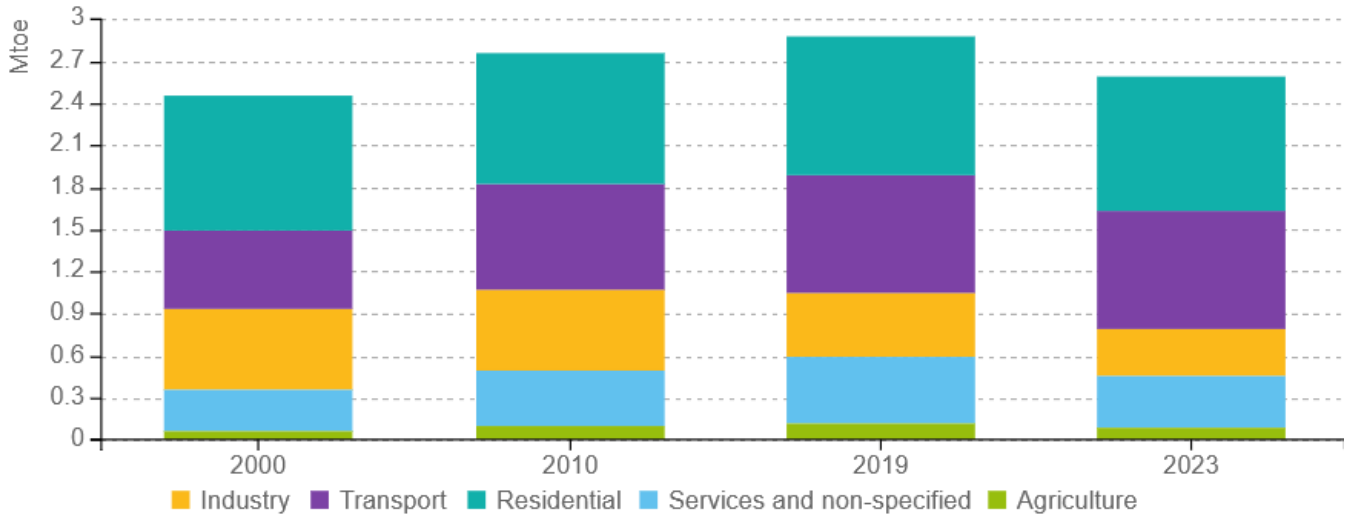
Energy efficiency trends and policies

Overview

In 2023, Estonia's final energy consumption reached 2.6 million tonnes of oil equivalent (Mtoe), representing an increase of approximately 5.6% compared to 2000 (2.45 Mtoe). The share of the residential sector, which remains the largest energy consumer, has decreased by 2 percentage point, from 39% in 2000 to 37% in 2023. The share of the industrial sector declined substantially, by 11 percentage points, falling from 24% to 13%. During the same period, the transport sector increased its share from 23% to 33% (+10 percentage points). The tertiary sector grew by 2 percentage points, while the agricultural sector increased by 1 percentage point.

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



Source: ODYSSEE

The index of energy efficiency progress, known as ODEX, measures improvements in energy efficiency across sectors or for the entire economy. It is calculated by aggregating changes in unit energy consumption at a detailed level, by sub-sector or end-use, over a specified period. The Technical ODEX excludes negative efficiency trends, meaning it can only decrease (indicating improved efficiency) or remain stable. Between 2000 and 2023, end-use energy efficiency, as measured by Technical ODEX, improved by an average of 2.1% per year. The fastest progress was recorded in industry (5.4% annually). Improvements were more modest in the transport sector (1.3%), households (1.4%), and the services sector (0.4%).

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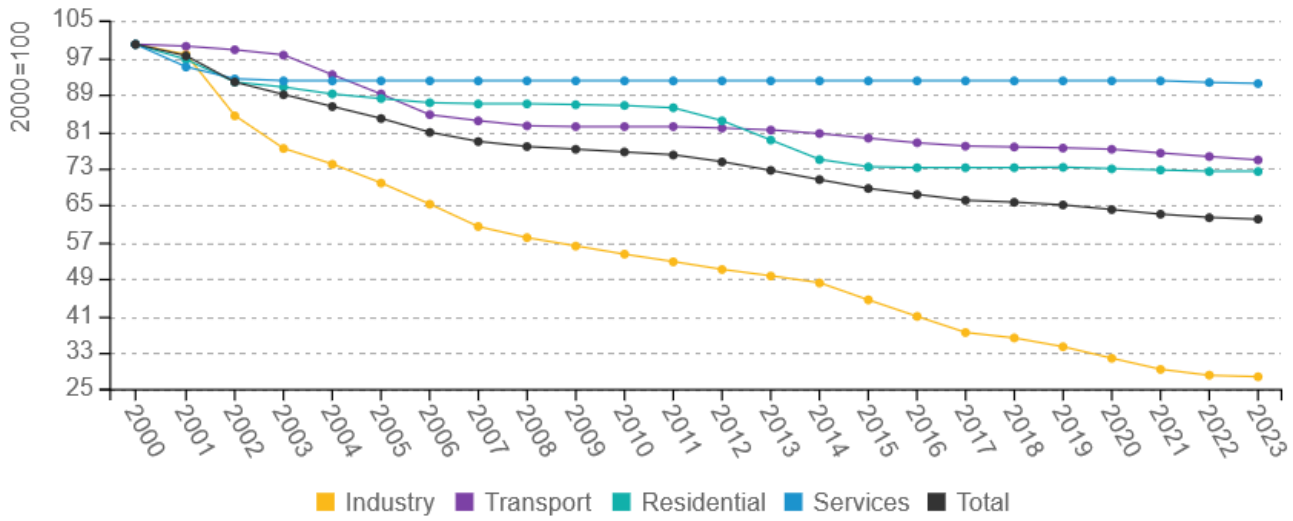
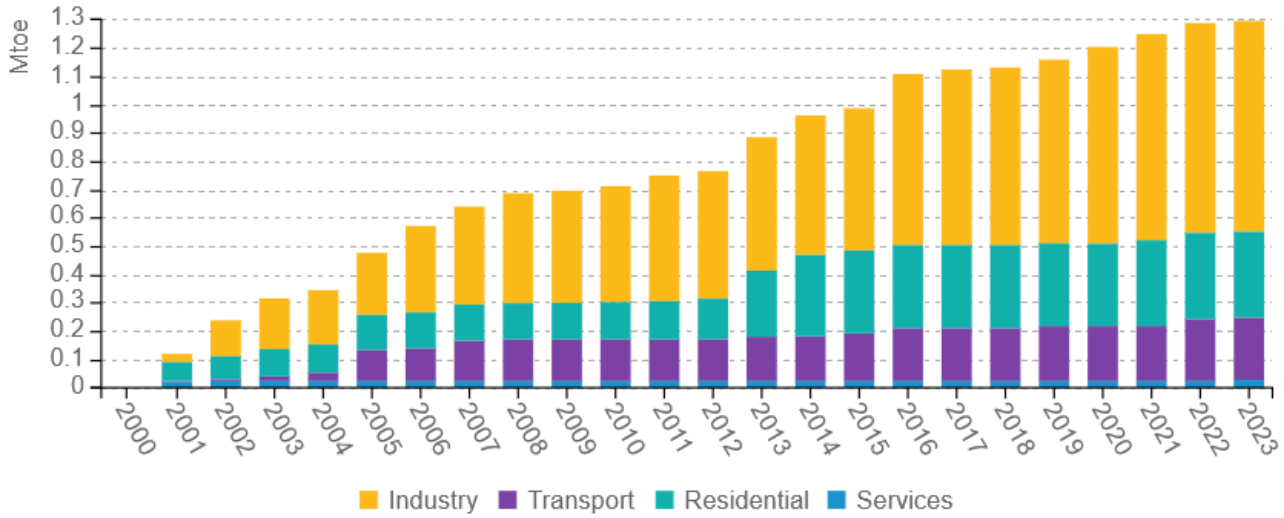
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

The Energy Efficiency Directive defines three key indicators:•New annual energy savings – savings achieved within a given year from measures implemented in that same year; •Total annual savings – all savings achieved in a specific year from measures implemented in previous years; •Cumulative energy savings – total savings achieved over a defined period through all actions carried out during that period. Between 2000 and 2023, cumulative energy savings in Estonia reached 1.3 million tonnes of oil equivalent (Mtoe). The industrial sector accounted for the largest share (0.7 Mtoe), followed by households (0.3 Mtoe), transport (0.2 Mtoe), and the commercial and public sector (0.03 Mtoe).

Figure 3: Energy savings by sector



Source: Odyssee

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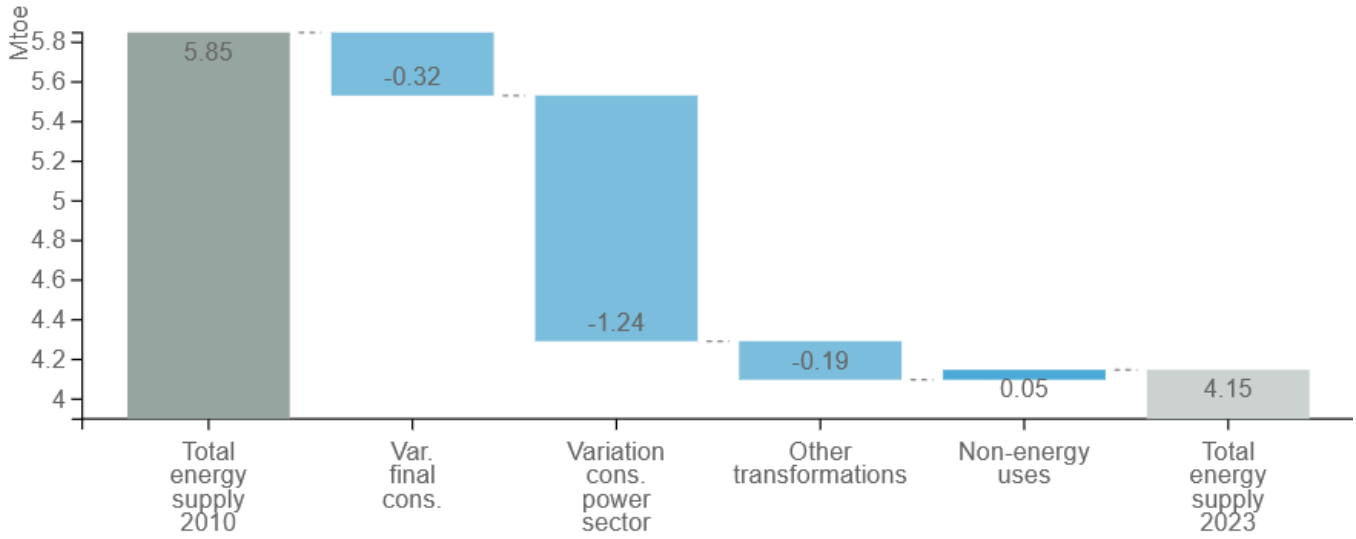
In 2023, Estonia's total energy supply amounted to 4.15 Mtoe, representing a decrease of about 29,1% compared with 2010 (5.85 Mtoe). The most significant factor behind this reduction was the transition to new, more efficient energy production technologies and the substantial decline in the use of old, polluting systems, particularly oil shale power plants, in the energy conversion sector. Together, these technological and structural changes reduced total energy supply by approximately -1.75 Mtoe between 2010 and 2023. Additional contributions came from increased renewable energy production and improved energy efficiency across end-use sectors.

Figure 4: Main drivers of the total energy supply variation



Source: Odyssee

Final energy consumption in Estonia reached 2.56 Mtoe in 2023, which is over 11% lower than in 2010 (2.88 Mtoe). The decline was driven by several factors, including the implementation of energy saving measures (-0.58 Mtoe), milder climatic conditions (-0.19 Mtoe), and structural and activity changes in the economy (-0.03 and -0.35 Mtoe, respectively). However, growth in certain sectors, particularly in business and public services such as IT and national defense, partly offset these reductions by increasing energy consumption. Overall, efficiency improvements and favourable climate conditions remain the main contributors to the downward trend.

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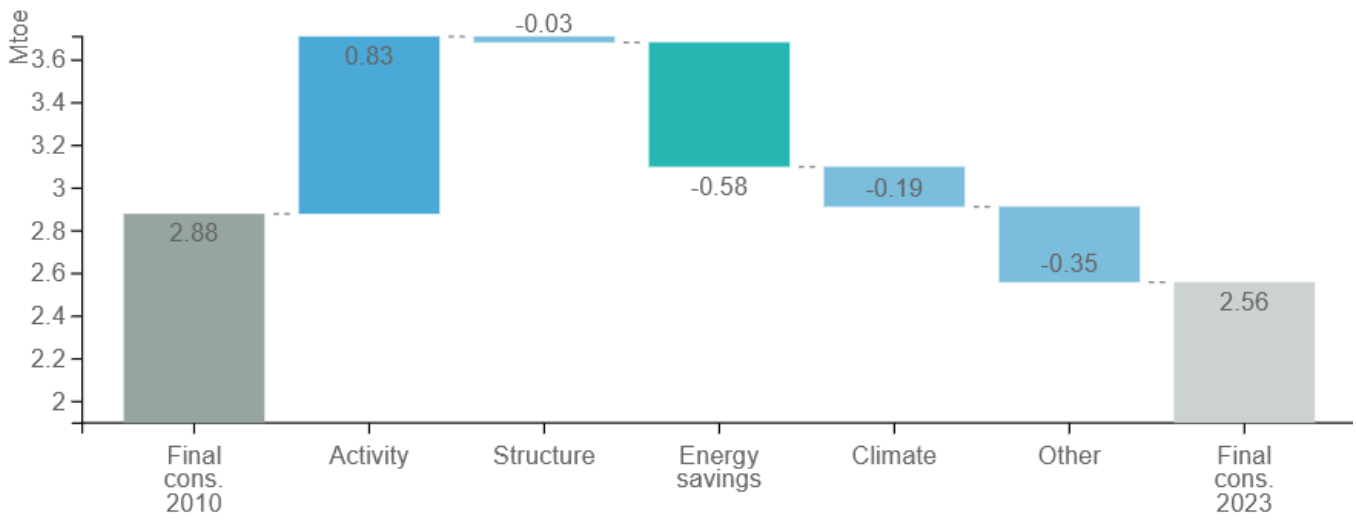
Figure 5: Main drivers of the final energy consumption variation



Source: Odyssee

Estonia has set a target to maintain final energy consumption at 32-33 TWh/a (approximately 2.84 Mtoe) by 2030. Under the updated EU Energy Efficiency Directive (2023), Estonia's energy-saving obligations are tightened, with the maximum allowed final consumption for 2030 reduced to 30 TWh (2.58 Mtoe) instead of the previous 33 TWh (2.84 Mtoe). In 2023, final energy consumption amounted to 2.59 Mtoe, representing a decrease of roughly 6% compared to the ten-year average of 2.8-2.9 Mtoe. A structural shift is also evident: energy demand in the service sector (notably information and communication, trade, as well as professional and technical activities) has increased, while industrial energy consumption has declined due to rising carbon dioxide prices under the EU Emissions Trading System and the impact of the COVID-19 pandemic during 2020–2023.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
Fuel and energy taxes	Yes	The VAT and excise duties paid to the state budget make an indirect but still significant contribution towards the financing grant from the state budget to final customers for energy conservation measures.	1790 TJ
Requirement for remotely readable electricity meters	Yes	In order to achieve energy saving target set for 2030, it is necessary to make all building and apartment-based water, electricity, gas and heating meters remotely readable by 2026.	2408 TJ

Source: MURE

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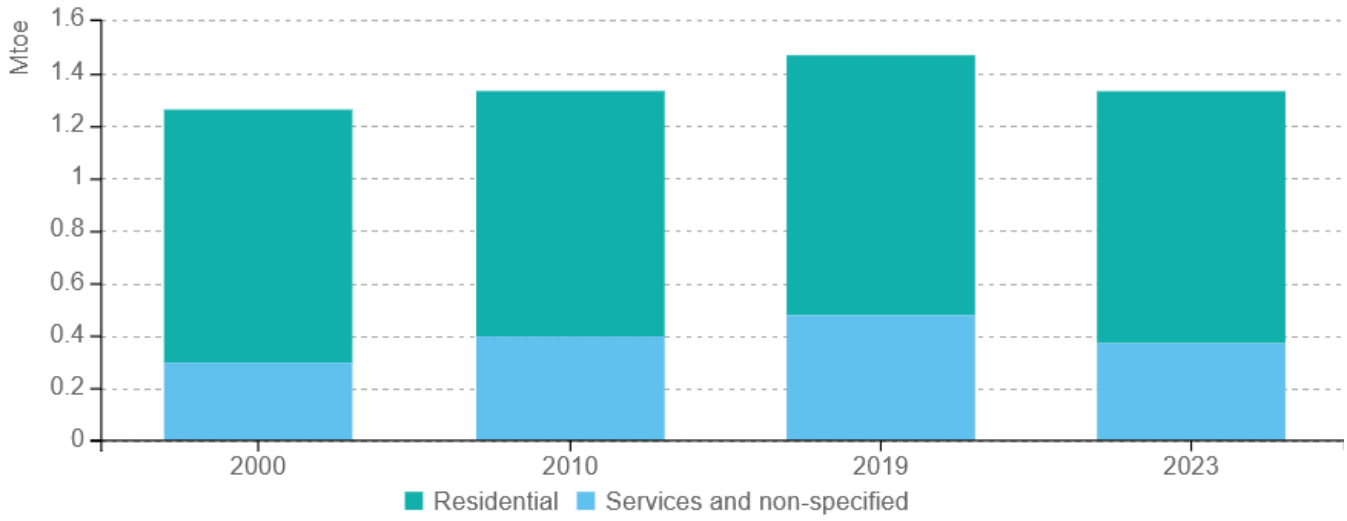
Buildings

Final energy consumption in buildings increased by approximately 5.6% over the period 2000-2023, primarily due to higher consumption in commercial and public sector buildings. Household energy consumption remained relatively stable, fluctuating within the range of 0.9-1.0 million toe. In contrast, energy use in commercial and public sector buildings varied more widely - from 0.3 million toe in 2000 to 0.5 million toe in 2020.

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



Source: Odyssee

Figure 7 illustrates the changes in household energy consumption by end-use categories in 2000, 2010, 2020, and 2023. While energy consumed for space heating accounted for 75% of final household energy consumption in 2000, its share decreased to 72% in 2023—a reduction of 3 percentage points. The shares of energy consumption for hot water preparation declined by 0.9 percentage points, while the share for lighting and household appliances increased by 3.9 percentage points, in 2023 compared to 2000.

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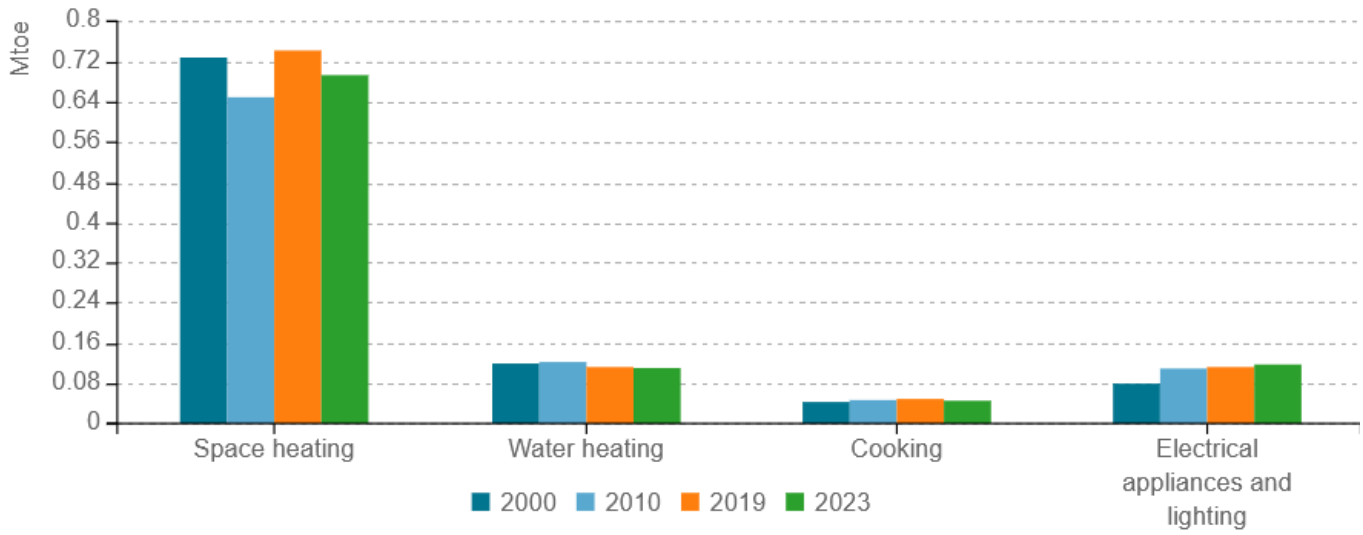
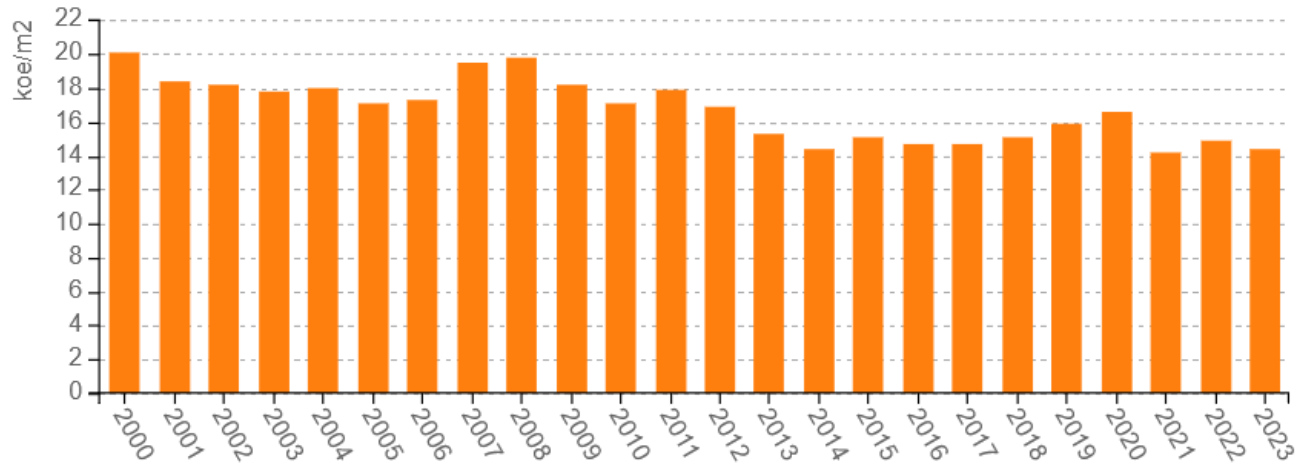
Figure 7: Energy consumption by end-use of households (with climatic corrections)



Source: Odyssee

Specific heat consumption per square meter decreased by approximately 28% (equivalent to 1.4% per year) between 2000 and 2023. This reduction is mainly attributed to the increasing use of heat pumps. Minor fluctuations in the long-term trend observed in some years (e.g., 2007–2008) can be explained by the fact that normalisation using heating degree days does not completely account for year-to-year variations in weather, particularly when those variations are significant.

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



Source: ODYSSEE

The average energy consumption per dwelling (excluding space heating) was 0.40 kWh/dw in 2000 and 0.38 kWh/dw in 2023. Regarding energy used for hot water production, consumption decreased from 0.197 kWh/dw in 2000 to 0.155 kWh/dw in 2023—an overall reduction of approximately 21%. Energy consumption for cooking

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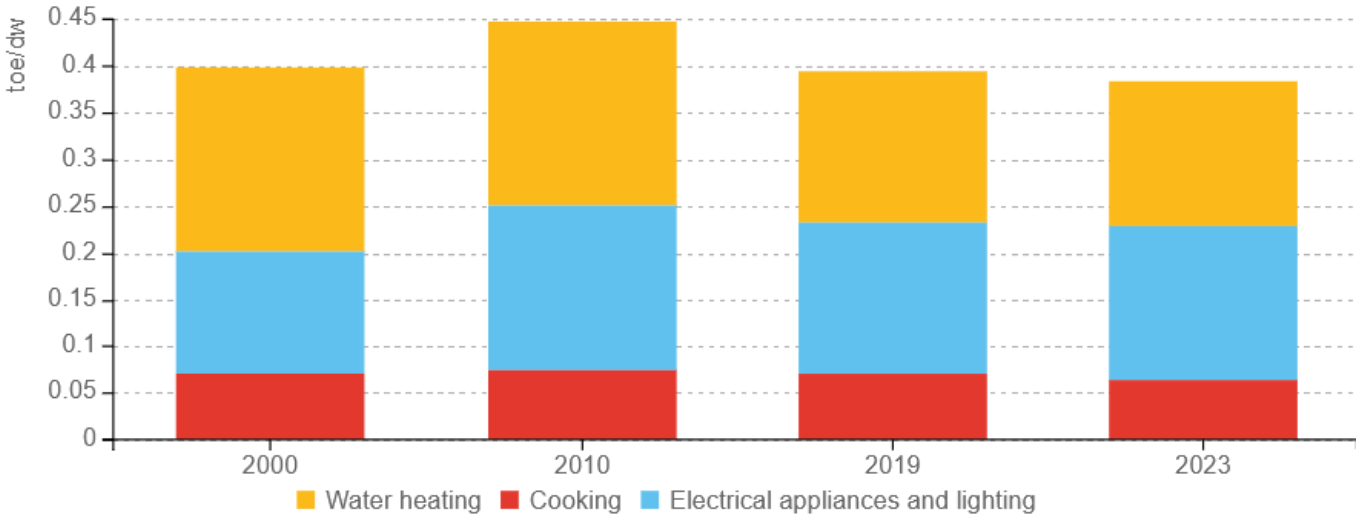
declined by 9.6%, from 0.0704 kWh/dw in 2000 to 0.064 kWh/dw in 2023). In contrast, energy consumption per dwelling for lighting and household appliances increased by approximately 26% over the same period (from 0.131 kWh/dw in 2000 to 0.165 kWh/dw in 2023).

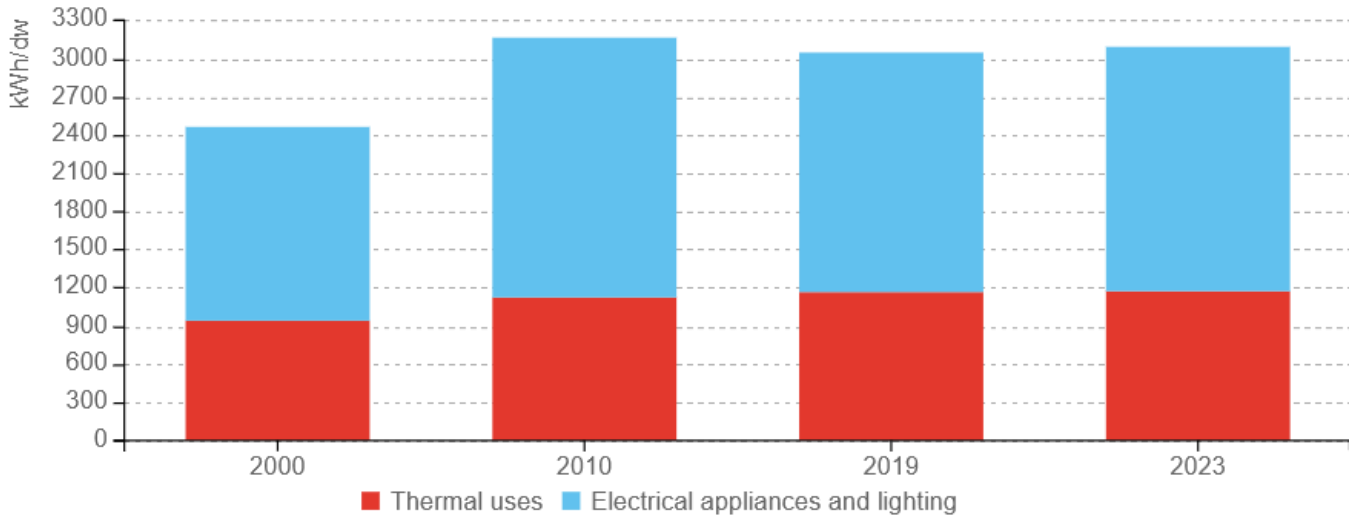
Figure 9: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

Electricity consumption in households has grown significantly. In 2000, the average consumption was 2,463 kWh per dwelling, rising to 3,092 kWh in 2023 – an increase of approximately 25%. Electricity is primarily used for space heating, lighting, and various household appliances. Although absolute electricity consumption has increased, the proportional breakdown of uses has remained stable. Around 38% of electricity is used for heating, while the remaining 62% is used for lighting and appliances, and these shares have changed very little since 2000.

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



Source: Odyssee

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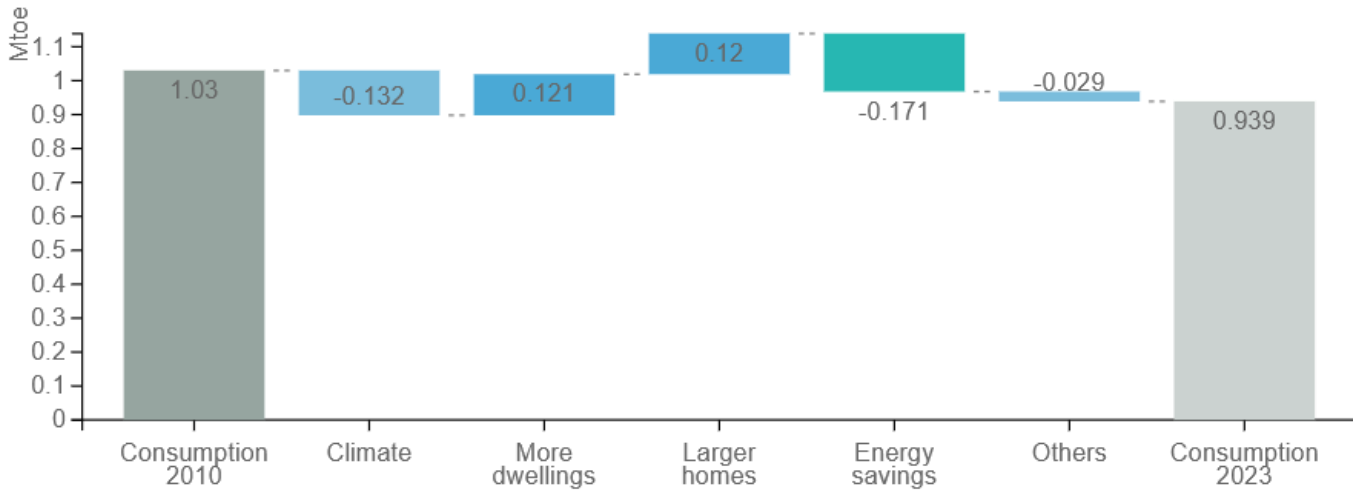
Household energy consumption decreased from 1.03 Mtoe in 2010 to 0.939 Mtoe in 2023, representing a reduction of approximately 0.09 Mtoe, or 9%. This decline is the net result of several contributing factors: energy saving measures (-0.171 Mtoe), climatic conditions (warmer winters, -0.132 Mtoe), and other factors (-0.029 Mtoe). At the same time, the use of new dwellings (+0.121 Mtoe) and the trend toward larger homes (+0.12 Mtoe) have contributed to an increased in energy consumption, partially offsetting the achieved savings.

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



Source: ODYSSEE

Household heat consumption for space heating amounted to 0.749 Mtoe in 2000 and 0.665 Mtoe in 2023, representing a decrease of approximately 0.08 Mtoe or 11.2%. This reduction is the result of several combined factors, including energy-saving measures (-0.127 Mtoe), climatic conditions (warmer winters, -0.132 Mtoe), increased use of district heating (-0.02 Mtoe), etc. However, part of the achieved reduction has been offset by increases in new housing stock (+0.087 Mtoe), larger dwelling sizes (+0.09 Mtoe), and other factors (+0.017 Mtoe). Thus, although efficiency and climate-related factors have significantly reduced heat consumption, growth in the housing stock and floor area has counterbalanced these savings to some extent.

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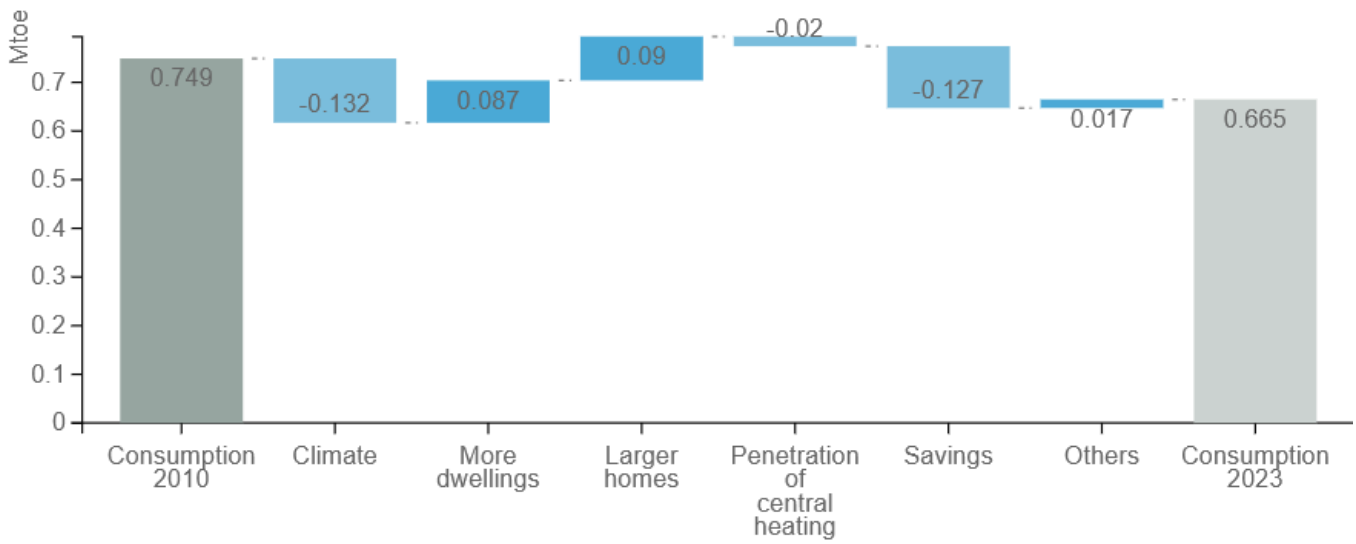
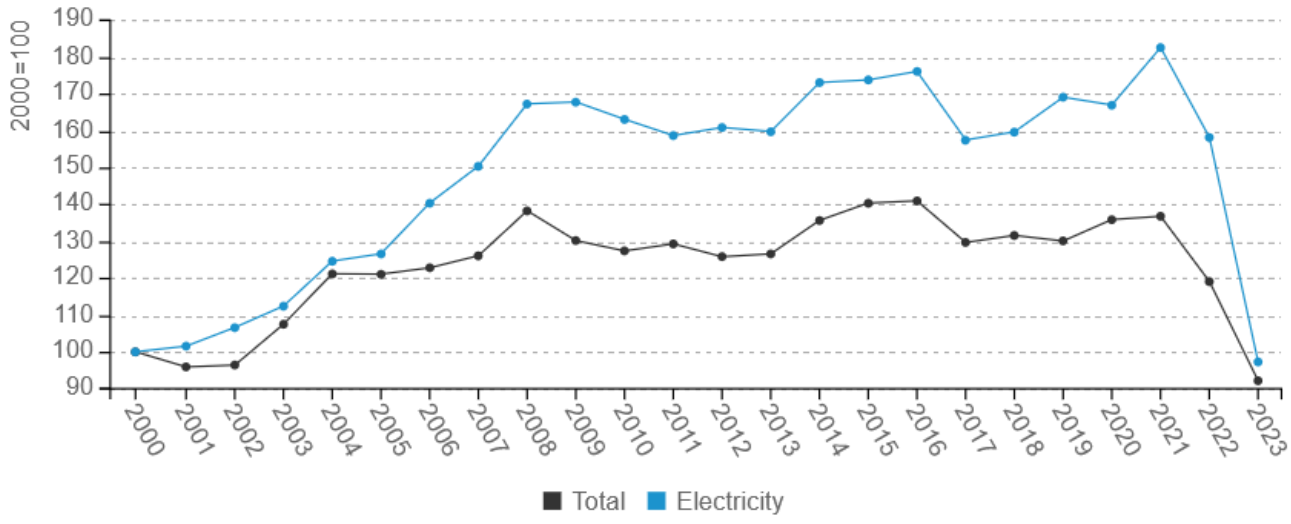
Figure 12: Main drivers of the space heating consumption variation of households



Source: Odyssee

Both energy consumption and electricity consumption per employee increased steadily from 2000, reaching their peak in 2021. Since 2022, these indicators have been on decreasing. In 2023, electricity consumption per employee was approximately 3.8 MWh, compared to 3.92 MWh in 2000, corresponding to a reduction of 2.7%. Total energy consumption per employee reached the 2000 level again in 2023, amounting to 0.8 tonnes of oil equivalent (toe) per employee per year

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



Source: ODYSSEE

To date, energy efficiency policy in the buildings sector has focused primarily on households, through various measures aimed at improving the energy performance of residential buildings. The government has confirmed that investments in improving building energy efficiency must continue, with the public sector expected to lead

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by example in both the maintenance and construction of buildings. Investments in improving the energy efficiency of apartment buildings must continue, and additional opportunities to expand state support measures for enhancing the energy efficiency of single-family houses should be identified. In the heating sector, funding is provided for the development and renovation of district heating systems. The central government also financially supports municipalities in preparing local energy supply development plans. In addition, support is planned for local heat supply solutions that serve as alternatives to district heating, provided these solutions are proven to be the most sustainable options for the region and ensure compliance with environmental standards.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Renovation of apartment buildings 2021-2030	Yes	The support finances both the complete reconstruction of apartment buildings and, as an individual activity, the replacement of a heating device in the heating system of a gas, furnace or electric apartment building with a heating device using renewable energy sources, or the connection of these apartment buildings to a district heating network.	36 TJ
Modernisation of street lighting	Yes	The aim of the measure is to renovate obsolete street lighting infrastructure with the use of modern lighting and control technology which reduces the use of energy.	107 TJ
Aid for energy and resource-efficient processing of fishery and aquaculture products	Yes	The energy and resource audit help to identify investments that help achieve energy savings or reduce the impact on the environment in the processing of fishery and aquaculture products, including the processing of waste.	124,6 TJ

Source: MURE

Transport

In 2023, road transport accounted for 97% of total energy consumption in the transport sector. Compared with 2000, the share of road transport in increased by approximately 7 percentage points. Conversely, the share of rail transport declined by 5.9 percentage points, falling from 8.1% in 2000 to 2.0% in 2023. The share of water transport decreased slightly (by about 0.5 percentage points), while the share of air transport remained unchanged.

Figure 14: Transport energy consumption by mode

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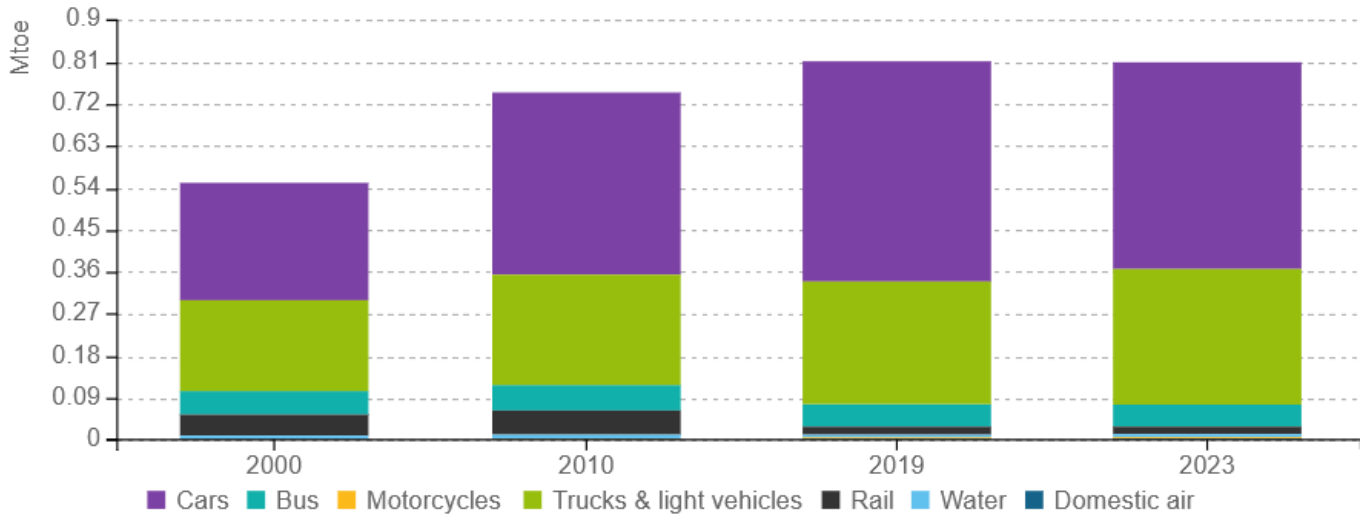
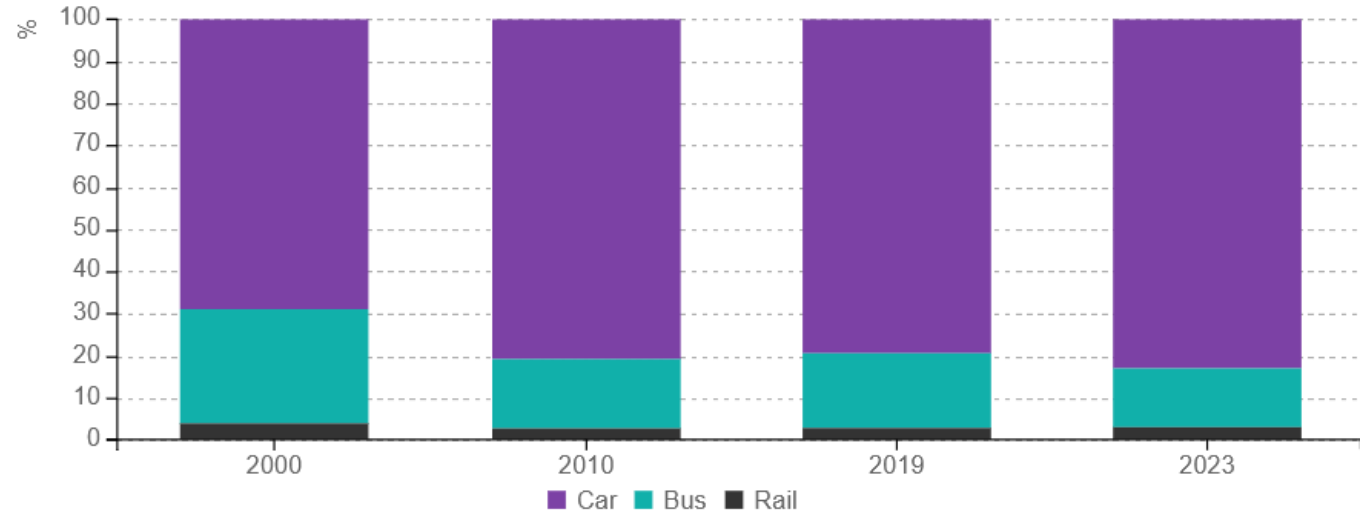


Source: ODYSSEE

Between 2000 and 2023, the modal structure of passenger transport also shifted significantly. The share of buses in total passenger traffic decreased by 13.2 percentage points, and rail passenger transport decreased by 0.9 percentage points. During the same period, passenger transport by car more than doubled—from 6.7 Gpkm in 2000 to 14.7 Gpkm in 2023—resulting in an increase of 14.1 pp, between 2000 and 2023 in the modal share of cars. This increase is primarily attributed to the growth in the number of private vehicles.

Figure 15: Modal split of inland passenger traffic



Source: ODYSSEE

Freight transport has undergone a profound structural transformation as well. In 2000, rail accounted for 88.7% of total freight transport, but by 2023 its share had fallen to 20.4%, a decrease of 68.3 percentage points. In contrast, the share of road freight transport increased by 68.3 percentage points, rising from 11.3% in 2000 to 79.6% in 2023.

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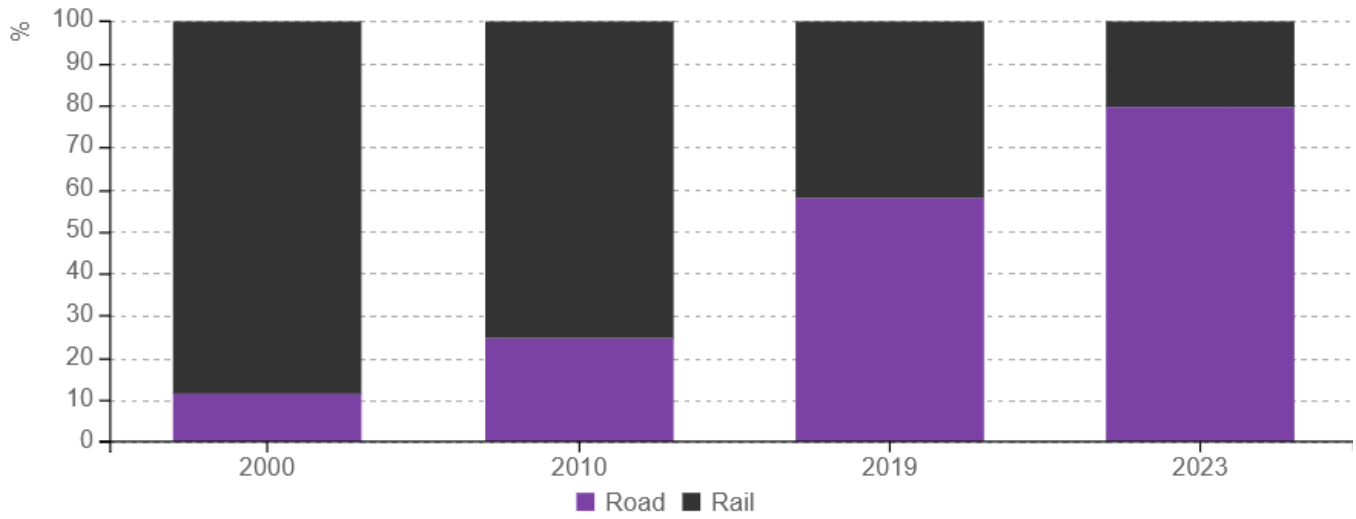
Figure 16: Modal split of inland freight traffic



Source: ODYSSEE

Energy consumption per passenger varies significantly across vehicle types. On average, a typical petrol car consumes approximately 0.175 kWh per passenger-kilometre, whereas an electric car consumes around 0.21 kWh per passenger-kilometre. Final energy consumption per person is influenced by vehicle characteristics, occupancy rates, road conditions, and driver behaviour. Overall energy consumption of cars per passenger-kilometre has improved notably between 2000 and 2023, decreasing from 0.038 koe/pkm in 2000 to 0.030 koe/pkm in 2023. Despite this progress, considerable potential for further improvement remains.

The fuel efficiency of the Estonian vehicle fleet has remained relatively stable over the years. Fuel costs are directly related to the fleet being older than the EU average. Slightly higher fuel consumption is observed among vehicles over 20 years old; however, these account for only 8% of total vehicle energy consumption.

Although the direct potential for energy savings from replacing short car trips with walking or cycling is relatively modest at the national level (around 1%), the development of pedestrian and cycling infrastructure is a crucial cross-cutting measure. It provides the necessary conditions for the effectiveness of other policy measures—such as improvements in public transport, car-sharing systems, revised parking policies, "Park and Ride" schemes, congestion charging, and road tolling. These measures rely on walking and cycling as attractive, safe, and widely accepted modes of transport.

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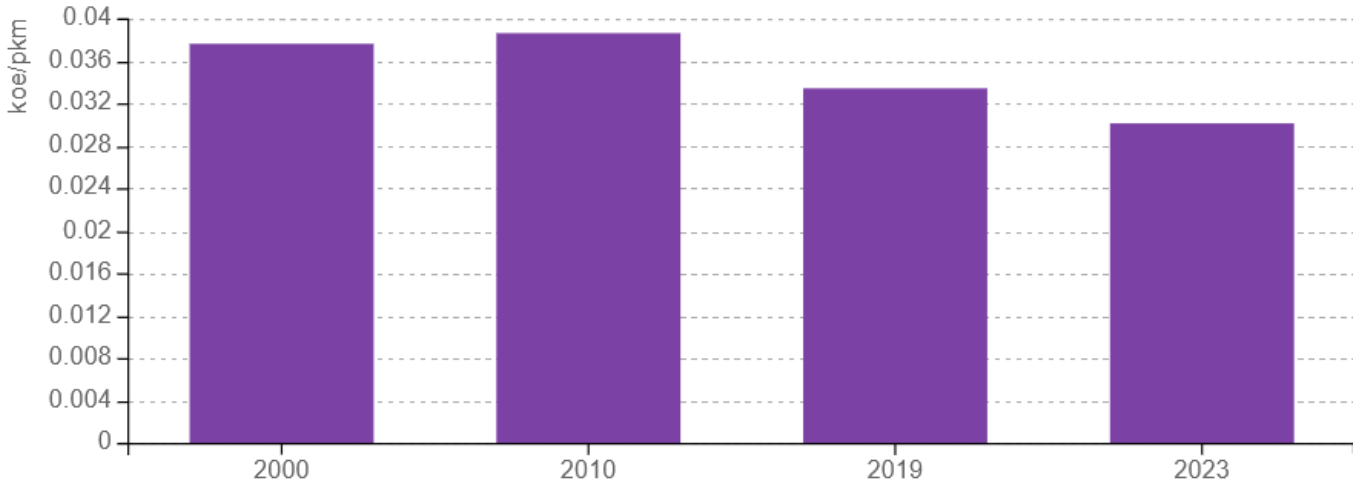
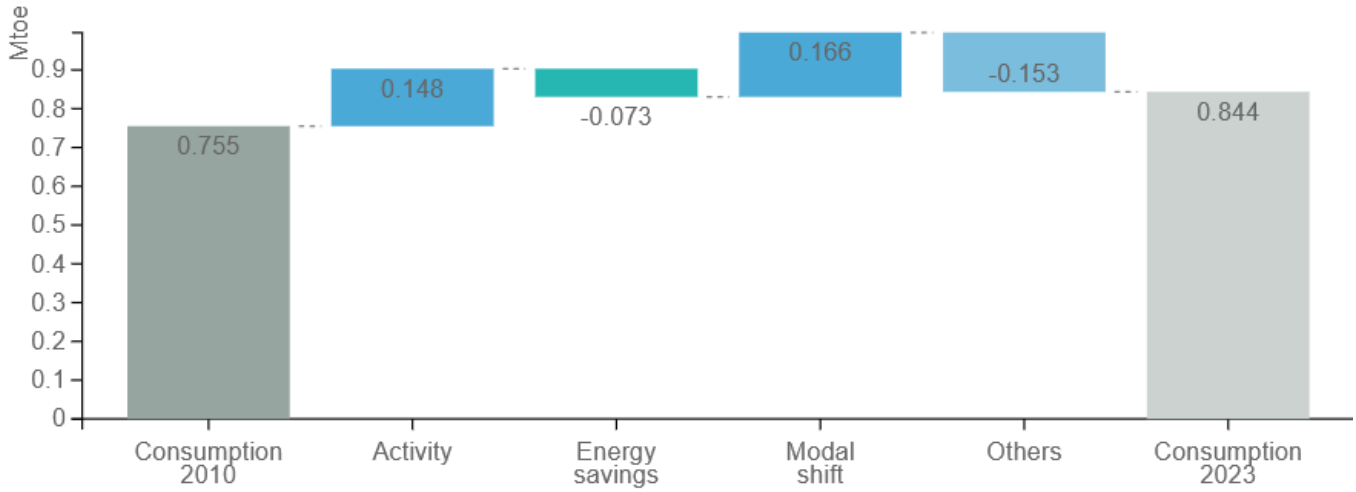
Figure 17: Energy consumption of cars per passenger-km



Source: ODYSSEE

In 2023, energy consumption in the transport sector was approximately 11.7% higher than in 2010. This increase is primarily driven by growth in passenger transport (+0.148 million toe) and by structural changes in the sector, notably the rising share of private vehicles and road freight transport in traffic (+0.166 million toe compared to 2000). These effects outweigh the energy-saving measures (-0.073 million toe) and other reducing factors (-0.153 million toe), resulting in a net increase in transport-sector energy use.

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



Source: ODYSSEE

Transport plays a crucial role in the economy and daily life. It facilitates the movement of goods and people, supports economic activity and significantly enhances quality of life. At the same time, it presents considerable

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risks and challenges—most notably, the need to reduce energy consumption and environmental impacts now and in the future. Historically, energy use in the transport sector has been shaped mainly by fuel excise taxes. Excise rates have been increased ten times over the past 22 years. The government has also taken steps to promote the uptake of vehicles with lower environmental impact and reduced energy consumption. Energy-efficiency initiatives in the energy sector have so far been financed primarily through the "green investment scheme". Looking ahead, Estonia plans to manage and reduce energy use in the transport sector through four main areas of action:

• reducing the need for transport, including improving the efficiency and environmental performance of freight transport and implementing measures to decrease forced mobility

• increasing the use of public transport

• improving vehicle efficiency

• introducing car registration and annual taxation starting in 2025.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Eco driving	Yes	The aim of sustainable driving training is to reduce vehicle fuel consumption, environmental pollution and increase road safety. All new license holders are expected to receive mandatory sustainable driving training.	62 TJ
Time-based road toll for heavy duty vehicles	Yes	According to the Traffic Act, the Road Transport Act and the Taxation Act, a time-based road toll for heavy duty vehicles is valid in Estonia, the payment of which gives you the right to use road for a certain period.	47 TJ
Development of Estonian railway infrastructure	Yes	The aim of the measure is to support investments in railway infrastructure, which will allow passenger train speeds to be increased to up to 160 km/h in the future, and through railway electrification, contribute to the reduction of CO2 emissions and the overall increase in energy efficiency in the transport sector.	190 TJ

Source: MURE

Industry

Energy consumption in the Estonian industrial sector has decreased significantly between 2000 and 2023, by approximately 42%, or about 2.3% per year on average. Around one quarter of industrial energy consumption is

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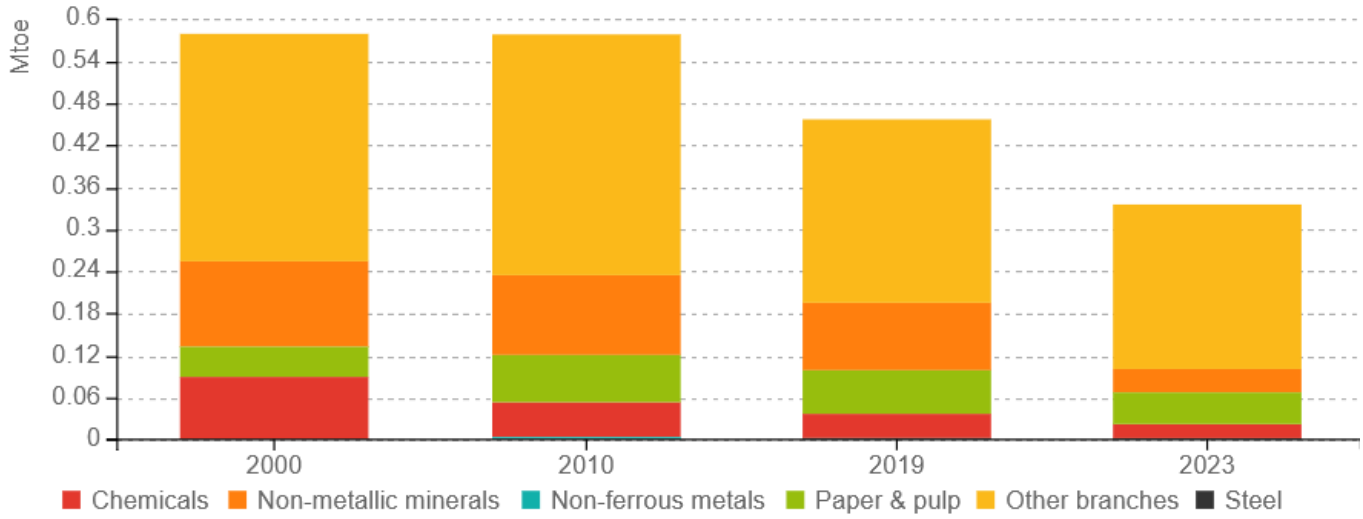
attributed to energy-intensive sectors, primarily the non-metallic mineral industry and the paper industry. The remaining traditionally energy-intensive sectors, such as the chemical industry, non-ferrous metals, and steel, have only a minor presence in Estonia's manufacturing landscape. Instead, the most important sectors for Estonia are the forest industry and the food industry, which together form the category of "other industries".

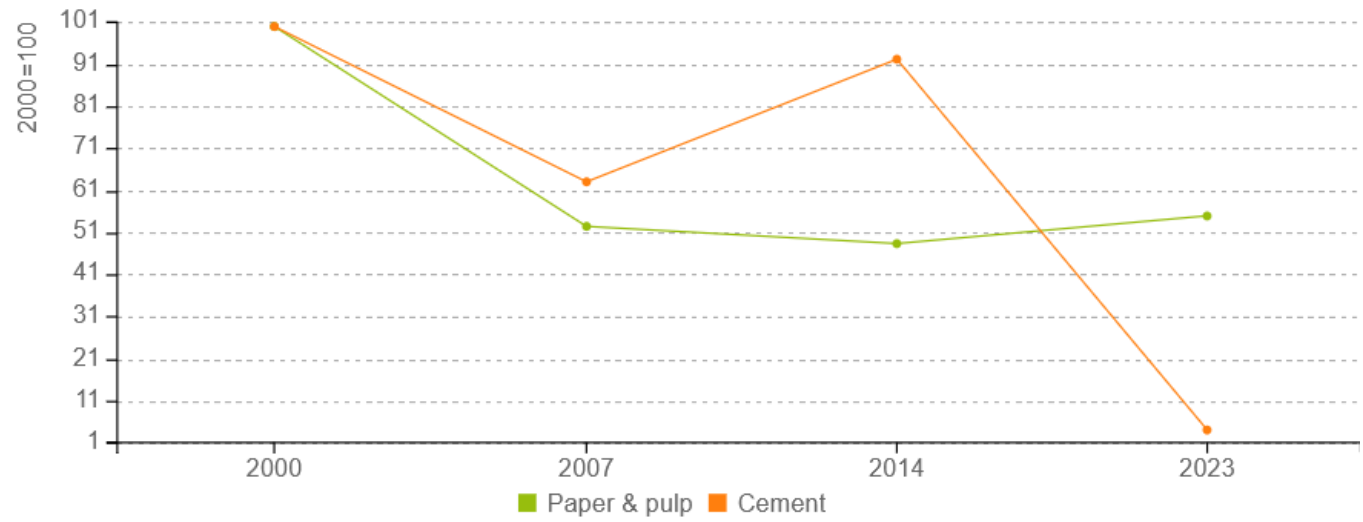
Figure 20: Final energy consumption of industry by branch



Source: ODYSSEE

The most energy-intensive industrial sectors in Estonia were traditionally the cement and paper industries. However, beginning in 2020, energy-intensive clinker production ceased domestically, with cement subsequently manufactured using imported clinker. As a result, by 2023, the energy consumption required to produce one tonne of cement had decreased by approximately 96% compared to the year 2000. Over the same period, the energy consumption associated with producing one tonne of paper declined by about 45%, corresponding to an average reduction of roughly 2.6% per year.

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



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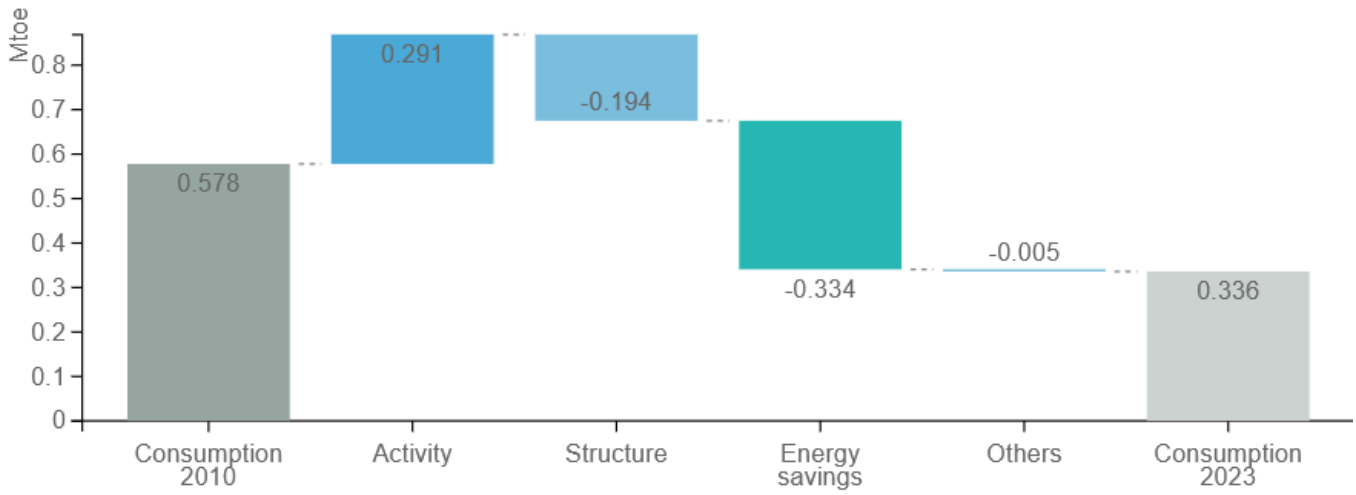
Source: ODYSSEE

The implementation of energy -saving measures (-0.344 million toe), structural changes within the industrial sector toward less energy-intensive branches (-0.194 million toe), and other factors (-0.005 million toe) have collectively contributed to a substantial reduction in industrial energy consumption since 2000. Conversely, increased industrial activity (+0.291 million toe) has partially offset these savings. Overall, the total energy consumption of the industrial sector decreased by 0.242 million toe between 2000 and 2023.

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



Source: ODYSSEE

Current estimates indicate that the industrial sector still holds significant energy-saving potential—approximately 30% for heat and 10% for electricity. Realising this potential, however, requires the adoption of modern technologies and increased awareness across the sector. Consequently, energy-efficiency efforts must prioritise improvements in both energy and resource efficiency. To support this transition, various measures have been introduced, including initiatives to inform industrial companies about existing energy efficiency opportunities and to carry out analyses of resource use.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Electro intensive enterprises excise duty reduction	Yes	The electricity excise duty discount is accompanied by the obligations of ISO50001, which promotes energy savings for each energy carrier.	43 TJ

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Resource efficiency measure to support investments in manufacturing and mining industry	Yes	More complete use of resources and recycling of waste saves the environment and human health on the one hand and increases the competitiveness of companies through efficient use of resources and energy savings on the other.	318 TJ

Source: MURE

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