Energy efficiency trends and policies

Overview

In 2023, Croatia's final energy consumption reached approximately 7.1 Mtoe, which was 2.1% higher than the 2010 level. The transport sector was the largest consumer of energy in 2023, with its consumption increasing by 1.8% per year from 2010 to 2023. Energy use in the service sector grew by 0.4% annually, between 2010 and 2023. Meanwhile, energy consumption in the industrial sector and household sector declined by 0.9%, respectively by 0.8% per year during the same period. Overall energy consumption in buildings, which includes both the residential and service sectors, decreased by 0.5% per year throughout the observed timeframe.

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



Source: ODYSSEE

From 2010 to 2023, energy efficiency for final consumers, as measured by ODEX, improved by 11% (0.9% per year). The largest energy efficiency gains were achieved in the industry sector (1.9% per year), followed by the residential sector (1.2% per year); the trends in these sectors can be explained by the introduction of various regulations and financial incentives. Energy efficiency progress was much slower in the transport and services sector (0.2% and 0.1% per year, respectively).

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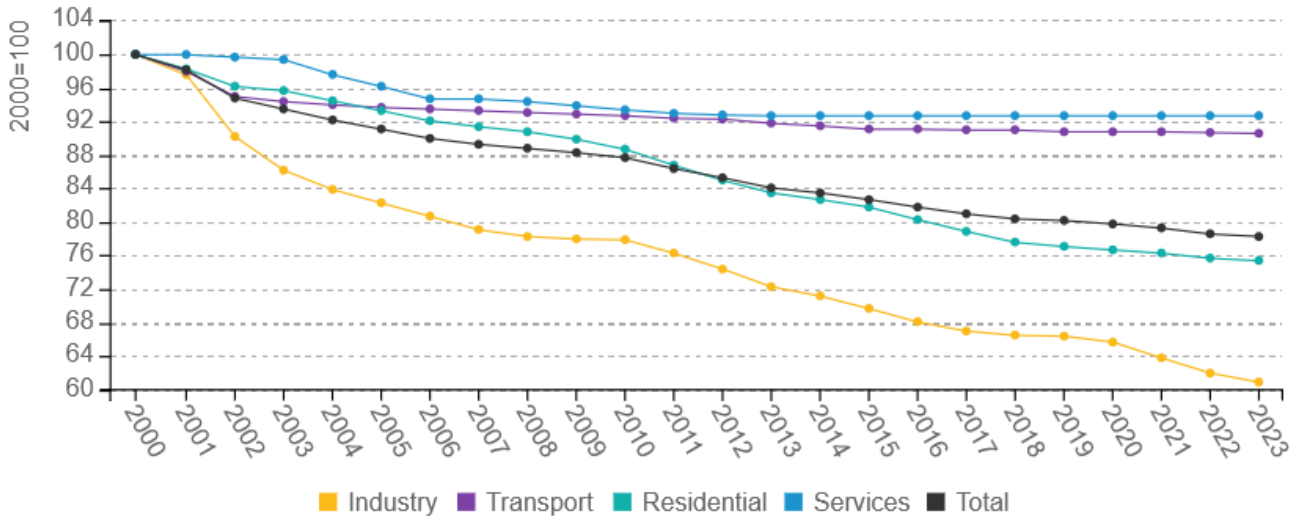
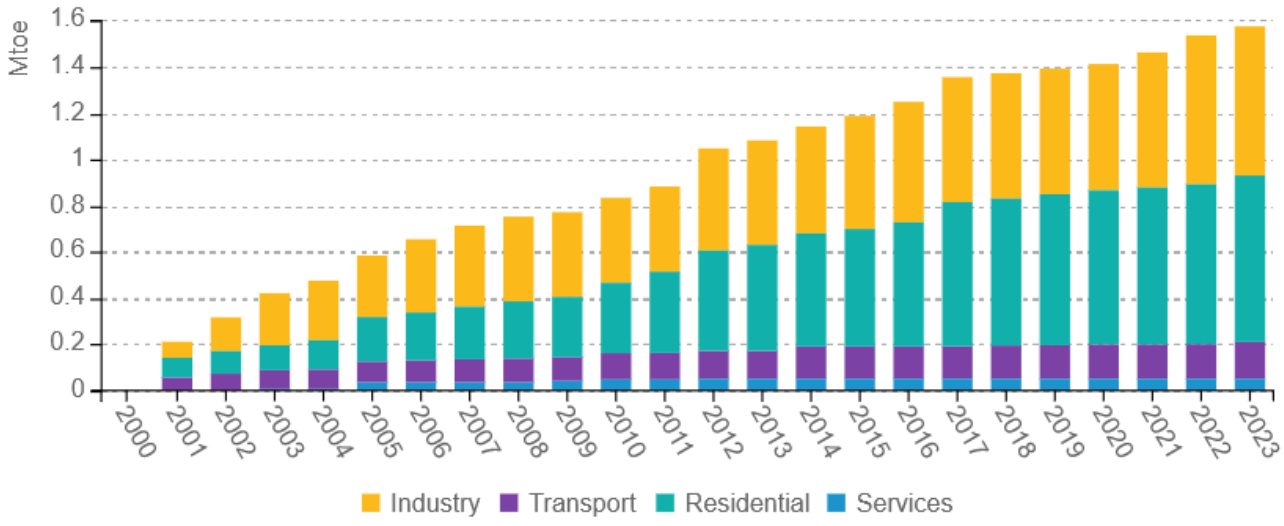
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

From 2000 to 2023, the largest savings were achieved in the household sector, amounting to 0.7 Mtoe, while the smallest savings were achieved in the service sector, amounting to 0.05 Mtoe. Since 2010, the annual increase in energy savings was achieved in the following order: household sector with an annual increase of 6.8%, industry sector with an annual increase of 4.4%, transport sector with an annual increase of 2.6%, and service sector with an annual increase of 0.6%.

Figure 3: Energy savings by sector



Source: Odyssee

Total energy supply in 2023 amounted to 8.68 Mtoe, which is 7.4% lower than in 2010, when total energy supply amounted to 9.37 Mtoe. The most significant drivers are non-energy uses, other transformations and variation in final consumption, which have been declining in the observed period.

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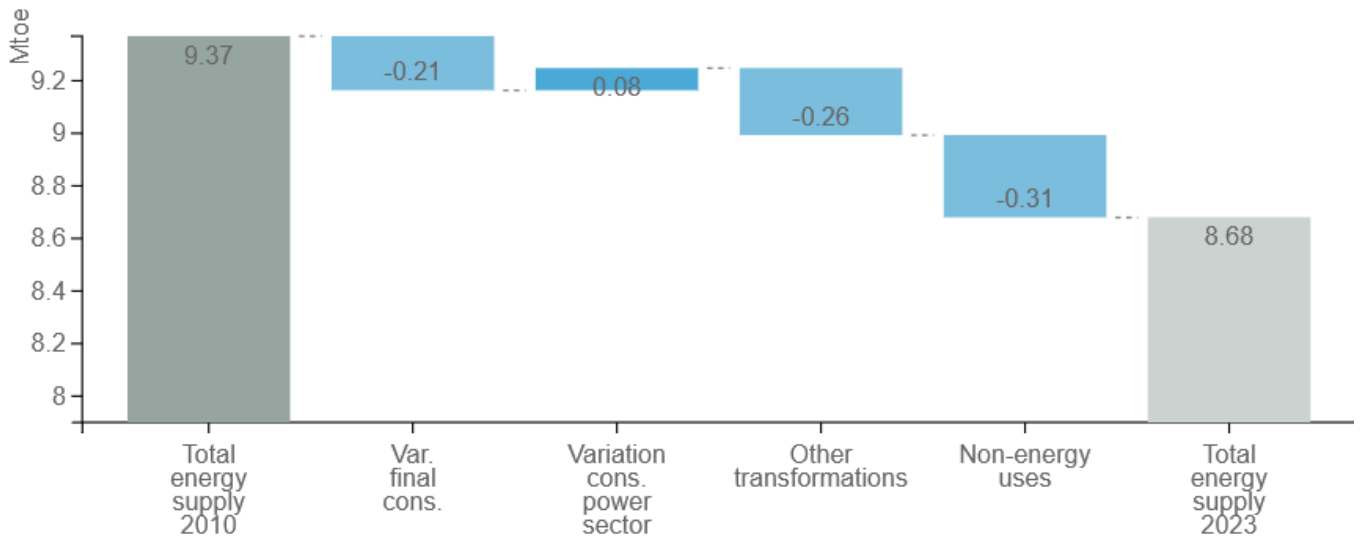
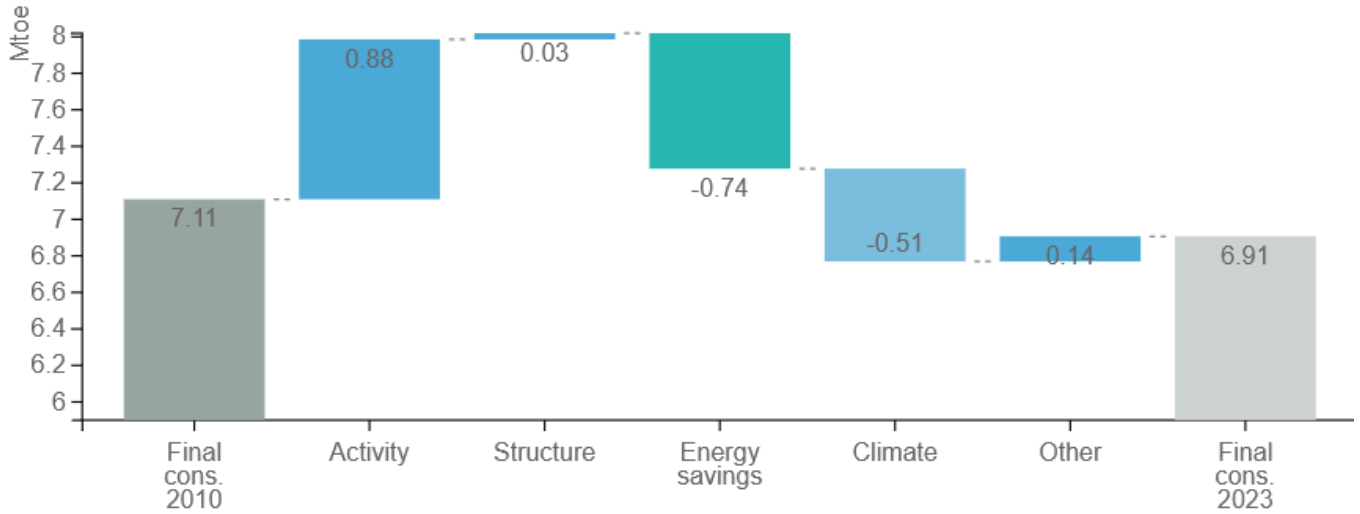
Figure 4: Main drivers of the total energy supply variation



Source: Odyssee

Final energy consumption in 2023 amounted to 7.1 Mtoe, while in 2010 it amounted to 6.9 Mtoe.

Figure 5: Main drivers of the final energy consumption variation



Source: Odyssee

The Integrated National Energy and Climate Plan for the period through 2030 builds upon existing national strategies and frameworks. The key targets set by the Plan for 2030 include: 1) a 62% reduction in greenhouse gas emissions (GHG) in the ETS sector compared to 2005; 2) a 16.7% reduction in GHG in non-ETS sectors compared to 2005; 3) a share of renewable energy sources (RES) in gross final energy consumption of up to 44%; 4) a share of RES in final energy consumption in transport of up to 24.6%; 5) primary energy consumption (total energy consumption excluding non-energy use) limited to 336.9 PJ; and 6) final energy consumption capped at 246.2 PJ.

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Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
Energy efficiency of the electricity transmission system	Yes	Current levels of losses in the transmission grid of the Republic of Croatia amount to about 2% of the transmitted electricity, which is the amount at the level of other operators in the ENTSO-E transmission system. An important feature of the Croatian transmission grid, both in terms of plant safety and support of market activities, as well as in terms of losses, is the extremely strong connection with neighbouring power systems (interconnections). While, on the one hand, this significantly increases the safety of the plant, on the other hand, the transmission increases the grid losses. HOPS (Croatian Transmission System Operator) will continue to implement measures related to the operation of the power system operation development and measures related to the development of the transmission grid by 2030, with the aim of further reducing technical losses in the grid. For this measure, along with provision of funds by HOPS, it is proposed to programme the use of ESI funds in the next programming period 2021 - 2027.	5.20 TJ
Energy Efficiency Obligation Scheme	Yes	The Energy Efficiency Obligation System was established by the Energy Efficiency Act (OG 127/14, 116/18), and its functioning is further defined by the Ordinance on the Energy Efficiency Obligation System (OG 41/19).	5.00 TJ
Reduction of losses in the distribution network and introduction of smart grids	Yes	In the period of up to 2030, HEP-DSO will continue to conduct activities to reduce technical and non-technical losses in the distribution power grid. A detailed analysis will identify the causes of increased losses in some parts of the grid and the priorities for implementing activities to reduce technical and non-technical losses. Based on the experience gained from the implementation of a pilot project for the deployment of advanced grids in pilot areas using ESI funds, it is necessary to programme the continuation of the use of ESI funds in the next programming period from 2021 to 2027 for the further development of advanced grids.	1.00 TJ

Source: MURE

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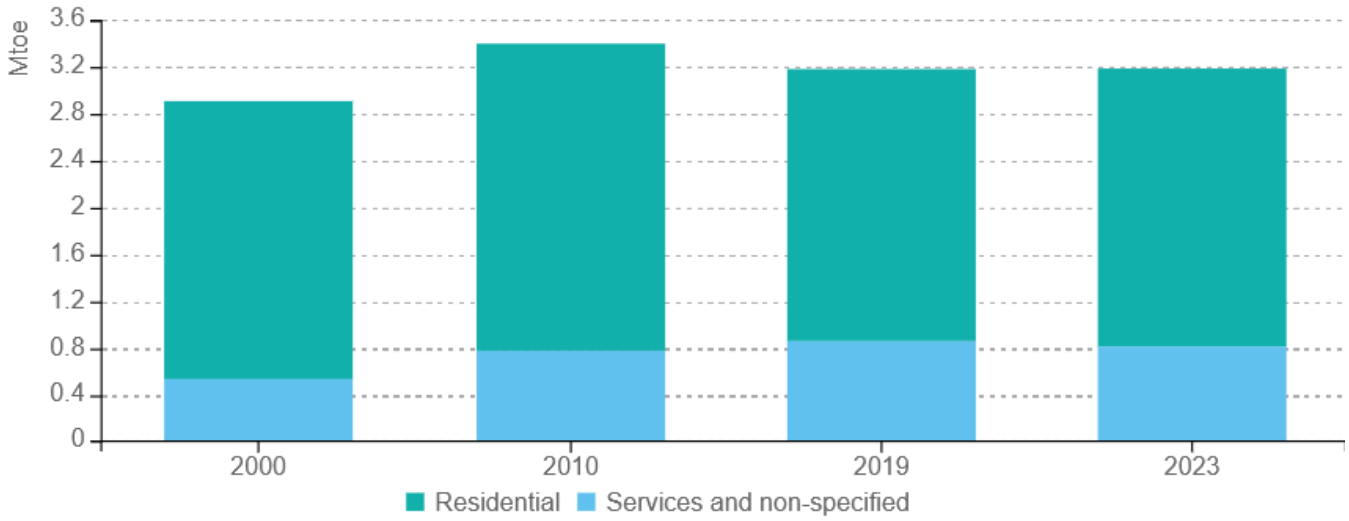
Buildings

Final energy consumption in buildings in 2023 amounted to 3.2 Mtoe, which is a decrease of 6.1% compared to 2010, when it amounted to 3.4 Mtoe. The household sector is represented by 75%, while the remaining 25% refers to energy consumption in buildings in the service sector.

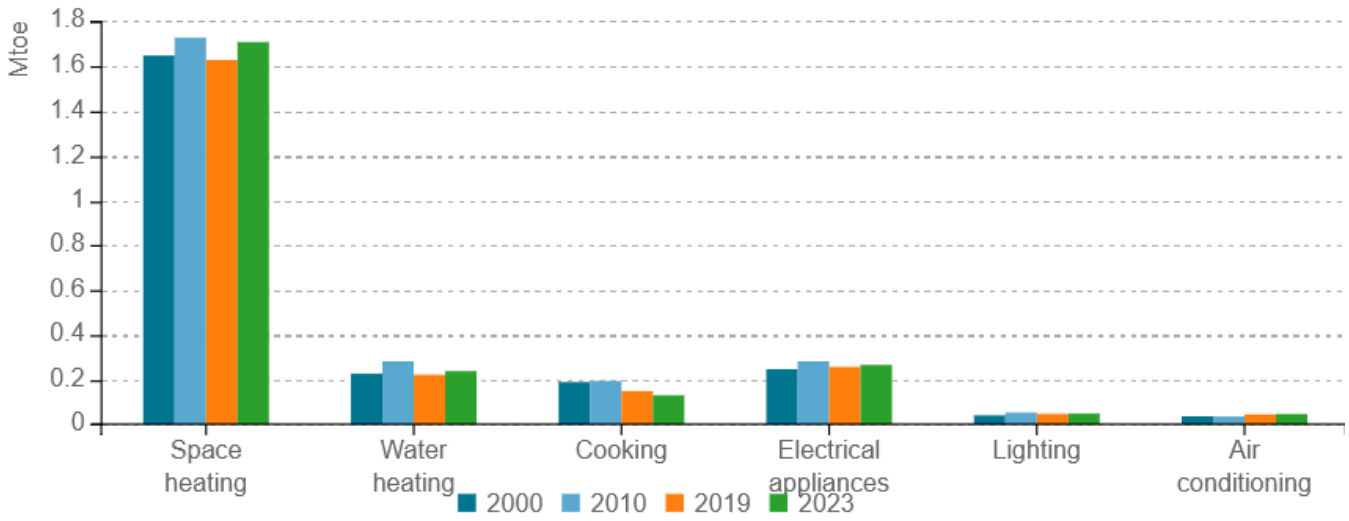
Figure 6: Final energy consumption in buildings (with climatic corrections)



Source: Odyssee

Total energy consumption by end-use in the household sector amounted to 2.4 Mtoe in 2023, which is 5.5% less than in 2010. The structure of consumption in 2023 did not change significantly compared to 2010.

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



Source: Odyssee

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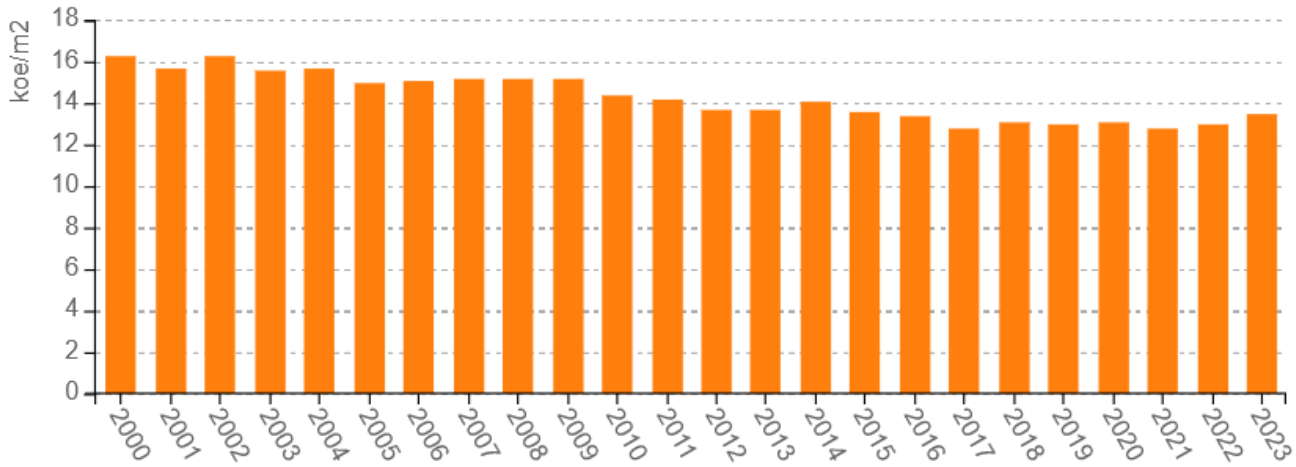
In 2023, space heating accounted for around 70% of the final energy consumption of the residential sector, electrical appliances and lighting for 13%, water heating for around 10%, cooking for 5% and air cooling for around 2%. Between 2010 and 2023, final energy consumption for electrical appliances and lighting decreased by 6% (0.5% per year), and final energy for water heating by 15.6% (1.3% per year). In contrast consumption for air cooling increased by 30.3% (2.1% per year).

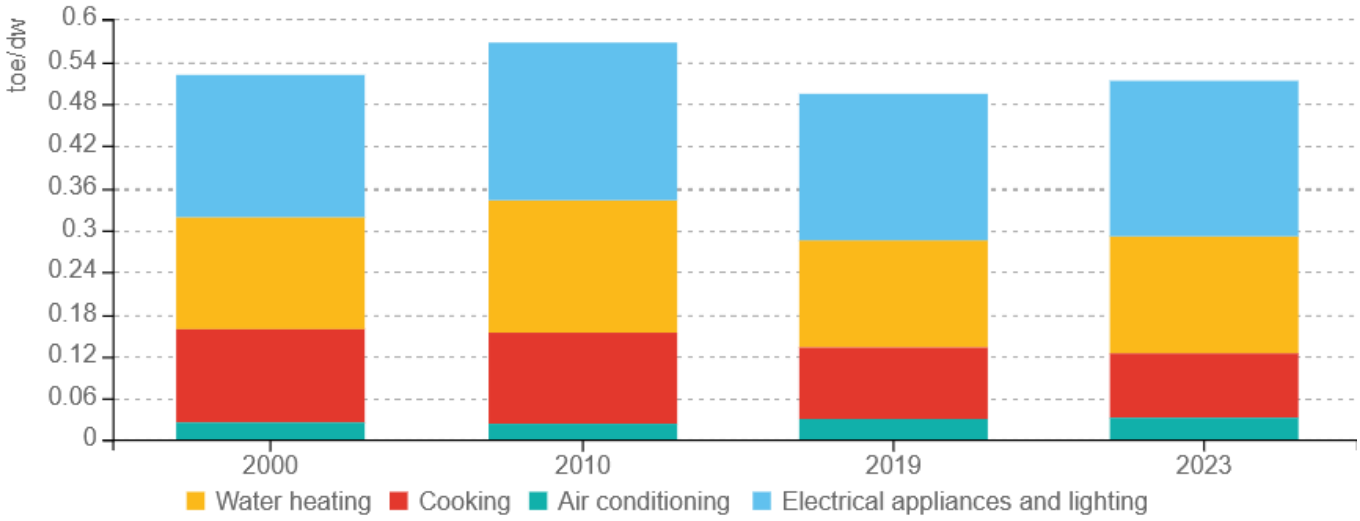
Figure 8: Energy consumption of household space heating per m2 (with climatic corrections)



Source: ODYSSEE

Energy consumption per dwelling was 0.51 toe in 2023, while in the year 2010 it was 0.57 toe (with the exception of energy for space heating), which represents a drop of 10%. The most significant increase in energy consumption was for air conditioning, which rose by 37%, while the largest decrease was in energy used for cooking, which fell by 30%.

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



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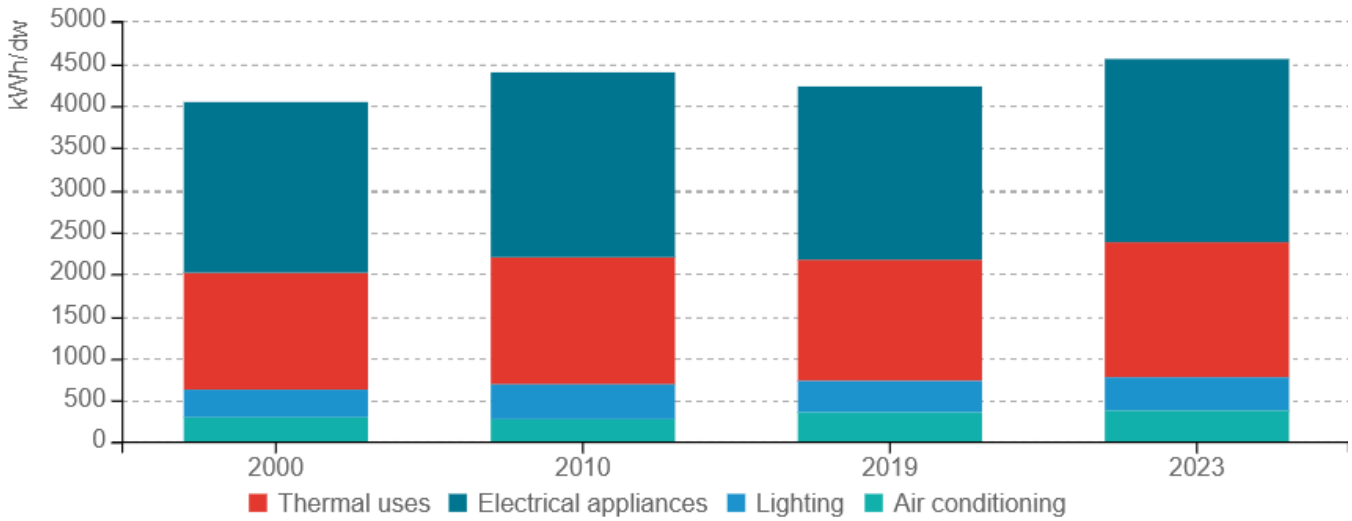
Source: ODYSSEE

Electricity consumption per dwelling amounted to 4.6 MWh in 2023, while in 2010 it amounted to 4.4 MWh, which is an increase of 3.6%. In the observed period, a decrease in electricity consumption for appliances and lighting was observed (1% and 4%), while an increase was recorded in energy consumption for thermal uses and air conditioning (6% and 37%).

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



Source: Odyssee

Final energy consumption of residential buildings in 2023 was slightly lower than in 2010 (-20%). This was the result of two opposite trends. Increase comfort (more appliances per dwelling and larger homes) contributed to increase consumption by 0.29 and 0.30 Mtoe, respectively, while energy savings reduced consumption by 0.41 Mtoe. Other effects, which can be mainly interpreted as change in heating behaviors, also offset the effect of drivers on consumption growth (-0.73 Mtoe).

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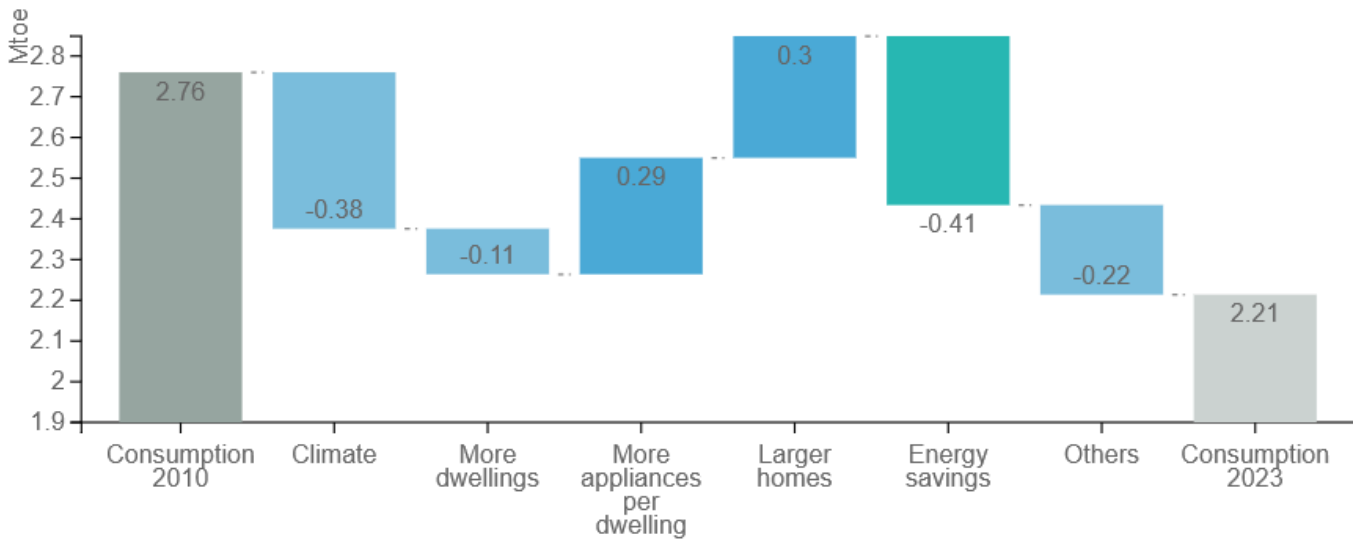
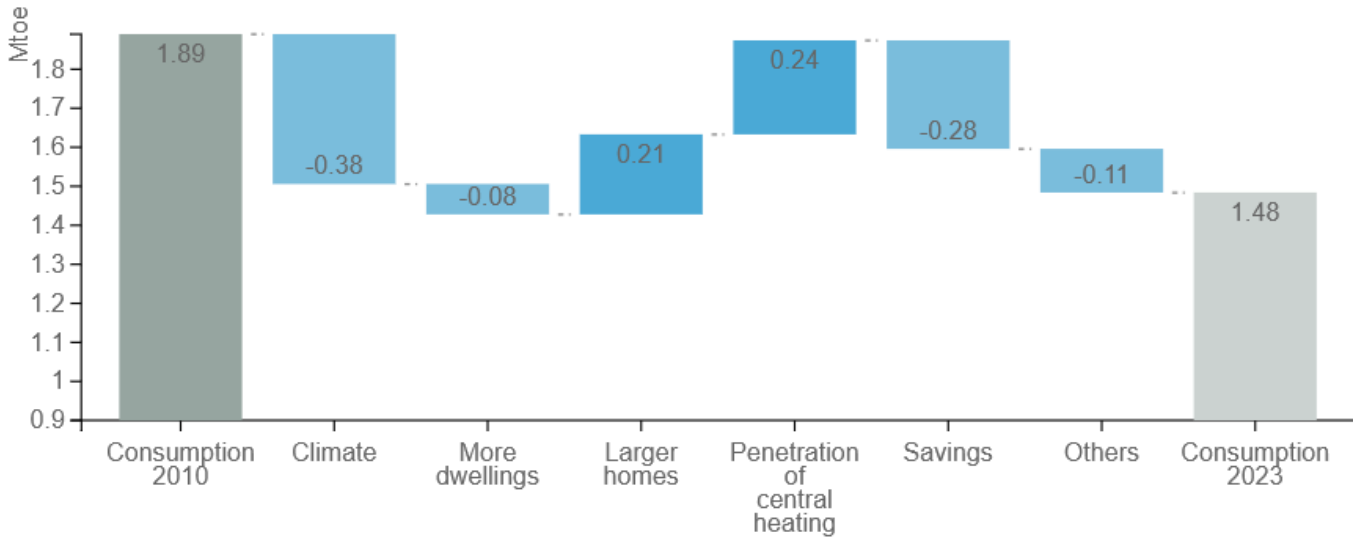
Figure 11: Main drivers of the energy consumption variation in households



Source: ODYSSEE

Energy consumption for space heating in 2023 amounted to 1.48 Mtoe, which represents a decrease of 21.7% compared to 2010. The biggest drivers of such a trend are precisely the climate and savings, while in contrast, larger households and central heating played a role in increasing energy consumption for space heating.

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



Source: Odyssee

Between 2010 and 2023, the energy consumption per employee decreased by 1.0% per year. The electricity consumption per employee decreased by 0.5% per year over the same period.

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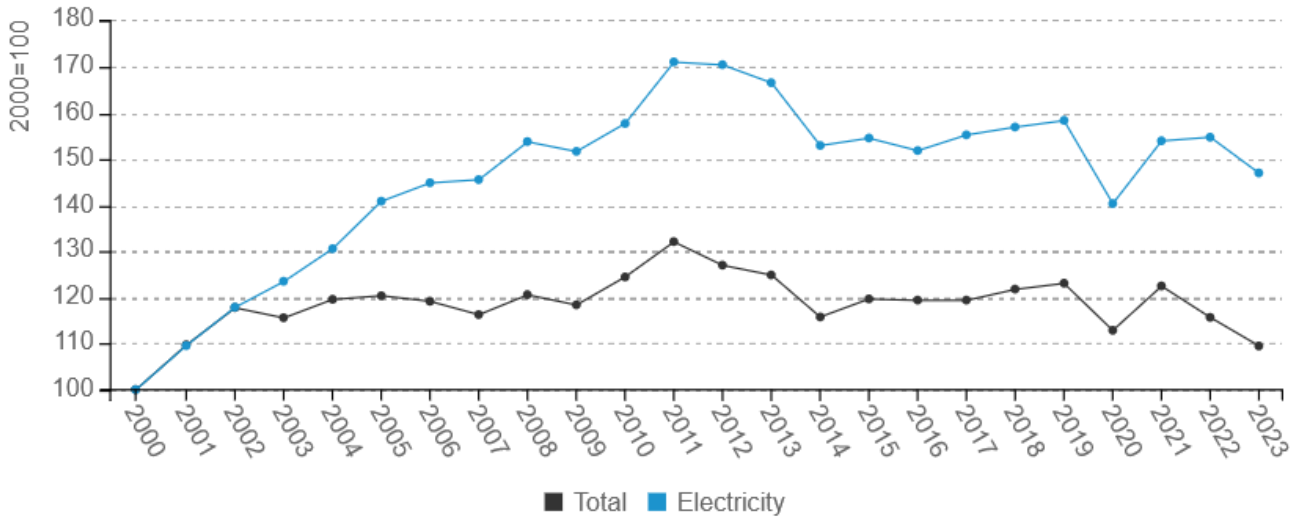
Figure 13: Energy and electricity consumption per employee in services (with climatic corrections)



Source: ODYSSEE

Pursuant to Article 2a of Directive 2018/844 amending Directive 2010/31/EU on the energy performance of buildings, the Republic of Croatia has adopted a new Long-term strategy for renovation of the national building stock until 2050 (29th session of the Government of the Republic of Croatia, 14th December 2020), with a plan of measures and indicators for 2030, 2040 and 2050. The building renovation rate according to the text of the Long-Term Strategy in the period from 2021 to 2030 is growing from the current 1% per year to 3% per year in 2030, rising to 3.5% in the period until 2040 and 4% by 2050. The increased renovation rate outlined in the Long-Term Strategy results from a significantly lower building demolition rate. While abandoned buildings do not burden the energy system, the goal of decarbonizing the entire building stock by 2050 requires the renovation of unused buildings, necessitating an increase in renovation efforts relative to new construction.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Energy renovation programme for single family houses 2021-2030	Yes	Energy renovation programme for single family houses 2021-2030 determines the terms and conditions for the operation of the subsidy scheme. The use of funds from national Environmental Protection and Energy Efficiency Fund is planned, with subsidy rate of 60%.	1.91 TJ
Energy renovation	Yes	Energy renovation programme for multi-apartment buildings 2021-2030 determines the terms and conditions for the operation of the	1.48 TJ

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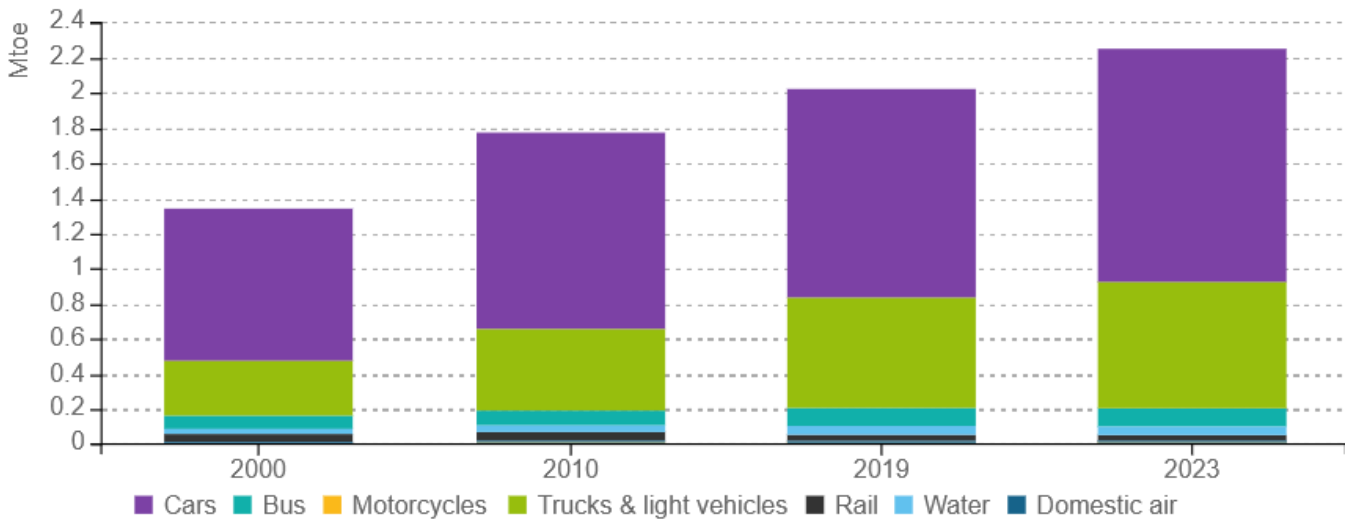
programme for multi-apartment buildings 2021-2030		subsidy scheme. The use of European Structural and Investment (ESI) funds is planned, with subsidy rate of 60%.	
Programme for energy renovation of multi-apartment buildings 2014-2020	No		0.51 TJ

Source: MURE

Transport

Road transport in 2023 represents more than 96% of total final energy consumption in transport. Water transport has a share of 2.1%, rail transport 1.5% and domestic air transport 0.4%.

Figure 14: Transport energy consumption by mode



Source: ODYSSEE

The transport of passengers (measured in passenger-kilometre) decreased by 7,1% between 2010 and 2023. In the structure of passenger transport, car transport dominates with 83%, while rail transport is the weakest with 5% share. Road transport is the primary mode of transport of passengers in the Republic of Croatia.

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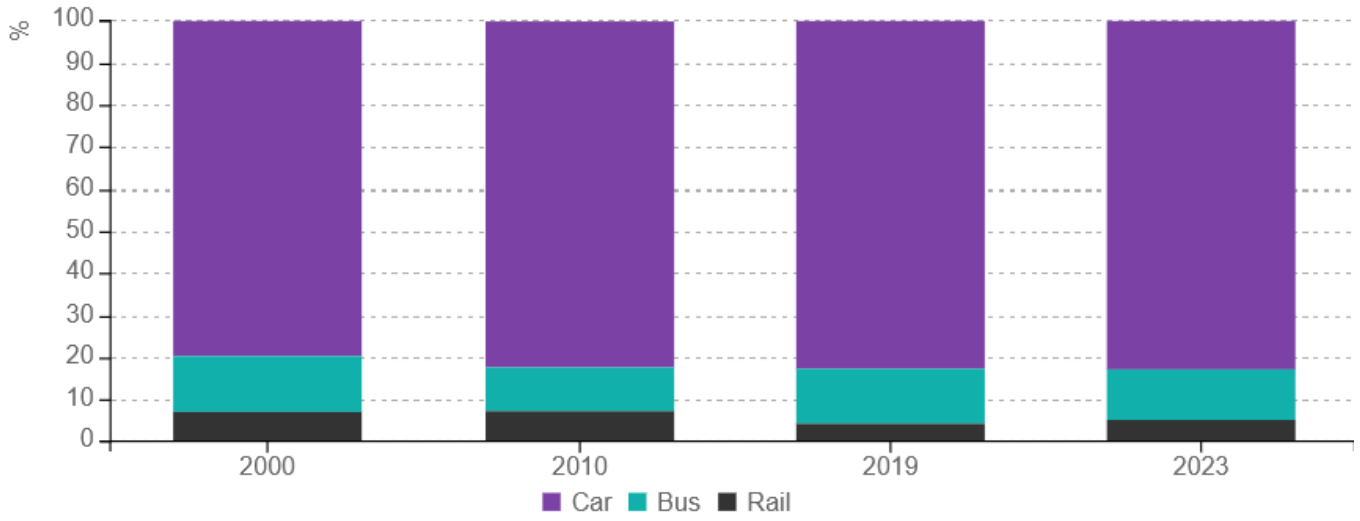
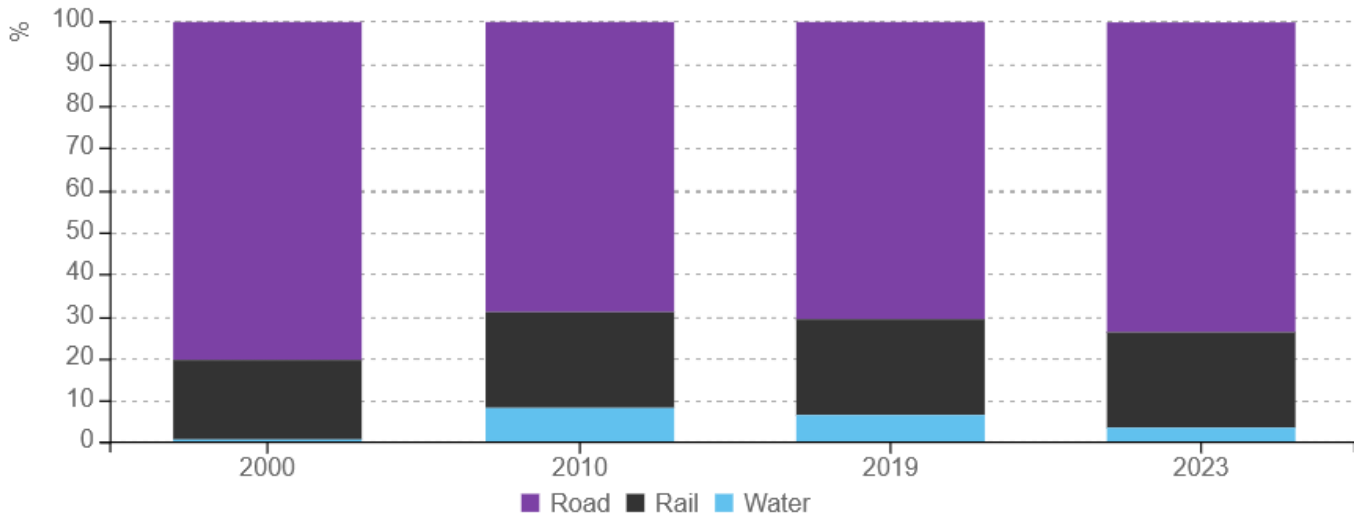
Figure 15: Modal split of inland passenger traffic



Source: ODYSSEE

The total transport of goods (measured in tonne-kilometre) increased significantly, around 20% (1.4% per year) between 2010 and 2023. Concerning the total transport of goods, road and rail transport increased by 28% and 20%, respectively.

Figure 16: Modal split of inland freight traffic



Source: ODYSSEE

Energy consumption of cars per passenger-km was 0.055 koe/pkm in 2023, which represents an increase of 26.6% compared to the year 2010.

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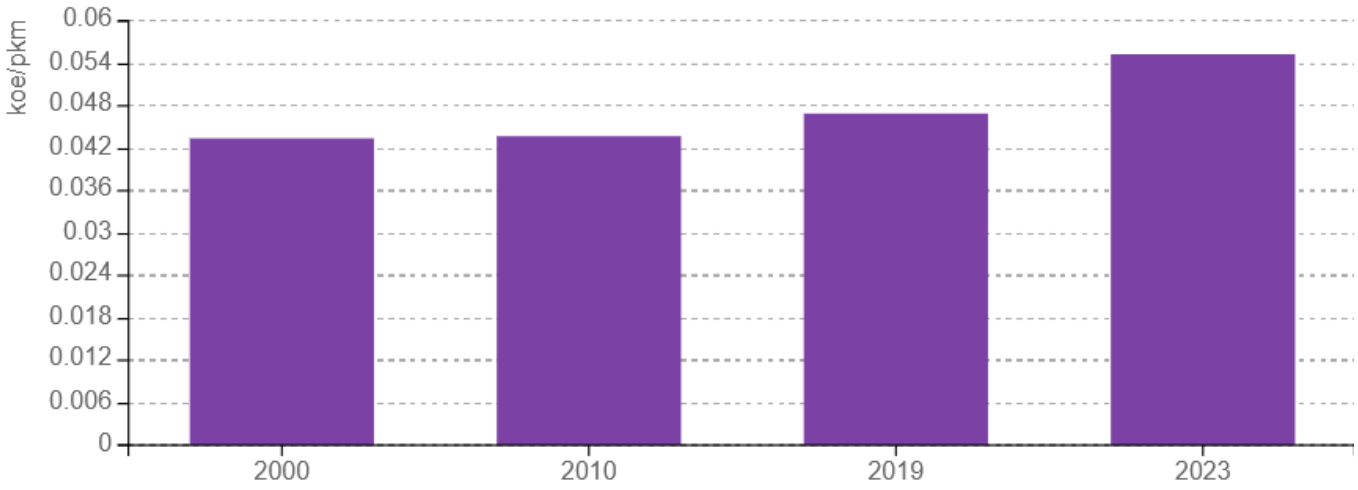
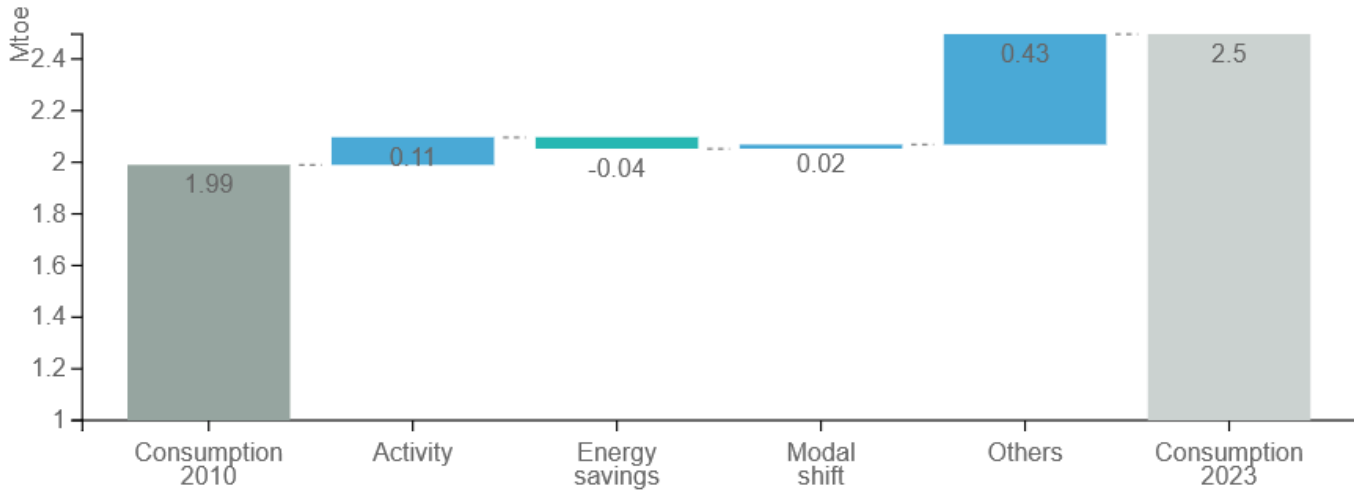
Figure 17: Energy consumption of cars per passenger-km



Source: ODYSSEE

Energy consumption of transport increased by around 25% from 2010 to 2023. Energy consumption growth was mainly driven by the increase in passenger and goods traffic ("activity"), slightly compensated by energy savings. Other drivers also participated to a higher energy consumption.

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



Source: ODYSSEE

In the transport sector, the Croatian energy efficiency policy focuses on the use of alternative fuels and more efficient vehicles. This is mainly done through the fiscal policy (special tax on motor vehicles) as well as financial incentives for more efficient vehicles and for the development of an infrastructure in favour of alternative fuels usage, especially in the field of e-mobility.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Programme for co-financing the purchase of new alternative fuel vehicles and the development of alternative fuel infrastructure in road transport	Yes	In the context of co-financing of cleaner transport projects, special lines of co-financing for specific purposes will be defined for the purchase of vehicles of all categories with alternative energy sources. Incentives for co-financing the purchase of vehicles will be conducted consistently, transparently and continuously, and will be primarily geared towards alternative fuels for which the assessment of the existing situation has shown a minor representation in the total number of vehicles and will be time-limited until the minimum representation of vehicles is achieved. The minimum degree of market uptake will be defined by the revision of the National Policy Framework for the Establishment of Infrastructure and the Development of Alternative Fuel Markets in Transport by 1st January 2024.	0.74 TJ
Intermodal freight transport	No		0.27 TJ
Developing a low-carbon fuel market	Yes	Increasing the share of RES in transport by 2030 through the development of the market for low-carbon fuels and achieving the planned share of fuels produced from renewable energy sources in final energy consumption in transport. The implementation of the measure is based on amendments to the relevant laws and by-laws based on the Renewable Energy Directive. The measure also implies the creation of a long-term sustainable supply chain of biomass and the construction of a bio-industrial complex designed to produce advanced biofuels with negative net greenhouse gas emissions. Likewise, the measure implies the creation of preconditions for investment to enable sustainable business models for investment in the construction of synthetic fuel plants.	0.27 TJ

Source: MURE

Industry

Final energy consumption in industry decreased by 11.6% (0.9% per year) between 2010 and 2023. In 2023, energy consumption was distributed by industrial branches follows: non-metallic minerals (34% of total final

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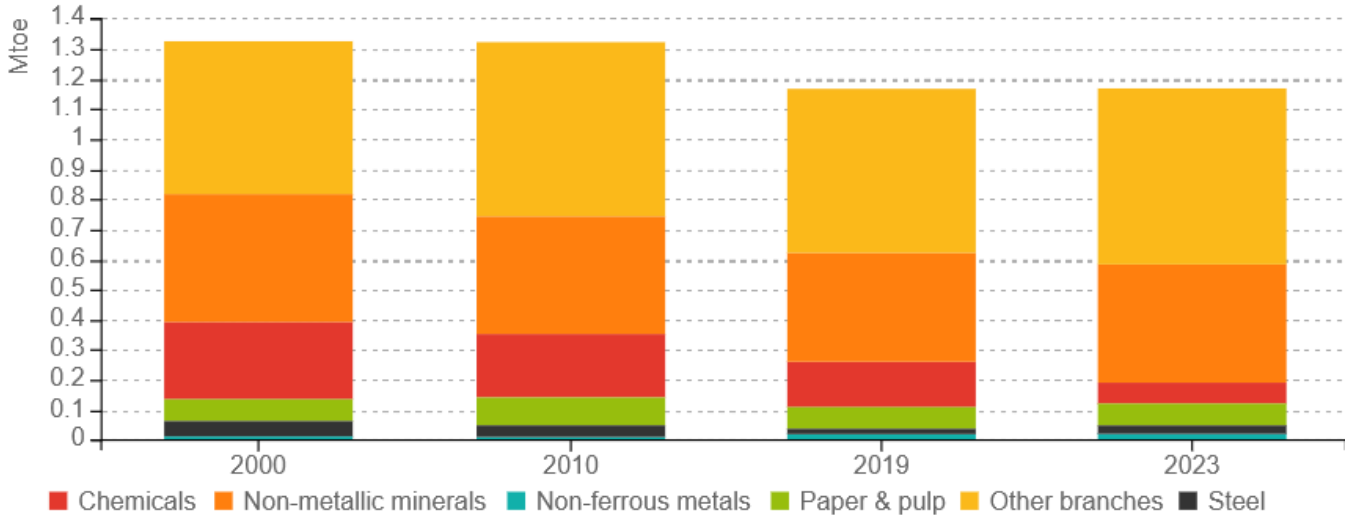
energy consumption in industry), chemicals (6%), paper, pulp and printing industry (6%) and other branches of industry (54%).

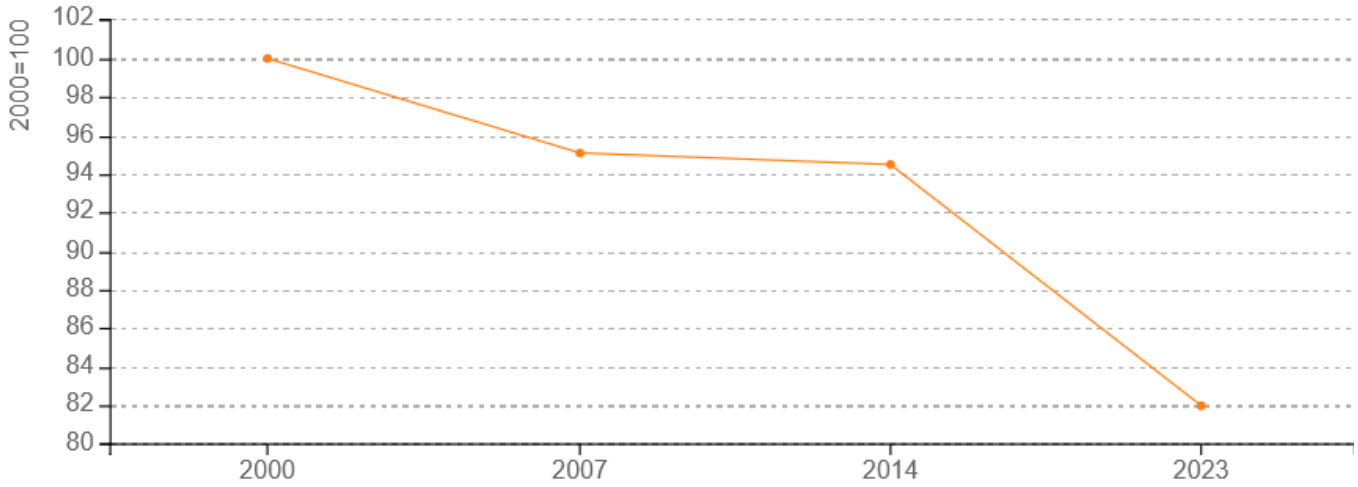
Figure 19: Final energy consumption of industry by branch



Source: ODYSSEE

During the period 2010 to 2023, the specific consumption for cement production has decreased by about 16.7%.

Figure 20: Unit consumption of cement (toe/t)



Source: ODYSSEE

Industrial energy consumption has decreased by 0.15 Mtoe between 2010 and 2023. Energy savings had the greatest contribution to this decrease (-0.28 Mtoe). Increase in industrial activity and other effects (higher share of energy intensive products with industrial branches) contributed to raise consumption by 0.04 and 0.06 Mtoe, respectively.

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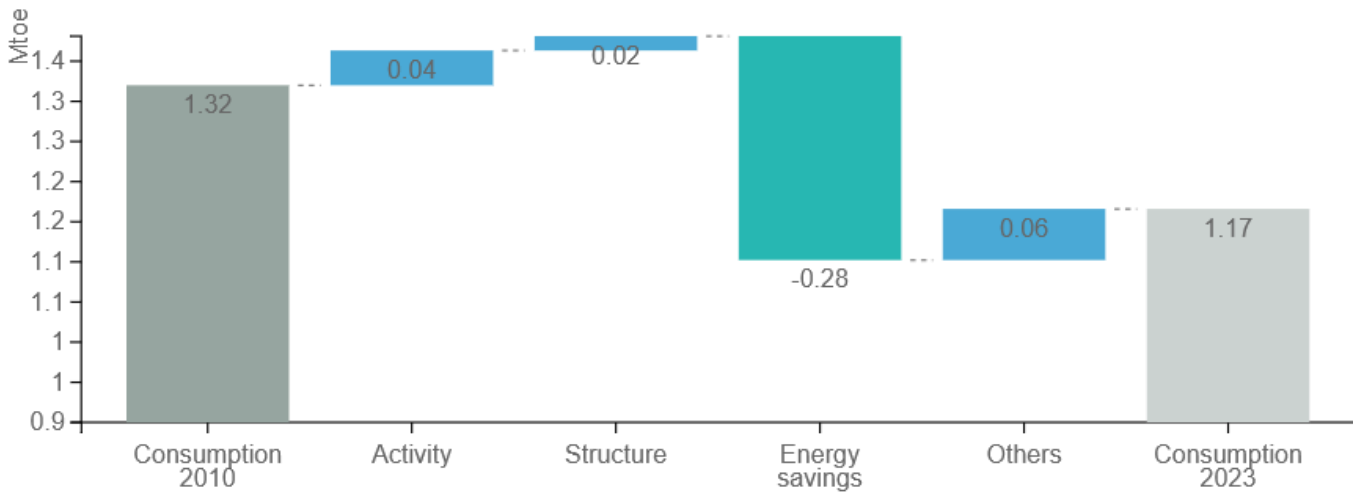
Figure 21: Main drivers of the energy consumption variation in industry



Source: ODYSSEE

The Croatian energy efficiency policy for the industrial sector is focused on regulatory, informational and financial measures. According to the Energy Efficiency Act, all large enterprises are obliged to perform energy audits every five years or, alternatively, to introduce a standardised energy management system based on international norms. A total of €60 million of funding from the EU Structural Funds has been used since 2017 for stimulating energy efficiency and RES in manufacturing industry.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Introduction of energy-efficient electric motor drives	No		0.15 TJ
Energy management system in business (service & production) sector	Yes	Use of the tax system to stimulate systematic energy management in the business sector.	0.05 TJ
Energy audits of	No		0.05 TJ

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small and medium-sized enterprises			

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