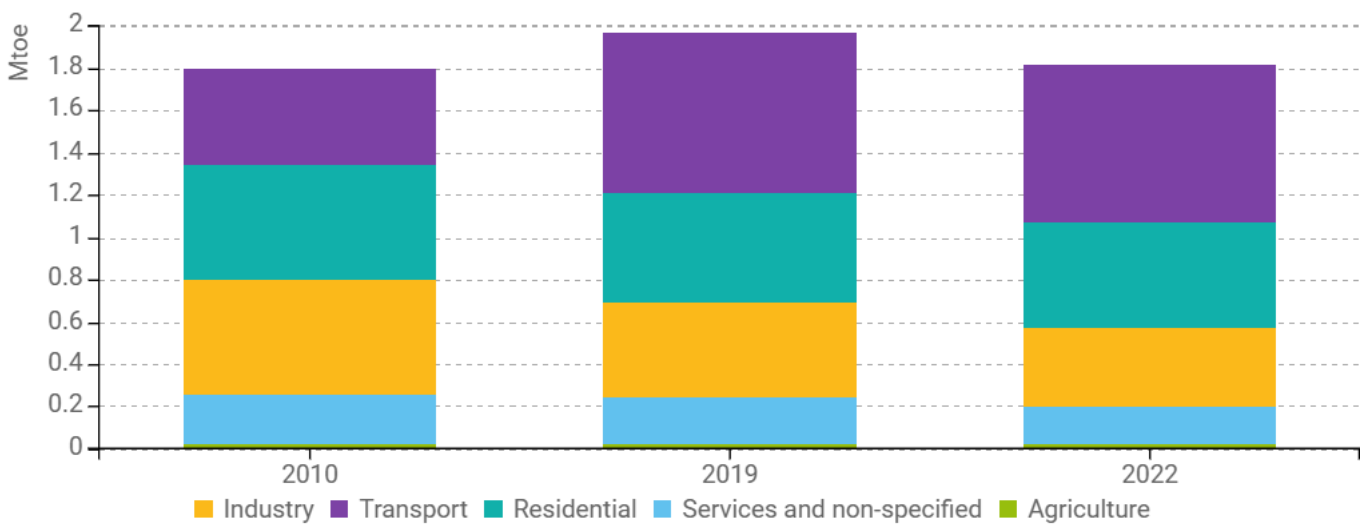


Energy efficiency trends and policies

Overview

In 2022, the final energy consumption in North Macedonia was 1.81 Mtoe, which is almost 8% less than in 2019. The transport sector had the largest share in the final energy consumption in 2022(41%), followed by the residential sector (27%) and industry sector (20%), services (10%) and agricultural sector with lowest energy consumption (2%). Compared to 2019, there was a decrease in final consumption in almost all sectors mainly due to COVID - 19 crisis, high energy prices, as well as implementation of energy efficiency measures.

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

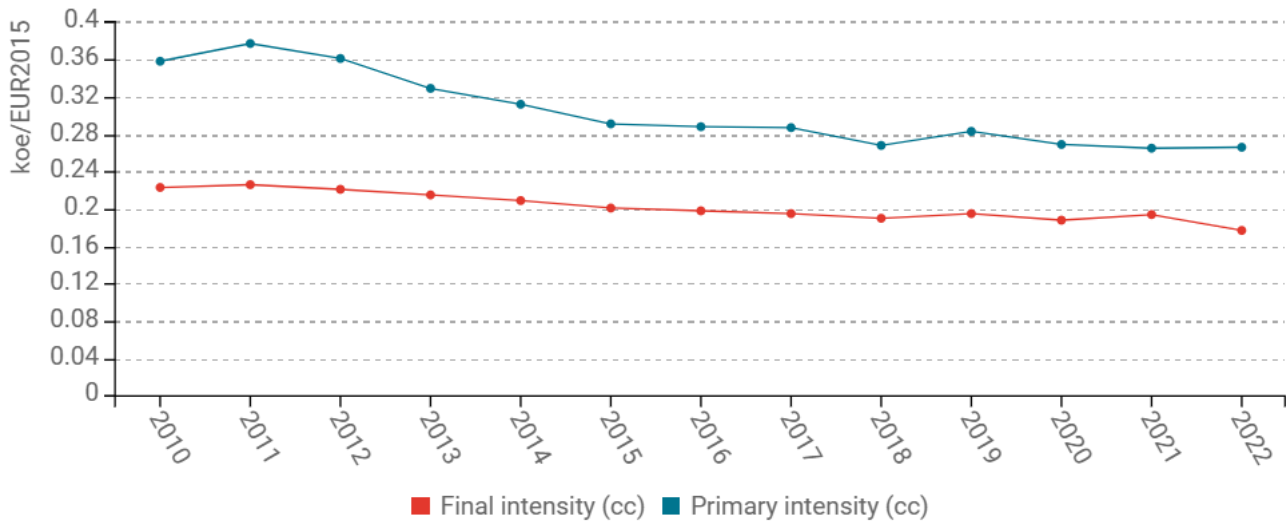


Source: ODYSSEE

Figure 2 illustrates the trends in primary and final energy intensity (with climatic corrections in koe/EUR2015) from 2010 to 2022. Both indicators - primary and final intensities show a declining trend over the years, by 2.5%/year and 1.9%/year, respectively, reflecting improvements in energy efficiency. However, the rate of reduction is more pronounced of the primary intensity before 2015 (1.3%/year since 2015). The trends observe for the final intensity indicate progress in decoupling energy use from economic growth, a key goal for sustainable development.



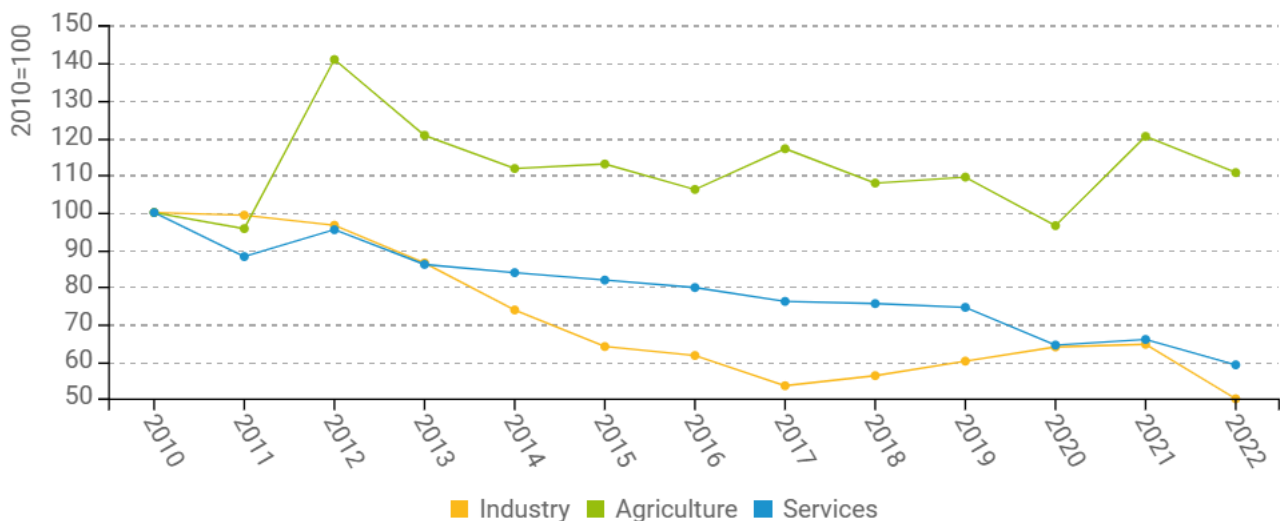
Figure 2: Primary and final intensities (with climatic corrections)



Source: ODYSSEE

The trends in final energy intensity across three sectors—industry, agriculture, and services—from 2010 to 2022 (indexed to 2010=100) are shown in figure 3. Energy intensity in all sectors has declined, indicating improved energy efficiency. Industry experienced the most significant reduction, followed by services, while agriculture showed more fluctuations, with a spike in 2012 and partial recovery afterward. The steady decline in industry and services highlights structural changes and energy efficiency measures, whereas agriculture's variability reflect external factors like climate or production shifts

Figure 3: Final intensity by sector

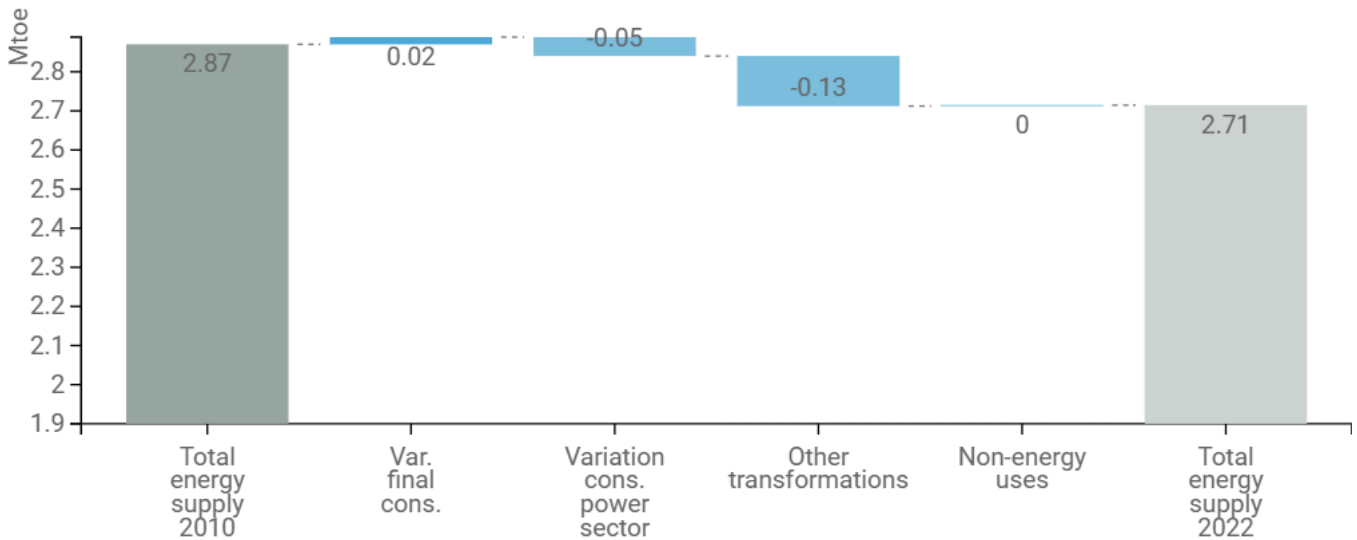


Source: ODYSSEE



Figure 4 shows the main drivers of total energy supply variation between 2010 and 2022, measured in Mtoe. Starting at 2.87 Mtoe in 2010, changes in final consumption contributed a minor increase (+0.02 Mtoe), while reductions occurred due to variations in power sector consumption (-0.05 Mtoe) and other transformations (-0.13 Mtoe). Non-energy uses had no impact. These drivers collectively resulted in a decrease of 0.16 Mtoe, bringing the total energy supply to 2.71 Mtoe in 2022. This highlights the significance of improvements in energy efficiency and transformation processes in reducing energy demand over this period.

Figure 4: Main drivers of the total energy supply variation



Source: ODYSSEE

The Integrated National Energy and Climate Plan for the period 2021-2030 builds on existing national strategies and plans. The plan was prepared based on the recommendation of Energy Community Secretariat, and North Macedonia was the first Contracting party that prepared NECP. Because the current NECP was prepared before the COVID -19 and energy crisis, it does not take in account the impact of the crisis. For this reason and also based on the new obligations from Energy Community, an update of NECP is ongoing. The crosscutting measures in table 1 are based on the inputs in MURE database as included in current NECP.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings
Rulebook on energy performance of buildings/ Правилник за енергетски карактеристики	Yes	The legal basis for the establishment of legal aspects for the energy performance of the buildings is based on the Energy Efficiency Law, with articles 32 and 33. The Rulebook on energy performance of buildings prescribes a calculation methodology that determines the energy characteristics of buildings, requirements for the energy efficiency of technical systems in a building, minimum requirements for energy performance, the way of categorizing	no calculations provided

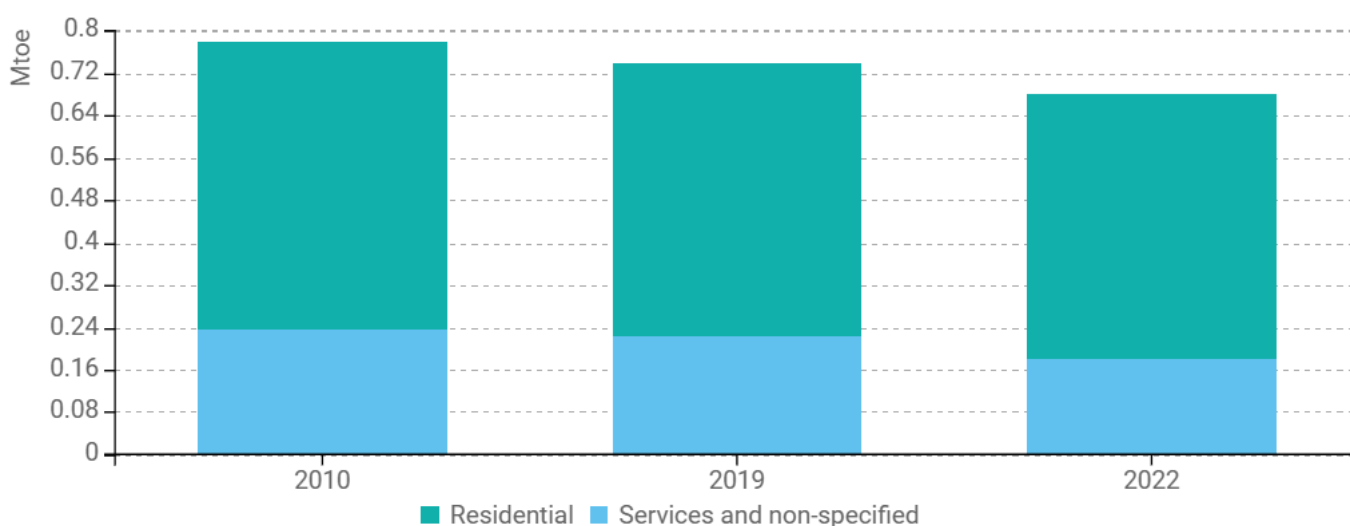
на згради		buildings, reconstruction of existing buildings or building units, in view of meeting the minimum requirements for energy efficiency; the labelling of buildings and construction units in terms of their energy characteristics and the corresponding class; the form and content of the certificate for the energy characteristics of the buildings, etc.	
Amendments on Energy Efficiency Law/ Изменување на Законот за енергетска ефикасност	Yes	For the first time in 2020, a separate law on Energy efficiency was adopted in the country. Before the adoption of the separate law, energy efficiency was part of the Energy Law. The law mainly transposes the Energy Efficiency Directive 2012/27/EU and the Energy Performance of the Buildings Directive 2018/844. Fully transposition is achieved with the preparation and adoption of secondary legislation arising from the Law. Following the amendments to the energy efficiency directive in the EU and obligations that come from the status as a Contracting Party in the Energy Community, amendments to the Energy Law are needed. For that reason, the draft Law that amends the Energy efficiency Law is prepared to aim transposition of 2018/2002 Directive and planned for adoption	no savings provided
Introduction of CO2 tax / Воведување на CO2 такса	Yes	The Republic of North Macedonia, a non-Annex I party to the United Nations Framework Convention on Climate Change (UNFCCC), ratified Paris Agreement in November 2017, with the following nationally determined contribution (NDC) to the global efforts for GHG emissions reduction (initial NDC, submitted 2015): “To reduce the CO2 emissions from fossil fuels combustion for 30%, that is, for 36% at a higher level of ambition, by 2030 compared to the business as usual (BAU) scenario.” The focus of the initial NDC is put on climate change mitigation, and particularly to CO2 emissions from fossil fuels combustion which covers almost 80% of the total GHG emissions in the country. The following sectors are of dominant share: energy supply, buildings and transport. Since the measure is still in phase of development -, at this moment impact evaluation cannot be achieved.	No estimate available

Source: MURE

Buildings

Figure 5 presents the final energy consumption in buildings, adjusted for climatic variations, across three years: 2010, 2019, and 2022. The data is categorized into two segments: residential (dark blue) and services & non-specified (light blue). In 2010, total energy consumption was the highest, exceeding 0.72 Mtoe, with residential consumption forming the majority. In 2019, total consumption remained nearly the same, with a slight decrease in the residential sector and a marginal increase in Services. By 2022, a noticeable decline in buildings energy consumption is observed, driven primarily by a reduction in residential use. This trend suggests improvements in energy efficiency or structural shifts in consumption patterns, influenced by policies, technological advancements, or changes in building occupancy and usage

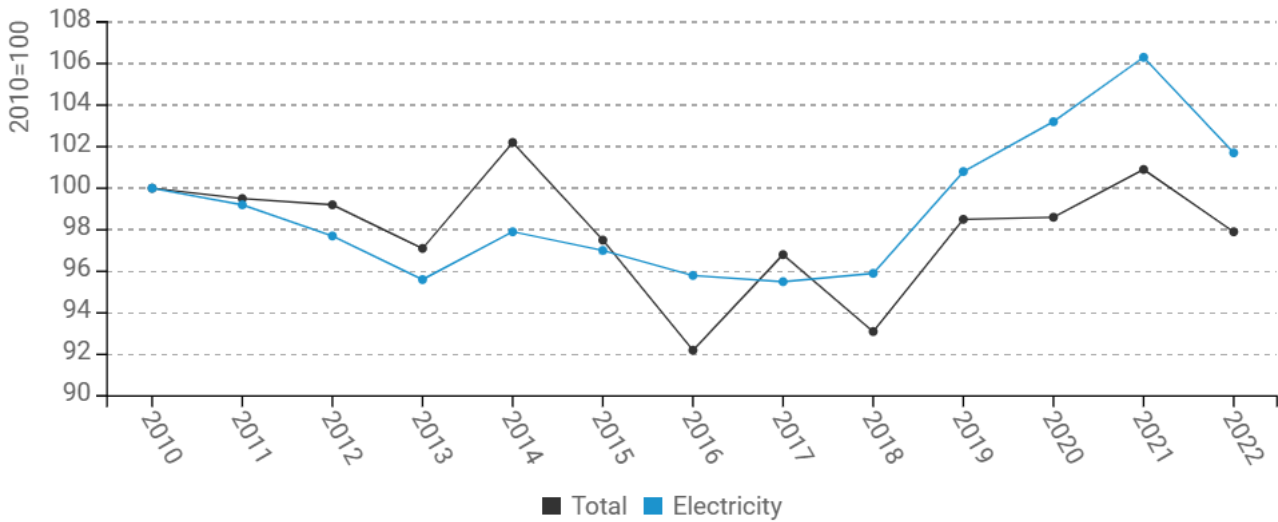
Figure 5: Final energy consumption in buildings (with climatic corrections)



Source: ODYSSEE

In the following figure is presented energy and electricity consumption per capita for households, adjusted for climatic variations, from 2010 to 2022. The total energy consumption (dark blue line) and electricity consumption (light blue line) are indexed to 2010 (=100). Overall, total energy consumption experienced fluctuations, with periods of decline (notably around 2013 and 2018) and increases in recent years until 2021, before declining in 2022. Meanwhile, electricity consumption followed a similar trend but showed a more pronounced upward trajectory from 2018 to 2021, reaching its highest point before slightly decreasing in 2022. The increase in electricity consumption in recent years may be linked to electrification trends, increased appliance usage, or heating system changes. The reduction in 2022 is due to higher prices.

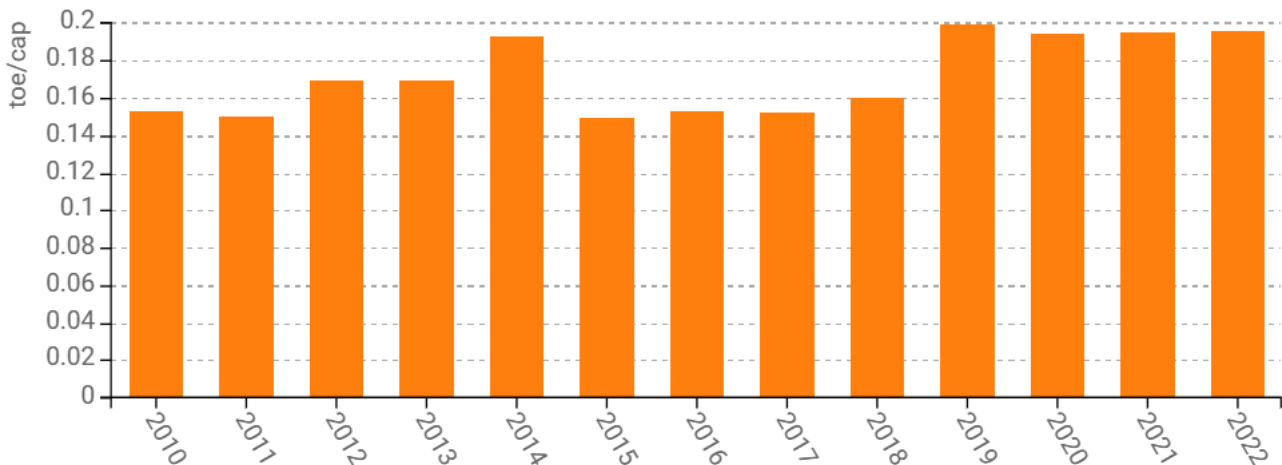
Figure 6: Energy and electricity consumption in households per capita (with climatic corrections)



Source: ODYSSEE

Energy consumption per capita for space heating in households, adjusted for climatic variations, from 2010 to 2022 (in toe/cap) is presented on figure 7. Between 2010 and 2018, consumption remained relatively stable, with minor changes. A peak occurred in 2014, followed by a reduction in the following years. In 2019, there was a noticeable increase, and consumption stabilized around 0.18 toe per capita until 2022. The increase in recent years is related to changes in heating system efficiency, increase in population household etc.

Figure 7: Energy consumption per capita for space heating in households (with climatic corrections)



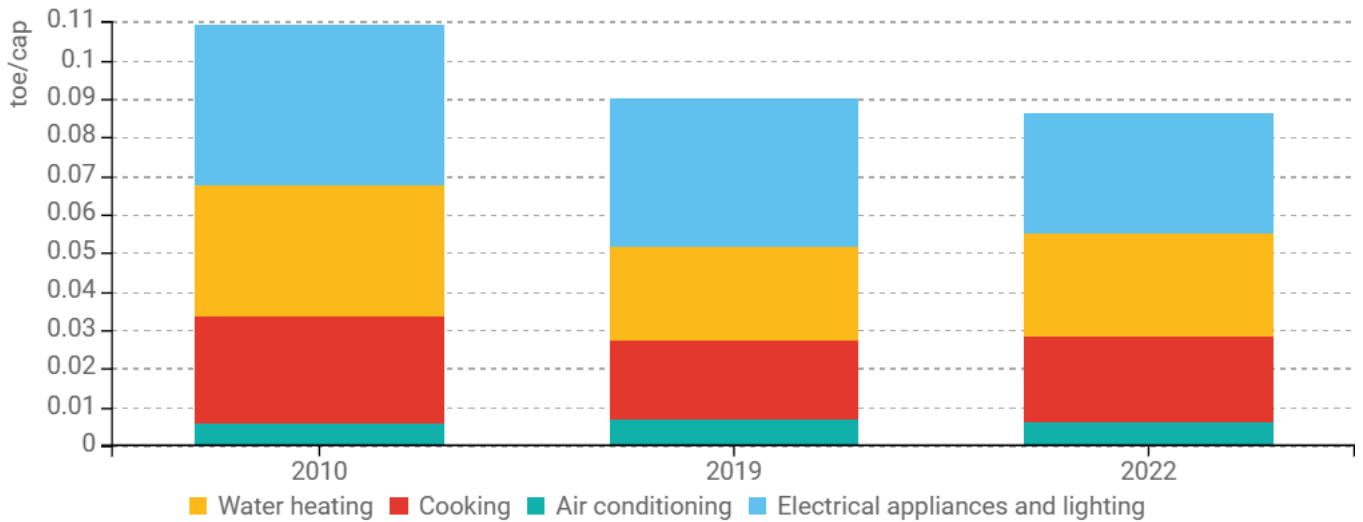
Source: ODYSSEE

Figure 8 shows household energy consumption per capita for other end -uses (i.e. excluding space heating) for the years 2010, 2019, and 2022. The consumption is measured in tons of oil equivalent per capita (toe/cap) and is categorized into four end-uses: water heating, cooking, air conditioning, and electrical appliances & lighting.



From 2010 to 2022, this energy consumption per capita has decreased, with each category showing a reduction in usage. Water heating and electrical appliances & lighting account for the largest shares, while air conditioning and cooking contribute the least. The decline is most noticeable between 2010 and 2019, with a slower reduction from 2019 to 2022. The trend suggests improved energy efficiency, behavioural changes, or technological advancements in household appliances. However, despite reductions, electrical appliances & lighting keep a significant portion of household energy consumption

Figure 8: Energy consumption per capita by end-use in households (except space heating)



Source: ODYSSEE

Republic of North Macedonia is planning to implement a number of policies and measures over the period 2020 – 2040, in order to reduce the energy consumption in buildings (households, commercial and public buildings). The policies and measures relevant to the building sector will focus on improving the energy performance of buildings by refurbishing the existing and constructing new buildings (including passive buildings), as well as through promotion and introduction of more advanced end-use technologies (if possible in combination with RES), utilization central heating systems, green procurements, etc. In February 2020, the Energy Efficiency Law (Official Gazette 32/2020)¹⁰ has been adopted, which, with the relevant by-laws, warrants transposition of the Energy Efficiency Directive 2012/27/EU, Energy Performance of Buildings Directive 2010/31/EC and package of regulation for energy efficient products (labelling and eco-design), as well as introduces a number of regulatory measures, such as building renovation strategy, EE obligation scheme, monitoring and verification of savings, comprehensive assessment of potential for efficient heating and cooling etc. Ongoing is the transposition of EED from the Clean Energy package as an amendment to the existing EE Law. The measures in table 2 are examples of successfully implemented measures that improve EE in buildings.

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

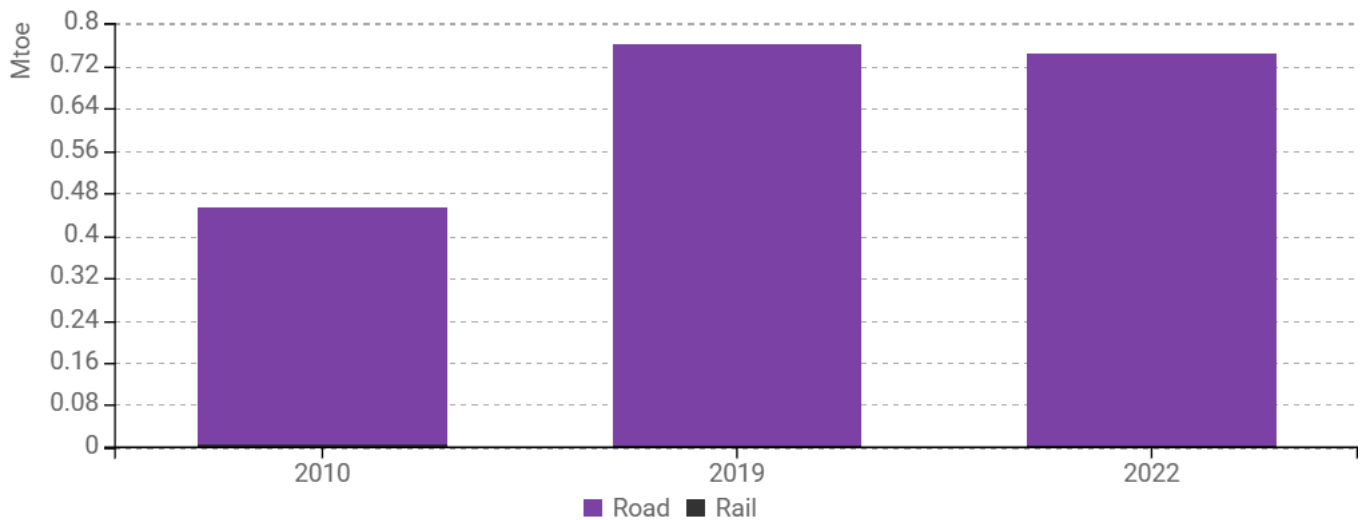
Measures	NECP measures	Description	Expected savings, impact evaluation
Replacement of windows	Yes	Main objective: Replacement of old and inefficient windows with new efficient PVC or aluminium windows in households. On the proposal of the Ministry of Economy, the Government of North Macedonia adopts annual program for promotion of RES and improving of energy efficiency. This measure is part of the Program since 2017 and considers only replacement of old windows with new PVC or aluminium windows in households. Reimbursement of the costs of installing PVC or aluminium windows in households is up to 50 % of the total amount, not more than 25.000 denars (\approx 400 €). Up till 2023 total amount of 164.000.000 denars (2.600.000 EUR) have been has been allocated from the central budget.	Estimated savings in 2030 1.758 PJ; estimated reduction in CO2 emissions in 2030, 73 ktCO2e.
Labelling of electric appliances and equipment	Yes	The main goal of this measure is to increase the penetration of appliances with higher efficiency classes and to introduce new labels for specific groups of products. Labelling of electric appliances and equipment is important to provide relevant information on the energy consumption of the products. The application of the labelling and eco-design of the products is necessary to ensure that the products sold in North Macedonia are in compliance with EU regulations	Estimated savings in 2030 0.795 PJ; estimated reduction in CO2 emissions in 2030, 56.3 ktCO2e.

Source: MURE

Transport

Figure 9 presents transport energy consumption by mode for 2010, 2019, and 2022 in Mtoe. Road transport dominates, with significant growth from 2010 to 2019 (+65%), whereas the share of rail transport is negligible (below 1%) with consumption decreasing by 60%.

Figure 9: Transport energy consumption by mode



Source: ODYSSEE

NECP provides implementation of EE measures in final energy consumption for transport sector that include replacement of old vehicles with energy-efficient ones, electrification of road transport, as well as modal shift from road to rail for freight transport and from car to bus for passenger transport, and more biking/walking in urban areas, and accelerating RES consumption (biofuels) in transport.

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

Measures	NECP measures	Description	Expected savings
Advanced mobility	Yes	The main goal of this measure is the reduction of the local air pollution. The measure includes conducting campaigns/providing subsidies and systems for the use of new bicycles, and electric scooters, promoting walking, and introducing parking policies that would reduce the use of cars in the city area. People, especially in smaller towns where a lot of them use cars for short distances, would increase the use of bicycles/electric scooters or walking.	NECP includes cumulative annual savings based on calculations for 2018-2040
Electrification of the transport	Yes	Transition from society based on fossil fuels to low carbon society, where the renewable energy and electrification of the transport will play the most important role. At least the following measures should be implemented: <ul style="list-style-type: none"> • Based the methodologies for calculation of environmental taxes as well as the excise duty on CO2 • Exemption from paying excise duty for electric vehicles • Direct subsidizing of electric vehicles, -Reserve green parking in all public parking lots • Obligation to place fast chargers at all gas stations on motorways 	

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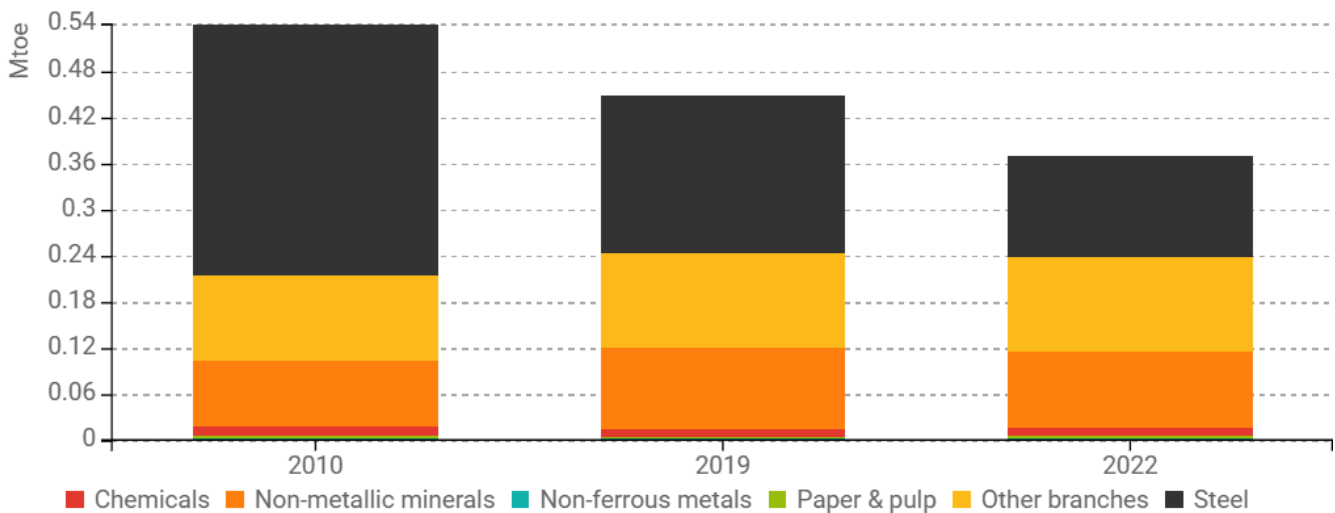
Co-funded by
the European Union

Source: MURE

Industry

Figure 10 shows final energy consumption in the industrial sector by branch for 2010, 2019, and 2022 (in Mtoe). Steel dominates consumption (36%), followed by other branches (34%) and non-metallic industries (27%). Energy use has steadily declined, with 2022 showing the lowest levels across all categories, indicating increased efficiency and/or reduced industrial activity.

Figure 10: Final energy consumption of industry by branch



Source: ODYSSEE

NECP for industry sector gives priority to the improvement of the processes by using more efficient and advanced technologies, in combination with the energy management of the processes. Implementation of EE measures in final energy consumption for industry sector like utilization of efficient technologies that will enable fuel switch (from coal to gas) and use of efficient electric motors (in industry) as well as energy management in manufacturing industries.

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

Measures	NECP measures	Description	Expected savings
Energy management in manufacturing industries	Yes	The main goal is efficient management of manufacturing processes in the industry aiming to increase production using the same energy consumption. This measure considers the implementation of obligatory energy audits of large companies and the implementation of ISO 50001 standard, as well as advanced measurement and introduction of new IT technologies. This will enable the prevention of defects, better process control, and quicker response times in manufacturing using advanced data analysis and predictive technologies.	Improvement of the systems efficiency in manufacturing industries at 0.15%/year. for the period 2020-2040

Source: MURE

