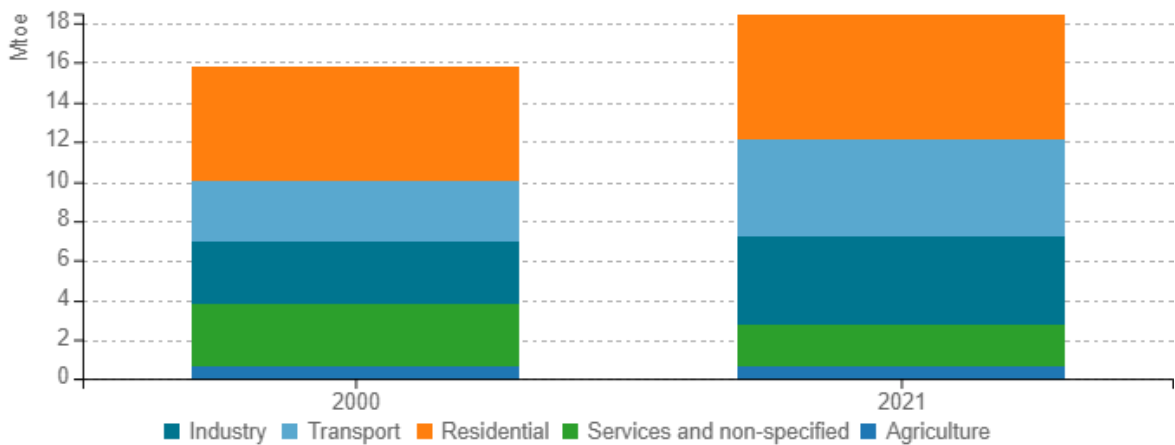


Energy efficiency trends and policies

Overview

In Hungary, final energy consumption has increased from 15.8 Mtoe to 18.4 Mtoe, i.e by 16.6% between 2000 and 2021. The residential sector has the biggest share, but its part has somewhat decreased over time (from 36.7% in 2000 to 34.1% in 2021). Transport is the second largest sector and its share has rapidly grown from 19.1% to 26.7% between 2000 and 2021. However, it is still well below the EU average of 29.7% in 2021. Industry is ranking third with the rise of 4.1 percentage point over the given period. The share of services has significantly decreased since 2000, while the share of agriculture remained almost at the same level (around 4%).

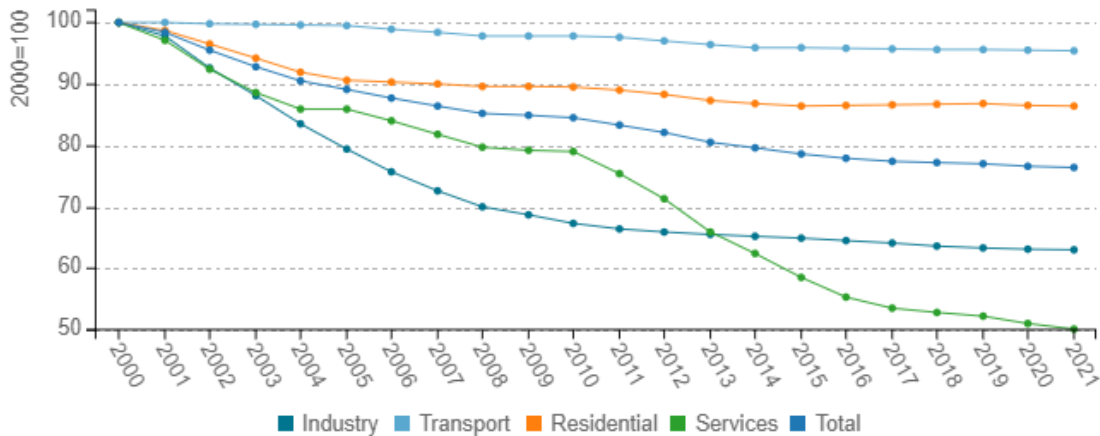
Figure 1: Final energy consumption by sector (normal climate)



Source: ODYSSEE

Energy efficiency, measured by ODEX has improved annually by 1.3%/year from 2000 to 2021, i.e. by 23.6% over the entire period. The most significant improvement occurred in the services sector (49.9% or 3.2% on average per year) and in the industry sector (37.0% or 2.2% on average per year), while only a lower development can be seen in the residential sector (13.6% or 0.7% on average per year) and the transport sector (4.6% or 0.2% on average per year).

Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE



Hungary’s main energy efficiency target is that the country’s final energy consumption in 2030 does not exceed 750 PJ. We also set a target of 336 PJ (NECP) of cumulative final energy savings by 2030 – a new saving of 61 PJ over 10 years. To achieve these, Hungary has introduced EEOS with several alternative policy measures. EEOS was introduced in 2021 for electricity, natural gas and transport fuel sector. The rate of end-use energy savings in the period 2021-2030 is expected to achieve 0.8% per year compared to the average final energy consumption in 2016-2018 period. The most important energy efficiency measures are non- or partly refundable support schemes, outlined in the Operational Programmes (OPs), financed by EU Funds. The focus of the 5th priority axis of the Environmental and Energy Efficiency Operative Programme (KEHOP) is explicitly the improvement of energy efficiency, combined with the development of renewable energy solutions in public buildings, the development of heating systems, including district heating, and awareness raising. The TOP programme finances energy efficiency upgrades at local authorities. The GINOP programme has also sub-programmes that aim to promote energy efficiency in the enterprise sector. The various OPs target a wide range of consumer groups, with potentially supportable projects, related to energy efficiency improvement in buildings, to industrial production and processes, and renewable energy. Hungary is committed to allocating significant amount of RRF resource to energy efficiency and renewable energy improvements.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
Operational Programmes with main focus on energy efficiency improvement, financed by ESIF and Cohesion Funds	yes	The most important measures of the 4th NEEAP are Operational Programmes (OPs) financed by the ESIF and European Cohesion Funds (some of them coupled with state budget), with primary focus on energy efficiency improvement. These are the Environmental and Energy Efficiency OP (KEHOP), the Regional and Rural Development OP (TOP), Competitive Central Hungary OP (VEKOP), Economic Development and Innovation OP (GINOP), Rural Development OP, Human Resources Development OP (EFOP). The OPs target a wide range of consumers (households, SMEs, local governments, public institutions, non-profit organizations, heat producers and suppliers), with a wide range of energy efficiency projects in buildings, production and processes, and renewables. Only savings, with a primary focus on energy efficiency improvement and/or final energy saving are counted to these programmes. There are more than 10 other Operational Programmes, where the primary focus is not energy efficiency, but other policy goals, such as rural development. Here, supported projects indirectly influence energy consumption, only projects are considered, where costs related to energy efficiency improvement are among eligible costs, and documented energy savings have been achieved.	Cumulative energy savings attributable to OPs with main focus on energy efficiency in 2017: 3.74493 PJ, 2020: 22.766 PJ 2021-2022: 1.098 PJ

National Network of Energy Managers	yes	<p>The National Network of Energy Managers was established in 2017 to exploit the energy efficiency potential in public institutions, including local governments, and to advise SMEs and households on energy saving methods and opportunities. Offices of the network are existing regional governmental offices, where energy managerial tasks are performed by local staff. The main tasks include free energy advising for public institutions, for managers of public buildings to help to prepare mandatory energy saving plans every 5 years, SMEs and households, promotion of energy audits and introduction of energy management system in public institutions and SMEs, and provision of help to implement energy saving measures.</p>	<p>2017: 0.005PJ 2021: 0.007 PJ 2022: 0.028 PJ</p>
Energy efficiency obligation scheme	yes	<p>Hungary indicated in the 1st NECP to introduce EEOS from 2021. According to Act LVII of 2015 on energy efficiency, the rate of end-use energy savings in the commitment period from 1 January 2021 to 31 December 2030 is the cumulative energy savings achieved with a national energy saving of 0.8% per year compared to the average final energy consumption in the 2016, 2017 and 2018 period.</p>	<p>Cumulative energy savings: 2021: 0.3 PJ 2022: 1.0 PJ 2023: 3.35 PJ 2024: 8.0 PJ 2025: 15.1 PJ 2026: 24.5 PJ 2027: 36.2 PJ 2028: 49.2 PJ 2029: 62.7 PJ 2030: 76.0 PJ</p>

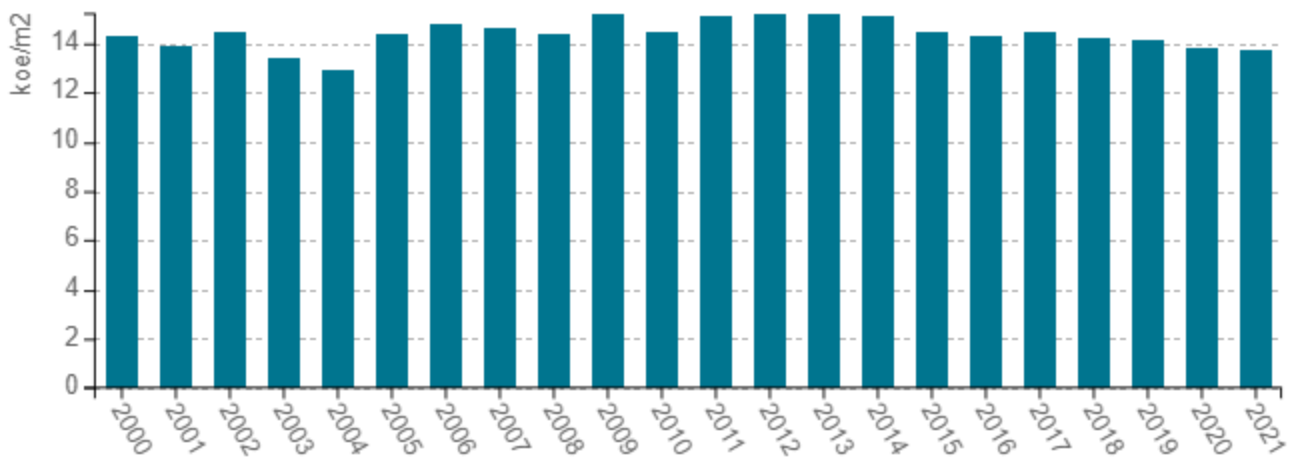
Source: MURE



Buildings

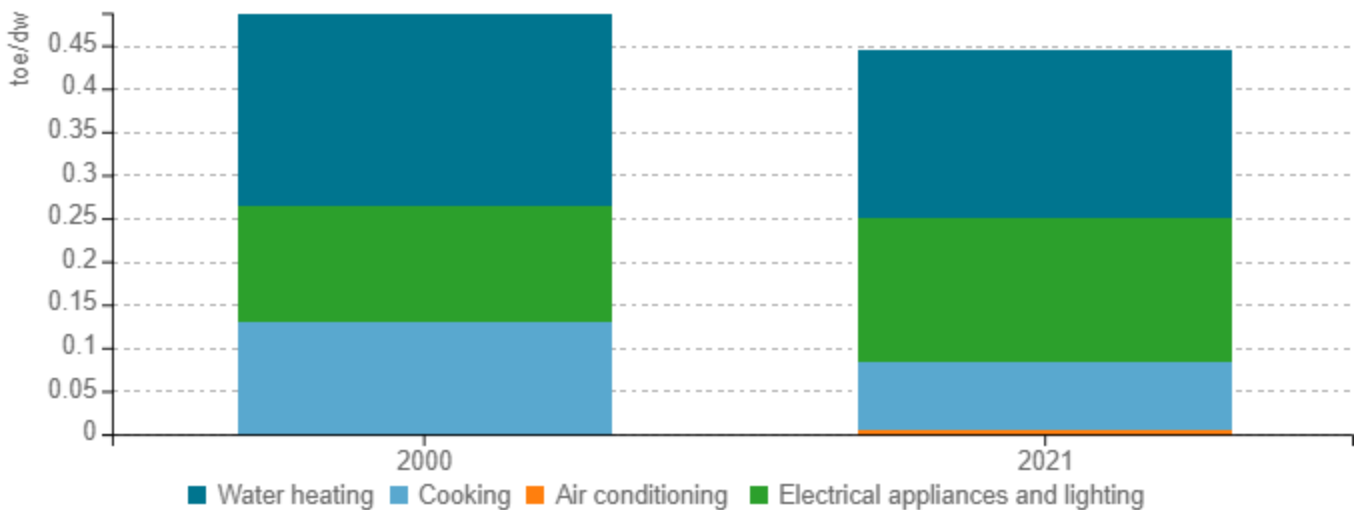
Space heating accounted for 72% of final energy consumption of households in 2021, which is 7% points higher than the EU average. Nevertheless, there is a slight decreasing trend in energy consumption of space heating per m2 visible in the last ten years. Overall, it has decreased by 4.8% between 2000 and 2021. The reason for this slight decrease is rather the lower growth rate of households heating energy consumption compared to the increase of occupied dwelling area size in m2. The second largest end-use is water heating, the share of which decreased by 2 points from 2000 to 2021. The greatest decline is seen in cooking, which has decreased by 3.3 points. On the other hand, the use of electrical appliances and lighting increased by 1.8 points. Unit consumption per dwelling for air cooling increased, but its quantity was still marginal in 2021.

Figure 3: Energy consumption of space heating per m2 (normal climate)



Source: ODYSSEE

Figure 4: Energy consumption per dwelling by end-use (except space heating)

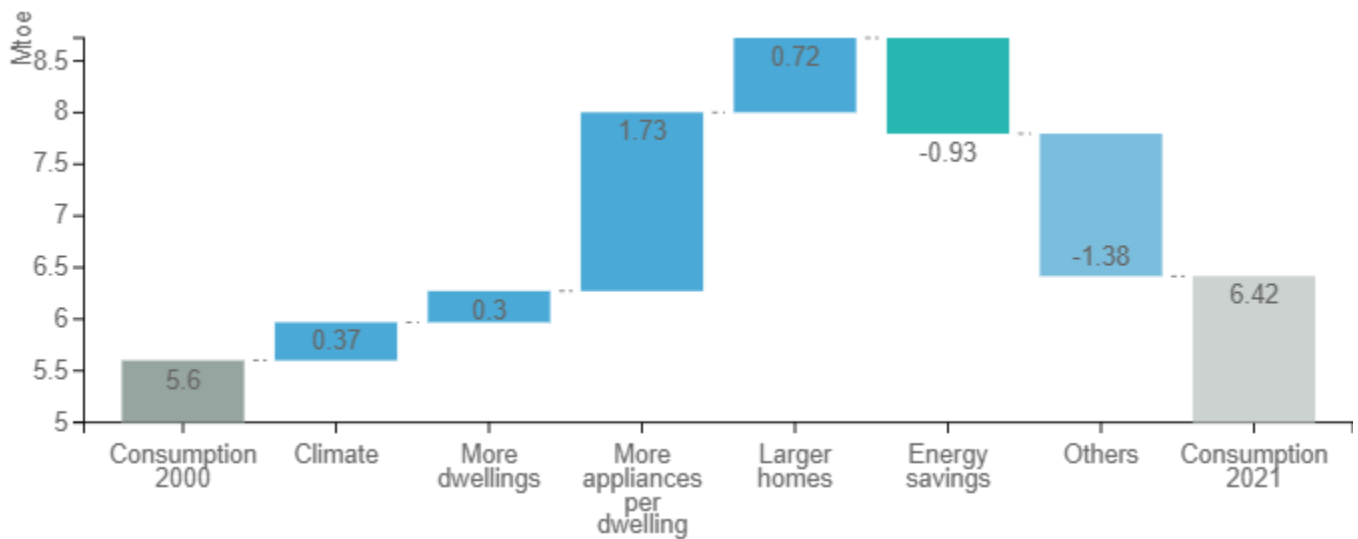


Source: ODYSSEE



Energy consumption in the household sector increased by 14.6% from 2000 to 2021 (+0.82 Mtoe). The main driving forces behind the consumption variation have been the increase in the stock of household appliances (+1.73 Mtoe) and the increase in the average size of homes (+0.72 Mtoe). On the other hand, energy savings, have contributed to lower the consumption by 0.93 Mtoe. A decrease of 1.38 Mtoe of the consumption was the result of changes in consumer behaviour, changes in fuel mix and other unknown effects and data problems.

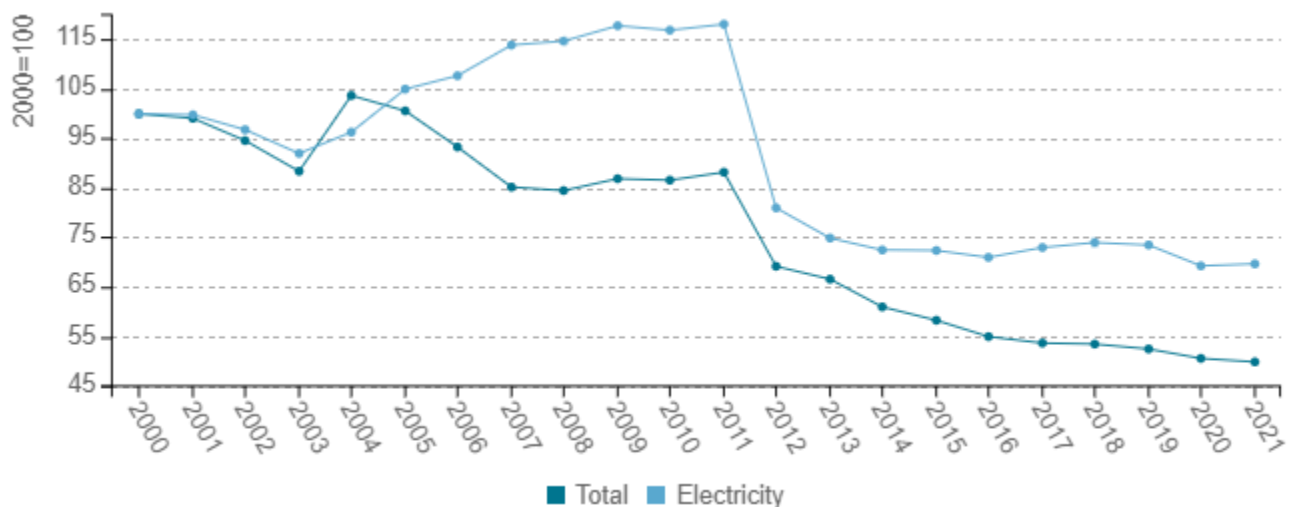
Figure 5: Main drivers of the energy consumption variation of households



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 regime change in data in 2012, slight efficiency improvement is observed afterwards (3.6%/year in total energy consumption and 1.7%/year in electricity consumption between 2012 and 2021).

Figure 6: Energy and electricity consumption per employee (normal climate)



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. TNM decree was further amended with effect from 2021. All new-construction buildings to be commissioned after 30 June 2024 must comply with the requirements of Annex 6 (nearly zero-energy buildings). From November 2023, 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 will be covered by the state.

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

Measures	Description	Expected savings, impact evaluation	More information available
Stricter building regulations	The 2002/91/EC directive was implemented in Hungary by the 7/2006 (V.24.) TNM Decree and the 176/2008 (VI.30.) Governmental Decree. These regulate the energy performance of buildings for new construction and major renovation of buildings above 1000 m ² . It also introduced a building certification scheme. 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 7/2006 TNM decree. An important amendment of the decree in 2014 made the cost-optimal energy efficient requirement a pre-condition for getting funding through grants from either state budget or EU funds. Implementing 2012/27/EU Article 5 a national building registry system was set up in 2013 by ÉMI Non-profit Kft. The Minister for Innovation and Technology amended 7/2006 (V. 24.) TNM decree on the definition of the energy performance of buildings with effect from 30 December 2020. According to the TNM Decree, all new-construction buildings to be commissioned after 31 December 2020 must comply with the requirements of Annex 6 (nearly zero-energy buildings). This requirement has been supplemented by the fact that if, according to the architectural and technical documentation, the design of the building is not nearly zero-energy or more favorable and the commissioning takes place after 31 December 2020 then the requirements of Annex 6 of the TNM Decree shall be applied only if the commissioning takes place after 30 June 2021.	-	4th NEEAP of Hungary 7/2006 (V. 24.) TNM decree

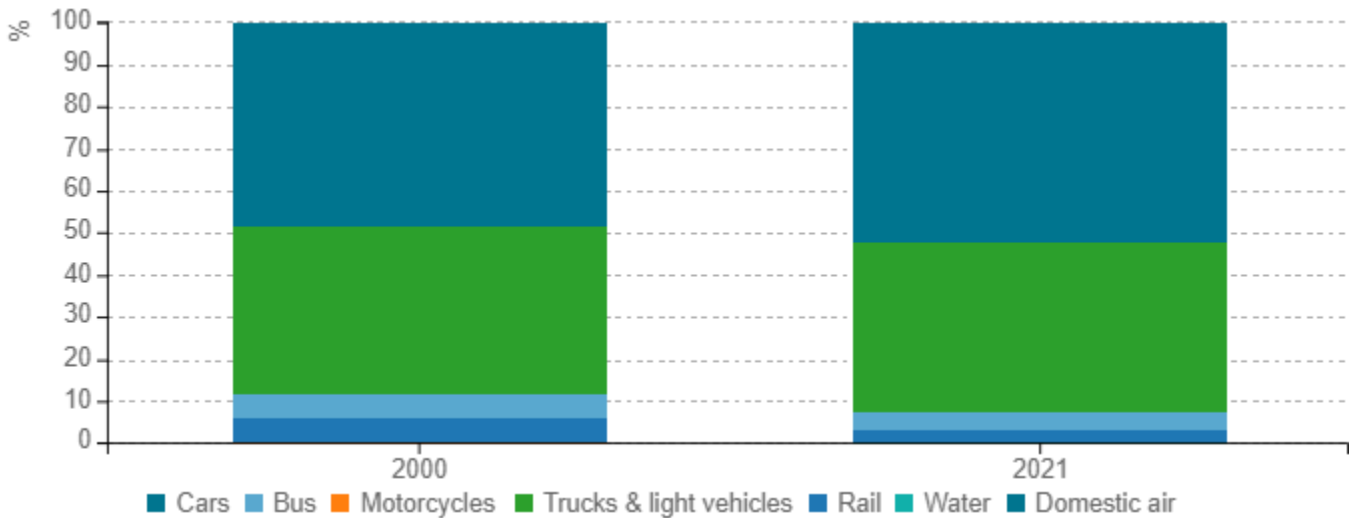
<p>Residential soft loan scheme provided by MFB, Hungarian Development Bank</p>	<p>A soft loan scheme with zero interest was introduced in April 2017 in order to trigger energy efficient building renovations in the residential building sector. An interest-free loan is introduced for homeowners, multi-apartment buildings and housing cooperatives to overcome difficulties associated with high investment costs and low financing capability. The loan is financed through EU Funds, by two different operational programmes (OP). Economic Development and Innovation Operational Programme (GINOP-8.4.4/A-17) has a budget of 339 million euro (HUF 105.2 billion), while Competitive Central Hungary Operational Programme has a budget of 30 million euro (HUF 9.41 billion). For each OP, max. 25% of the budget can be applied for multi-apartment buildings. The loan is provided by the state owned MFB Hungarian Development Bank Plc. The loan can be used for energy efficiency investments, such as thermal insulation, heating and cooling system modernization, summer heat protection, etc., and renewable energy projects, such as installation of solar energy system or solar panel, heat pump, or other renewable energy-based heating system.</p>	<p>-</p>	<p>4th NEEAP and https://www.mfb.hu/maganszemelyek/lakossagi-energiahatkonyasagihitelprogram-t32-p32</p>
<p>Green Investment System and Green Economy Financing (Warmth of Homes program)</p>	<p>The Green Economy Financing Scheme (GEFS) is financed from state budget and EU-ETS revenues. GEFS finances the 'Warmth at Homes' programme, which ensures non-refundable funding for energy efficiency in the residential sector, for e.g. for heating system modernization, replacement of old household appliances and complex building modernization.</p>	<p>Total annual end-use savings achieved in 2017: 0.96435 PJ 2020 expected: 5.21431 PJ</p>	<p>4th NEEAP of Hungary</p>
<p>Scheme for subsidising home renovations carried out by households with at least one child</p>	<p>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 (EUR 8,357) per renovation will be covered by the state. The support covers energy upgrades, kitchen and bathroom renovations, and extensions. The subsidy can be requested for within 60 days of the completion of the construction activities on the apartment and the payment of the bills, but no later than 31 December 2022. In case of more invoices, the last one is used when calculating the deadline. The amount of support can be 50-50% of the material cost and the entrepreneurial cost.</p>	<p>-</p>	<p>518/2020. (XI.25.) Government decree</p>

Source: MURE

Transport

The share of cars in the final energy consumption of transport increased by 3.5 percentage point from 48.6% in 2000 to 52.1% in 2021. The share of trucks and light vehicles remained stable over time around 40%. On the other hand, both bus and rail lost share between 2000 and 2021 (bus from 5.9% to 4.5% and rail from 5.5% to 2.7%).

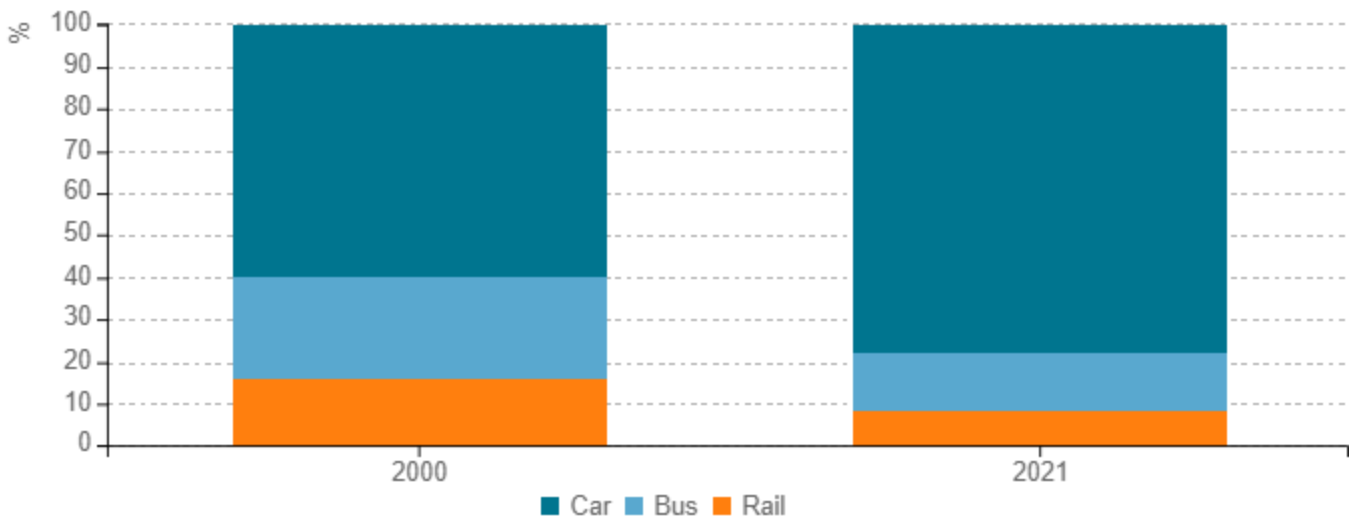
Figure 7: Transport energy consumption by mode



Source: ODYSSEE

Between 2000 and 2021, the share of cars in passenger traffic has significantly increased from 59.8% to 77.7%. During the same time, passenger rail performance declined by 41.5% and also bus decreased by 34.9% falling public transport heavily to individual traffic. In 2020, passenger transport decreased due to COVID effect, especially modal share of public transport declined dramatically. However, rail transport increased by 7.2% from 2020 to 2021, although it did not reach the 2019 level.

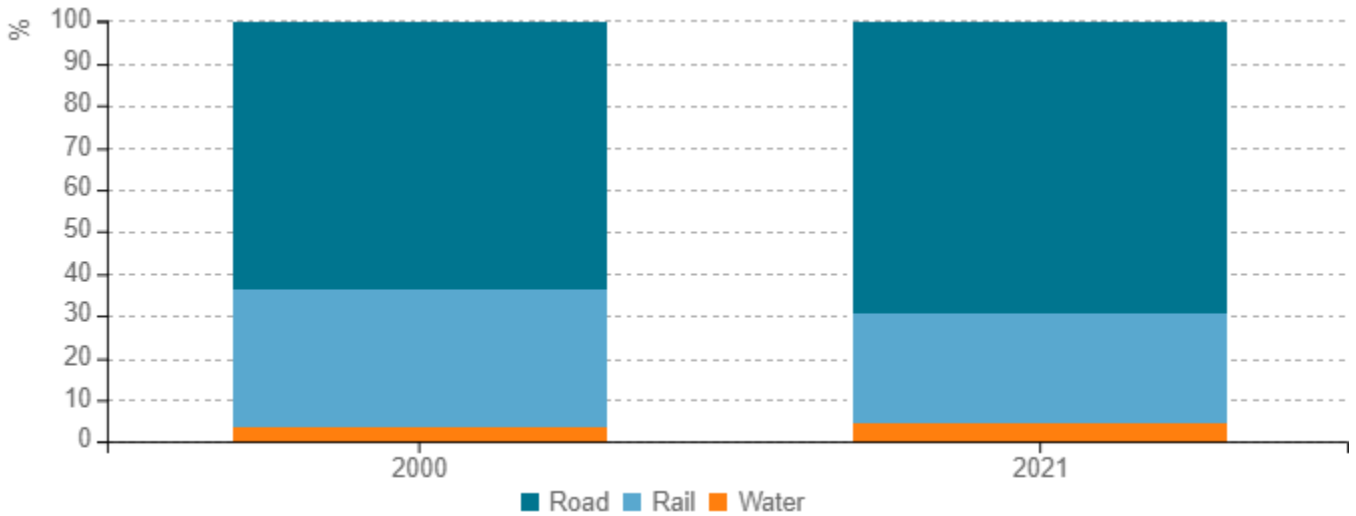
Figure 8: Modal split of inland passenger traffic



Source: ODYSSEE

Freight traffic (in tonne-km) has been rapidly growing by 61.6% in the period 2000-2021. The share of freight traffic on road increased from 63.5% in 2000 to 69,2% in 2021, while the share of rail transport decreased from 33.1% to 26.4%. The share of goods transported on water is below 5%.

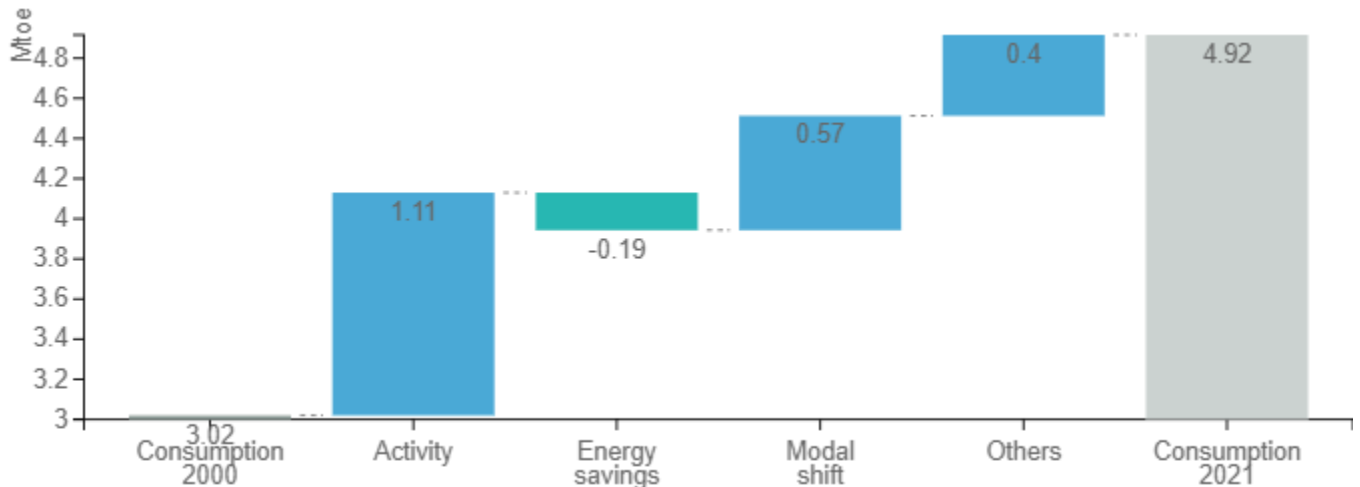
Figure 9: Modal split of inland freight traffic



Source: ODYSSEE

Energy consumption of transport grew by 1.9 Mtoe (+63%) in the period of 2000-2021. The rise was mainly due to increased activity (+1.11 Mtoe). The growing share of car in passenger traffic and share of road in freight traffic explain the increase of consumption by 0.57 Mtoe (modal shift). The increase of energy consumption due to activity was only in a small part compensated by energy savings (-0.19 Mtoe).

Figure 10: 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 Programmes, financed by European Union Funds. The development of 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	Description	Expected savings, impact evaluation
Toll road system	An electronic, distance-based toll system (DTS) has been introduced on the road network (motorways, highways, main routes). Energy savings are attributable to traffic rationalization, better capacity utilization, and division of labour of transport modes.	Cumulative energy savings expected is 10.6 PJ for 2020.
Jedlik Ányos Plan to support electro-mobility	In 2015 the Hungarian Government approved the Jedlik Ányos Plan that aims to promote electro mobility. The goal is to have 30 000 alternative vehicles in 2020 on the Hungarian roads. The Plan is implemented through the Jedlik Ányos Cluster, which includes various stakeholders related to electro- mobility in Hungary. The Plan aims at planning and implementing a supportive legal and financial framework for the spread of electric vehicles, such as the deployment of charging infrastructure, developing of measurement and accounting system for electricity used to charge vehicles, ensuring the operation of charging appliances, establishing direct and indirect financial incentives.	2017: 0.06 PJ, 2020 expected: 0.3 PJ
Operative programmes for transport development	In the programming period of 2007-2013 various infrastructure projects were developed related to public transportation in urban and suburban regions, e.g. finalizing the 4th metro line in Budapest. The budget within the Transport Operative Programme for these projects was HUF 544.6 billion. The Integrated Transport Operative Program provides funding in the period 2014-2020.	2017: 4.87 PJ 2020 expected: 28.75 PJ

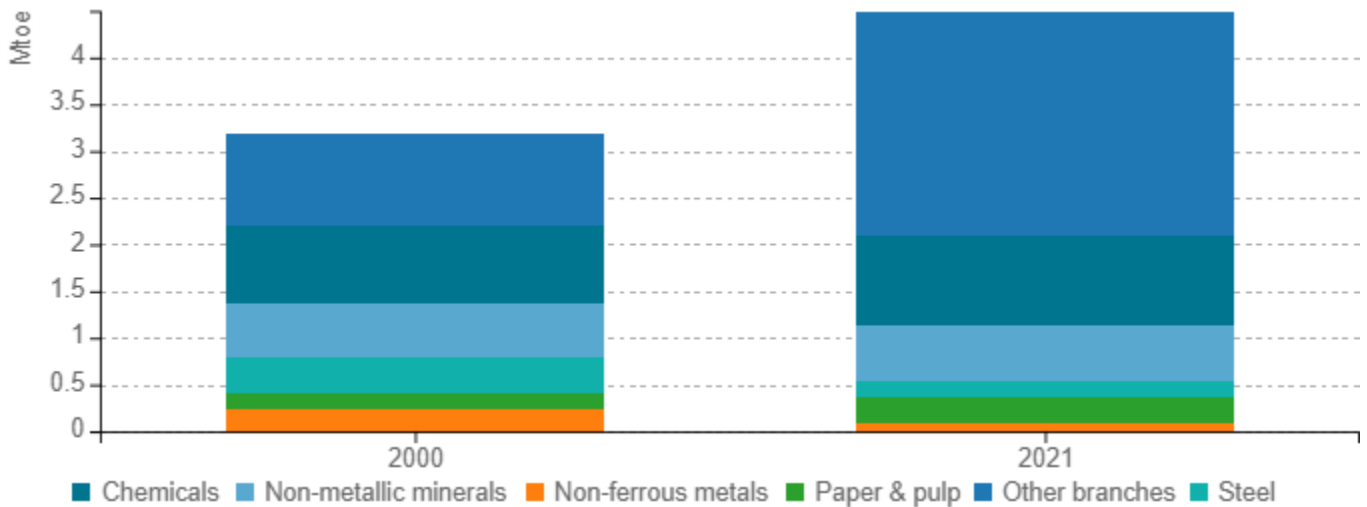
<p>Tender for supporting the purchase of bicycles with auxiliary electric motors</p>	<p>The tender was created to fulfil the objectives of the Climate and Nature Protection Action Plan in 2020. The aim of the tender is to provide an alternative to the use of motor vehicles and to reduce the use of fossil fuels, and thus the air pollution of the given settlement. The number of applicants receiving support is expected to be 6,200 – 10,700. The budget available for support is HUF 1 billion (~EUR 2.8 million). Applications may be submitted in 12 stages, until the available resources are exploited. In case of bicycles with auxiliary electric motors equipped with a pedal sensor drive system, the maximum amount of support is 50 percent of the maximum gross sales price of HUF 400,000 (EUR 1,114) valid at the time of purchase, but not more than HUF 90,000 (EUR 251). In case of bicycles with auxiliary electric motors equipped with a torque sensor drive system, the maximum amount of support is 50 percent of the maximum gross sales price of HUF 900,000 (EUR 2,561) valid at the time of purchase, but not more than HUF 150,000 (EUR 418).</p>	<p>Ex-post evaluation: Depending on the number of obtained vehicles and their use on the way to work, at least 1,600 but up to 2,700 tonnes of greenhouse gas emissions can be saved per year which is equivalent to annual GHG emissions of 275-465 households.</p>
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Source: MURE

Industry

Energy consumption in industry increased by 40.3%, at an annual average rate of 1.6% between 2000 and 2021. Final energy use in industry increased steadily from 2010 by an average of 7.3%/year due to the continuous growth of the economy, which offset the energy savings in the industry sector. The only temporary break was experienced in 2020 due to the COVID crisis.

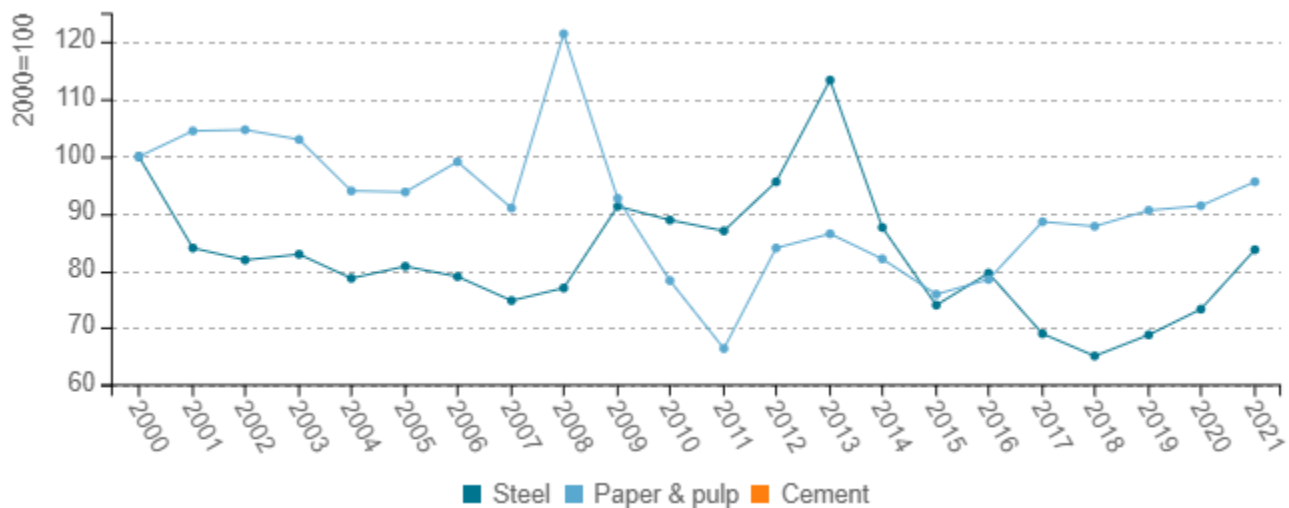
Figure 11: Final energy consumption of industry by branch



Source: ODYSSEE

Specific energy consumption per tonne of steel production has decreased by 16.3%, at an annual average rate of 0.8% between 2000 and 2021. The unit consumption was 0.33 toe/tonne in 2021. Specific energy consumption per tonne of paper production decreased by 4.4%, at an annual average rate of 0.2%. Despite the downward trend, both started to rise at the past few years due to lower utilization rates.

Figure 12: Unit consumption of energy-intensive products (toe/t)

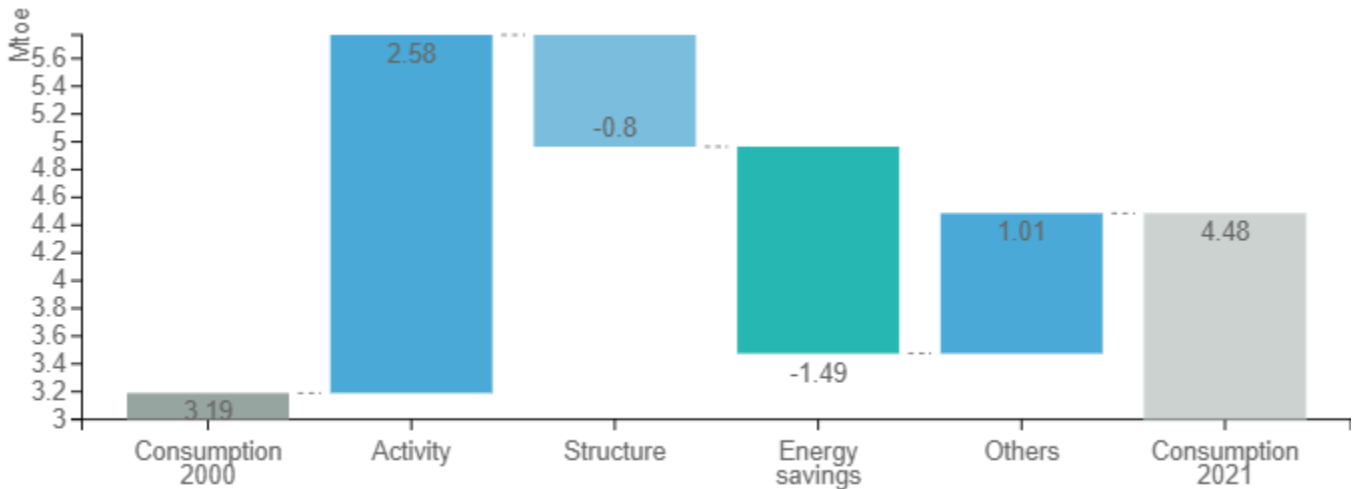


Source: ODYSSEE



Final energy consumption in industry increased by 1.29 Mtoe from 2000 to 2021, mostly caused by change in industrial activity (+2.58 Mtoe). This was partly compensated by efficiency improvements of production and processes (-1.49 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 13: Main drivers of the energy consumption variation in industry



Source: ODYSSEE

There are several measures targeting large enterprises based on the Energy Efficiency Act of 2015, including 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. The Economic Development and Innovation Operational Programme finances various energy efficiency measures for SMEs. In addition, Energy Efficiency Obligation Scheme was introduced in 2021, however, its effect is likely to be measurable through statistical data released on the upcoming years.

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

Measures	Description	Expected savings, impact evaluation	More information available
Economic Development and Innovation Operational Programme (GINOP)	Energy efficiency of the industry, with special focus on SMEs is supported through the Economic Development and Innovation Operational Programme, funded by EU Funds and state budget. Priorities of grants and supportable projects and budget are summarized yearly in government decrees.		3rd NEEAP of Hungary



<p>Mandatory energy audit for large enterprises</p>	<p>Implementation of EED Art. 8 into Hungarian law. There is an obligation for large enterprises to register at the Hungarian Energy and Public Utility Regulatory Authority (HEA) and to carry out an energy audit every four years. Every year there is a new registration obligation and data provision obligation on energy savings. Energy auditors also have to be registered at HEA. Compliance with the law is controlled by HEA, which may check the quality of energy audits and sanctions registered enterprises and/or auditors.</p>		
<p>Mandatory appointment of an energy manager in enterprises with large energy consumption</p>	<p>Measure is based on the Energy Efficiency Act of 2015. Goal of the measure is to support energy efficient behaviour, planning and investments at large enterprises. According to the EE Act of 2015 large enterprises are determined according to the following criteria: if consumption exceeds a) 400 000 kWh electricity or b) 100 000 m3 natural gas or c) 3 400 GJ heat Enterprises have the obligation to report yearly energy saving data to the Hungarian Energy and Public Utility Regulatory Authority (HEA). HEA verifies energy savings due to specific measures according to EED Art.7 methodology</p>	<p>2017: 0.64 PJ, 2020: 2.5552 PJ 2021: 0.555 PJ 2022: 1.706 PJ</p>	
<p>Corporate income tax incentive to trigger energy efficiency Investments</p>	<p>A tax incentive was introduced in 2017 for the implementation and operation of investments aimed at improving energy efficiency by reducing final energy consumption. Goal of the measure is to promote energy efficiency investments all over the business sector at large, medium and small enterprises. The tax incentive can be up to 30% of eligible costs, but not more than the HUF equivalent of EUR 15 million at present value, which can be increased by 20% for small enterprises, and 10% for medium-sized enterprises. The tax incentive may only be claimed in connection with projects aimed at energy efficiency improvement. No tax credit can be applied with respect to investments aiming at fulfilling the mandatory environmental protection standards or minimum mandatory energy efficiency standards. It is necessary for the taxpayer to obtain a certificate from an auditor registered at the Hungarian Energy and Public Utility Regulatory Authority that proves that the investment aims at improving energy efficiency by reducing energy consumption. The certificate should be based on the result of an energy audit. The taxpayer is obligated to provide data on the certified investment and the energy savings stemming from it.</p>	<p>2018: 269 TJ/year energy savings 2020 expected: 2.5552 PJ</p>	

Source: MURE