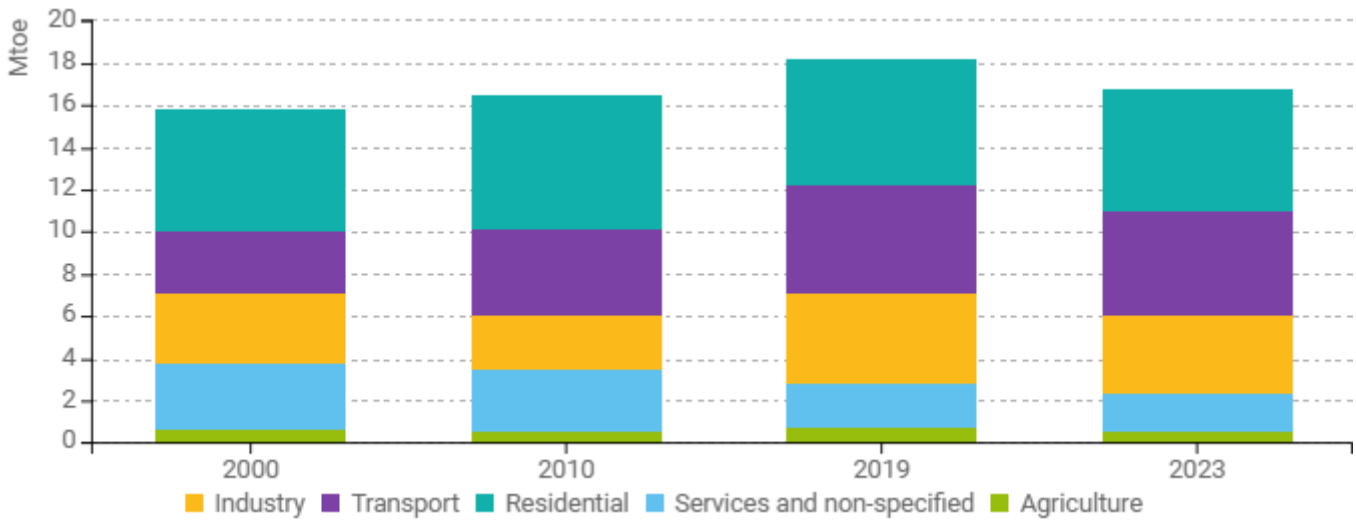
Energy efficiency trends and policies

Overview

In Hungary, final energy consumption has increased from 16 Mtoe to 17 Mtoe, i.e by 5.6% between 2000 and 2023. The residential sector has the biggest share in 2023, but its part has somewhat decreased over the period (-2.3 percentage points to 34% in 2023). Transport is the second largest sector, and its proportion has rapidly grown by 10 percentage points since 2000 to 30% in 2023. However, it is still below the EU average of 32% in 2023. Industry is ranking third with the rise of 2.0 percentage point over the given period. The contribution of services has significantly decreased since 2000, while the share of agriculture also decreased slightly (from 4.2% to 3.4%).

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



Source: ODYSSEE

Energy efficiency, measured by ODEX has improved annually by 1.3% per year from 2000 to 2023, i.e. by 26% over the entire period. The most significant improvement occurred in the services sector (56% or 3.5% on average per year) and in the industry sector (38% or 2.0% per year), while only a lower development can be seen in the residential sector (17% or 0.8% per year) and the transport sector (0.2% per year).

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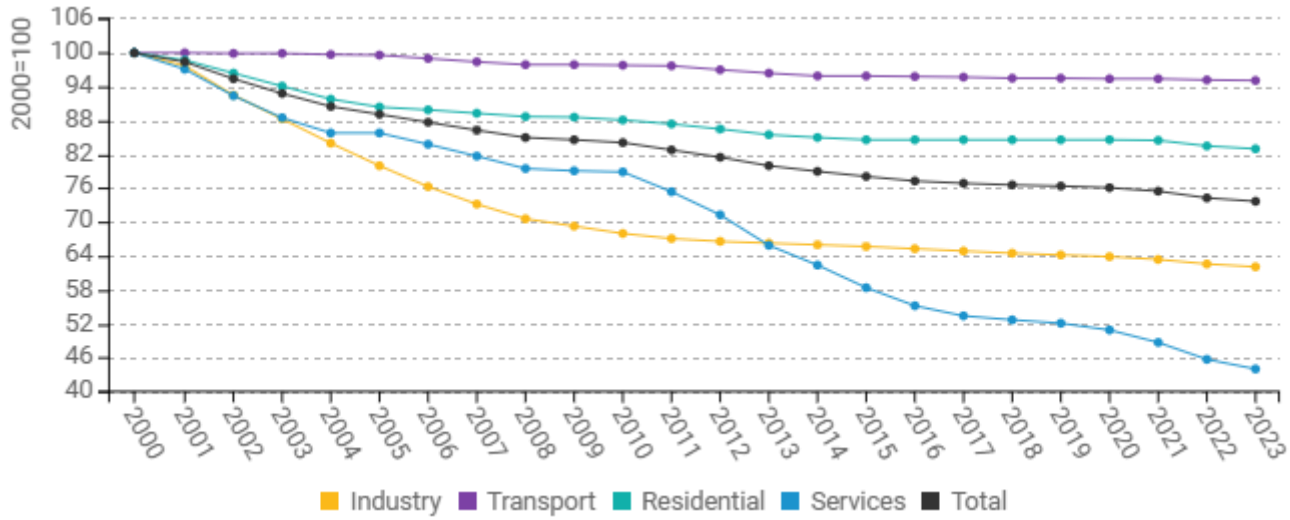
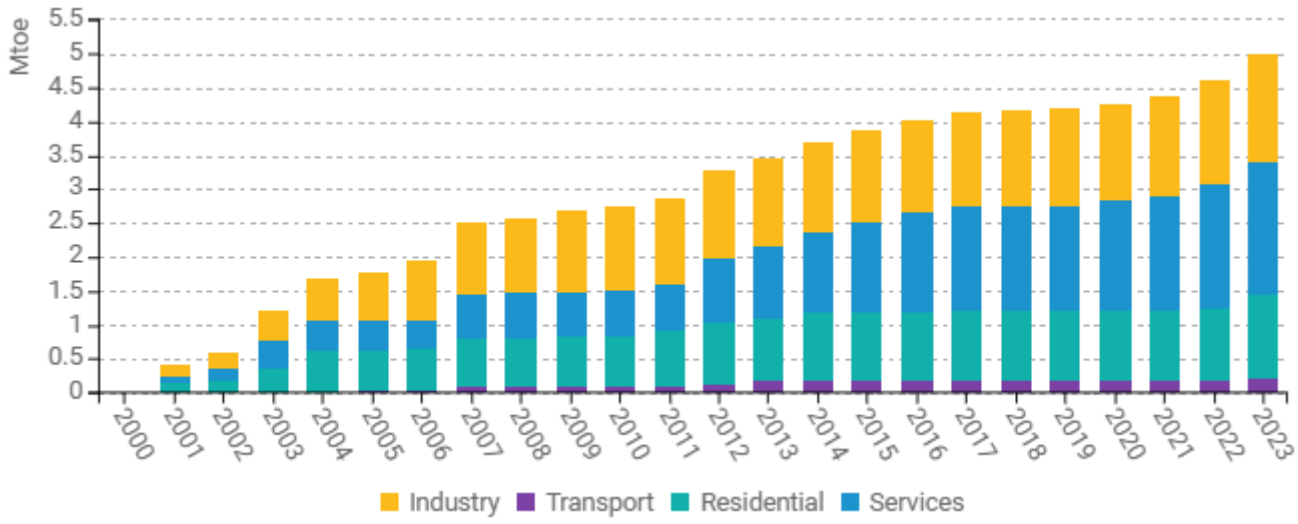
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

From 2000 to 2023 a total of 5 Mtoe of cumulated annual savings were achieved, although the scale of improvement varied across sectors. The services sector recorded the largest gains in energy savings achieving 2.0 Mtoe. This was followed by the industrial sector, which reached 1.6 Mtoe. The residential sector demonstrated slower progress than industry and services, but still achieved 1.2 Mtoe in savings over the period. The transport sector contributed the least to overall energy savings achieving only 0.2 Mtoe.

Figure 3: Energy savings by sector



Source: Odyssee

Total energy supply has decreased by 2.5 Mtoe (-9.4%) from 2010 to 2023; this is explained by reductions in final consumption by 0.7 Mtoe, lower consumption in the power sector by 1.3 Mtoe, and consumption and losses for other transformations by 0.9 Mtoe. Non-energy uses slightly offset the decrease by 0.3 Mtoe.

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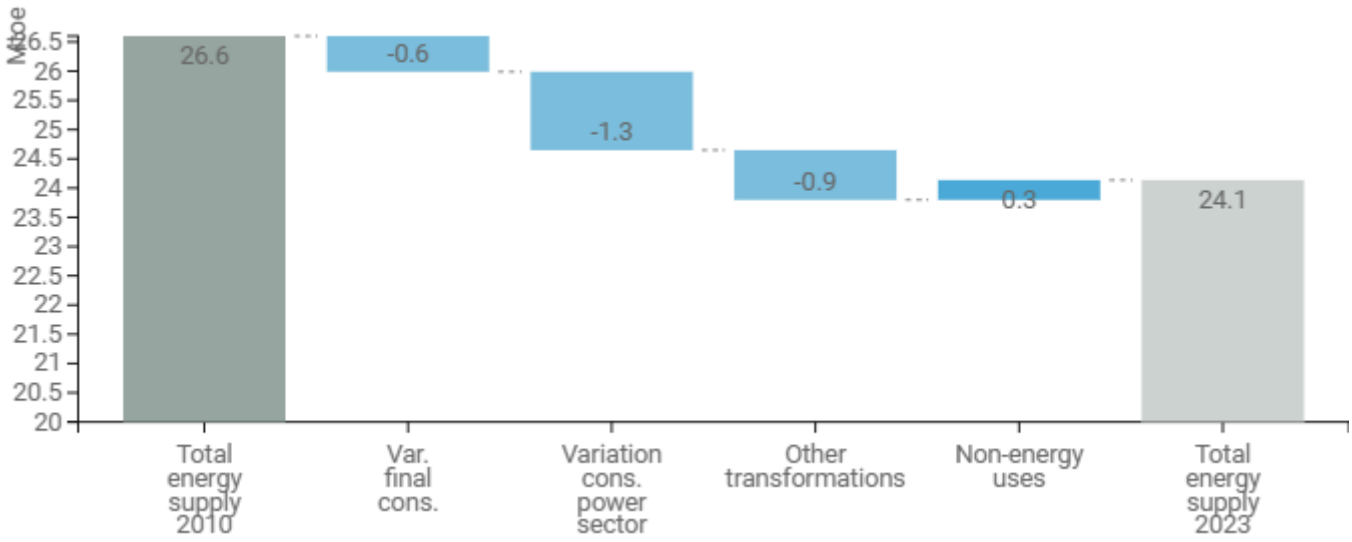
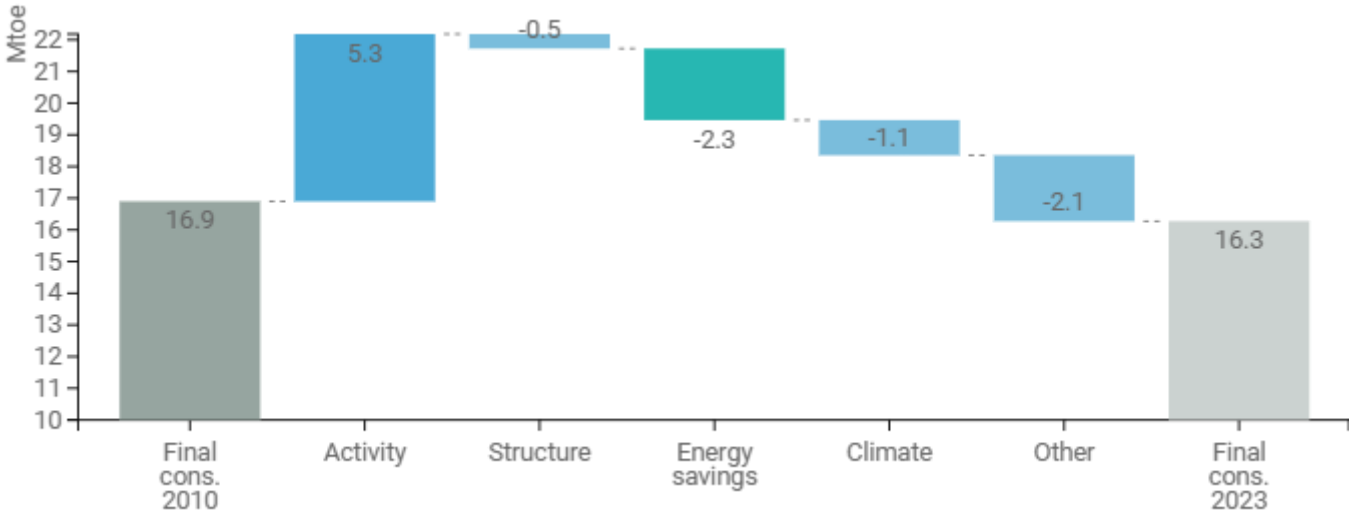
Figure 4: Main drivers of the total energy supply variation



Source: Odyssee

Final energy consumption has reduced by 0.6 Mtoe (-3.6%) between 2010 and 2023. The main driver of this decrease is energy savings by 2.3 Mtoe, while other effects (e.g. changes in in labor productivity in services, or in behavioral effects and negative savings) contributed an additional by 2.1 Mtoe, as well as climatic influences by 1.1 Mtoe. Structural changes provided an additional reduction of 0.5 Mtoe. These effects were largely counterbalanced by growth in activity, which contributed 5.3 Mtoe to energy consumption.

Figure 5: Main drivers of the final energy consumption variation



Source: Odyssee

Hungary's main energy efficiency target is that the country's final energy consumption in 2030 does not exceed 740 PJ. We are looking at the feasibility of the indicative cumulative energy savings target of 484.6 PJ set in the new Energy Efficiency Directive, which could be achieved by a reduction of 126 PJ in final energy by 2030. To

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achieve these, Hungary has introduced EEOS, which was introduced in 2021 for electricity, natural gas and transport fuel sector. The most important energy efficiency measures are EEOS, which accounted for the majority of the savings, while the amount of energy savings achieved by other policies decreased. Other important energy efficiency measures include the non- or partly refundable support schemes, outlined in the Operational Programs (OPs), financed by EU Funds. The focus of the 5th priority axis of the Environmental and Energy Efficiency Operative Program (KEHOP) is explicitly the improvement of energy efficiency. The TOP program finances energy efficiency upgrades at local authorities. The GINOP program has also sub-program that aim to promote energy efficiency in the enterprise sector. The various OPs target a wide range of consumer groups.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
Modern Cities Program (Modern Városok Program)	No	Modern Cities Program (Modern Városok Program) is a development program for cities with county rights in Hungary.	0.75 PJ
EU-related: Regulation on the governance of the energy union and climate action (EU) 2018/1999 - National Energy Strategy 2030	No	The new National Energy Strategy 2030 adapted in 2020 sets four priorities for Hungary. It places consumers at the heart of the strategy, aims to improve security of supply, to perform a clime-friendly transition of the energy sector and to exploit economic development opportunities stemming from energy innovation.	2.25 PJ
National Network of Energy Managers (Energiamegtakarítási intézkedési terv közintézményeknek)	Yes	Energy efficient management of public buildings is promoted through the requirement of preparing an energy saving action plan every 5 years, and report about implementation to the National Network of Energy Managers.	0.04 PJ

Source: MURE

Buildings

Final energy consumption in buildings decreased at an average annual rate by 0.8% between 2000-2023, it reached its maximum in early 2010's, then followed a decreasing trend to 2023. The share of residential energy use in buildings increased by 12 percentage points to 77% from 2000 to 2023, however barely changed at an average annual rate. Meanwhile energy consumption in the services and non-specified sectors decreased by 2.5% per year.

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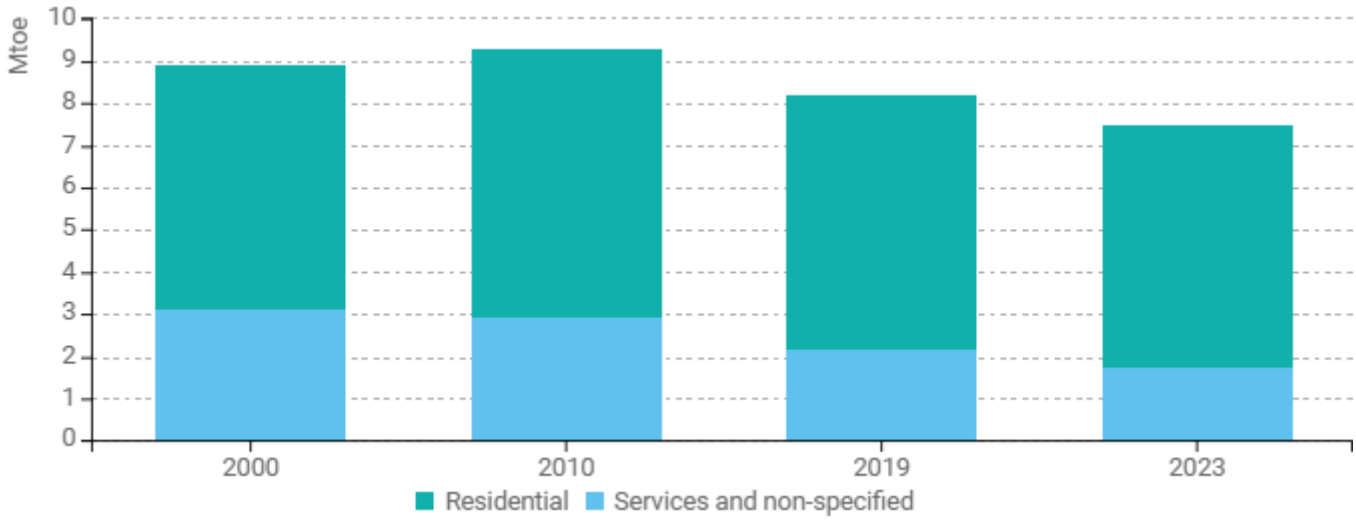
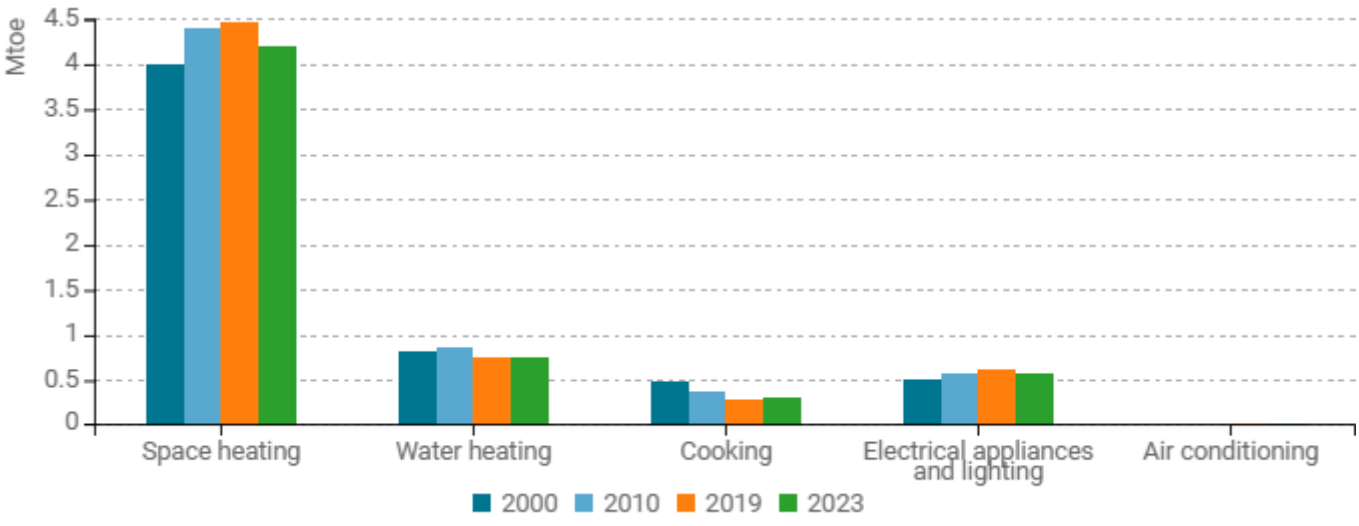
Figure 6: Final energy consumption in buildings (with climatic corrections)



Source: Odyssee

Space heating accounted for the largest share of household energy consumption, showing an increasing trend from 2000 to 2014, followed by a decline pattern to 2023. Overall, space heating energy consumption of residential sector grew at an average annual rate of 0.2% over the entire period. Water heating remained stable with a slight decline 0.4% per year. Conversely energy use for electrical appliances and lighting increased with an average annual growth of 0.6%. Cooking energy consumption fell in average 2.1% per year over the entire period, while air conditioning remained a minor part of total household energy use.

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



Source: Odyssee

Space heating accounted for 72% of final energy consumption of households in 2023, which is 7% points higher than the EU average. Nevertheless, there is a decreasing trend in energy consumption of space heating per m2

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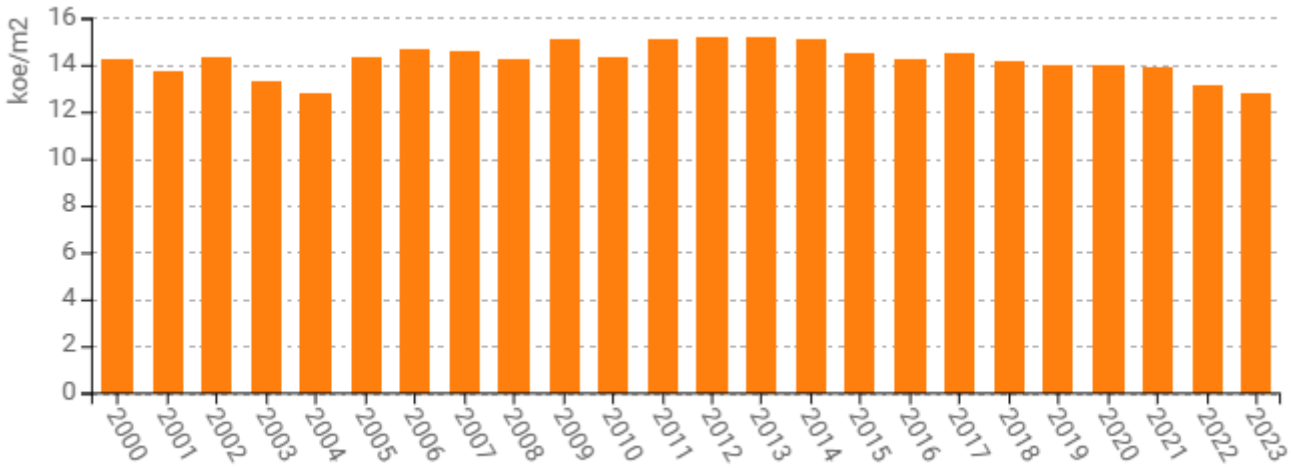
visible in the last years (-1.6% per year since 2012). Overall, the downward trend has continued by 10.5% decrease between 2000 and 2023, because of the lower growth rate of households heating energy consumption compared to the increase of occupied dwelling area size and the effects of energy crisis.

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



Source: ODYSSEE

Energy consumption per dwelling for other purposes than space heating decreased continuously by -2% between 2000 and 2023, corresponding to -0.1% per year. Water heating energy consumption, which represents the largest proportion, decreased by 0.8% per year, however energy used for cooking recorded the largest reduction, declining at an annual average rate of 2.4%. The energy consumption of electrical appliances increased slightly by 0.3% per year. Although air-conditioning remains the smallest end-use type, it became increasingly noticeable by 2023.

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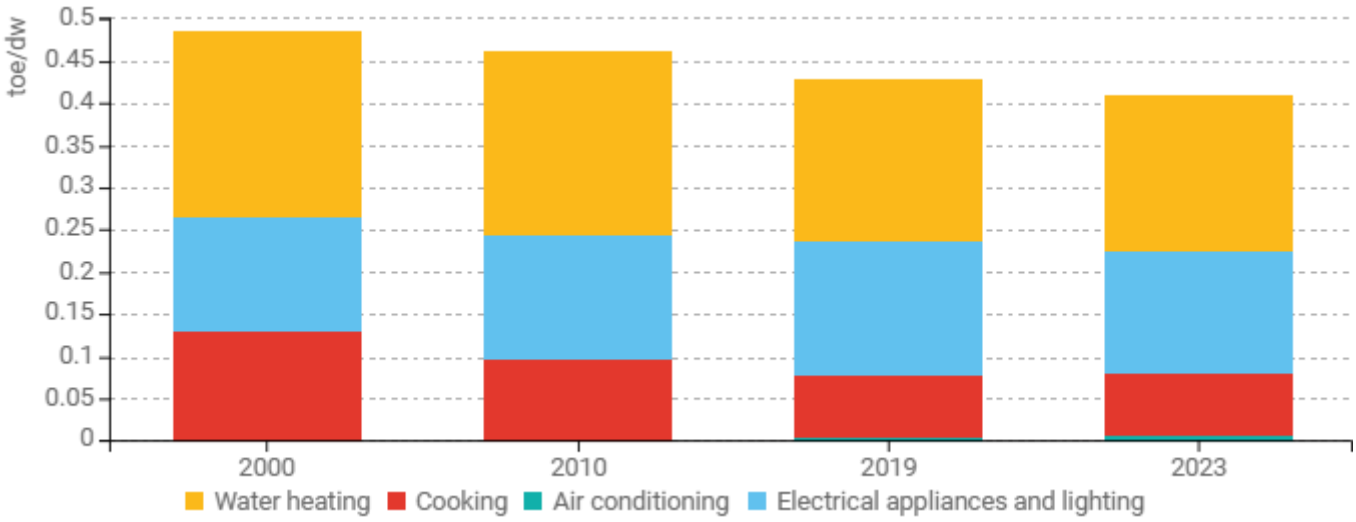
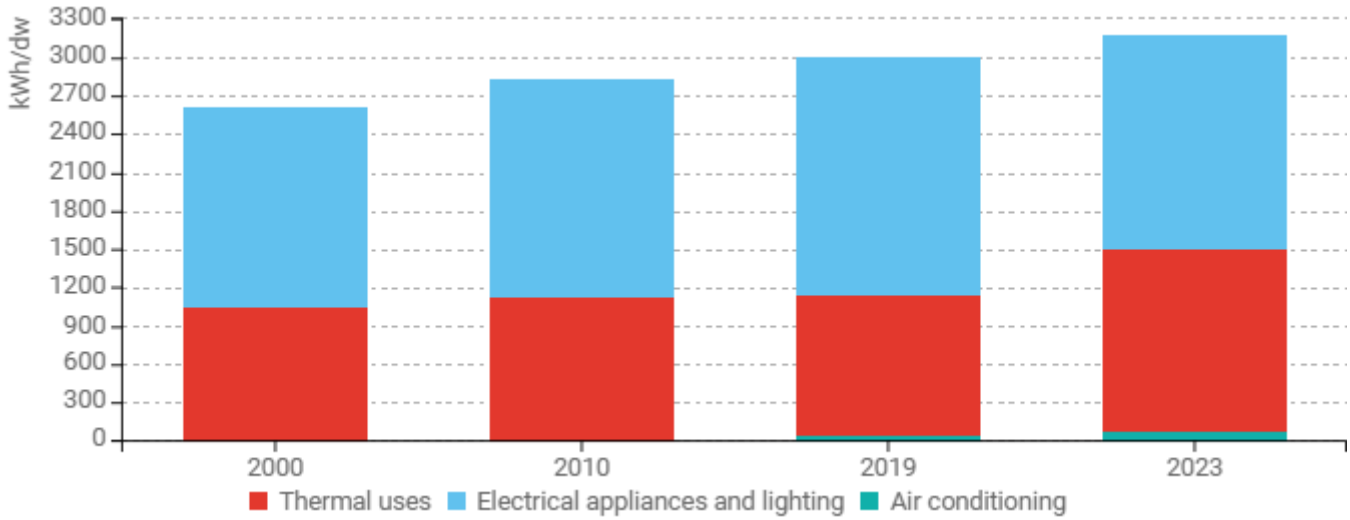
Figure 9: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

Electricity consumption per dwelling increased steadily by 22% between 2000 and 2023, corresponding to an average annual growth rate of 0.9%. During this period electricity use for appliances rose by 0.3% per year, while thermal uses grew by 1.4% per year. Energy use for air conditioning has been risen by 12% per year between 2019-2023.

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



Source: Odyssee

Energy consumption in the household sector decreased by 1.3 Mtoe (-20%) from 2010 to 2023. The decrease was due to climatic influences by 0.8 Mtoe, while the other effects (i.e. changes in consumer behavior, changes in fuel mix and other unknown effects and data problems) contributed an additional 1.3 Mtoe decrease. Energy savings had a slight contribution by –0.5 Mtoe to these effects. On the other hand, the main driving forces behind the

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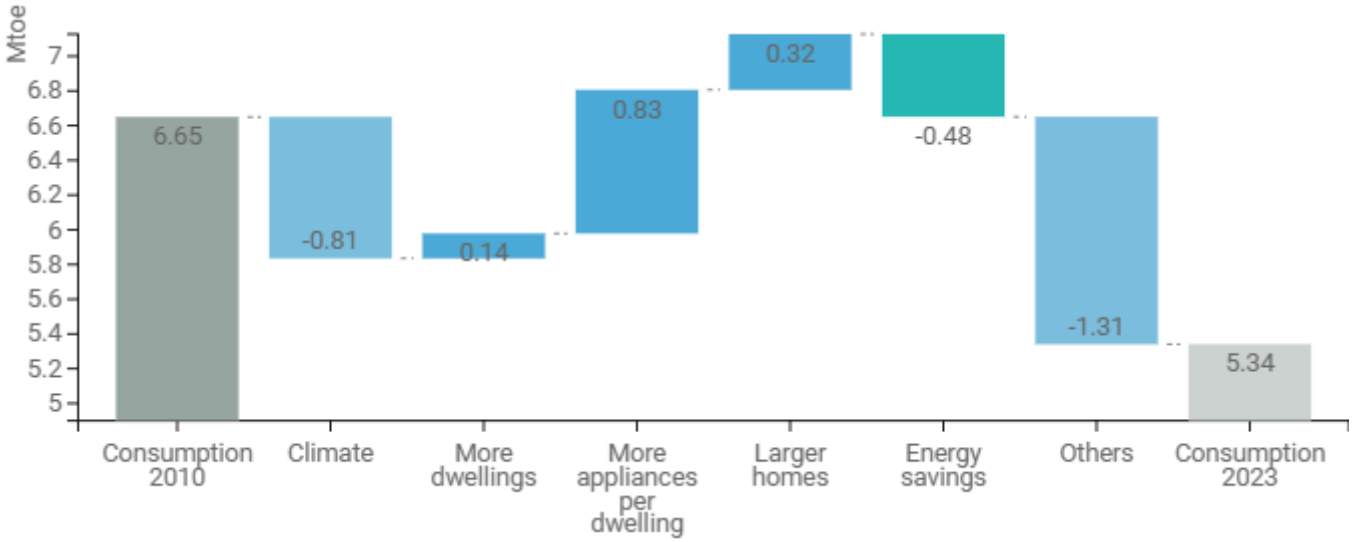
consumption variation with an increase have been the stock of household appliances by 0.8 Mtoe, the larger average size of homes by 0.3 Mtoe and the increase in the number of dwellings by 0.1 Mtoe.

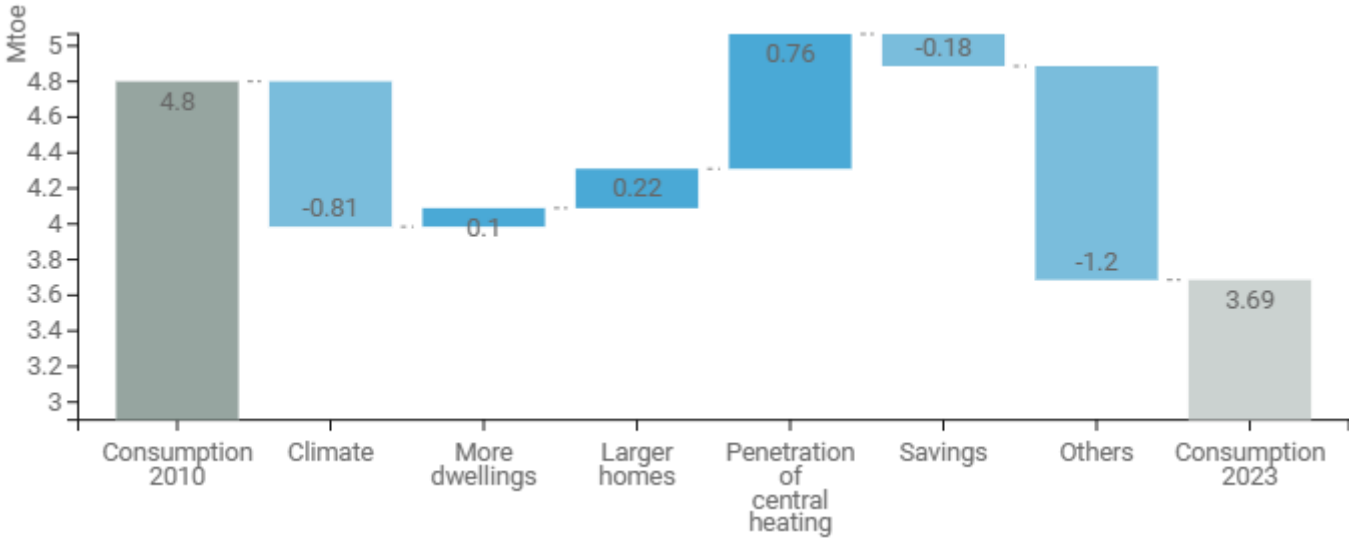
Figure 11: Main drivers of the energy consumption variation in households



Source: ODYSSEE

Energy consumption of space heating of households decreased by 1.1 Mtoe (-23%) in the period of 2010-2023. The decline was driven primarily by weather-related lower heating demand (climate) by -0.8 Mtoe and the other effects contributed an additional -1.2 Mtoe. Energy savings only added to slightly -0.2 Mtoe to these effects. However, the growing share of central heating (penetration of central heating) (+0.8 Mtoe), larger homes (+0.2 Mtoe) and more dwellings (+0.1 Mtoe) have contributed to the rise in the households space heating energy consumption.

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



Source: Odyssee

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Final energy consumption of services decreased by 25%, at an annual average rate of 3.6% between 2015 and 2023. The reduction in energy use can be observed across almost all branches, but the largest was in public offices sector, where consumption fell by 5.9% per year. However, the share of final energy consumption of services by branch has hardly changed. In 2023, more than half of the energy consumption of services was taken up by just three sub-sectors. Wholesale consumed energy made up 22% of energy consumption of all services. Final energy consumption of private offices represented 21% while other services followed by 17%.

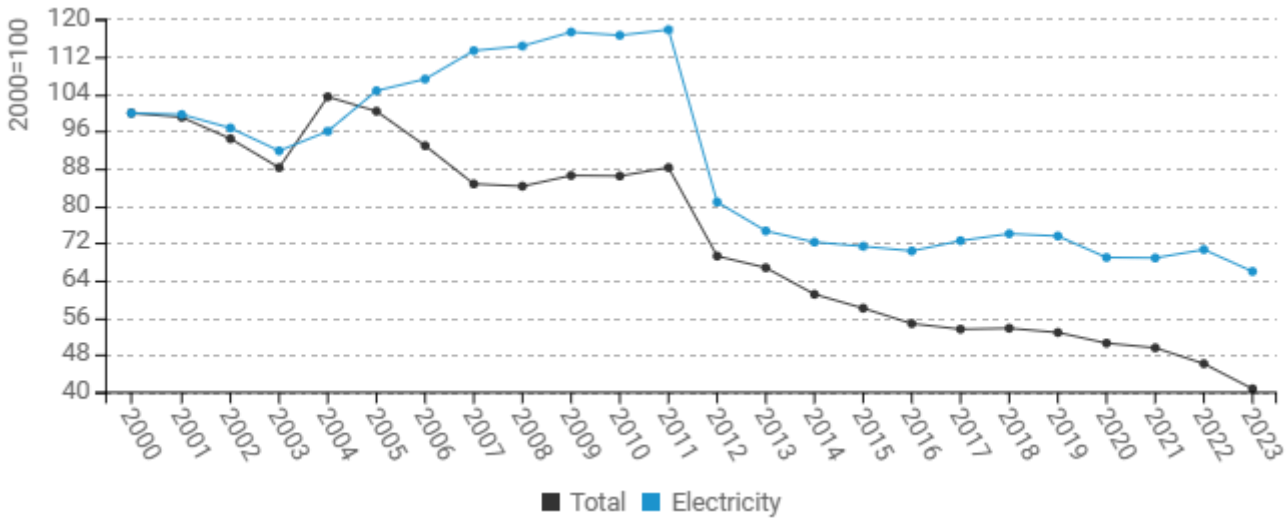
Figure 13: Final energy consumption of services by branch



Source: Odyssee

Due to a diffusion of electrical appliances in offices an increasing trend of electricity consumption can be observed over the period 2000-2010. There was a data revision in 2012, which explains the large variation in 2012. Since 2012, a slight efficiency improvement is observed (4.7% per year in total energy consumption per employee and 1.8% per year for electricity between 2012 and 2023).

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



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Source: ODYSSEE

The 2002/91/EC directive (EPBD) was implemented in Hungary by the 7/2006 (V.24.) TNM Decree and the 176/2008 (VI.30.) Governmental Decree. In 2008, a building certification scheme was introduced. Due to the new regulations, technical heat requirements became 30% stricter than before. The recast directive of 2010/31/EU introduced stricter requirements that were implemented through several amendments of the TNM decree. An important amendment of the decree in 2014 made the cost-optimal energy efficient requirement a pre-condition for obtaining funding from either state budget or EU funds. The TNM decree became null and void and was replaced by the 9/2023 (V.25.) ÉKM decree. On 1 January 2021 the government launched a scheme for subsidising home renovations carried out by households with at least one child. Half of the renovation costs up to a maximum of HUF 3 million per renovation was covered by the state, This program was replaced in 2024 by the Home Renovation Program, which was financed by European Union funds and focused on energy-saving investments and offering non-repayable grants and preferential loans to the general public, with the aim of modernizing the energy efficiency of existing properties.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Green Preferential Capital Requirement Programme (Zöld Tőkekövetelmény -kedvezmény Program)	No	Hungarian National Bank announced a preferential capital requirement programme for credit institutions to support the growth of green financial products and to improve the energy efficiency of the Hungarian building stock.	0.65 PJ
Scheme for subsidising home renovations carried out by households with at least one child	Yes	The tender was created to fulfil the objectives of the Climate and Nature Protection Action Plan which was approved by the Hungarian government in 2020. The aim of the tender is to provide an alternative to the use of motor vehicles and to reduce the use of fossil fuels, and thus the air pollution of the given settlement.	1.34 PJ
Residential loan scheme for energy efficiency and renewable energy based	Yes	This measure was launched in 2017 to trigger renovations that made buildings more energy efficient. Free loans are financed by EU funds so that low-income are also able to modernize their buildings. Claiming those funds comes with mandatory use, e.g. thermal insulation, heating/cooling system modernisation etc.	0.27 PJ

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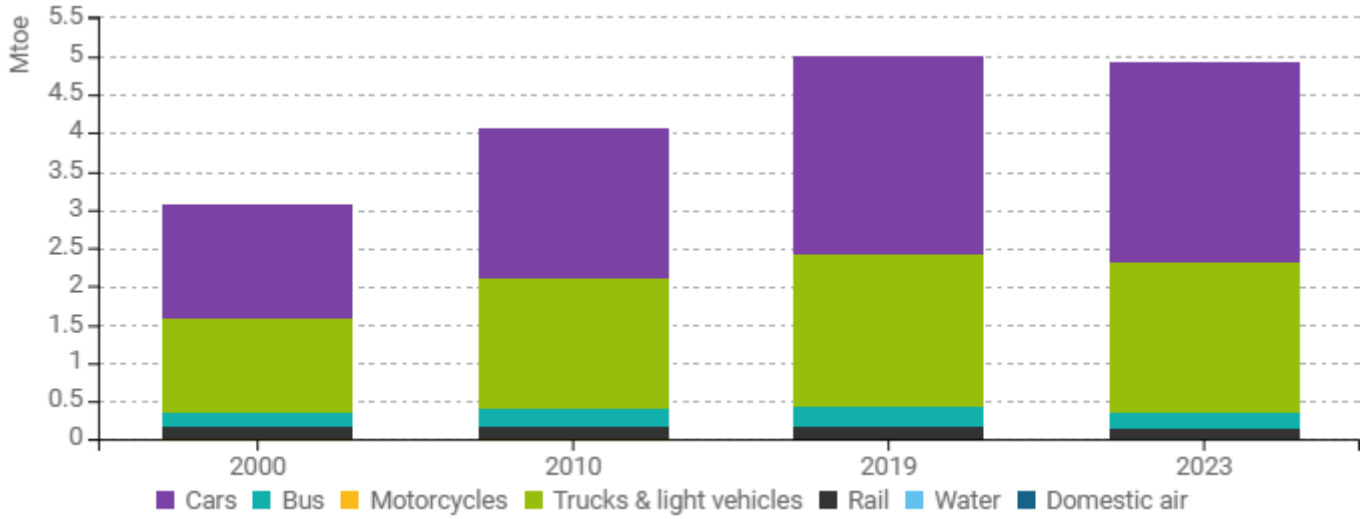
modernizations of the building stock		The funds are foreseen to be sufficient for 25 000 – 30 000 households.	

Source: MURE

Transport

The share of cars in the final energy consumption of transport increased by 5 percentage point since 2000 to 53% in 2023. The proportion of trucks and light vehicles remained stable over time at around 40%. On the other hand, both bus and rail reduced their shares in transport consumption. The part of motorcycles, water and domestic air transport remained at almost the same minor level.

Figure 15: Transport energy consumption by mode



Source: ODYSSEE

Between 2000 and 2023, the share of cars in passenger traffic has risen significantly from 60% to 73%. Passengers traffic by cars grew by 70%, while passengers traffic in trains increased by 8% (resulting in a -3.5 pp change in its share), whereas passengers traffic in buses decreased by 20% (-10 pp). The share of public transport fell heavily with the growth of individual traffic (-14 pp), although it has grown steadily in 2021-2023 (+4 pp).

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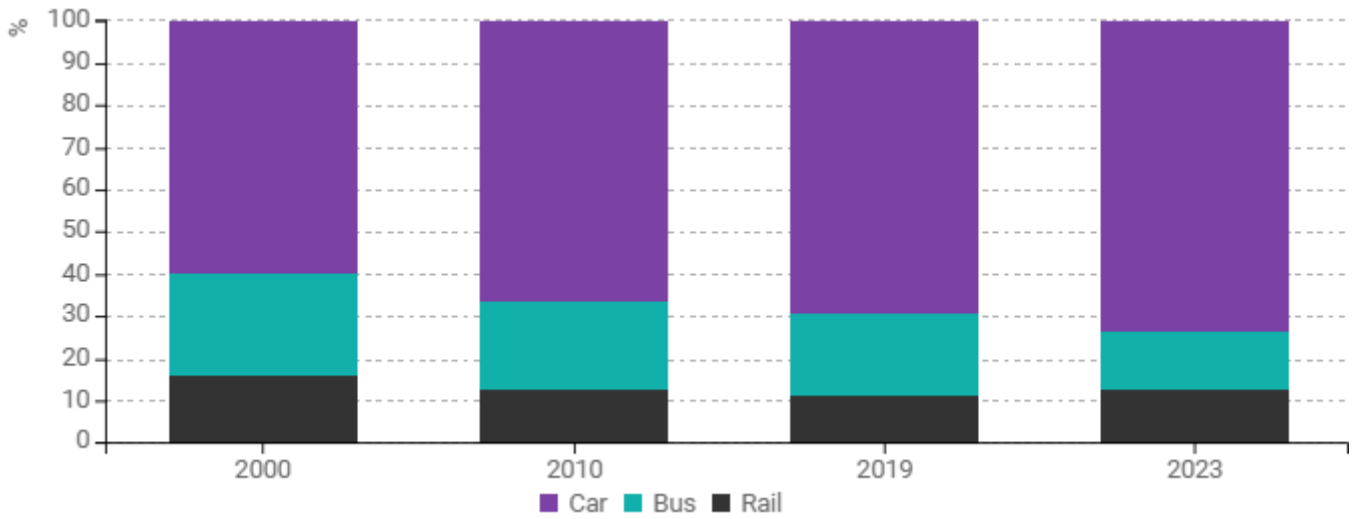
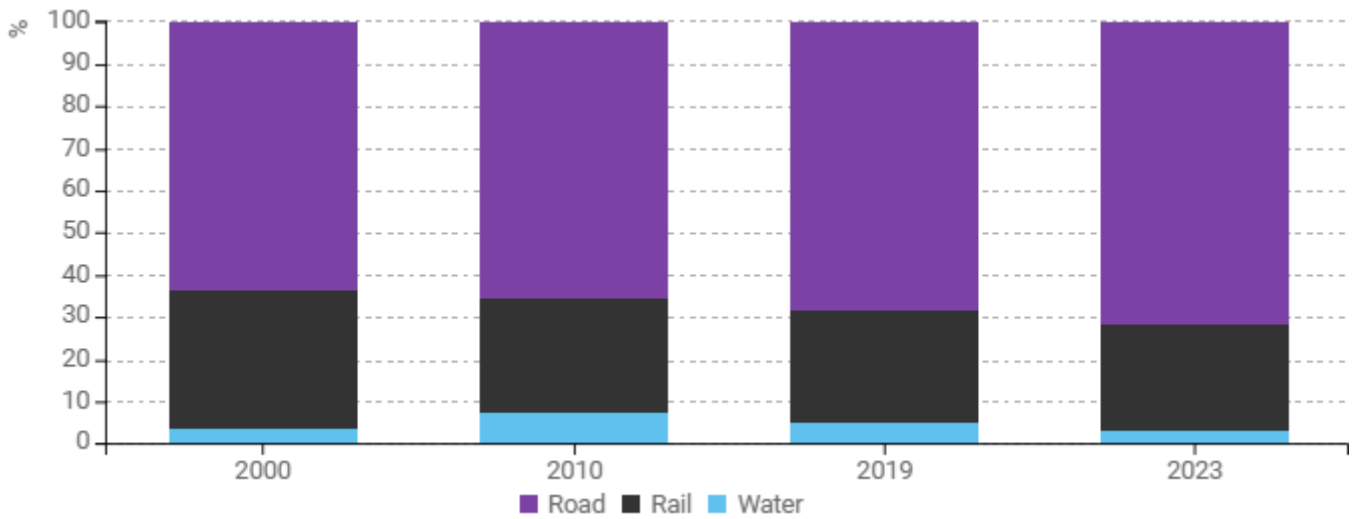
Figure 16: Modal split of inland passenger traffic



Source: ODYSSEE

Freight traffic (in tonne-km) has been rapidly growing by 76% over the period 2000-2023. The share of freight traffic on road increased from 64% in 2000 to 72% in 2023, while the share of rail transport decreased from 33% to 25%. The share of goods transported on water decreased slightly and remained below 5%.

Figure 17: Modal split of inland freight traffic



Source: ODYSSEE

The energy consumption of cars per passenger-kilometres reveals a gradual increase from 2000 to 2019, followed by a moderate decline in 2023. Overall, it increased slightly by 4% between 2000 and 2023, at an annual average rate of 0.2%. This was due to the fact that the total energy consumption of cars (+2.5%, at annual average rate) slightly exceeded the increase in passenger traffic measured in passenger-kilometres (+2.3%, at annual average rate).

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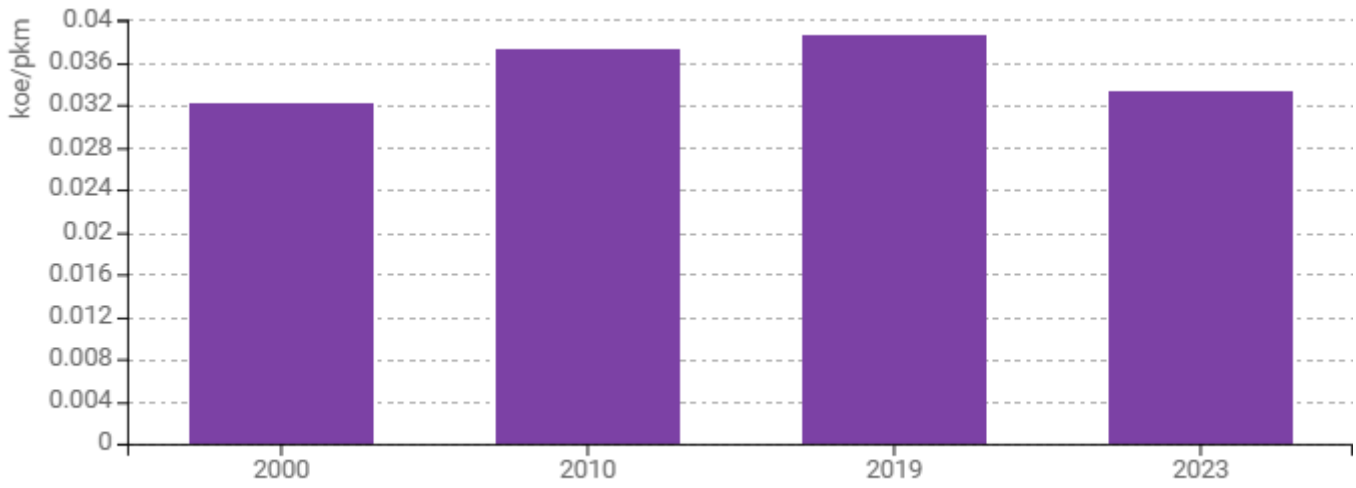
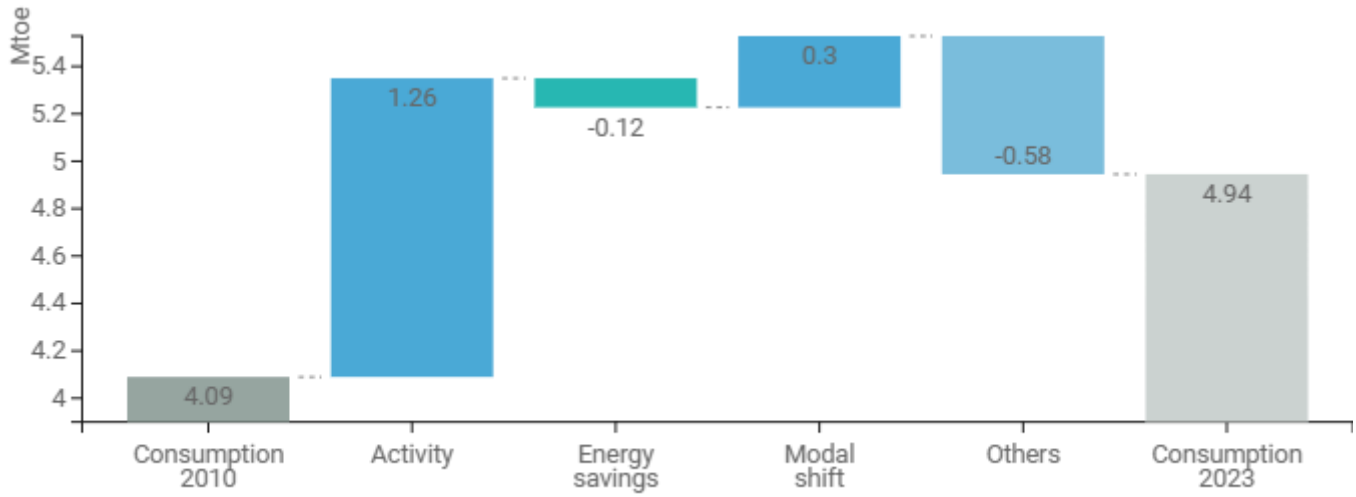
Figure 18: Energy consumption of cars per passenger-km



Source: ODYSSEE

Energy consumption of transport grew by 0.9 Mtoe (+21%) in the period of 2010-2023. The rise was mainly due to increased traffic for passenger and freight (activity) by 1.3 Mtoe and to the growing share of car in passenger traffic and road in freight traffic (modal shift) by 0.3 Mtoe. These two effects were only in a small part compensated by energy savings by -0.1 Mtoe. Other behavioral effects, like negative savings in freight resulting from low-capacity utilization or in passenger modes (Covid effect) contributed to a further decline of 0.6 Mtoe.

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



Source: ODYSSEE

Measures targeting the transport sector include the Jedlik Ányos Plan supporting electro-mobility, a toll road system, various transport infrastructure projects, electric vehicle purchase support and infrastructural development projects in Operational Programs, financed by European Union Funds. The development of

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infrastructure for bicycle also played a role. In 2020 a tender for supporting the purchase of bicycles with auxiliary electric motors was created to fulfil the objectives of the Climate and Nature Protection Action Plan. In addition, several other electric vehicle purchase support schemes have been running.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Green Bus Program (Zöld Busz Program)	No	Ensure energy efficient orientation in the public infrastructure planning, mobilize more finance for infrastructure investments	0.047 PJ
Tender for supporting the purchase of bicycles with auxiliary electric motors	No	The tender was created to fulfil the objectives of the Climate and Nature Protection Action Plan which was approved by the Hungarian government in 2020. The aim of the tender is to provide an alternative to the use of motor vehicles and to reduce the use of fossil fuels, and thus the air pollution of the given settlement.	0.21 PJ
Development of public transport systems	Yes		0.62 PJ

Source: MURE

Industry

Energy consumption in industry increased by 16%, at an annual average rate of 0.6% between 2000 and 2023. It grew steadily from 2010 to 2020 although with breaks in 2020 due to the COVID and in 2022 as a result of reduced demand caused by high energy prices.

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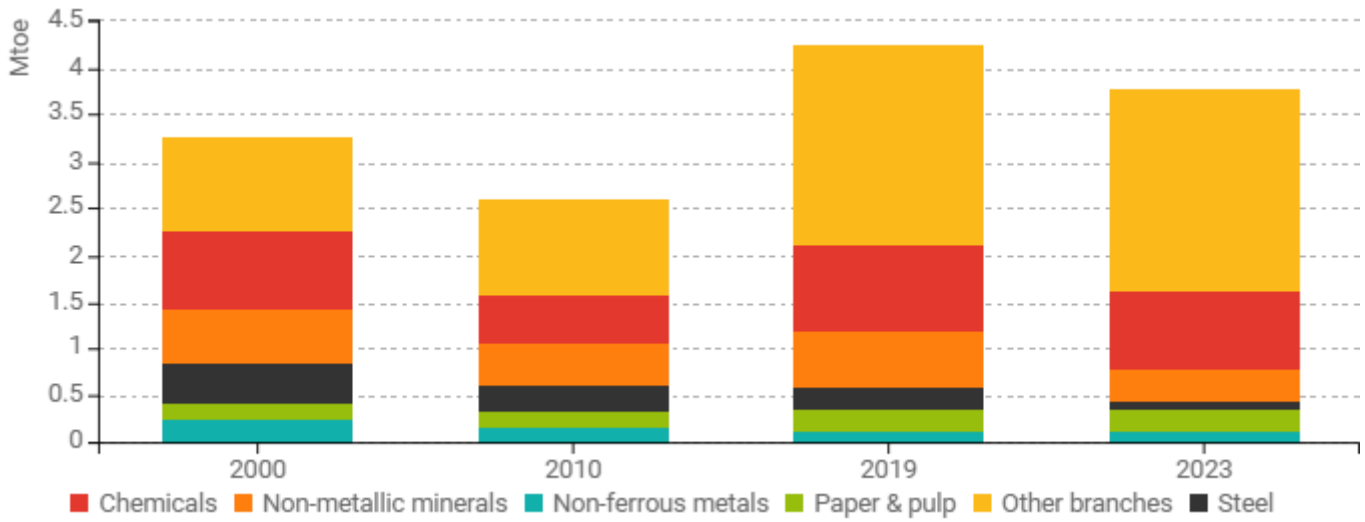
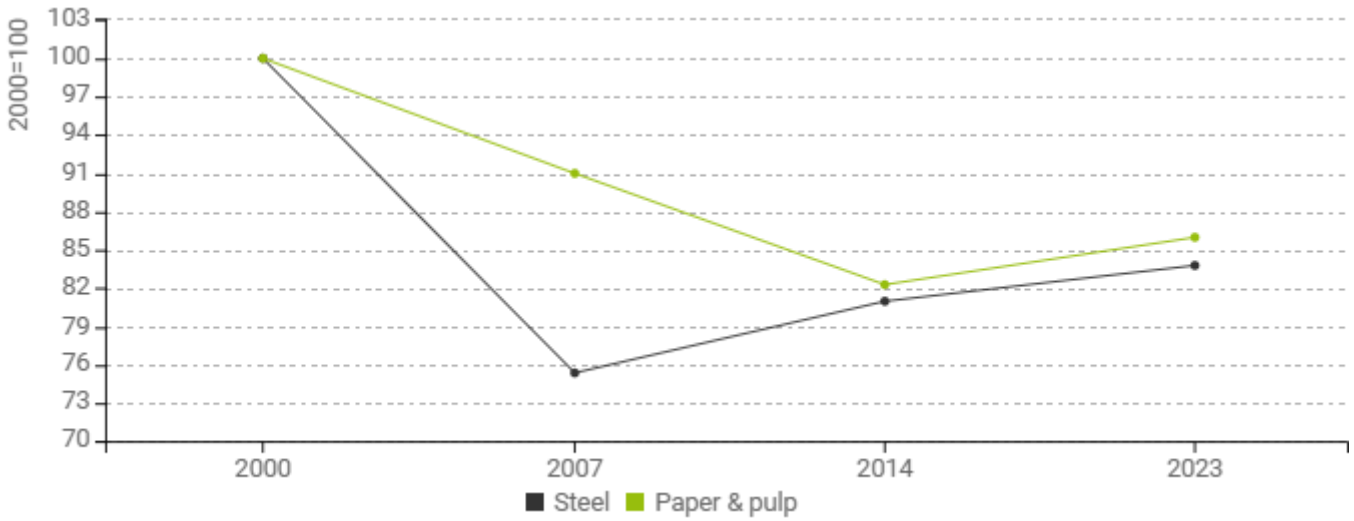
Figure 20: Final energy consumption of industry by branch



Source: ODYSSEE

Specific energy consumption per tonne of steel production has decreased by 16%, at an annual average rate of 0.8% between 2000 and 2023. The unit consumption was 0.3 toe/tonne in 2023. Specific energy consumption per tonne of paper production decreased by 14%, at an annual average rate of 0.7%.

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



Source: ODYSSEE

Final energy consumption in industry increased by 1.2 Mtoe (+50%) over 2010-2023 period, mostly caused by growth in industrial activity by 1.6 Mtoe. The other effects, that is, negative savings due to inefficient operations of recession/low growth, or structural changes towards energy intensive products within branches contributed an additional 0.7 Mtoe in the industry's energy consumption. This was partly counterbalanced by energy savings by -

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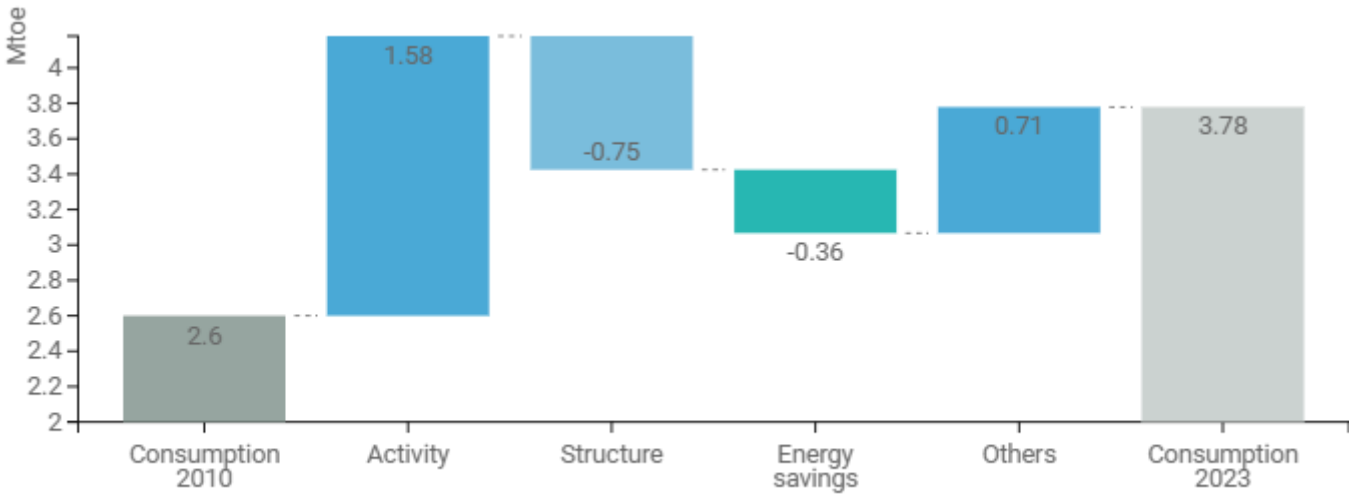
0.4 Mtoe. The economy has been continuously restructured from the 90's by less energy intensive branches gaining larger share. Structural changes continued in the 2000's, and to a smaller extent also after 2010, contributing to a decrease of energy consumption by 0.8 Mtoe.

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



Source: ODYSSEE

The Energy Efficiency Act of 2015 includes mandatory audit for large enterprises, the mandatory appointment of an energy manager in large energy consuming enterprises, and a corporate income tax incentive introduced in 2017 for the implementation and operation of investments aimed at improving energy efficiency.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Factory Rescue Program (Gyármentő program)	No	The Factory Rescue Program provides large companies with non-refundable aid for energy efficiency and energy production investments.	0.19 PJ
Requirement for large energy consuming enterprises to install sub-metering devices	No	Purpose of the measure is to make energy audits more meaningful, so that auditors are able to audit major energy consuming appliances, units or processes at large energy consuming enterprises.	0.56 PJ

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Energy audit obligation for large enterprises	Yes		0.56 PJ

Source: MURE

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