standards for new heavy-duty vehicles (Regulation (EU) 2019/1242)	No	From 2025 on, manufacturers will have to meet the targets set for the fleet-wide average CO2 emissions of their new lorries registered in a given calendar year. Stricter targets will start applying from 2030 on.	High impact

Source: MURE

Industry

Since 2010, energy consumption has decreased in all industrial branches, with the greatest reduction in non-ferrous metal (-22%) and steel industry (-20%). Chemical and non-metallic minerals industries are the main energy consuming branches (respectively 20% and 14% of total industry consumption in 2023); while the share of chemicals is decreasing (-1 percentage point since 2010), the share of non-metallic minerals is stable.

Figure 11: Final energy consumption of industry by branch



Source: ODYSSEE

The specific consumption of steel has been almost stable since 2007, after a sharp decrease over 2000-2007 (-2%/year). The specific consumption of pulp and paper fell by 4% between 2000 and 2007, stabilized through 2014, and subsequently decreased at an average annual rate of 0.6% over 2014–2023. The specific consumption of cement fell sharply between 2000 and 2006 (-1.7%/year) before rebounding after the financial crisis, and then resumed its downward trajectory at 1.3% annually since 2014.

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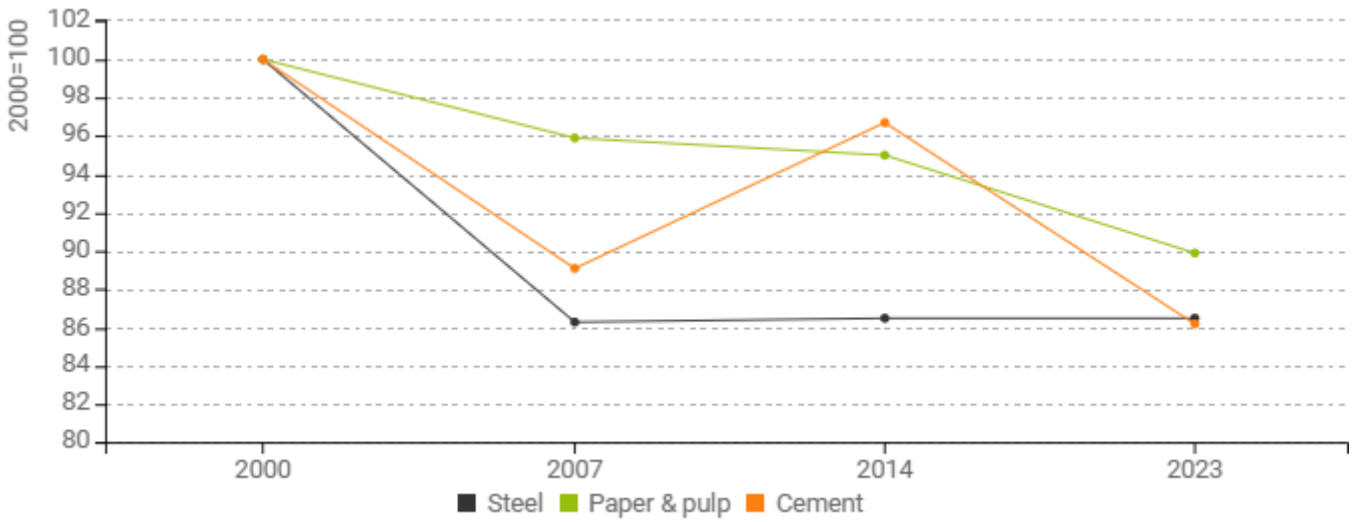
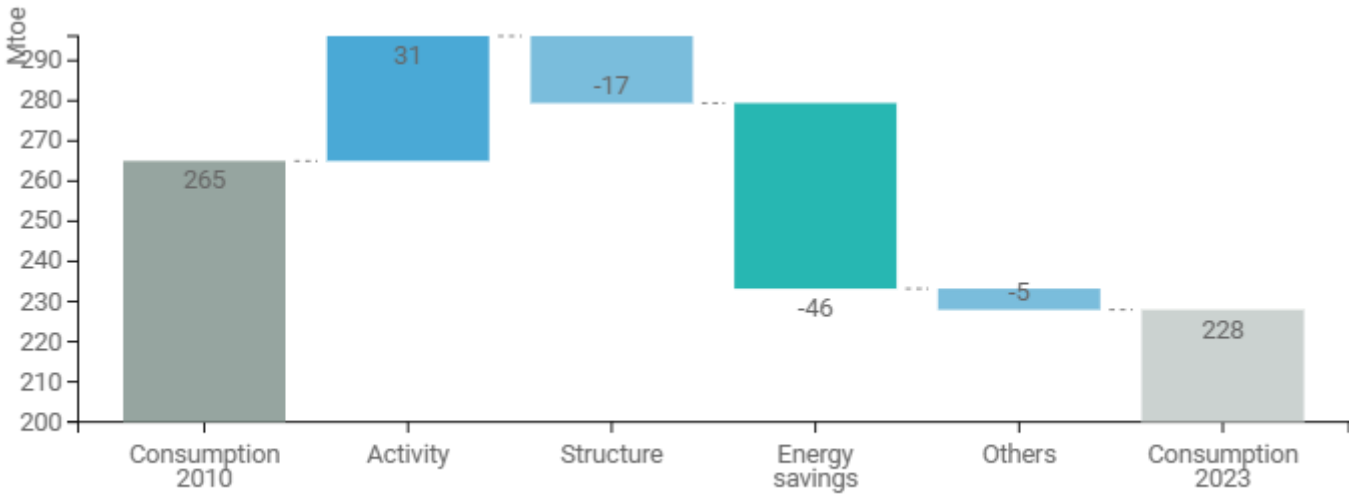
Figure 12: Unit consumption of energy-intensive products (toe/t)



Source: ODYSSEE

The energy consumption of industry decreased by around 37 Mtoe between 2010 and 2023. Energy savings and, to a lesser extent, structural effects (17 Mtoe), i.e. the fact that less intensive branches increased their contribution in industrial value added, contributed to decrease consumption by 46 and 17 Mtoe, respectively, while industrial growth (measured with production index) had a lower effect (31 Mtoe).

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



Source: ODYSSEE

The key regulation for energy-intensive industries is the emissions trading system (ETS). The legislative framework for the current trading period (phase 4 from 2021-2030) was revised in 2018 and again in April 2023. Industrial cross-cutting technologies (as e.g. circulators, electric motors, computers and servers, fans) are regulated by the

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EU's Ecodesign Directive (2009/125/EC). The Green Deal Industrial Plan from 1 Februrary 2023 aims at enhancing the competitiveness of EU's industry and at accelerating the transtion to climate neutrality.

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