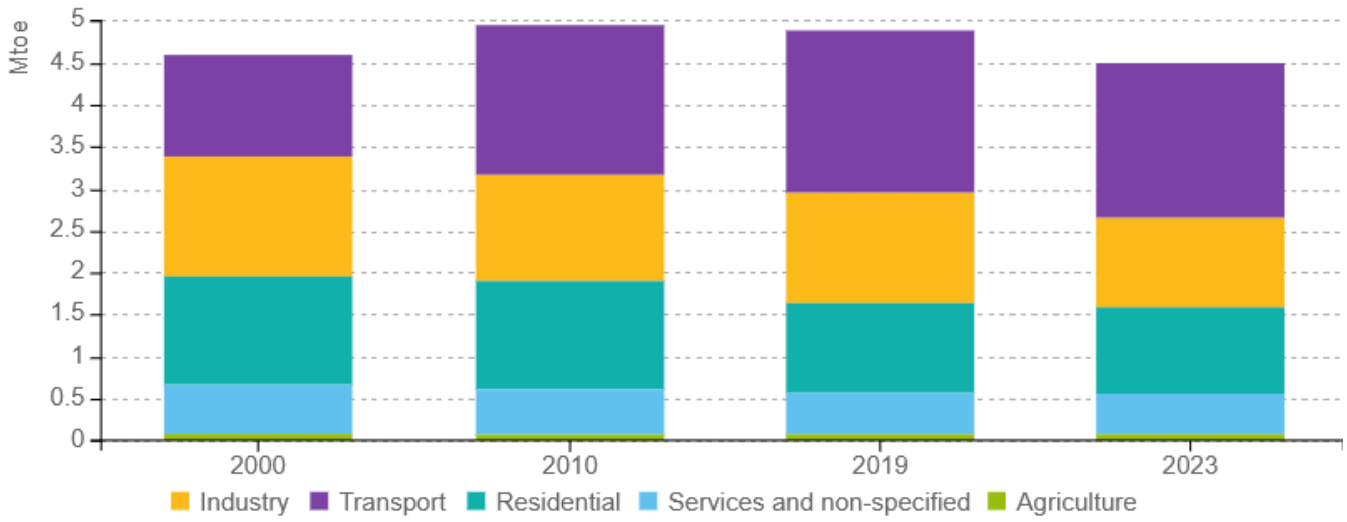
Energy efficiency trends and policies

Overview

The final energy consumption (climate corrected) of Slovenia decreased by 0.7%/year in the period 2010–2023, or by 0.1% between 2000 and 2023. The decrease of energy consumption was 2.1%/year between 2019 and 2023 and 0.15%/year in the period 2010-2019. In the period 2010–2023, energy consumption increased in transport by 0.2%/year, while energy consumption in other sectors decreased: in industry by 1.3%/year, households by 1.7%/year (with climate correction) and the service sector by 0.9%/year. The largest share of final energy consumption in 2023 was in transport (41%), followed by industry (24%), households (23%), services (11%) and agriculture (2%).

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



Source: ODYSSEE

Energy efficiency for total final consumers, as measured by technical energy efficiency index “ODEX”, improved by an average of 1.2%/year over the period from 2010 to 2023 (1.0%/year in the period 2010-2019 and 1.8%/year in the period 2019-2023). Energy efficiency improvement in industry reached 1.3%/year (1.1%/year in the period 2010-2019 and 1.8%/year in the period 2019-2023) but the largest improvement was in the households sector 2.5%/year (2.5%/year in the period 2010-2019 and 2.4%/year in the period 2019-2023). Transport (excluding international air transport) was the sector with the lowest energy efficiency improvement 0.1%/year. Efficiency improvement measured in the service sector 2.1%/year must be considered with caution, since data before 2022 are not very reliable.

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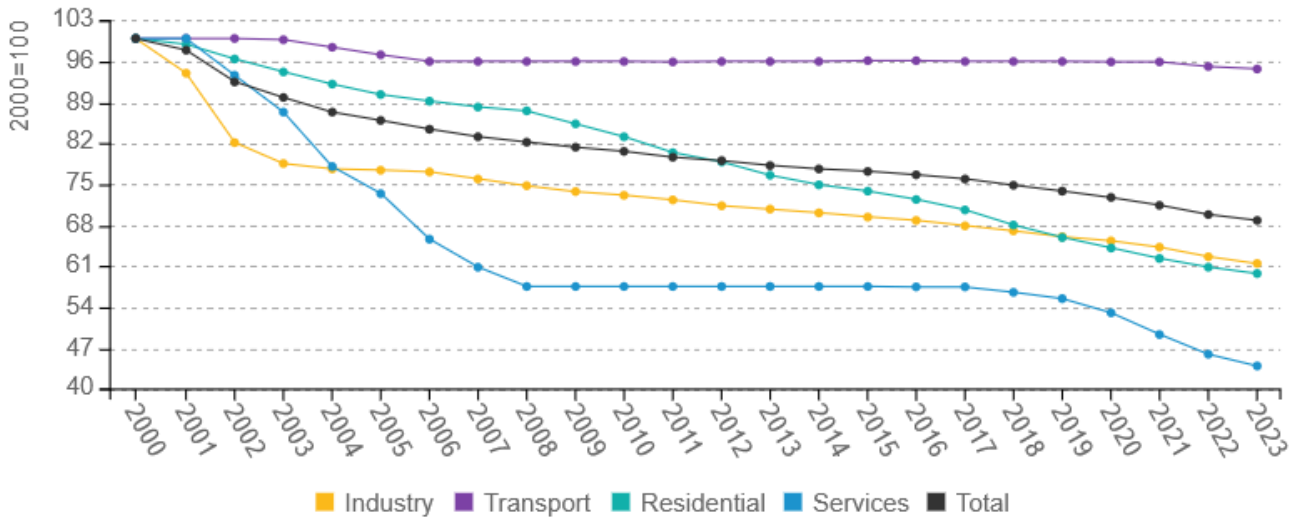
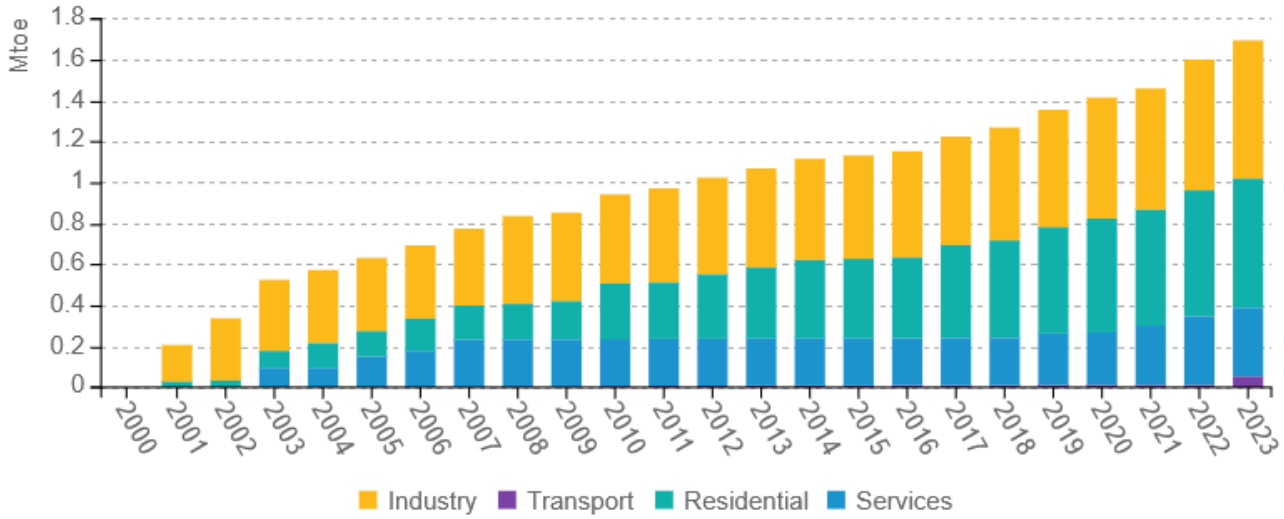
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

The total cumulative final energy savings in 2023 since 2010 reached 1.7 Mtoe. Total cumulative energy savings in 2023 since 2010 reached 0.7 Mtoe in industry, 0.6 Mtoe in residential, 0.3 Mtoe in services and only 0.1 Mtoe in transport. The variation of total final energy consumption was +5.9% in 2020–2021, +0.2% in 2021–2022 and -4.3% in 2022–2023. In the observed period (2020–2023), the total final energy consumption increased by 1.5%: transport by 15.9%, services sector by 7.4%, while energy consumption in industry decreased by -14.6% and in the residential by -3.4% (with climate corrected). Consumption in 2020 was heavily influenced by COVID especially in the transport sector.

Figure 3: Energy savings by sector



Source: Odyssee

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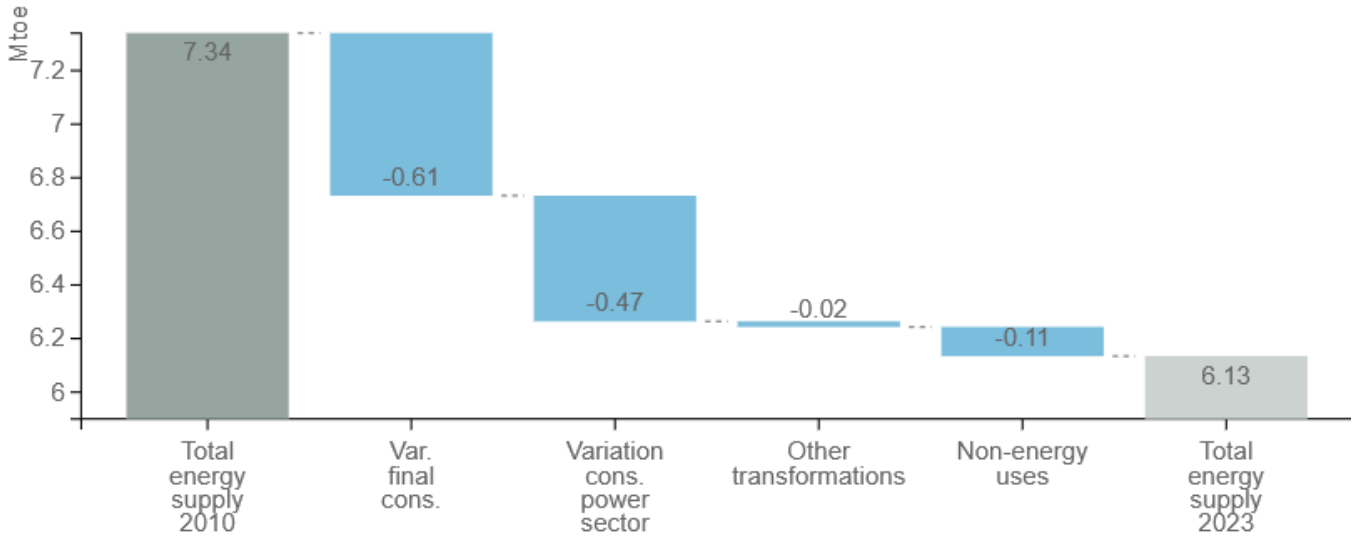
Total energy supply represents the total energy supply for all activities: consumption by the energy sector itself, transformation consumption, transmission and distribution losses, final energy consumption by end users and non-energy use of fossil fuels. Total energy supply decreased by 1.21 Mtoe in the period 2010–2023. The main drivers of the decrease of total energy supply are the variation of the final energy consumption for energy uses (-0.61 Mtoe) and the variation of consumption of power sector (-0.47 Mtoe). Other drivers are the variation of the consumption of non-energy uses (-0.11 Mtoe) and the variation of the consumption of the other energy transformations (-0.02 Mtoe).

Figure 4: Main drivers of the total energy supply variation



Source: Odyssee

The final energy consumptions decreased from 5.04 Mtoe in 2010 to 4.43 Mtoe in 2023. The main drivers that contributed to the reduction in final energy consumption are the achieved energy savings (-0.75 Mtoe) and structural changes (-0.27 Mtoe). Structural changes are a consequence of changes in industrial sector i.e. abandonment of pulp production and electrolysis aluminum production. In addition, warmer climate contributed to lower consumption by 0.20 Mtoe and other factors by 0.22 Mtoe, where effect of increase in ambient heat is the most important factor. On the other hand activity increase contributed to higher energy consumption by 0.84 Mtoe.

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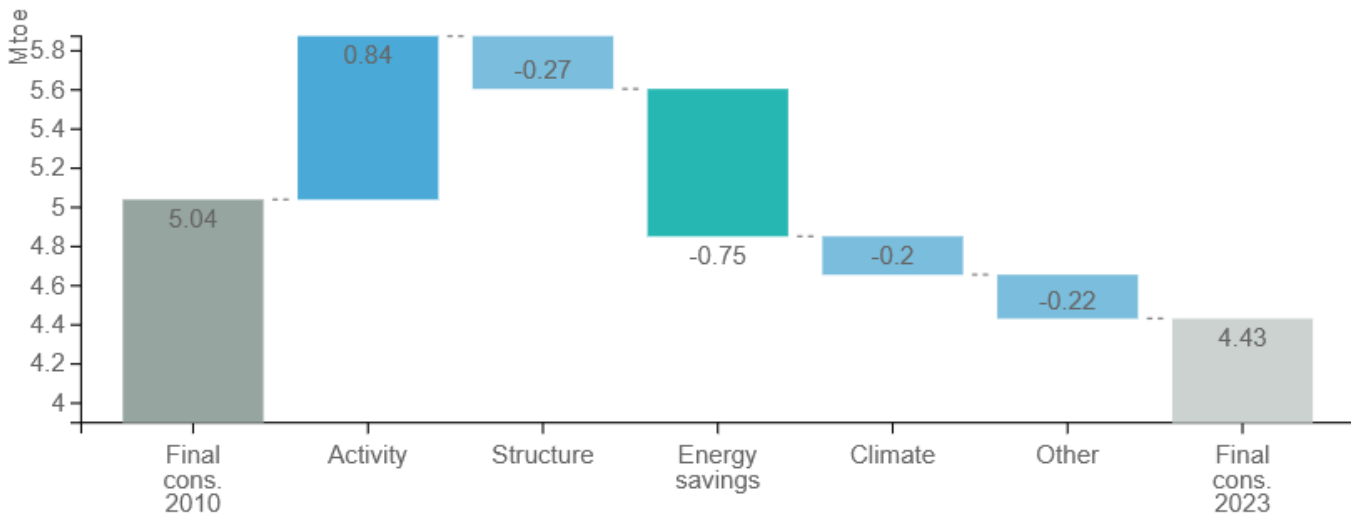
Figure 5: Main drivers of the final energy consumption variation



Source: Odyssee

The target of National Energy Efficiency Action Plans (NEEAPs) was to limit final energy consumption below 5.12 Mtoe and primary energy consumption below 7.125 Mtoe in 2020. The new National Energy and Climate Plan (NECP) was adopted by the Government in December 2024, setting more ambitious targets for 2030. One of the key objectives of the Slovenian NECP is to ensure the systematic implementation of adopted energy efficiency policies and measures so that the total final energy consumption in Slovenia should not exceed 4.32 Mtoe (50.2 TWh) by 2030. Slovenian government adopted in 2020 the Energy Efficiency Act (ZURE) that regulates the areas previously regulated by the Energy Act (EZ-1) and aligns the country with the new rules of the European Union. The Energy Efficiency Act contains measures to improve energy efficiency in order to achieve the goals of the energy efficiency policy in all sectors.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
Act on Energy Efficiency (ZURE)	Yes	The Act on Energy Efficiency (ZURE) regulates areas previously covered in the Energy Act (EZ-1) and brings the country in line with the new European Union rules. ZURE contains measures for energy efficiency improvement for all sectors. The Act on Energy Efficiency (ZURE) includes energy services and essential measures for improving energy efficiency to achieve energy savings targets.	0.98 TJ
Long-term energy	Yes	The long-term energy renovation strategy for 2050 (DSEPS 2050) defines the approaches and policies for decarbonising the national	0.59 TJ

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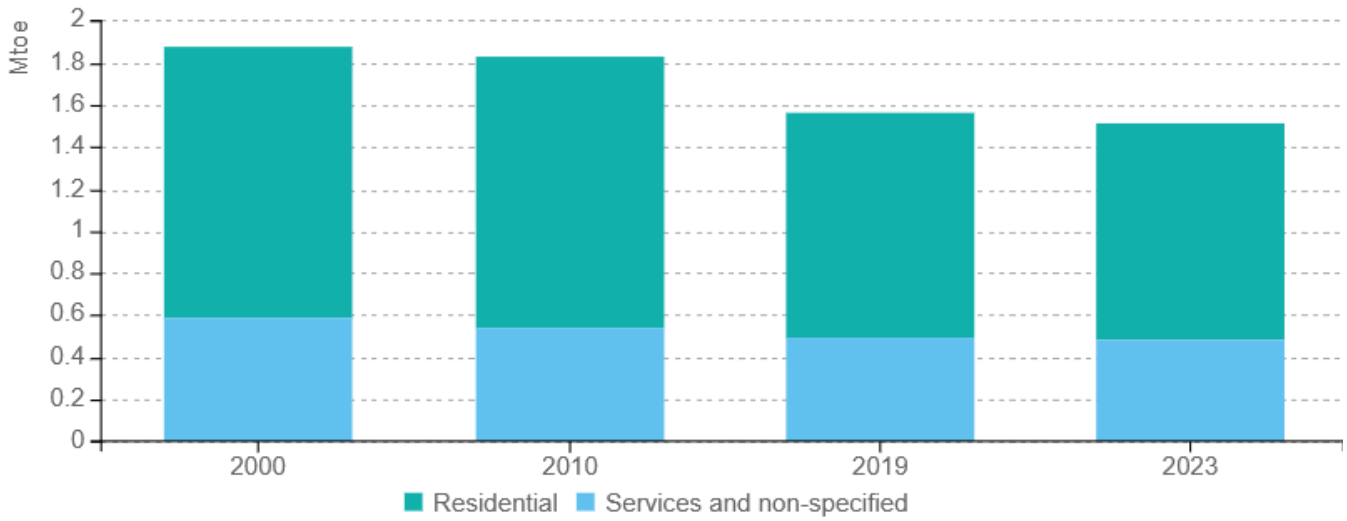
renovation strategy of buildings until 2050		building fund by 2050 and identifies measures supporting the building headline targets set in the National Energy and Climate Plan of the Republic of Slovenia (NECP).	
Energy efficiency obligation scheme	Yes	Energy suppliers are obliged to achieve energy savings at final consumers. They are preparing sets of measures that final consumers can apply and provide financial incentives	0.98 TJ

Source: MURE

Buildings

Total consumption of the buildings sector amounted to 1.5 Mtoe in 2023, being 17.3 % lower than in 2010. Households represent 68 % of the buildings sector, which is 2 percentage points lower than in 2010. Between 2010 and 2023, energy consumption in households declined at an average annual rate of 1.7%. However, this downward trend moderated in the more recent period (2019-2023), with the annual decrease slowing to 1.0%. Similarly, the services sector experienced a 0.9% annual reduction in energy consumption over 2010-2023, with the pace of decline also easing to 0.5% per year between 2019 and 2023.

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



Source: Odyssee

Majority of energy use in households can be attributed to space heating, although the consumption is decreasing progressively. In 2023 it amounted to 0.6 Mtoe, being 24% lower than in 2010. It share decreased from 68% in 2010 to 62% in 2023. On the other hand, consumption of electrical appliances increased by 19%, resulting in increasing its share from 12% to 18%. This increase comes from other use of electricity, not directly from large appliances. The share of water heating remained constant.

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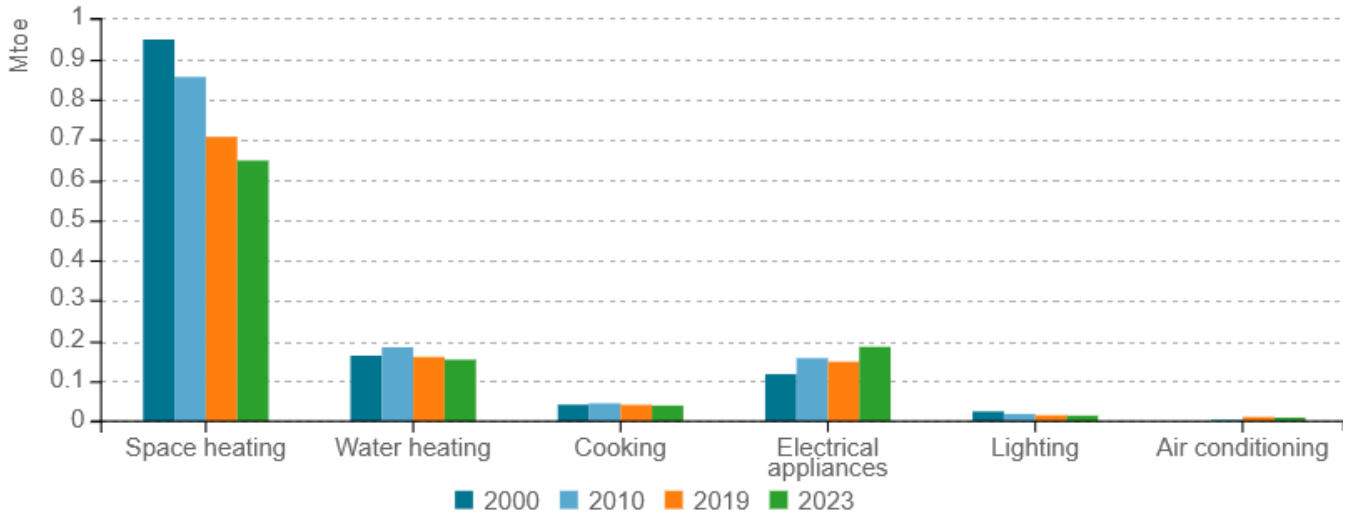
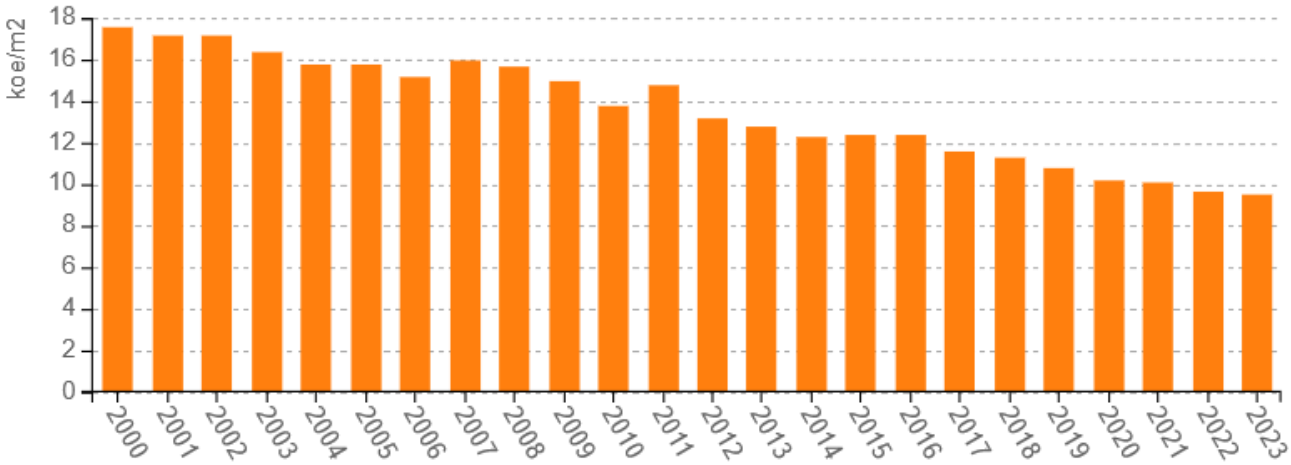
Figure 7: Energy consumption by end-use of households (with climatic corrections)



Source: Odyssee

In the residential sector, the unit consumption for space heating, measured in climate corrected energy per square meter of floor area of the housing stock, decreased by 2.8%/year on average between 2010 and 2023. This decline in specific energy consumption for heating can be attributed to the enhancement of building performance through the implementation of various measures. This is to a large extent due to subsidies from the public fund Ecofund for additional insulation of buildings, replacement of building furniture, and replacement of heating appliances.

Figure 8: Energy consumption of household space heating per m2 (with climatic corrections)



Source: ODYSSEE

Analyzing other uses in households without space heating, shows that consumption of water heating has decreased by 7 percentage points since 2010, reaching a share of 38% by 2023, while electrical appliances and

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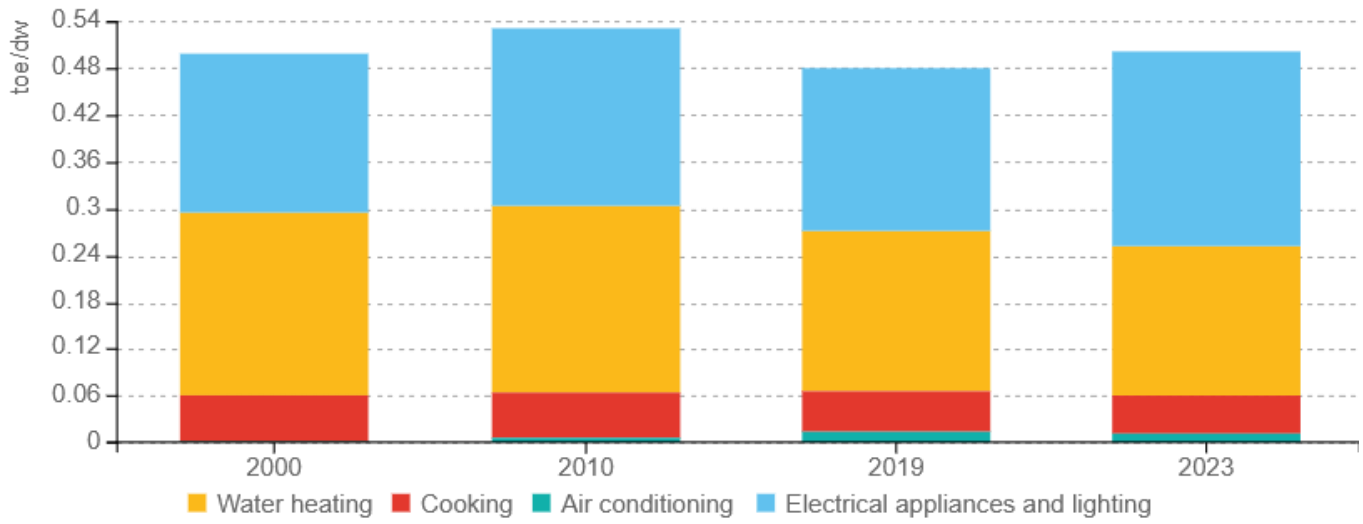
lighting increased by 7 percentage points over the same period, reaching a share of 50% by 2023. Cooking energy consumption is decreasing at an average annual rate of 1.3% since 2010 and its share is fairly stable at around 10% in 2023. Energy consumption of air conditioning is increasing fast due to climate change, its share represent 2% in 2023.

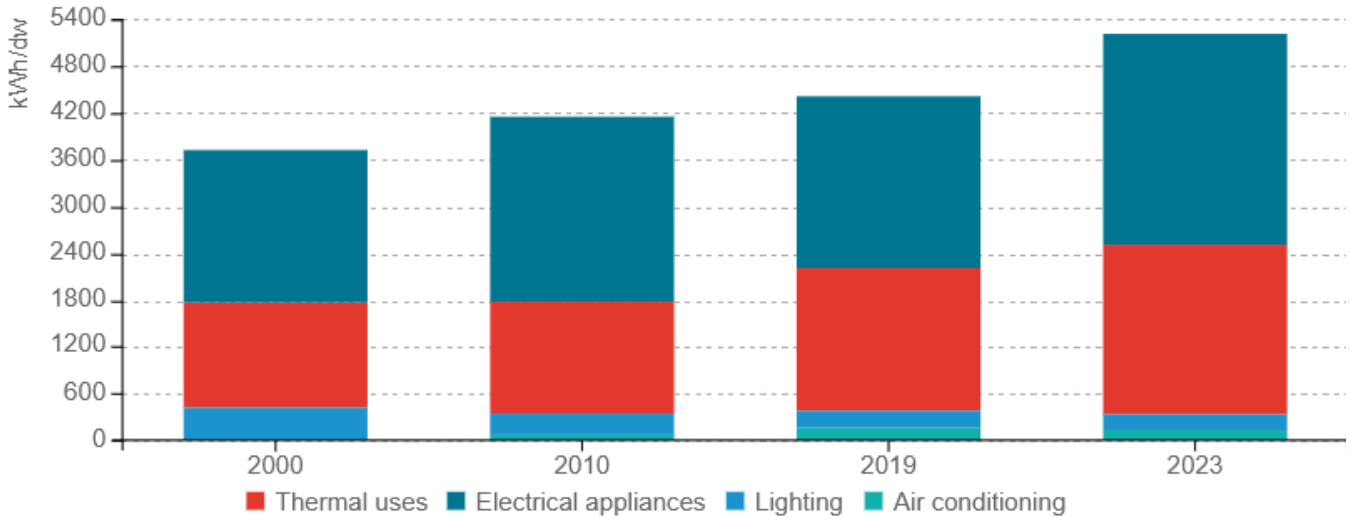
Figure 9: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

Electricity consumption in households is increasing at a fast pace. In the period 2010-2023 electricity consumption per dwelling increased by 1.8 % per year. Increase mainly came from thermal uses, especially due to larger use of heat pumps, where a 3.2 % growth per year was observed and electrical appliances, where a 1.0% growth per year was observed.

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



Source: Odyssee

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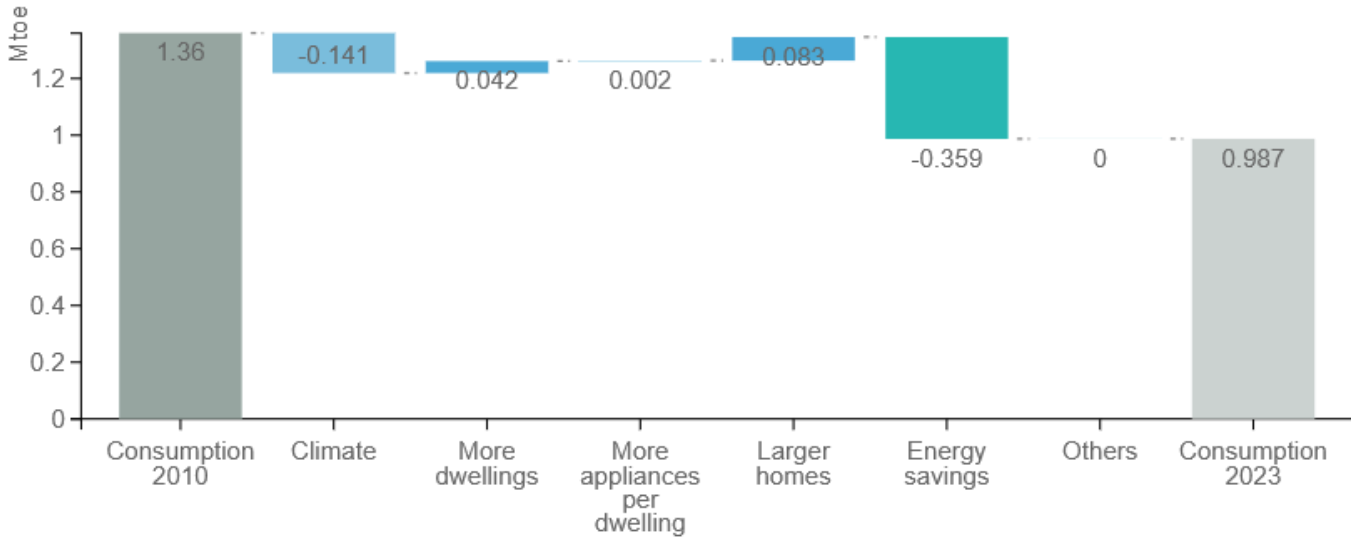
The energy consumption of households in 2023 amounted to 0.99 Mtoe, being 0.37 Mtoe lower than in 2010 without climatic corrections. Over the period, increase in the number and size of dwellings and minimally growth in the number of appliances contributed to raise of energy consumption by 0.13 Mtoe. At the same time, energy efficiency improvements enabled energy savings to overpass the increase in energy consumption (-0.36 Mtoe). Improved energy efficiency is due to improved technical performance of buildings and appliances and also behavioral changes. Additionally, climate in 2023 was much milder compared to 2010, reducing energy consumption even further.

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



Source: ODYSSEE

The reduction in energy consumption for space heating was the primary driver of the overall decline in household energy use. As can be seen on the figure below, savings were the main driver of the decrease, stemming from renovation of buildings envelope and substation of heating systems. The second most important factor was decrease in heating needs due to warmer climate, followed by the penetration of central heating. Reduction was lowered due to additional buildings and increase in their size and also due to behavioral changes.

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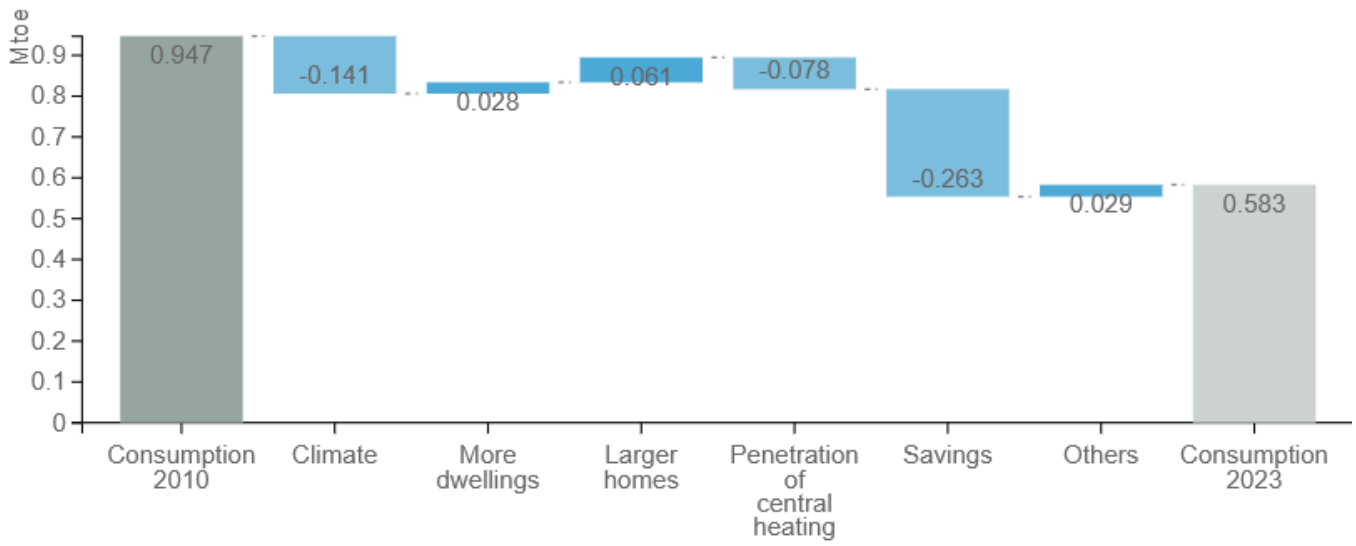
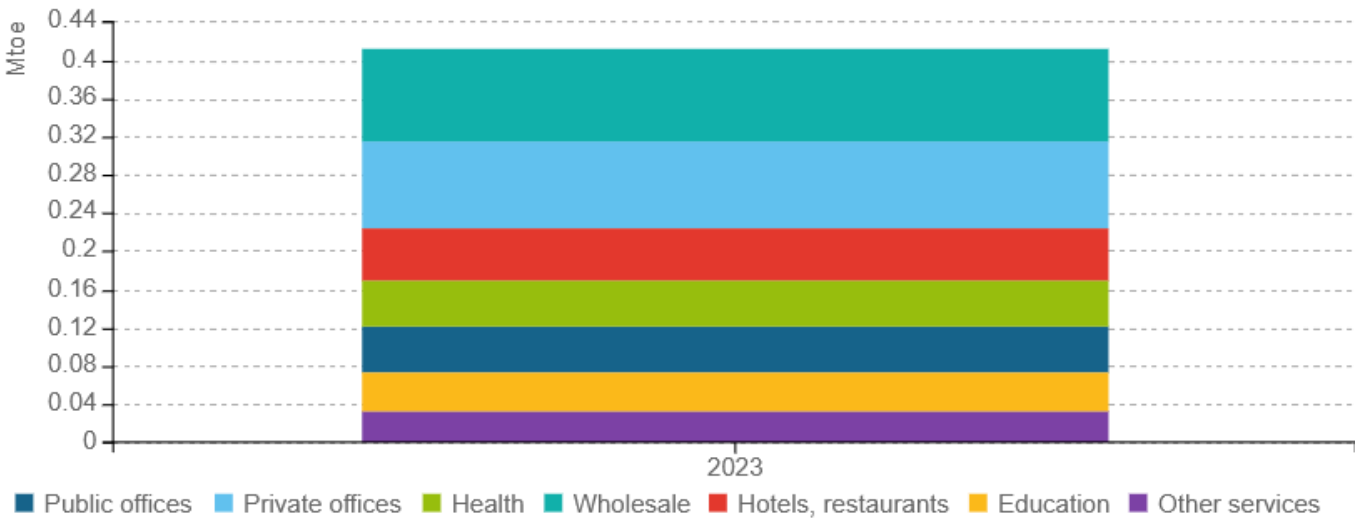
Figure 12: Main drivers of the space heating consumption variation of households



Source: Odyssee

Detailed data for services sector that enabled separation by different subsectors is possible from 2022 onward. Before 2022 energy consumption in services was calculated as a residual. In 2023 most of the energy in services is consumed in wholesale and retail trade (24%) and private offices (22%), being followed by hotels and restaurants (13%), health and social works (12%), public offices (12%), education (10%) and other services (8%). Electricity is by far the most important energy carrier in services representing more than 50 % of the sectoral consumption.

Figure 13: Final energy consumption of services by branch



Source: Odyssee

In the service sector, the consumption per employee was quite volatile before 2013. After that total energy consumption decreased, while electricity per employee remained almost constant. From 2022 onward data on

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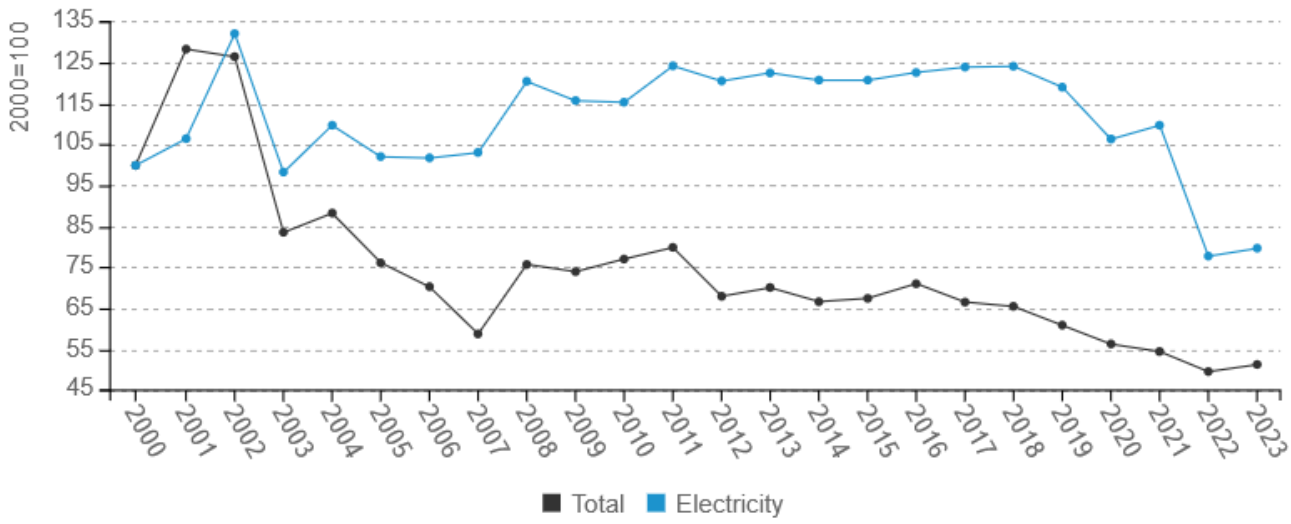
energy consumption in the service sector is collected through survey, so quality of the data is much better. Electricity consumption decreased rapidly based on that data, as only part of the residual belongs to services.

Figure 14: Energy and electricity consumption per employee in services (with climatic corrections)



Source: ODYSSEE

Measures from the NEEAP were upgraded in the NECP and especially in the long-term renovation strategy. Subsidies and soft loans are available for private homeowners who wish to improve the energy performance of their homes through better insulation, installation of heat recovery ventilation and investment in renewable energy sources. Special attention is given to multifamily houses, by the preparation of new instruments to gain consensus for renovation, by subsidizing renovation for socially vulnerable people at 100% and by setting up guaranty scheme. Construction of new very efficient houses and flats is also subsidised. Building Regulations set statutory minimum energy performance requirements for new buildings and substantial changes in existing buildings are in place. Regulation has been tightened in 2022. Financial programmes for energy renovation of buildings in public sector are in place and combined with energy contracting schemes. Energy management is being setup in public sector. The NECP sets the goal to reduce energy use in buildings by at least 15% in 2030 compared to 2020.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Financial incentives for energy-efficient renovation and	Yes	Support for renovation of inefficient buildings and construction of sustainable new buildings is provided by Eco Fund. Subsidy cover at least 25 % of the investment and if multiple measures are combined it can reach 50 %.	1.5 TJ

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sustainable construction of residential buildings			
Action plan for reducing energy poverty for a period of three years	Yes	The Action Plan specifies measures to mitigate energy poverty, the indicators, responsible parties for the implementation of the measures and definition of the sources of financial resources	0.05 TJ
EU-related: Revised Directive for Labelling of Energy-related Products (Directive 2010/30/EU) - Decree on labelling of energy-related products as regards the use of energy and other resources	No	The EU-Directive "Energy Consumption Labelling Ordinance (2012/27/EU)" establishes a framework for labelling and consumer information regarding energy consumption for energy-related products. The transposition of the Slovenian law: Act on Energy Efficiency,	0.05 TJ

Source: MURE

Transport

Overall transport energy demand in Slovenia has seen periods of dramatic growth and contraction between 2000 and 2023, as transport activity is highly sensitive to economic growth, purchase of fuels from foreign vehicles and activity of domestic vehicles. Purchase of fuels from foreign vehicles can represent up to 30 % of the yearly amount of fuels sold in Slovenia. It is sensitive to transit transport through Slovenia and border trade/ fuel tourism, which depend on relative fuel prices in Slovenia and neighboring countries. Road freight increased heavily resulting in an increased share in total consumption from 24 % in 2000 to 33 % in 2023. The largest share of energy consumption belongs to cars, but its share decreased from 65 % in 2010 to 62 % in 2023, as yearly energy use increase was only 0.1 %/year over this period.

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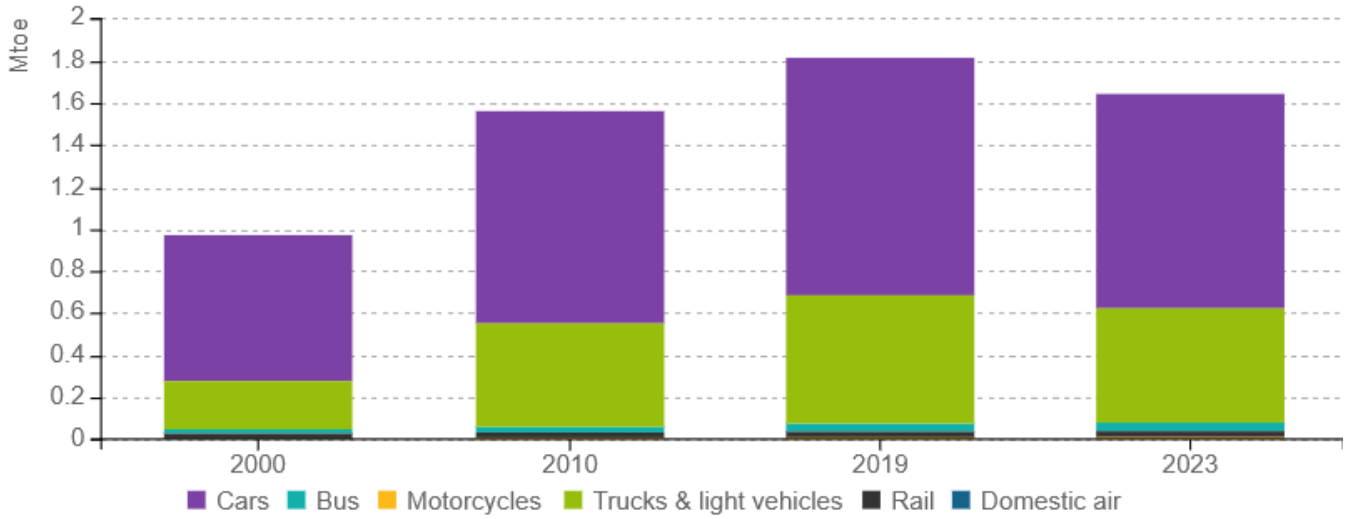
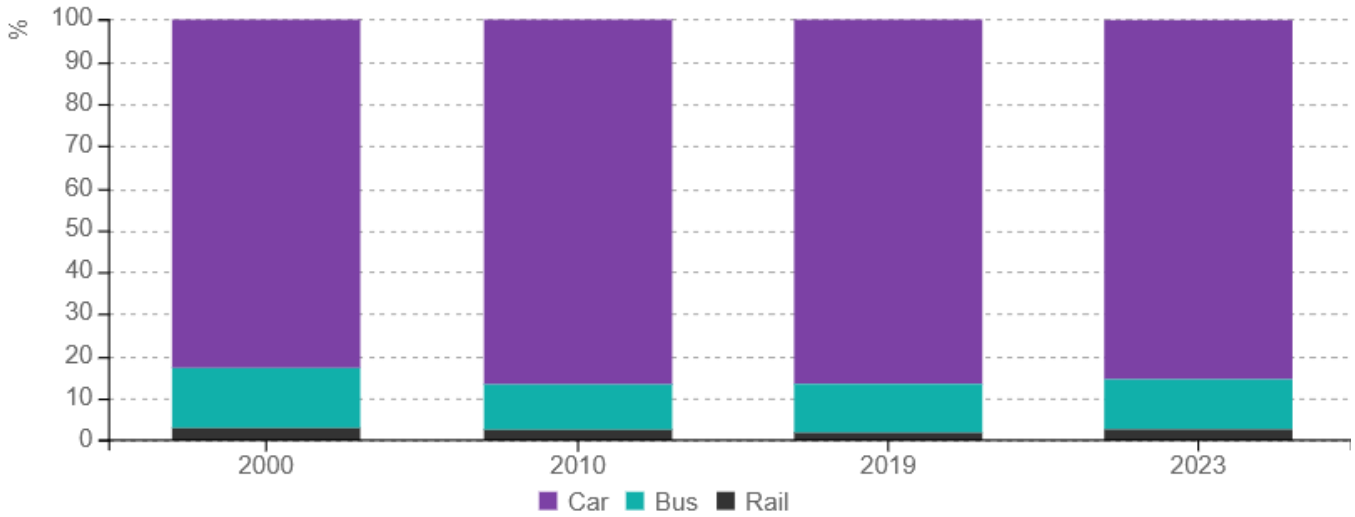
Figure 15: Transport energy consumption by mode



Source: ODYSSEE

Private cars remain the dominant passenger transport mode (with 86% in 2023), reflecting Slovenia's dispersed settlement patterns, investments mainly in road infrastructure and weak public transport. Despite improved implementation of measures to support use of public transport in the last years, such as the new national agency that manages public transportation, investment in rail infrastructure, better transport planning and other, the use of public transport in 2023 was still lower than in 2000.

Figure 16: Modal split of inland passenger traffic



Source: ODYSSEE

Freight transport is also dominated by road. Its share increased from 61% to 70% between 2000 and 2023, while volumes more than doubled. Slovenia is an export-oriented country with good transport connections to EU countries and favorable geographic location also due to port on Adriatic Sea. Road infrastructure has been greatly

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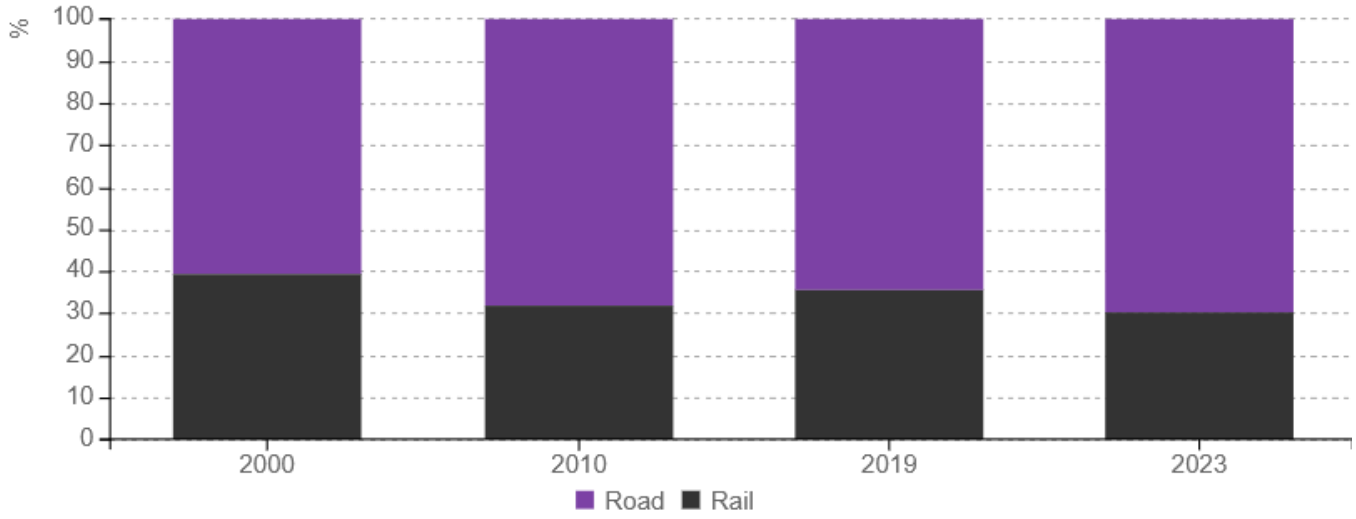
improved in the past, while improvements in rail infrastructure have started to gain momentum in the recent years.

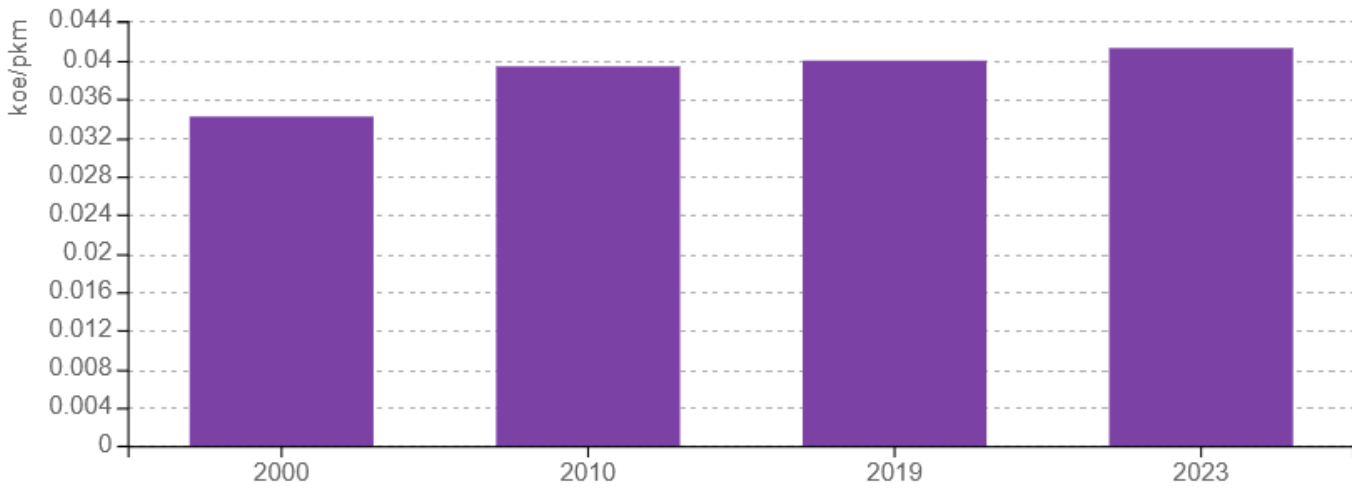
Figure 17: Modal split of inland freight traffic



Source: ODYSSEE

Energy consumption of cars per passenger kilometer increased between 2000 and 2023. Majority of the increase happened between 2000 and 2010, but continued also from 2010 to 2019 and from 2019 to 2023. In 2023 it was 21% higher than the 2010 level. Although efficiency of cars improved, they become heavier, more powerful and occupancy rate decreased. Between 2017 and 2021 average occupancy rate in cars decreased from 1.65 to 1.49.

Figure 18: Energy consumption of cars per passenger-km



Source: ODYSSEE

The primary driver behind the increase in energy use of domestic and foreign vehicles from 1.78 Mtoe in 2010 to 1.84 Mtoe in 2023 (+0.06 Mtoe) is activity, encompassing the growth of domestic traffic (+0.23 Mtoe). On the

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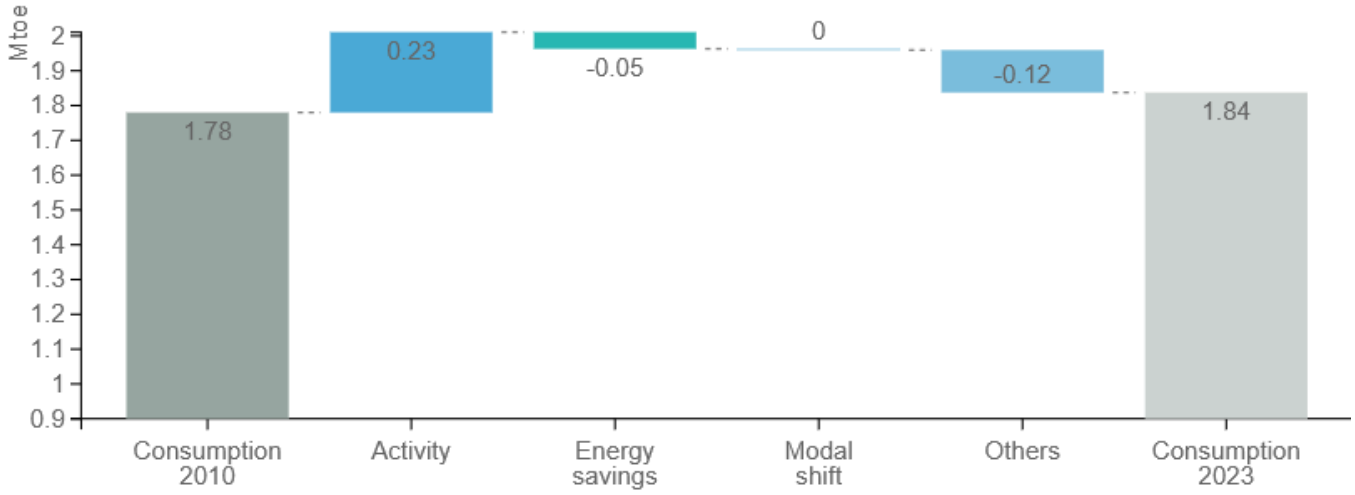
other hand growth of energy consumption has been offset by other factors, where reduction of fuel purchase from foreign vehicles is the main contributor and by energy savings from technical improvement of vehicles. Modal shift had no effect on energy consumption meaning that between 2010 and 2023 no changes have been observed, which can be treated as a failure of Slovenian transport policy.

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



Source: ODYSSEE

Support to public transport including investments in railway infrastructure and trains and improvement of public transport management represents a very important policy package targeting to overturn negative trend in public transport and increase its use. NECP focuses on rail infrastructure for rail freight and passenger transport, to improve position of rail transport compared to road. The largest benefits on energy efficiency are expected from increased energy efficiency of vehicles, through technological improvement of vehicles with internal combustion engines and penetration of new technologies, especially electric vehicles. Main support mechanisms are subsidies for vehicles without emissions, subsidies for charging infrastructure and EU regulation on specific CO2 emission of vehicles. Support for active mobility (walking and cycling) is also included in the measures in the transport sector.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Incentives for sustainable transport in general	Yes	The measure is aimed at establishing sustainable traffic planning in Slovenian municipalities through the development of strategic documents: planning at the local and regional level, mobility management, incentives to use modern technologies, promoting sustainable choice of transport, sustainable mobility	0.38 TJ

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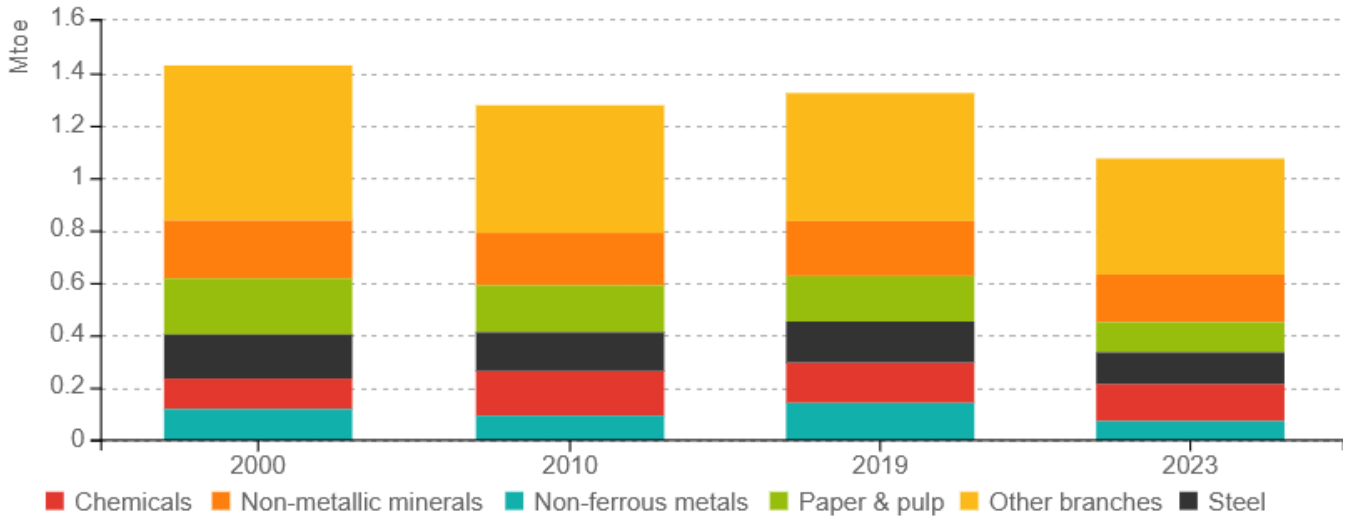
		measures/informing and raising public awareness, infrastructure for sustainable mobility at the regional level and in cities.	
Financial support for purchase of electrical or hybrid cars or motorcycles	No	Incentives for the purchase of electric vehicles is available by Borzen.	3.0 TJ
Provision of financial resource for the development of rail transport for the period 2014-2030	Yes	The measure is aimed to providing a financial funds for investments in the modernization and development of railways transport in the next period until 2030.	0.08 TJ

Source: MURE

Industry

Total final energy consumption in industry decreased by -1.3%/year between 2010 and 2023. The energy consumption decreased in all industrial branches. The largest decrease was in paper industry by 3.3%/year, followed by non-ferrous metals by 2.0%/year, steel by 1.6%/year, chemicals by 1.3%/year and other industrial branches by 0.7%/year.

Figure 20: Final energy consumption of industry by branch



Source: ODYSSEE

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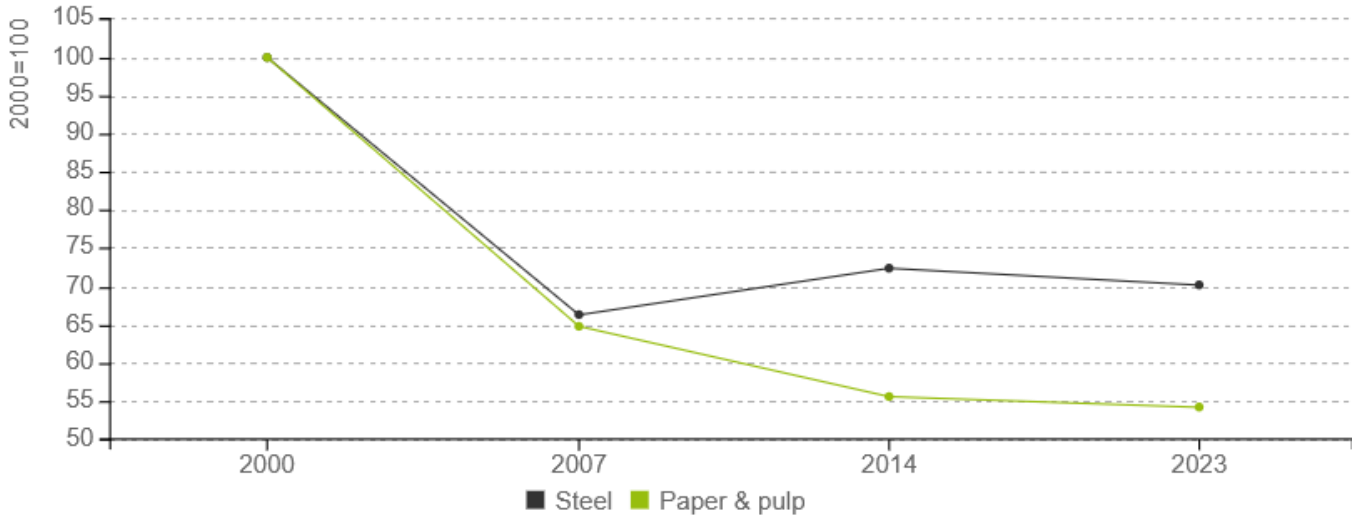
In the period 2010–2023, the specific energy consumption in steel production decreased by 0.5%/year and in paper and pulp production by 0.8%/year. Specific energy consumption of steel increased by 0.3%/year in 2010-2019, and decreased by 2.4%/year in 2019-2023. The specific energy consumption in paper and pulp production decreased over the entire period 2010–2023.

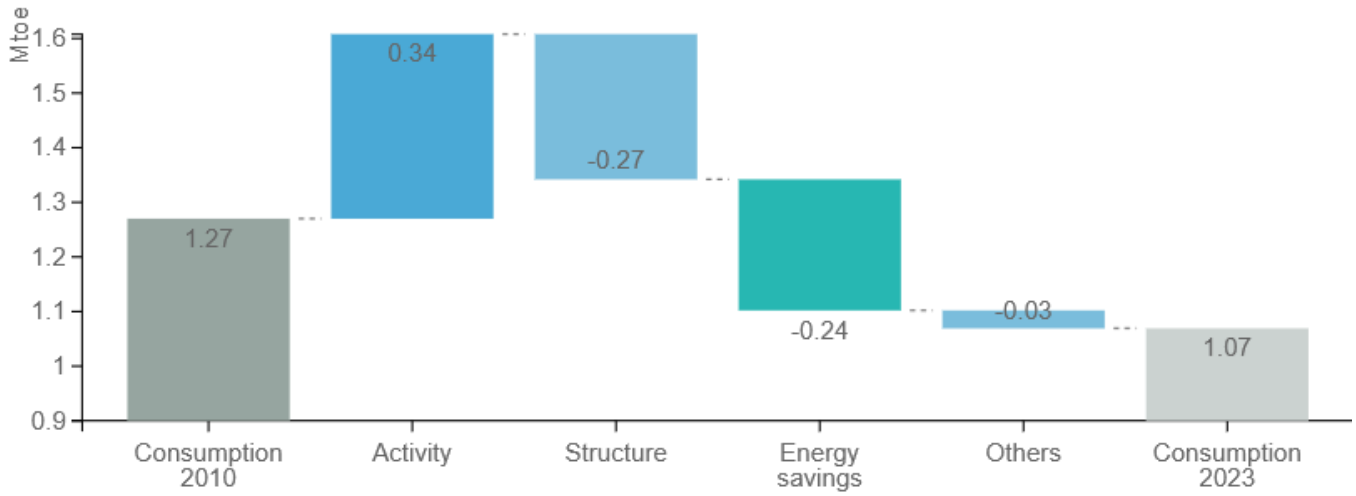
Figure 21: Unit consumption of energy-intensive products (toe/t)



Source: ODYSSEE

Energy consumption in industry decreased by 0.20 Mtoe between 2010 and 2023, mainly due to structural change (-0.27 Mtoe), due to ceasing of production in some energy intensive productions (cellulose production, primary aluminium production by electrolysis) and to energy savings (-0.24 Mtoe) due to the successful implementation of energy efficiency measures . On the other side, the increase in industrial production ("activity") contributed to an increase in consumption by 0.34 Mtoe. Others effects had a small contribution (+ 0.03 Mtoe).

Figure 22: Main drivers of the energy consumption variation in industry



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Source: ODYSSEE

Stimulation of energy efficiency in industry is one of the measures of Slovenian industrial policy for the development and raising of the competitiveness in industry. A legal framework was adopted to promote the efficient use of energy for industrial enterprises under EU-ETS. Financial incentives for industrial Non-ETS companies has been included in all NEEAPs (2008-2020) and the operational program for reduction of GHG emission. The implementation and improvement of energy efficiency measures in industry continue in the adopted NECP until 2030.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Scheme for reducing GHG emissions	No	The aim of the measure is to establish and implement a scheme for reducing GHG emissions related to the exemption of air pollution charges for CO2 emissions.	0.05 TJ
Subsidy for introducing energy management systems in industry	Yes	The measure is an energy efficiency measure in a form of financial incentives (subsidy) to introduce energy management systems in industrial companies.	0.16 TJ
Financial incentive for increasing the efficiency and use of RES in industry	Yes	Financial incentives in the form of revolving funds for energy efficiency measures and the improvement of the efficient use of renewable energy sources, in particular improving the efficiency of wood biomass boilers in the processing industry.	0.05 TJ

Source: MURE

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