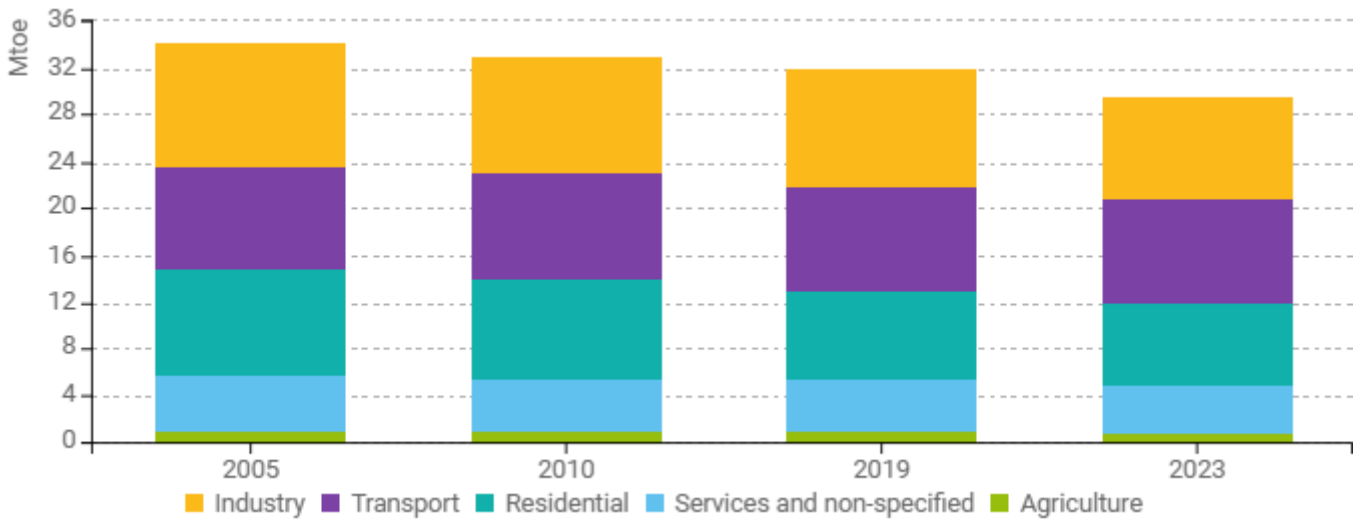
Energy efficiency trends and policies

Overview

Due to data quality issues, 2005 was taken as the base year throughout this report. In 2023, the final energy consumption (with climatic corrections) in Belgium, as calculated by Enerdata, was 30 Mtoe, 10% lower than its 2010 level (33 Mtoe). Industry, historically the largest consumption sector in Belgium, the residential sector and the services sector recorded a decrease in their share of total final energy consumption since 2010, reaching respectively 29% (- 1 percentage point), 24% (- 2 percentage points) and 13% (- 1 percentage point) in 2023. Over the same period, the transport sector increased its share by 3 percentage points to 30% (the same share as that held by industry in 2010).

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



Source: ODYSSEE

Energy efficiency for final consumers improved by an average of 1.5% per year from 2010 to 2023 or 18% over the period, as measured by the ODYSSEE technical energy efficiency index, called ODEX. This improvement was mainly driven by the industrial sector (2.1% per year or 25% over the period) and the residential sector (1.7% per year or 20% over the period). In transport, energy efficiency improvements have been steady, with an average of 0.6% per year since 2010.

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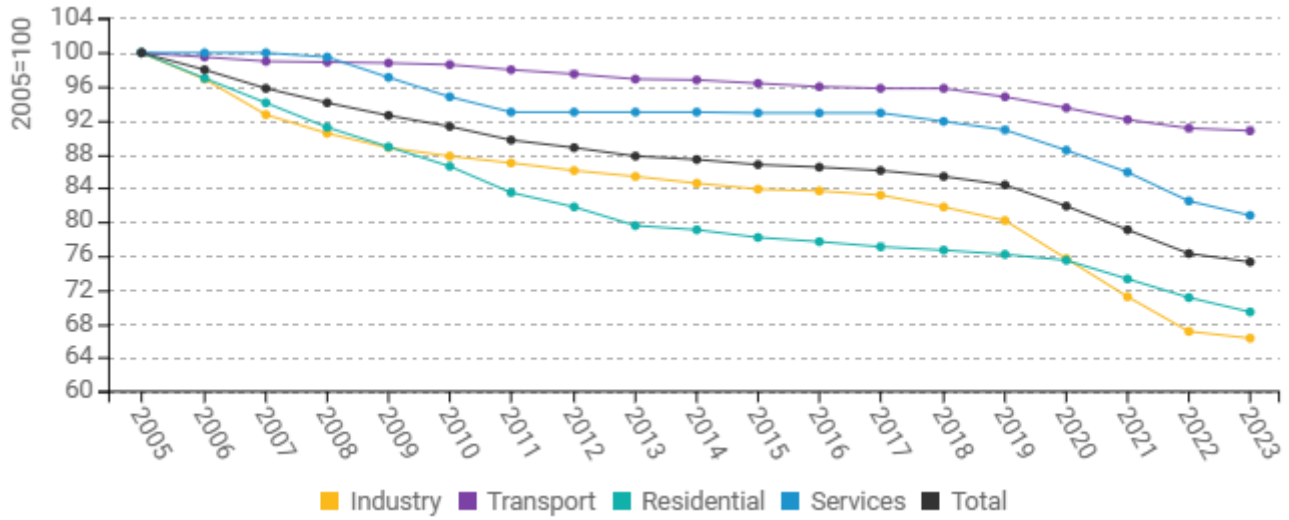
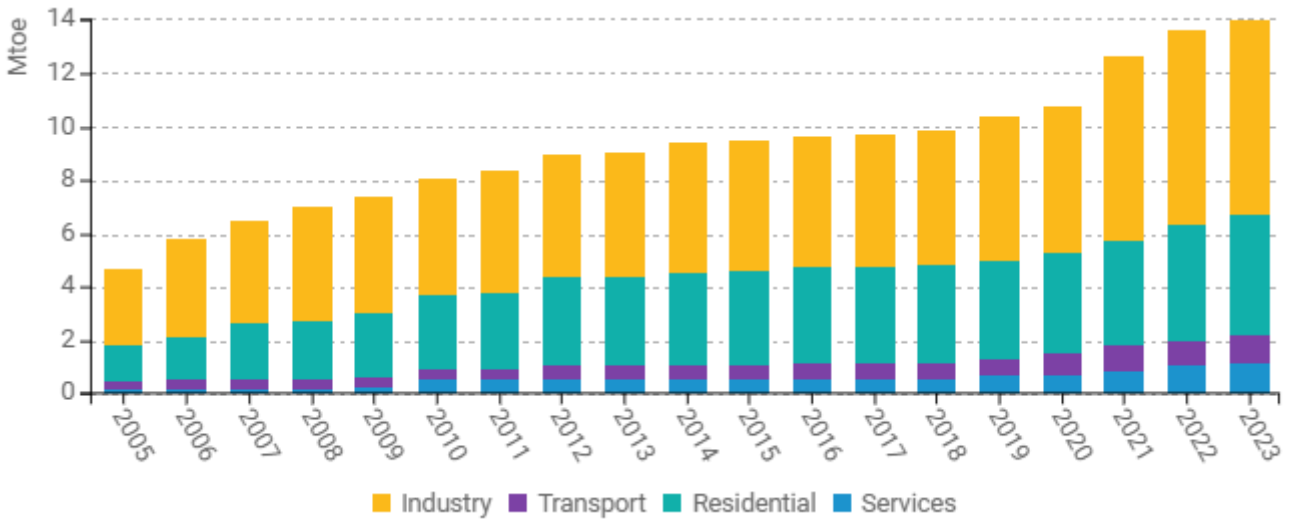
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

Energy savings are mainly to be found in the industry sector (7.3 Mtoe in 2023 since 2000). The residential sector comes second (4.5 Mtoe in 2023). The transport and services sectors saved far less energy (both 1.1 Mtoe in 2023). Additionally, the sharp increases in energy savings observed in the transport sector in 2020 (33%), and in the services, industry and transport sectors (29%, 26% and 13% respectively) in 2021 are likely linked to COVID-19 pandemic measures restricting travel and imposing telework. Similarly, the energy price increases following Russia's invasion of Ukraine could explain some of the savings observed in all sectors in 2022 and 2023.

Figure 3: Cumulated energy savings by sector



Source: Odyssee

Total energy supply decreased by 12 Mtoe between 2010 and 2023 (- 21%). Only 44% of this reduction is explained by the decrease in the final consumption for energy uses (- 5.4 Mtoe). The rest is mostly explained by a

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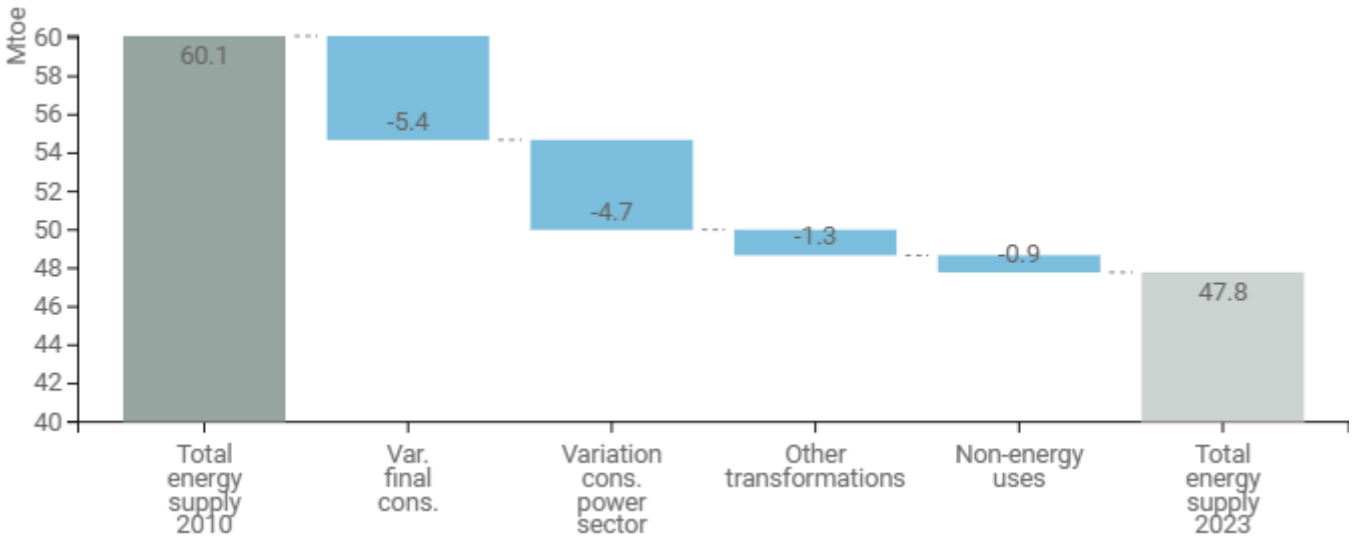
reduction in the consumption of the power sector (- 4.7 Mtoe) due to improvements in the thermal power efficiency (- 0.9 Mtoe) and changes in the power mix (- 2.4 Mtoe). Indeed, the transformation of renewable energy sources such as wind or solar energy into electricity is more efficient (100%) than that of fossil energy sources (between 30% and 50%) or nuclear energy (33%), which generates losses (mainly in the form of heat).

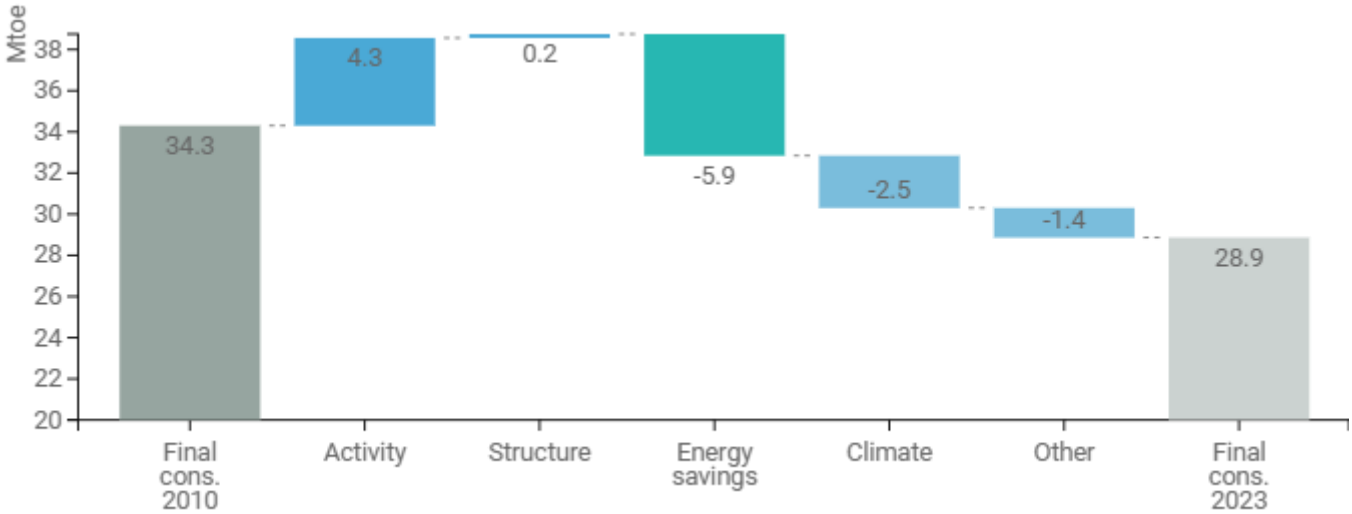
Figure 4: Main drivers of the total energy supply variation



Source: Odyssee

Between 2010 and 2023, the final energy consumption fell by 16% (- 5.4 Mtoe). Energy savings (- 5.9 Mtoe), climate (- 2.5 Mtoe) and changes in other drivers (- 1.4 Mtoe), like behaviors of households or labor productivity in services, exceeded the rise in economic, sociodemographic and transport activities (4.3 Mtoe) and the structural changes in industry or transport, such as modal shift (0.2 Mtoe). The energy prices crisis linked to the geopolitical situation in Ukraine has led to (perhaps temporary) changes in behaviors and likely also to investments in energy efficiency improvements.

Figure 5: Main drivers of the final energy consumption variation



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Source: Odyssee

Belgium is a federal state, in which energy efficiency is a competence of the three Regions (Flanders, Wallonia and Brussels-Capital), with supporting measures from the federal government. Within the framework of Art. 4 of the Energy Efficiency Directive (EED) recast (directive (EU) 2023/1791), Belgium has set an indicative energy efficiency target: a primary energy consumption of 36.5 Mtoe in 2030, corresponding to a final energy consumption of 29.9 Mtoe.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
EU-related: Energy Efficiency Directive (EED) - Directive 2012/27/EU - Federal government - Public procurement requirements for the central administrations	Yes	Addresses inefficiencies in public procurement by mandating energy performance criteria for products, services, and buildings. This regulatory measure ensures sustainable purchasing practices, aiming to reduce energy consumption and foster environmental responsibility. Implemented in 2014, it targets central authorities across Belgium.	/
Brussels - Green Certificates for renewable electricity and high yield cogeneration	Yes	The Brussels government Decree of 17 December 2015, replacing the government Decree of 6 May 2004 on the promotion of green electricity and quality cogeneration, states among other things that final electricity clients with a green electricity production installation benefit from a compensation and that green certificates are allocated to each beneficiary household based on the electricity produced by its installation.	/
Flanders - Imposing RUE-Public Service Obligations on the Electricity Distribution Network	Yes	In Flanders, electricity distribution network operators are required to support energy-saving actions through grants for building renovations (e.g., insulation, double glazing, heat pumps) and for energy-efficient new constructions. Special attention is given to vulnerable customers, who receive higher grants and free energy scans. The measure also includes awareness campaigns and support for local authorities. The Flemish government	34.03 PJ (cumulative savings over 2021-2030)

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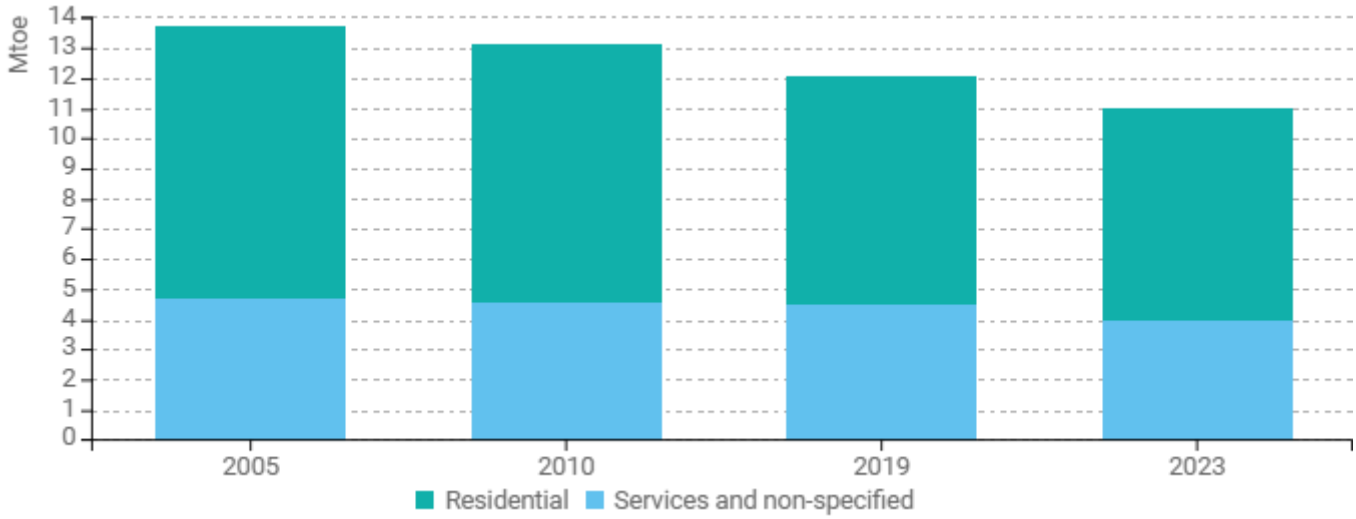
Operators		compensates most of the costs, reducing the financial impact on households.	

Source: MURE

Buildings

The energy consumption of buildings (with climatic corrections) decreased by 16% between 2010 and 2023. Residential buildings, which consume more energy than services (including non-specified activities), represented 64% of the total energy consumption in buildings in 2023, but also contributed more to the decrease than the other buildings category (- 17% vs. - 14%).

Figure 6: Final energy consumption in buildings (with climatic corrections)



Source: Odyssee

Due to the unavailability of reliable data before 2010, figures 7 to 10 use 2010 as the base year. Among household end-uses, space heating was the main energy consumer, with a share of 72% in 2023. Water heating (14%), electrical appliances and lighting (11%) and cooking (2%) came far behind. Air conditioning was still negligible in Belgium. Owing to a break in time series, the rise in water heating consumption is an artefact. This break will be corrected in the near future.

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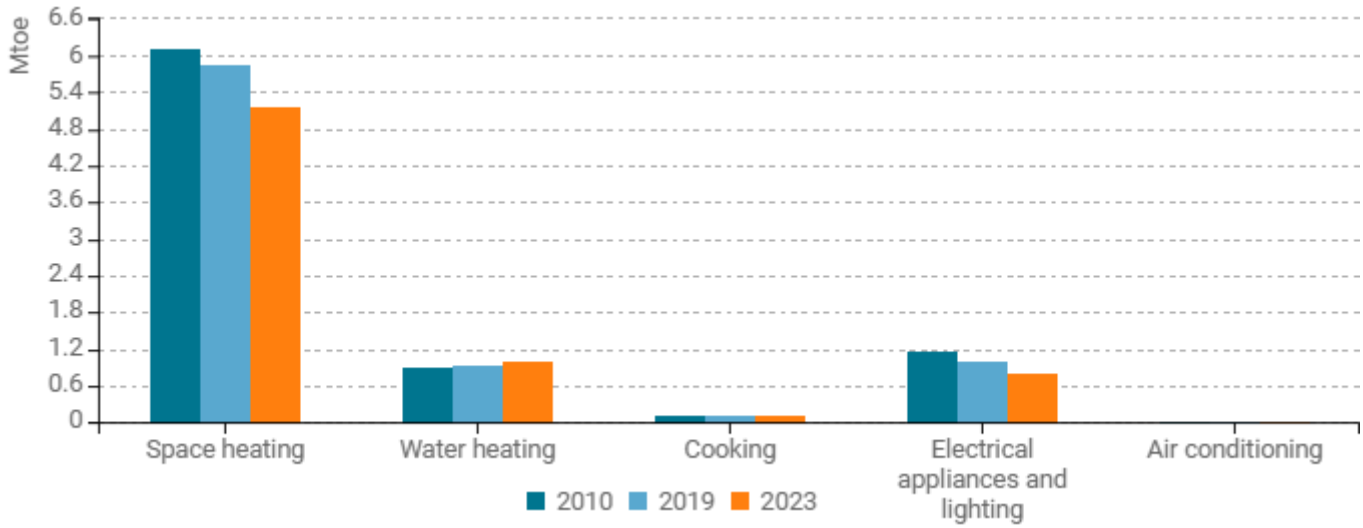
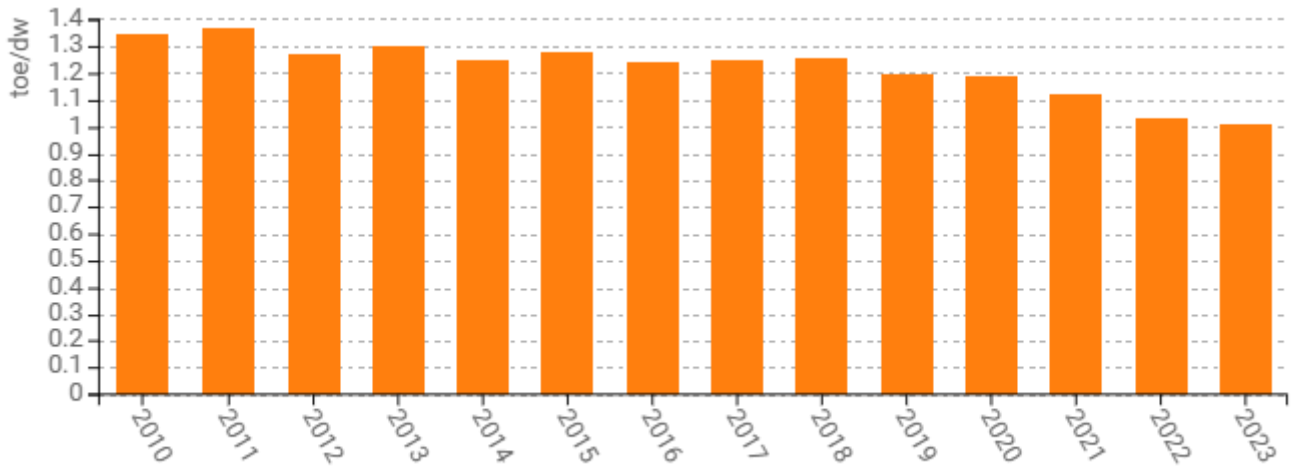
Figure 7: Energy consumption by end-use of households (with climatic corrections)



Source: Odyssee

In 2023, the average consumption per dwelling for space heating (with climatic corrections) was 12 MWh (1 toe). This is a decrease of 25% compared to 2010, where the average consumption per dwelling was 16 MWh (1.4 toe), an improvement of 2.2% or 0.3 MWh per year on average. The 2020 increase is at least partially attributable to the lockdowns linked to the COVID-19 pandemic. The significant decrease in 2022 is in part due to (perhaps temporary) changes in behaviors following the energy prices crisis triggered by Russia's invasion of Ukraine.

Figure 8: Energy consumption of household space heating per dwelling (with climatic corrections)



Source: ODYSSEE

Between 2010 and 2023, a decline in the energy consumption per dwelling was observed for all other end-uses, except for air conditioning, which began to develop recently in Belgian dwellings and whose consumption is therefore increasing (113%). Electrical appliances and lighting show the best improvement with a reduction of

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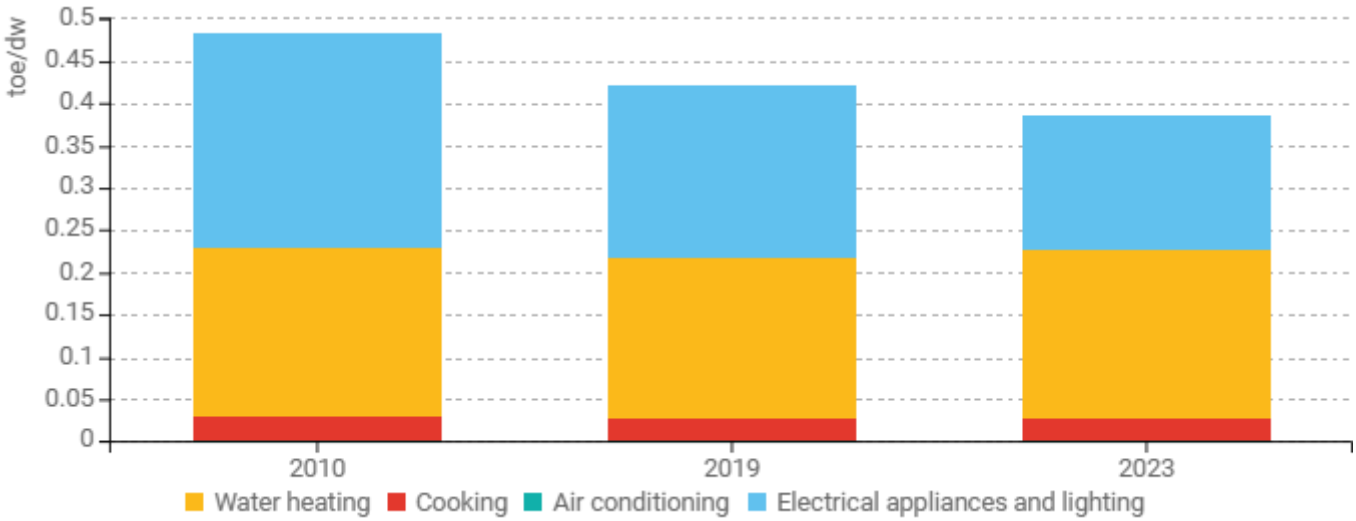
37% (- 3.5% per year). They are followed by cooking (-- 14% over the period and - 1.2% per year). As mentioned for figure 7, the rise in the water heating consumption is due to a break in time series.

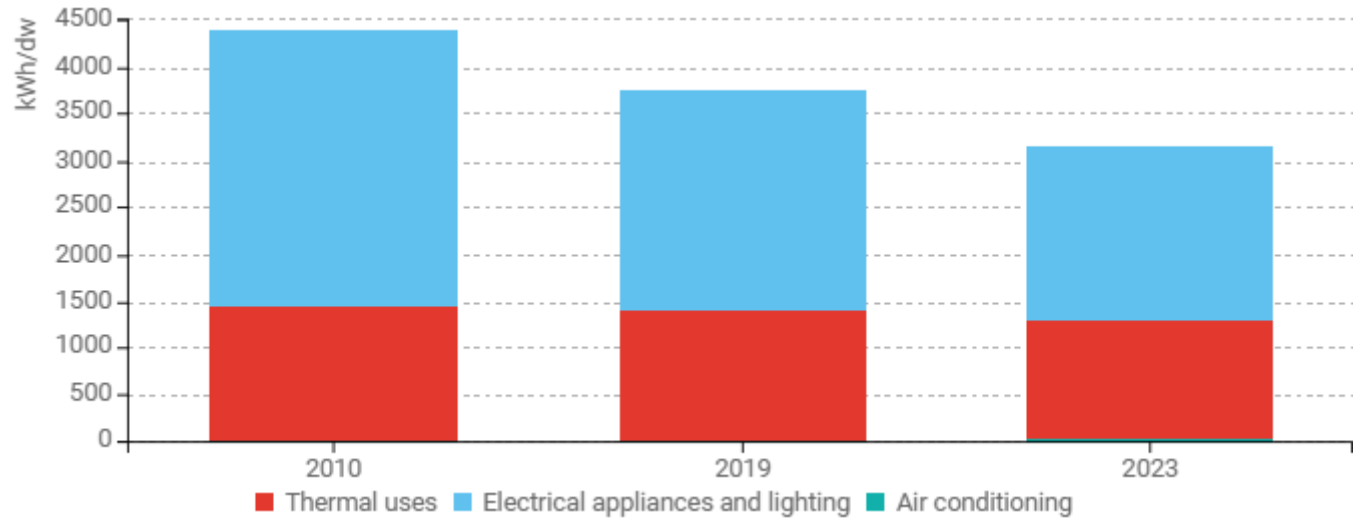
Figure 9: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

In 2023, electricity was mainly used in electrical appliances and lighting, which accounted for 59% of the total electricity consumption in dwellings. This share is nevertheless decreasing in favour of thermal uses, the share of which increased from 32% in 2010 to 40% in 2023.

Figure 10: Electricity consumption per dwelling by end-use (with climatic corrections)



Source: Odyssee

The final energy consumption of residential buildings was lower in 2023 than in 2010 (- 2.9 Mtoe). Two drivers contributed to increase energy consumption over the period – more appliances per dwelling (1.2 Mtoe) and more dwellings (1.0 Mtoe). However, the effect of these drivers was more than offset by energy savings (- 1.7 Mtoe),

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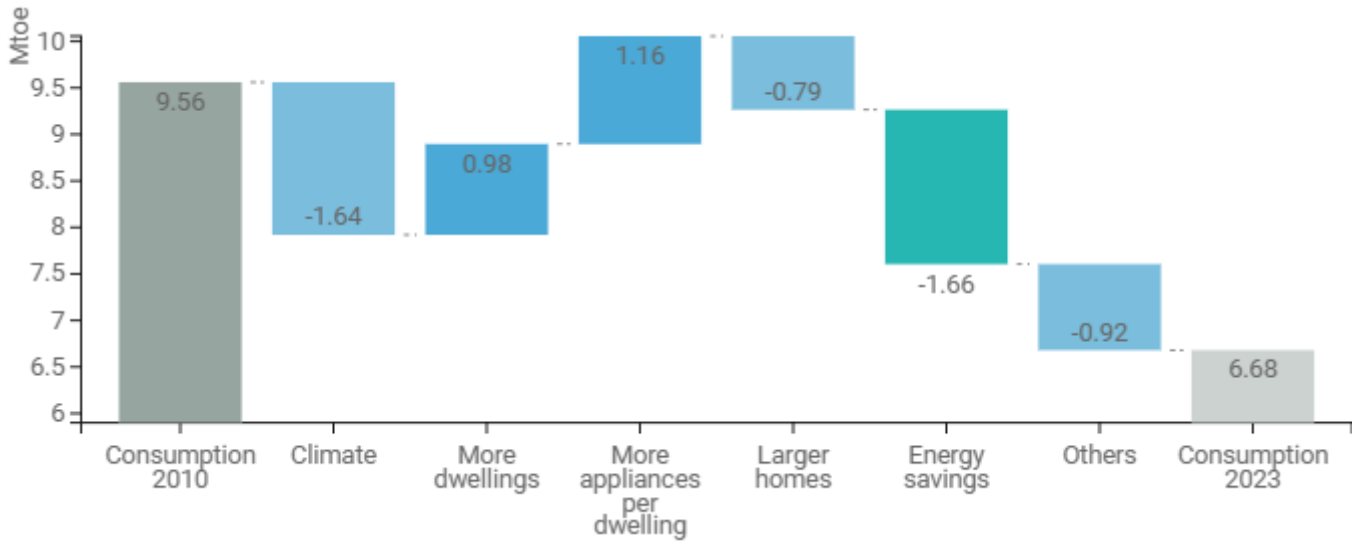
climate (- 1.6 Mtoe), smaller homes (- 0.8 Mtoe) and other drivers (- 0.9 Mtoe), such as changes in habits. The effect of the climate is most likely linked to the abnormally low temperatures recorded in 2010.

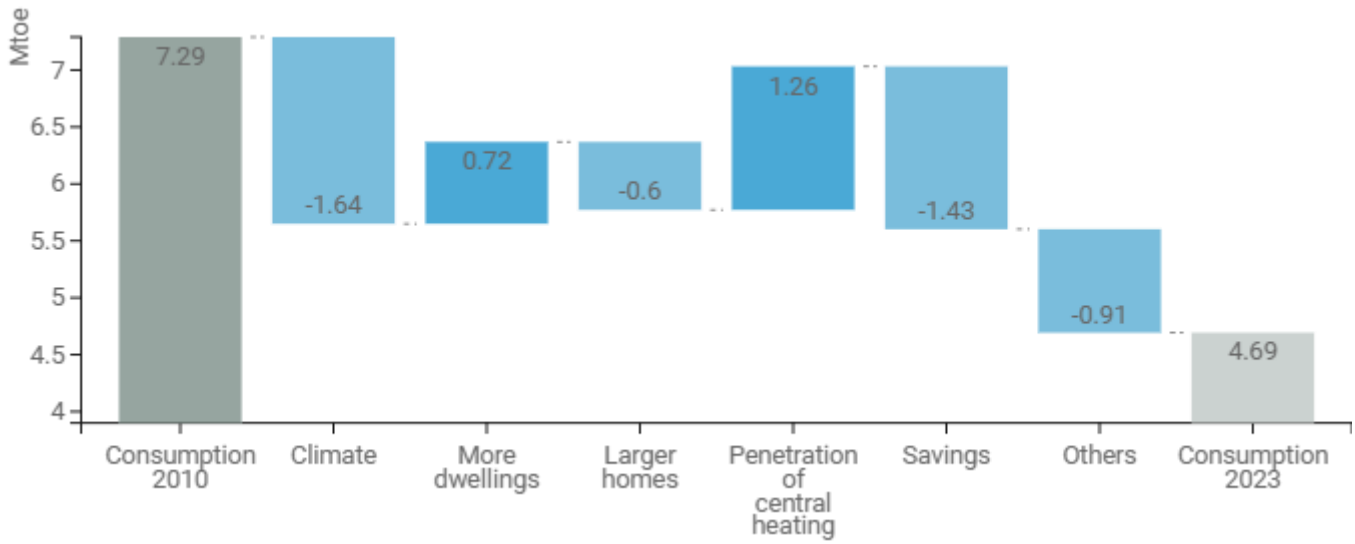
Figure 11: Main drivers of the energy consumption variation in households



Source: ODYSSEE

Space heating consumption of residential buildings was also lower in 2023 than in 2010 (- 2.6 Mtoe). While the penetration of central heating (1.3 Mtoe) and more dwellings (0.7 Mtoe) pushed it upward, climate (- 1.6 Mtoe), savings (- 1.4 Mtoe), smaller homes (- 0.6 Mtoe) and other drivers (- 0.9 Mtoe) pushed it downward. The energy prices crisis in 2022 certainly played a role in this consumption reduction.

Figure 12: Main drivers of the space heating consumption variation of households



Source: Odyssee

In the services sector, the energy consumption per employee dropped by 27% since 2010 (likely driven by a decrease in consumption for space heating), while the electricity consumption per employee diminished by only

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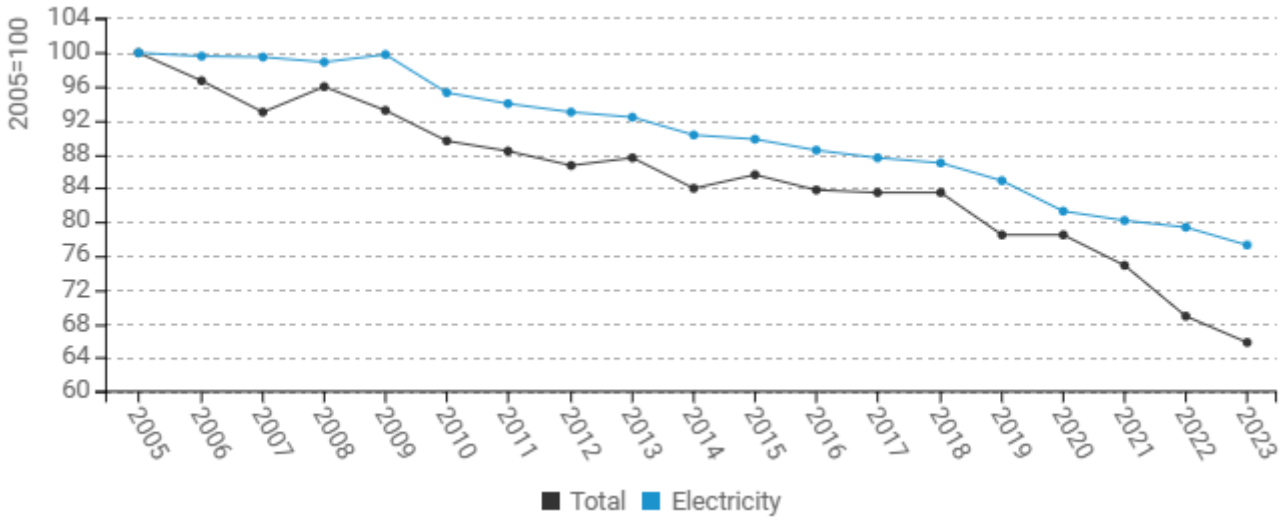
19% over the same period. Unlike the former, the latter remained quite stable until 2009, before declining slowly until 2019 and more sharply thereafter. This could be explained by the diffusion of IT and electrical appliances in offices, which eventually reached a saturation point and was then offset by increased efficiency. The lockdowns linked to the COVID-19 pandemic and the subsequent generalization of teleworking probably contributed to reducing both consumptions from 2020 on.

Figure 13: Energy and electricity consumption per employee in services (with climatic corrections)



Source: ODYSSEE

The regions have, each for their own territory, mainly implemented the EU Energy Performance of Buildings (EPB) directive, and promoted further energy efficiency through grants, audit schemes, awareness raising, etc. In Brussels, a special effort has also been made to develop exemplary buildings with virtually zero consumption and high environmental quality.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Brussels - Renovation Primes Program [RENOLUTION]	Yes	The RENOLUTION program in the Brussels-Capital Region offers financial incentives to support the renovation of residential and non-residential buildings. It aims to improve energy efficiency, reduce greenhouse gas emissions, and enhance living comfort. The program includes grants for a variety of works, such as insulation, heating system upgrades, facade improvements, and renewable energy installations. It is tailored for individual homeowners, housing collectives, and professional developers.	10.38 PJ (cumulative savings over 2021-2030)

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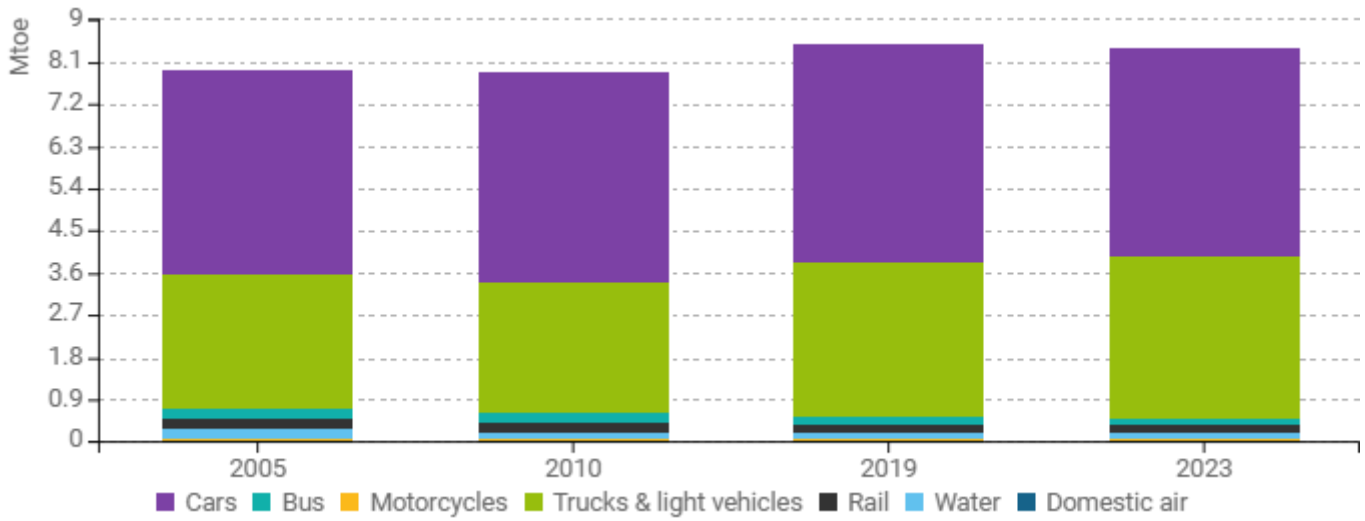
EU-related: Energy Performance of Buildings (Directive 2002/91/EC) - Wallonia - Long-Term Renovation Strategy	Yes	This policy measure aims to achieve high energy efficiency levels in the Walloon building stock by 2050. For the residential sector, the target is an average Energy Performance Certificate (EPC) label A, with specific energy consumption ≤ 85 kWh/m²/year. For the tertiary sector, the goal is a highly energy-efficient building stock with heating, sanitary hot water, cooling, and lighting energy consumption limited to 80 kWh/m². The measure encompasses mandatory energy performance improvements, financial incentives, training, and support services.	65.38 PJ (cumulative savings over 2021-2030)
EU-related: Energy Performance of Buildings (Directive 2002/91/EC) - Flanders - Renovation Obligation	Yes	The Flemish renovation obligation requires new owners of residential properties with low energy performance to improve the energy efficiency of their buildings. Starting from 1 January 2023, properties with an EPC label E or F must be renovated to achieve at least label D within five years of acquisition.	4.66 PJ (cumulative savings over 2021-2030)

Source: MURE

Transport

In Belgium, road transport remains the main driver of energy consumption in domestic transport. Cars represented 53% of the total consumption in the sector in 2023, while trucks and light vehicles represented 41% (vs. 57% and 35% respectively in 2010). Over the same period, there was a slight decrease in the share of buses (- 0.9 percentage points), rail (- 0.5 percentage points) and water transport (- 0.2 percentage points).

Figure 14: Transport energy consumption by mode



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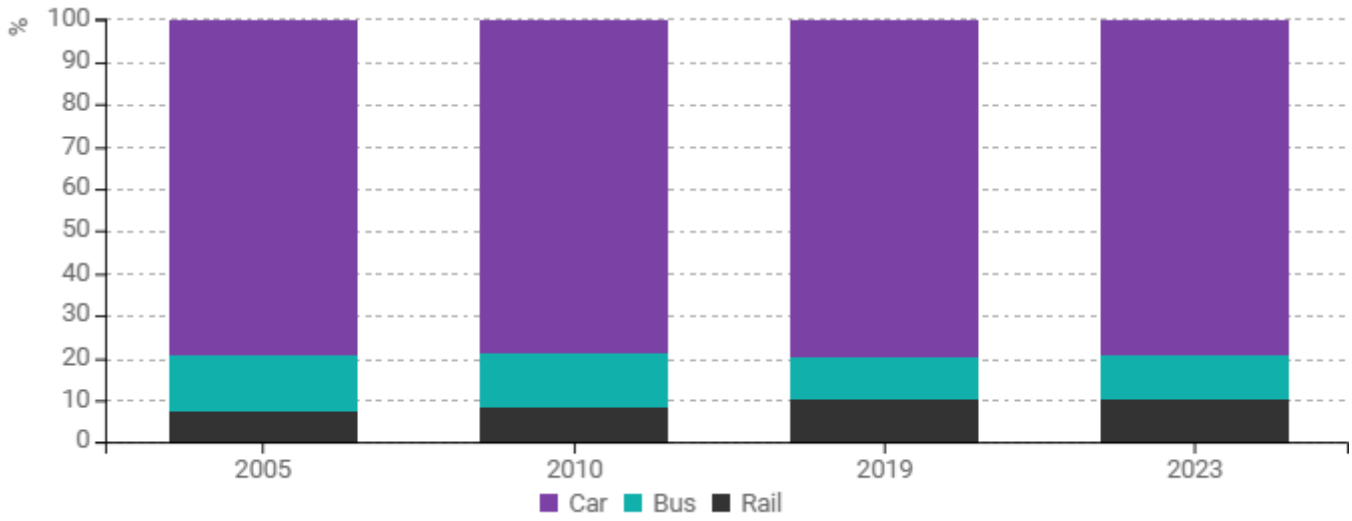
Source: ODYSSEE

Passenger traffic decreased between 2010 and 2023 (- 4.3% over the period). The modal evolutions were nevertheless different. Between 2010 and 2023, a reduction was observed in bus traffic (- 23%) and car traffic (- 4%). Over the same period, the share of buses in overall passenger traffic decreased (from 13% to 10%), while the share of cars increased modestly (from 79% to 80%). On the contrary, train traffic increased (18%), as well as its share (10% in 2023 vs. 8% in 2010).

Figure 15: Modal split of inland passenger traffic



Source: ODYSSEE

Freight traffic increased significantly between 2010 and 2023 (12% over the period). As with passenger traffic, the modal evolutions were different. Between 2010 and 2023, an increase was observed in road transport (11%) and rail transport (59%), while water transport decreased over the same period (- 23%). The share of rail transport increased by 5 percentage points, while the share of water transport decreased by 5 percentage points.

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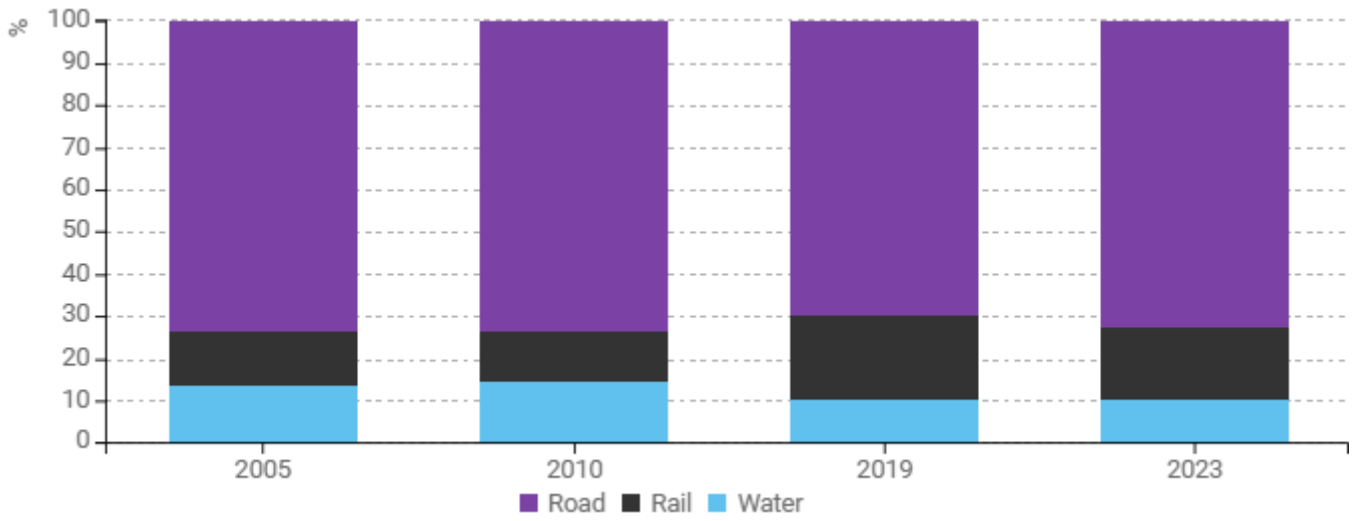
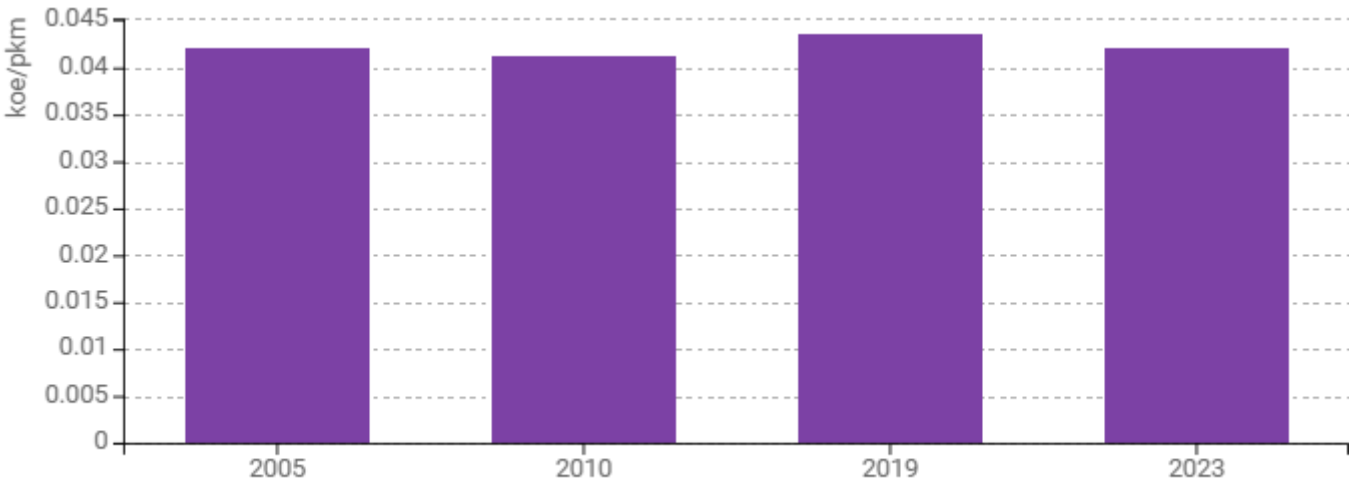
Figure 16: Modal split of inland freight traffic



Source: ODYSSEE

Energy consumption of cars per passenger-km increased by 2.3% between 2010 and 2023, at an annual pace of 0.2%. After a light decrease between 2005 and 2010, it increased between 2010 and 2019, the last year before the COVID-19 pandemic. In 2023, in spite of an upward trend, it remained lower than the level reached in 2019.

Figure 17: Energy consumption of cars per passenger-km



Source: ODYSSEE

Between 2010 and 2023, energy savings (- 0.68 Mtoe) and modal shift (- 0.02 Mtoe) hardly compensated for the consumption increase induced by activity (0.01 Mtoe) and other factors (0.61 Mtoe), such as a decrease in load factors for freight transport. Savings were modest for cars partly because of a rise in their average weight.

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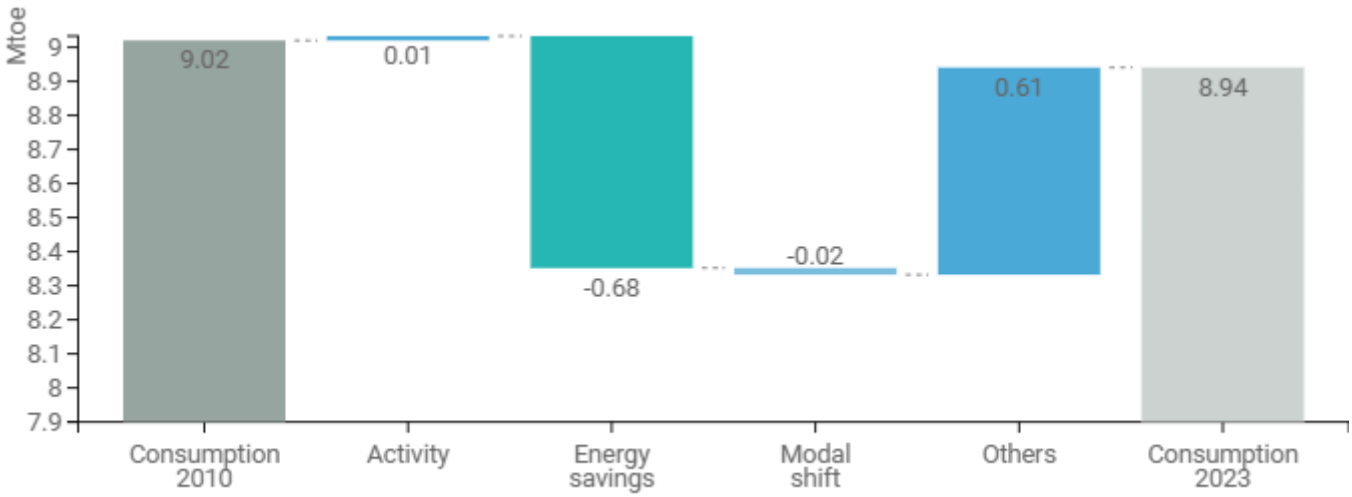
Figure 18: Main drivers of the energy consumption variation in transport



Source: ODYSSEE

Each of the three regions has implemented a diversity of measures, covering mobility, infrastructure, promotion of modal shifts and alternative vehicles, as well as unit consumption of vehicles.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Flanders - Measures Improving Mobility Needs and Environmental Performance of Transport	Yes	This policy by the Flemish Region targets improving mobility and reducing the environmental impact of transport through the Mobility Plan Flanders, fiscal and technological innovations, and promoting energy-efficient behavior in transportation.	28.35 PJ (cumulative savings over 2021-2030)
Wallonia - Implementation of the FAST Vision through the Regional Mobility Strategy [SRM]	Yes	This policy aims to reduce greenhouse gas (GHG) emissions from transport in Wallonia by at least 24% compared to 2005 levels (personal mobility). It involves a combination of regulatory, financial, and voluntary measures to enhance transportation sustainability through demand moderation, modal shifts, and improved vehicle performance.	59.40 PJ (cumulative savings over 2021-2030)

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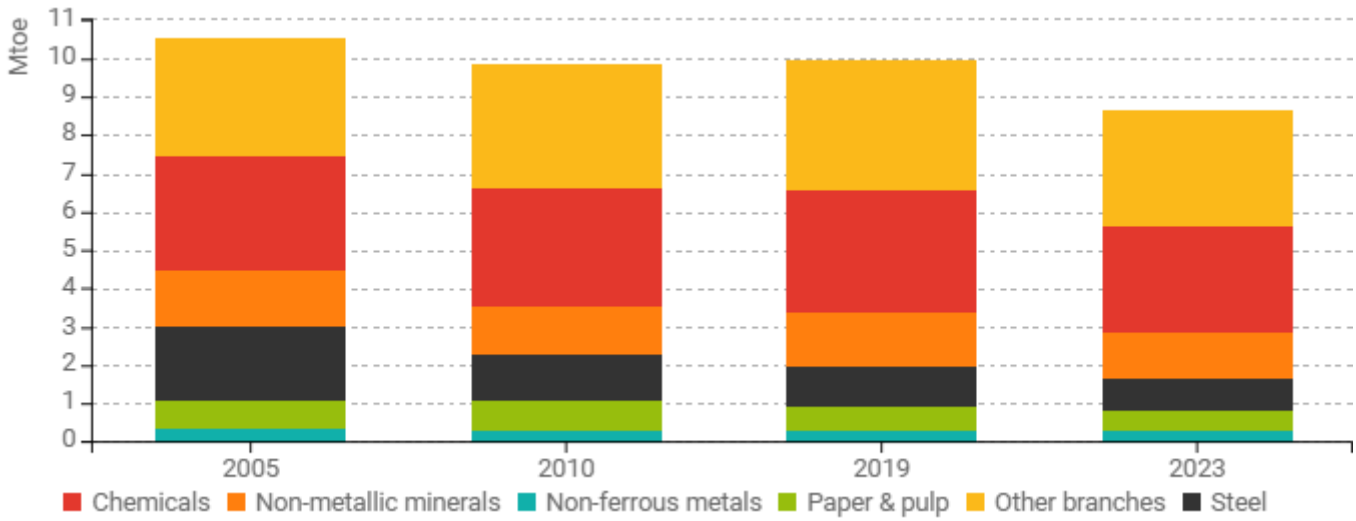
Source: MURE

Industry

The energy consumption of industry decreased by 12% to 9 Mtoe between 2010 and 2023. As can also be seen in figure 2, the reduction accelerated from 2019 on. In 2023, the main consumption sectors were chemicals (32%), non-metallic minerals (14%) and steel (10%). The evolution of the consumption in these sectors is however dramatically different, with respectively - 11%, - 5% and - 33% compared to 2010.

Figure 19: Final energy consumption of industry by branch



Source: ODYSSEE

Between 2010 and 2023, technical energy savings (- 2.9 Mtoe) and "others" (- 0.2 Mtoe), which are structural changes within branches, such as changes towards less energy intensive products, more than compensated for the rise in activity (1.7 Mtoe) and structural changes between the main industrial branches, namely changes in the relative shares of the branches in the total production (0.2 Mtoe).

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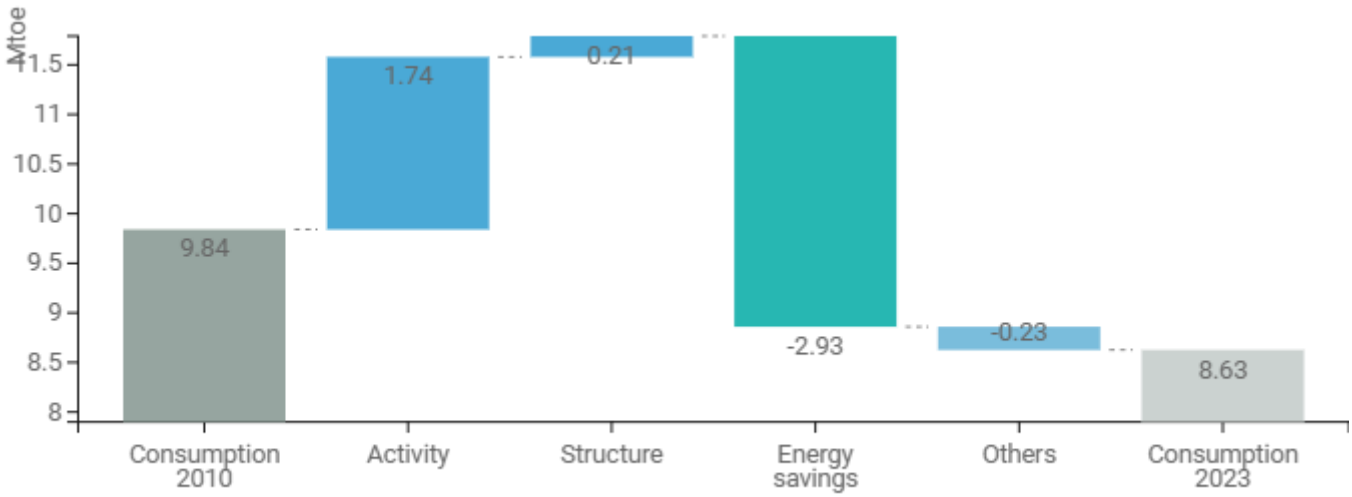
Figure 20: Main drivers of the energy consumption variation in industry



Source: ODYSSEE

In Belgium, the energy efficiency policy in industry focuses on voluntary agreements between the regional governments (of Flanders and Wallonia) and industry. The ways of setting the targets and monitoring the results differ between the regions and have changed over time.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Flanders - Voluntary Energy Policy Agreements for Energy-Intensive Enterprises [EBO]	Yes	The Energy Policy Agreements (EBO) in Flanders provide a framework for large energy-intensive enterprises to improve energy efficiency and reduce CO_2 emissions.	97.89 PJ (cumulative savings over 2021-2030)
Wallonia - Voluntary Agreements with the Industry - 2nd and 3rd Generation	Yes	A continuation and evolution of the 2nd generation Voluntary Agreements between industrial federations and the Walloon Government, transitioning towards the preparation of a 3rd generation framework. These agreements focus on achieving significant improvements in energy efficiency and reductions in greenhouse gas (GHG) emissions, surpassing spontaneous efforts by participating companies.	45.03 PJ (cumulative savings over 2021-2030)

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