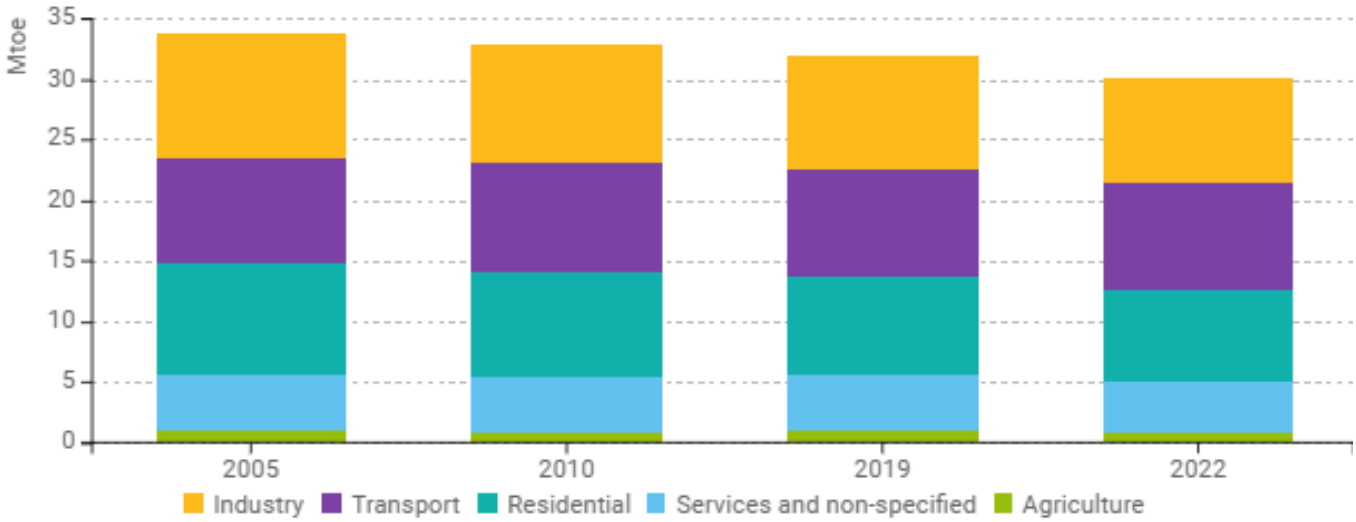
Energy efficiency trends and policies

Overview

Due to data quality issues, 2005 was taken as the base year all along this report. In 2022, the final energy consumption (with climatic corrections) in Belgium, as calculated by Enerdata, was 30 Mtoe, 11% lower than its 2005 level (34 Mtoe). Industry, historically the largest consumption sector in Belgium, and the residential sector both recorded a decrease by 1.3 percentage points in their share of total final energy consumption since 2005, reaching respectively 29% and 25.5% in 2022. Over the same period, the transport sector increased its share by 2.9 percentage points to 29% (the same share as industry) and the services sector maintained its share at 14%.

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 2005 to 2022 or 23% over the period, as measured by the ODYSSEE technical energy efficiency index, called ODEX. This improvement was mainly driven by the industrial sector (2.3% per year or 33% over the period) and the residential sector (1.8% per year or 27% over the period). In transport, energy efficiency improvements have been steady, with an average of 0.4% per year since 2005.

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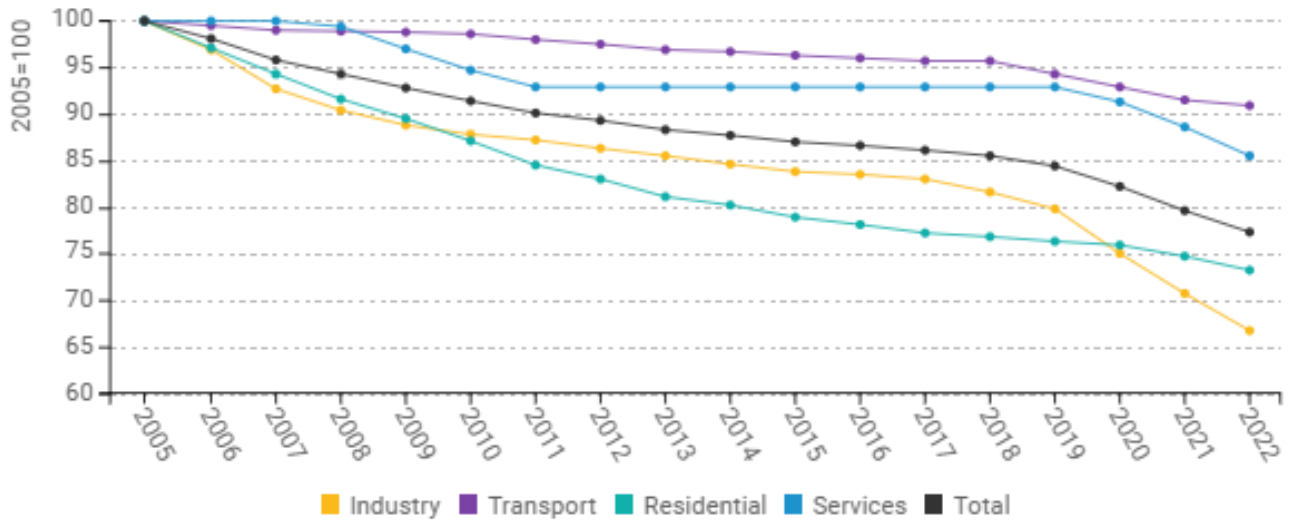
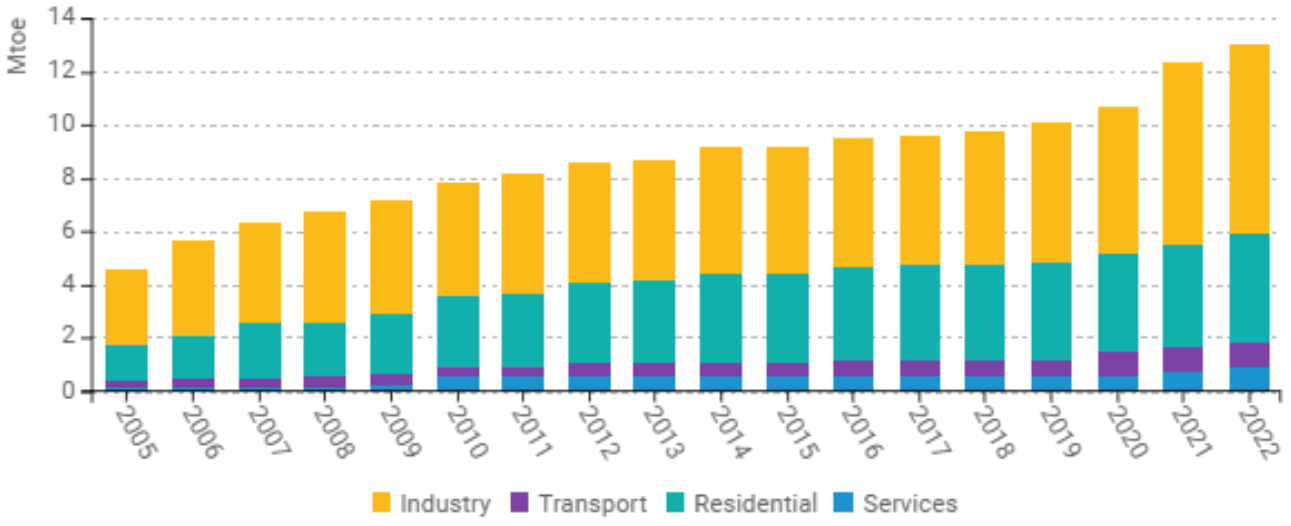
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

Energy savings are mainly to be found in the industry sector (7.1 Mtoe in 2022 since 2000). The residential sector comes second (4.1 Mtoe in 2022). The transport and services sectors saved far less energy (0.8 and 0.9 Mtoe in 2022 respectively). Additionally, the sharp increases in energy savings observed in the transport sector in 2020 (63%) and in the services sector in 2021 (48%) 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.

Figure 3: Energy savings by sector



Source: Odyssee

Total energy supply decreased by 7 Mtoe between 2005 and 2022 (-12%). Only around 60% of this reduction is explained by the decrease in the final consumption for energy uses (-4.3 Mtoe). The rest is mostly explained by a reduction in the consumption of the power sector (-2.4 Mtoe) due to improvements in the thermal power

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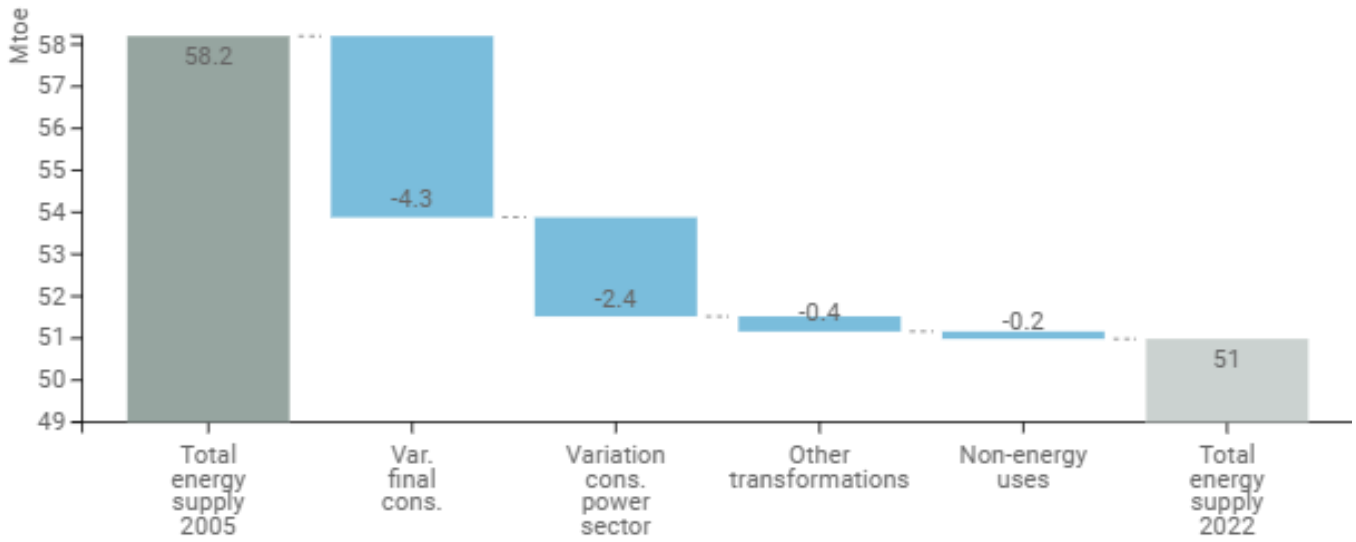
efficiency (+8 percentage points) and changes in the power mix (-10 percentage points in the share of nuclear energy and +19.5 percentage points in the share of hydraulic, wind and solar energy). Indeed, the transformation of renewable energy sources such as wind or solar energy into electricity is more efficient (100%) than that of fossil energy sources (almost 48% in 2022) or nuclear energy (33%), which generates losses (mainly in the form of heat).

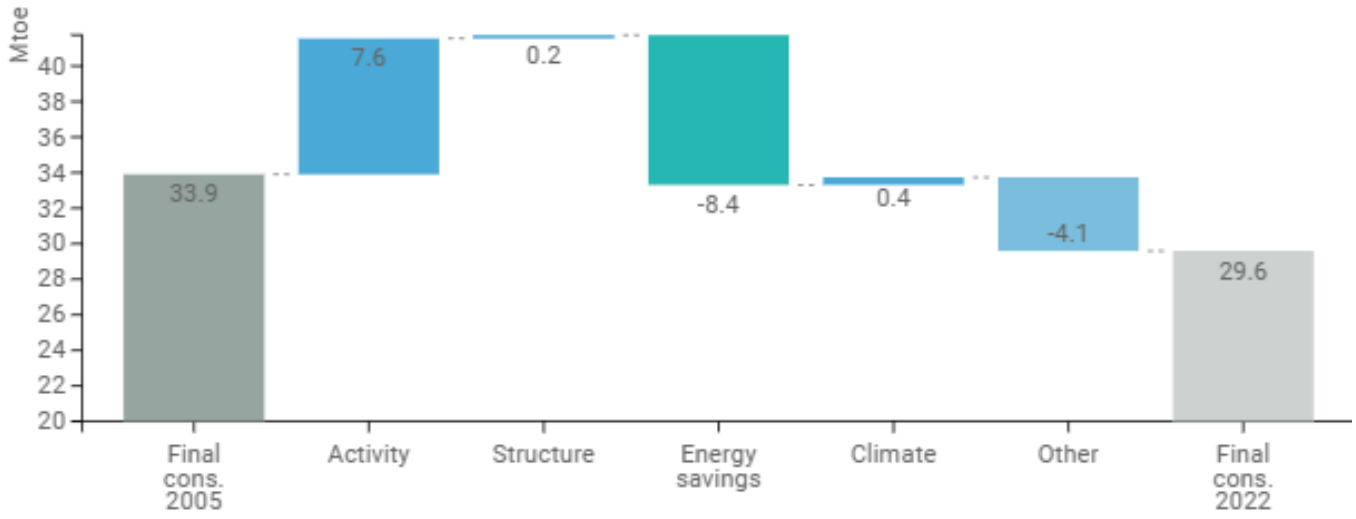
Figure 4: Main drivers of the total energy supply variation



Source: Odyssee

Between 2005 and 2022, the final energy consumption fell by 12% (-4 Mtoe). Energy savings (8 Mtoe) and changes in other drivers (-4 Mtoe), like behaviors of households or labor productivity in services, exceeded the rise in economic, sociodemographic and transport activities (8 Mtoe) and in other drivers (structure and climate, 0.2 and 0.4 Mtoe respectively). 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



Source: Odyssee

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

Source: MURE

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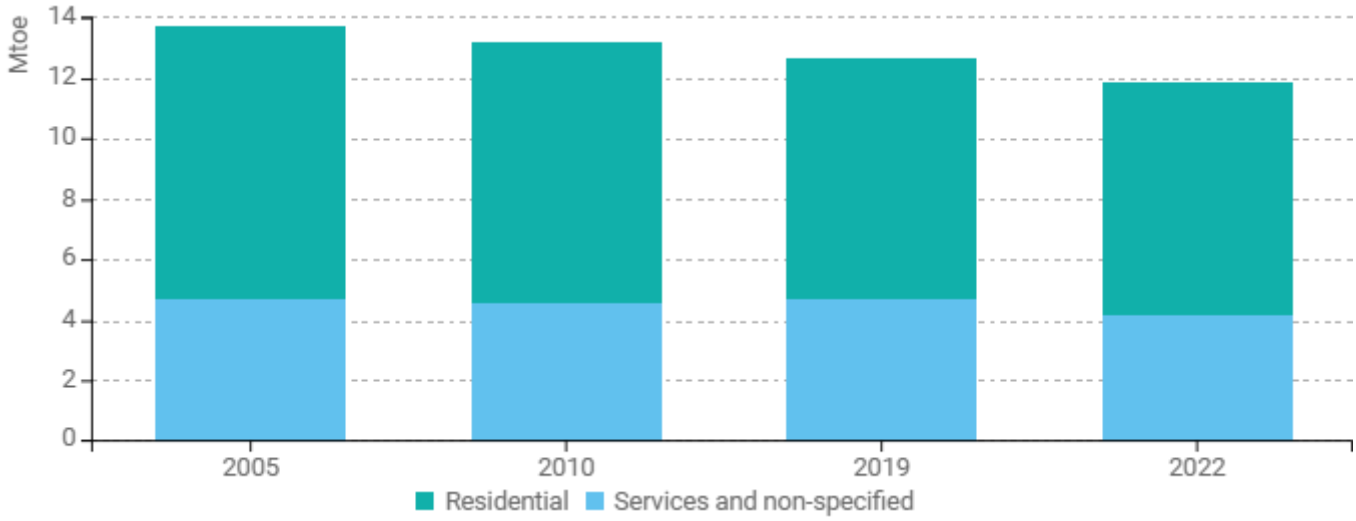
Buildings

The energy consumption of buildings (with climatic corrections) decreased by 14% between 2005 and 2022. Residential buildings, which consume more energy than services, including non-specified activities (65% of the total energy consumption in buildings in 2022), also contributed more to the decrease than the other buildings category (-15% vs. -11%).

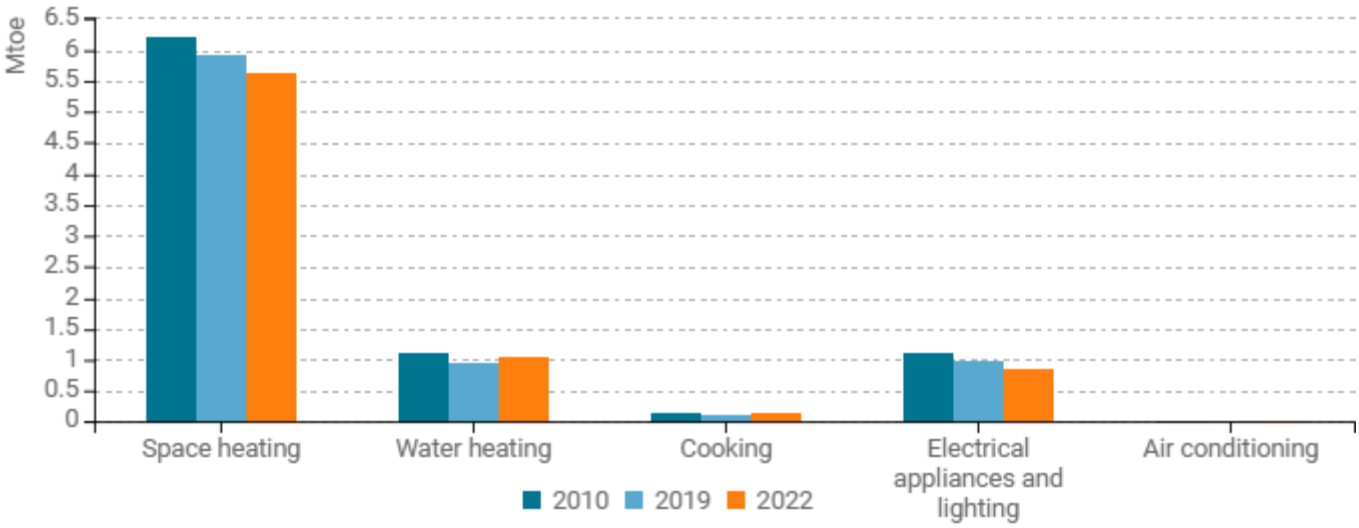
Figure 6: Final energy consumption in buildings (with climatic corrections)



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 is the main energy consumer, with a share of 74% in 2022. Water heating (14%), electrical appliances and lighting (11%) and cooking (1.7%) come far behind. Air conditioning is still negligible in Belgium. Owing to a break in time series for 2022, the rise in the water heating consumption is an artefact. This break will be corrected in the near future.

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



Source: ODYSSEE

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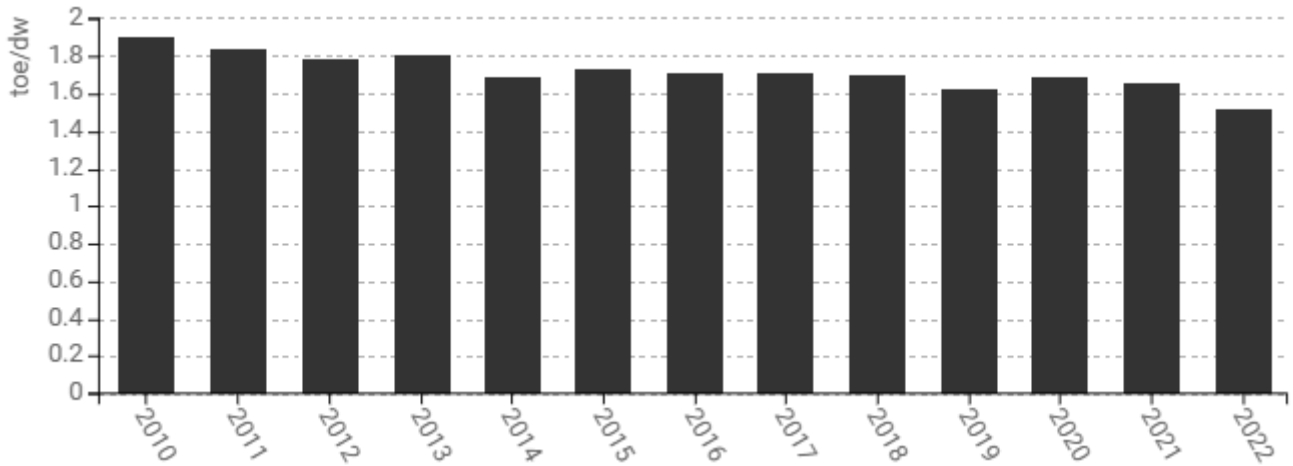
In 2022, the average consumption per dwelling for space heating (with climatic corrections) was 17 MWh (1.5 toe). This is a decrease of 20% compared to 2010, where the average consumption per dwelling was 22 MWh (1.9 toe), an improvement of 1.9% or 0.4 MWh per year on average. The 2020 increase is at least partially attributable to the lockdowns linked to the COVID-19 pandemic. The sharp 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.

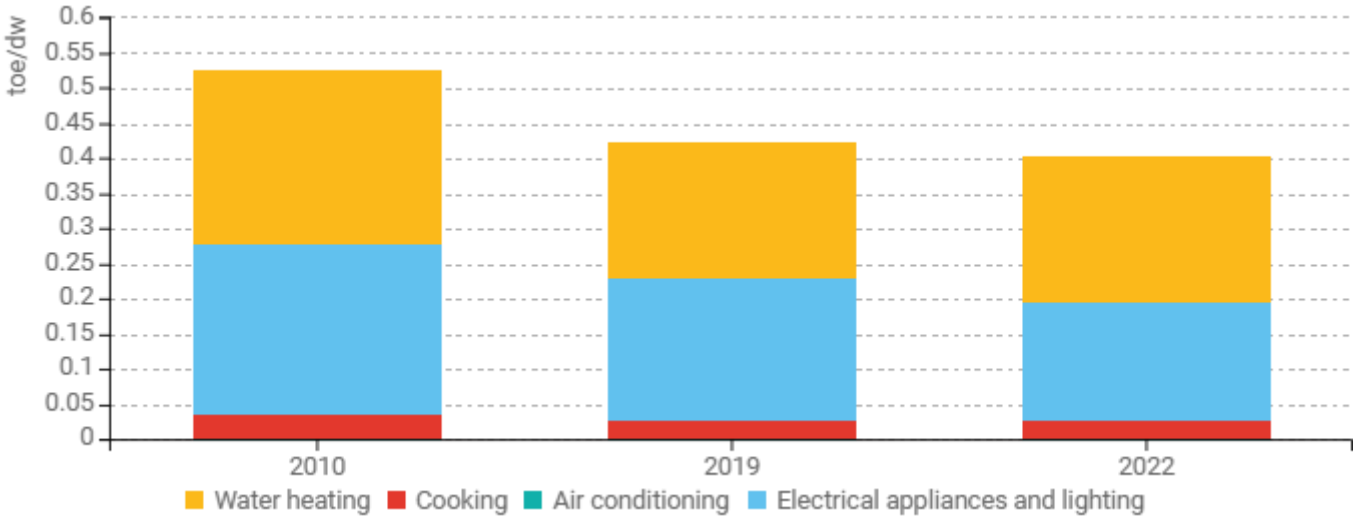
Figure 8: Energy consumption of household space heating per dwelling (with climatic corrections)



Source: ODYSSEE

Between 2010 and 2022, 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 (150%). Electrical appliances and lighting show the best improvement with a reduction of 31% (3% per year). They are followed by cooking (-22%) and water heating (-17%). As mentioned for figure 7, the rise in the water heating consumption in 2022 is due to a break in time series.

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



Source: ODYSSEE

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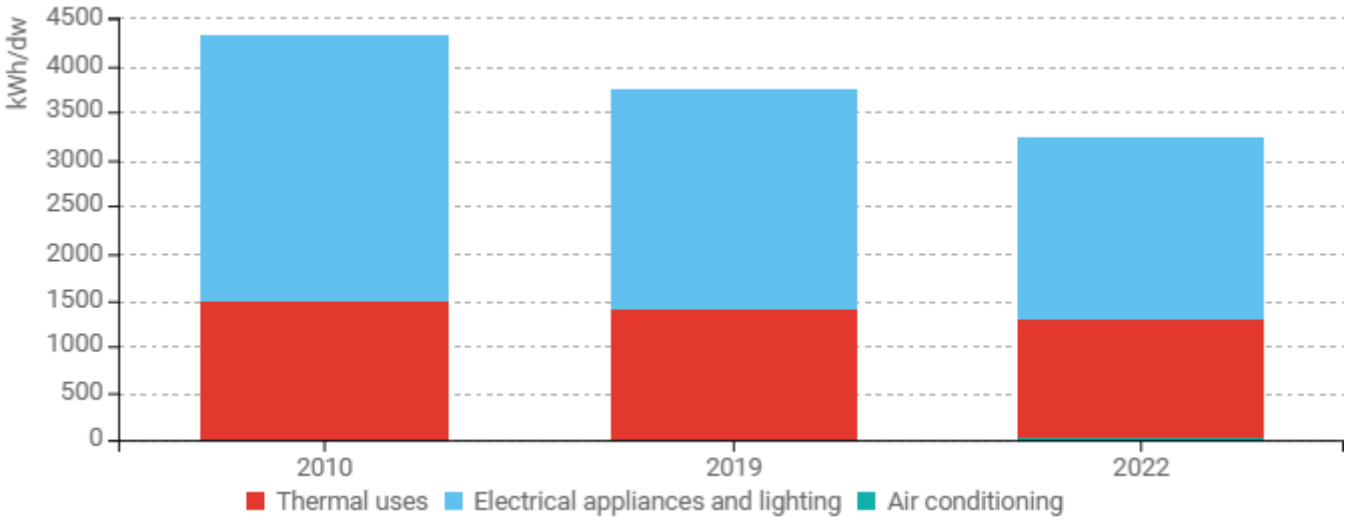
In 2022, electricity is mainly used in electrical appliances and lighting, which account for 60% of the total electricity consumption in dwellings. This share is nevertheless decreasing in favour of thermal uses, the share of which increased from 34% in 2010 to 39% in 2022.

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



Source: ODYSSEE

Globally, the final energy consumption of residential buildings was lower in 2022 than in 2005 (7.3 Mtoe vs. 9.1 Mtoe). Two drivers contributed to increase energy consumption over the period – more appliances per dwelling (1.5 Mtoe) and more dwellings (1.3 Mtoe). However, the effect of these drivers was more than offset by energy savings (-2.7 Mtoe) and other drivers (-1.2 Mtoe), such as changes in habits. Space heating consumption was also lower in 2022 than in 2005 (5.2 Mtoe vs. 6.9 Mtoe). While the penetration of central heating (1.5 Mtoe), activity (1.0 Mtoe) and climate (0.7 Mtoe) pushed it upward, other drivers (-2.7 Mtoe), savings (-2.1 Mtoe) and smaller homes (-0.2 Mtoe) pushed it downward. The energy prices crisis in 2022 certainly played a role in this consumption reduction.

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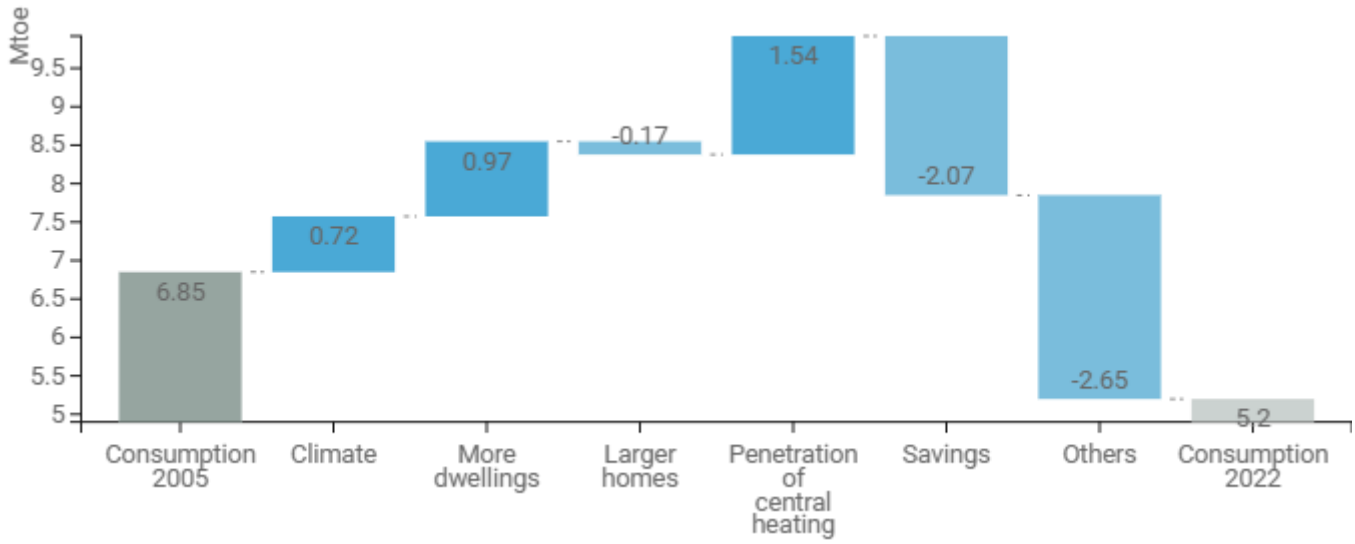
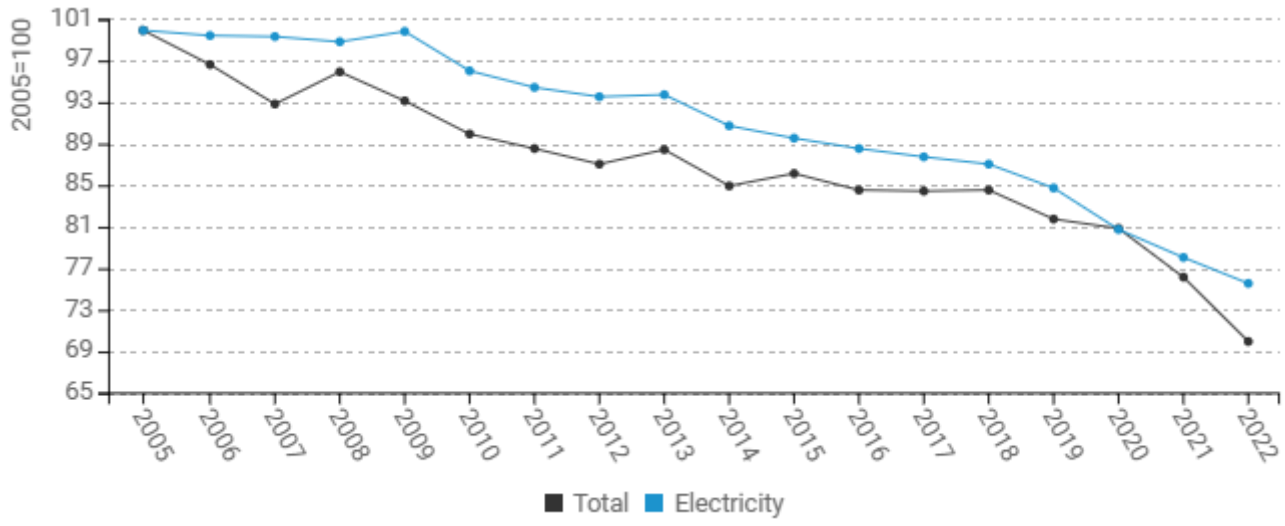
Figure 11: Main drivers of the space heating consumption variation of households



Source: ODYSSEE

While the energy consumption per employee in the services sector dropped by 30% since 2005 (likely driven by a decrease in consumption for space heating), electricity consumption 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 12: Energy and electricity consumption per employee in services (with climatic corrections)



Source: ODYSSEE

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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
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.	209.64 PJ
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.	/

Source: MURE

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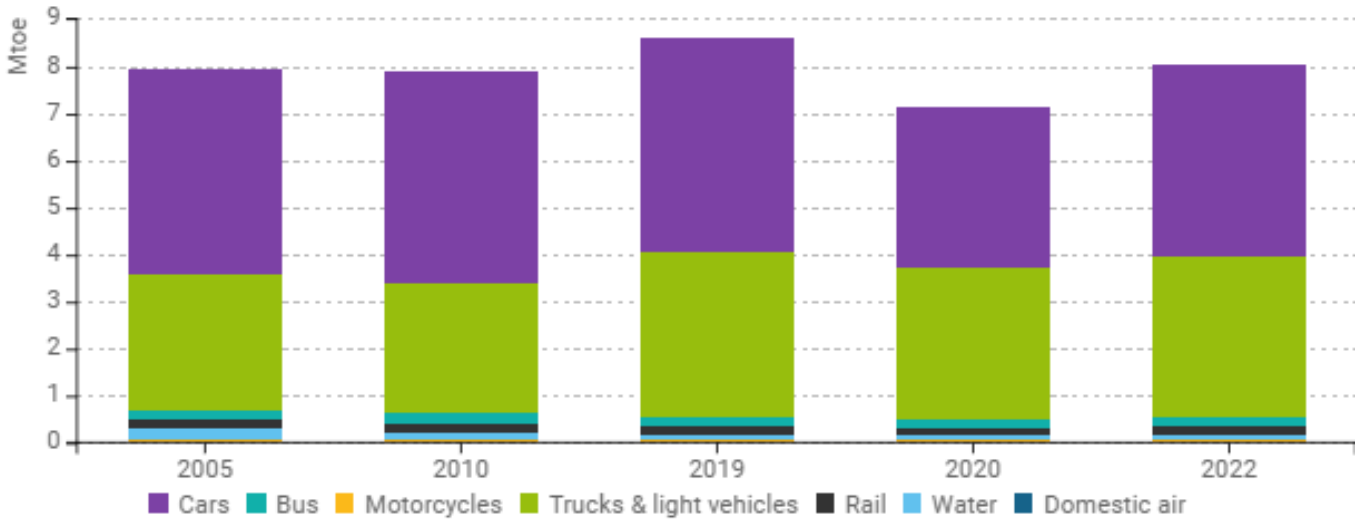
Transport

In Belgium, road transport remains the main driver of energy consumption in domestic transport. Cars represented 51% of the total consumption in the sector in 2022, while trucks and light vehicles represented 42% (vs. 55% and 37% respectively in 2005). Over the same period, there was a slight decrease in the share of buses (-0.2 percentage points), rail (-0.5 percentage points) and water transport (-1.3 percentage points).

Figure 13: Transport energy consumption by mode



Source: ODYSSEE

In spite of a rise between 2005 and 2012, passenger traffic decreased between 2005 and 2022 (-3.3% over the period). A sharp decline occurred in 2020 due to the COVID-19 pandemic. It was followed by an increase, but this was not sufficient to return to the 2019 level. The modal evolutions were nevertheless different. Between 2005 and 2022, a reduction was observed in bus traffic (-28%) and car traffic (-1.8%). Over the same period, the share of buses in overall passenger traffic decreased (from 14% to 10%), while the share of cars increased modestly (from 79% to 81%). On the contrary, train traffic increased (26%), as well as its share (9.5% in 2022 vs. 7.3% in 2005).

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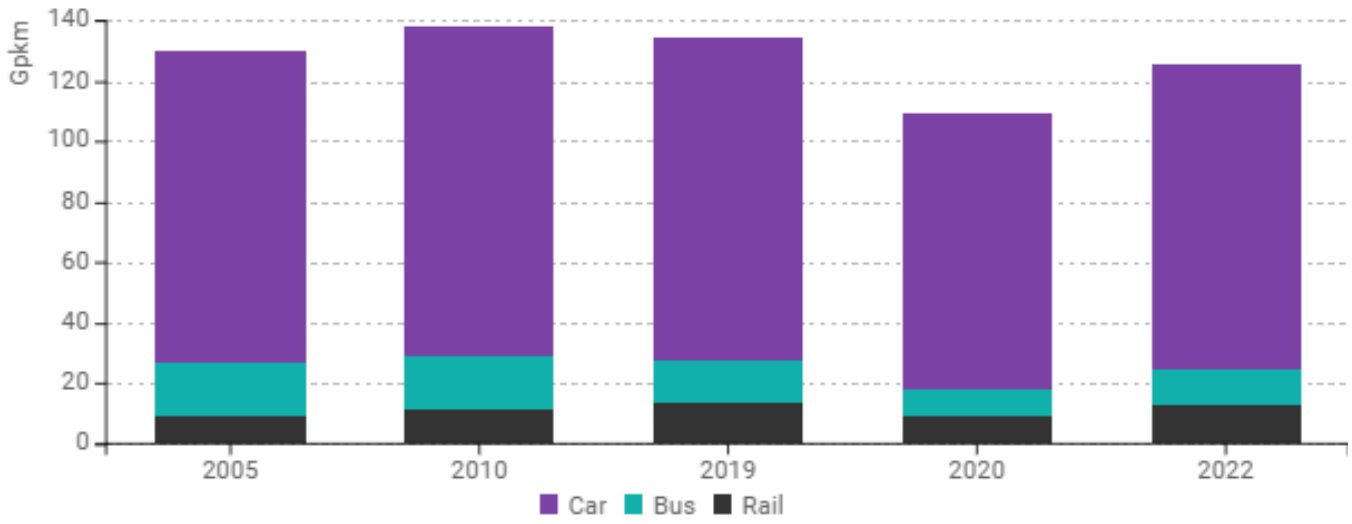
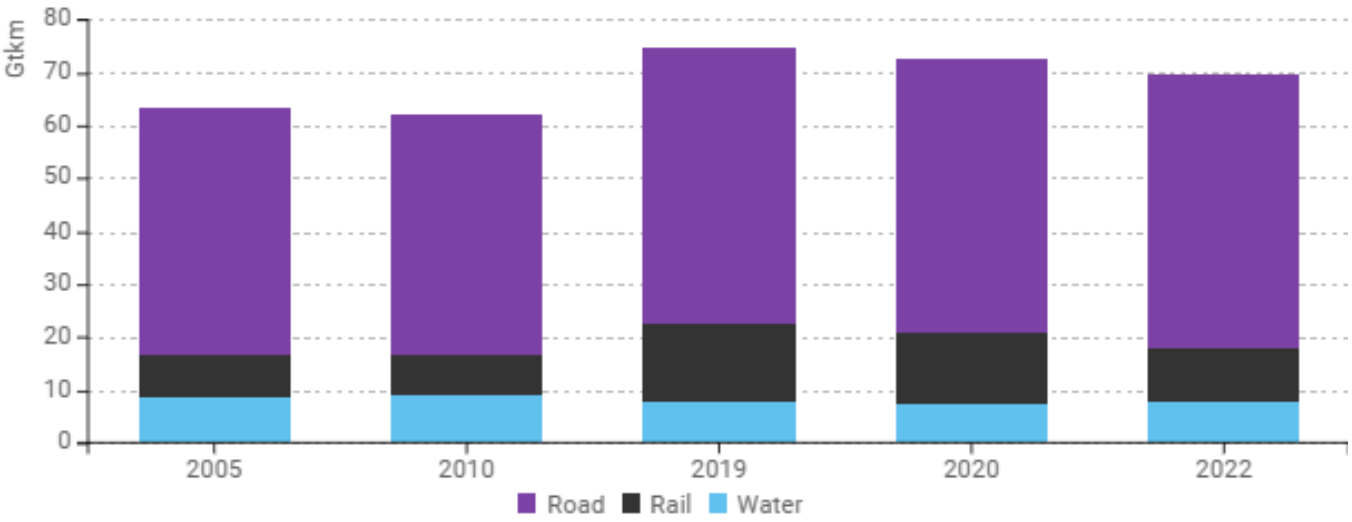
Figure 14: Modal split of inland passenger traffic



Source: ODYSSEE

Freight traffic increased significantly between 2005 and 2019 (12% over the period). It dropped in 2020 due to the COVID-19 pandemic and increased again afterwards, but without reaching the 2019 level. As with passenger traffic, the modal evolutions were different. Between 2005 and 2022, an increase was observed in road transport (11%) and rail transport (26%), while water transport decreased over the same period (-12%). The share of rail increased by 1.8 percentage points, while the share of water transport decreased by 2.6 percentage points.

Figure 15: Modal split of inland freight traffic



Source: ODYSSEE

Energy consumption of cars per passenger-km diminished modestly by 3% between 2005 and 2022, 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 2022, it increased again, but remained lower than the level reached in 2019.

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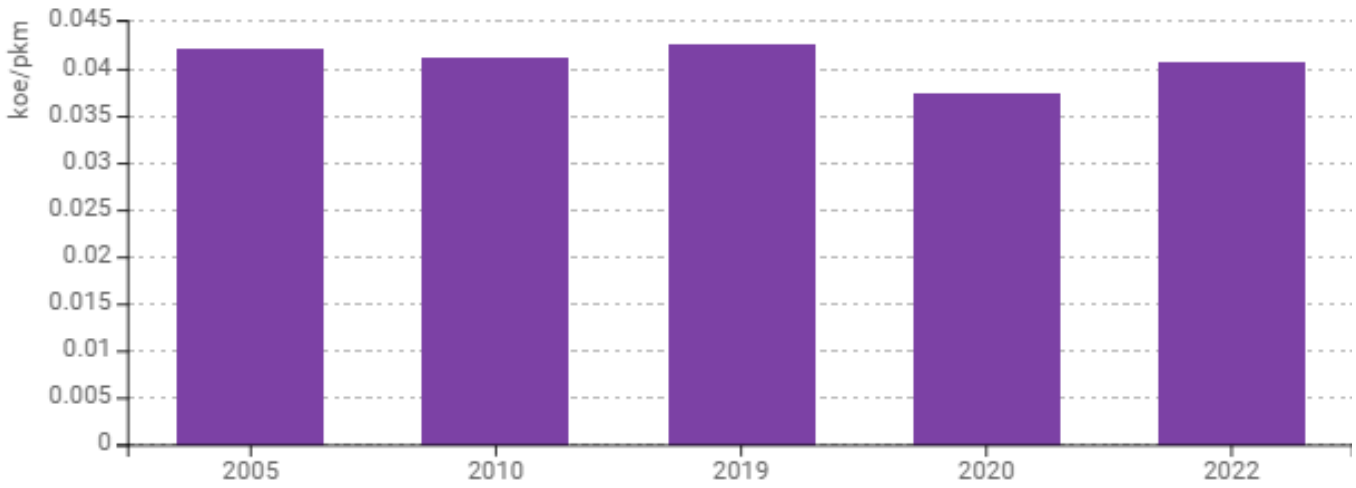
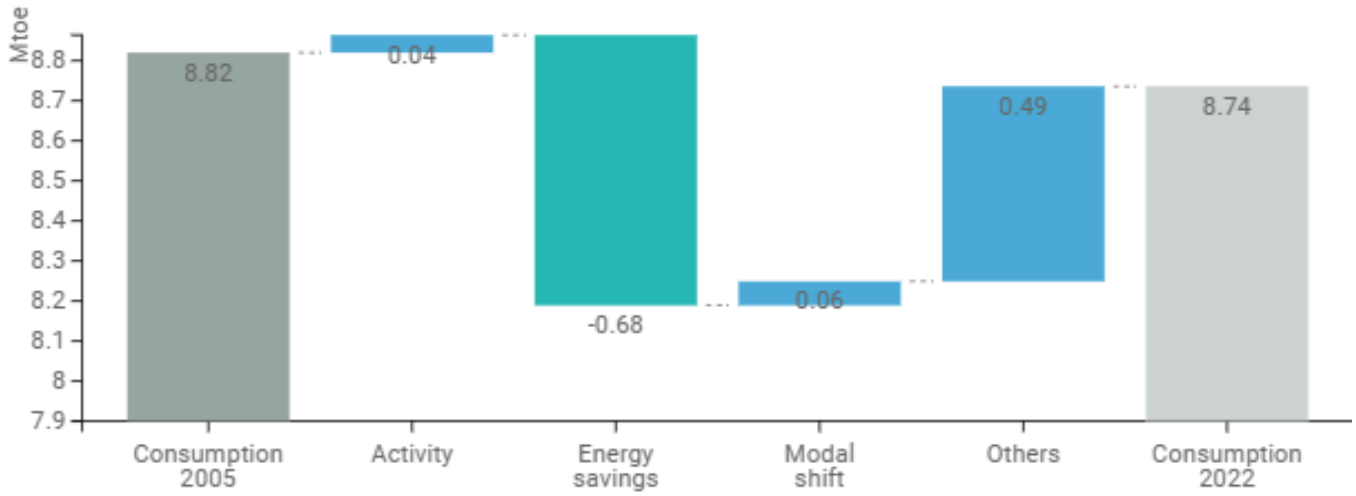
Figure 16: Energy consumption of cars per passenger-km



Source: ODYSSEE

Between 2005 and 2022, energy savings (-0.68 Mtoe) hardly compensated for the consumption increase induced by activity (0.04 Mtoe), modal shift (0.06 Mtoe) and other factors (0.49 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.

Figure 17: Main drivers of the energy consumption variation in transport



Source: ODYSSEE

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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 behaviour in transportation.	28.35 PJ
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

Source: MURE

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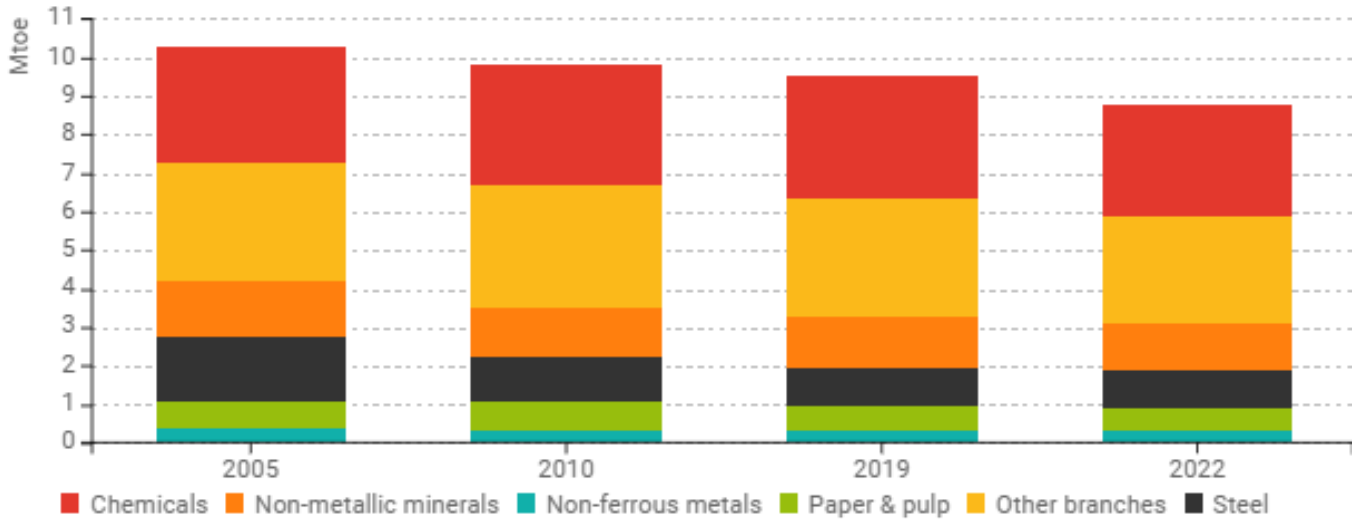
Industry

The energy consumption of industry decreased by 15% to 9 Mtoe between 2005 and 2022. This decrease was gradual until 2021, but sharp between 2021 and 2022. In 2022, the main consumption sectors were chemicals (33%), non-metallic minerals (14%) and steel (11%). The evolution of the consumption in these sectors is however dramatically different, with respectively -2.8%, -15% and -42% compared to 2005.

Figure 18: Final energy consumption of industry by branch



Source: ODYSSEE

Despite the economic crisis of 2007 and the COVID-19 pandemic, industrial activity in Belgium rose overall since 2005. Between 2005 and 2022, technical energy savings (-4.3 Mtoe) and "others" (-0.6 Mtoe), which are structural changes within branches, more than compensated for the rise in activity (3.2 Mtoe). Structural changes between the main industrial branches (changes in the relative shares of the branches in the total production) were marginal (0.1 Mtoe). As can be seen in figure 2, the energy consumption reduction in the industrial sector accelerated from 2019 on.

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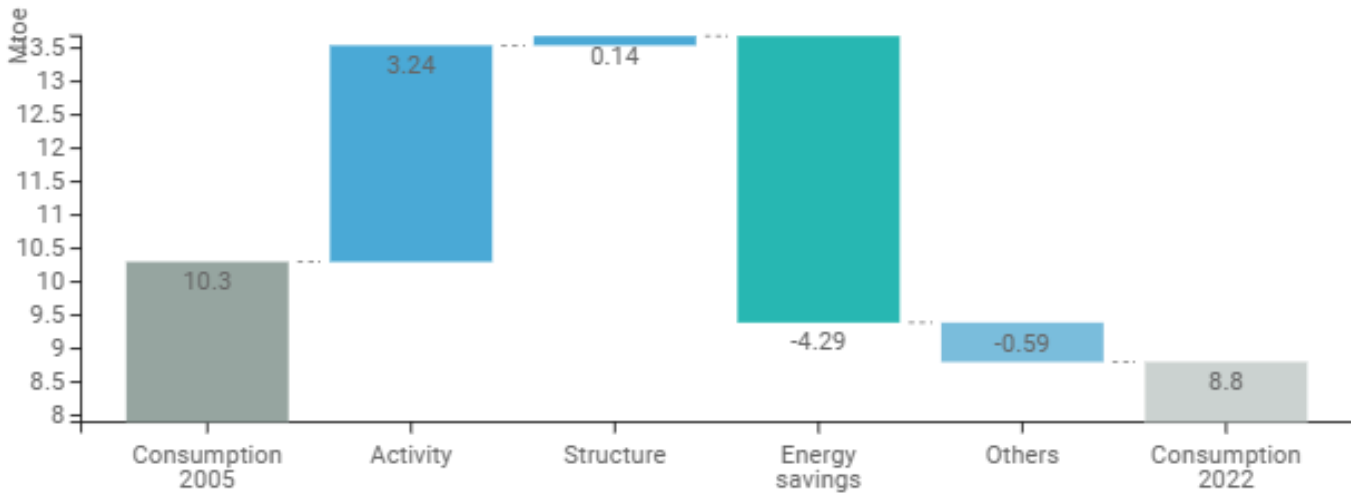
Figure 19: Main drivers of the energy consumption variation in industry



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.	162.36 PJ
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 PJ

Source: MURE

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