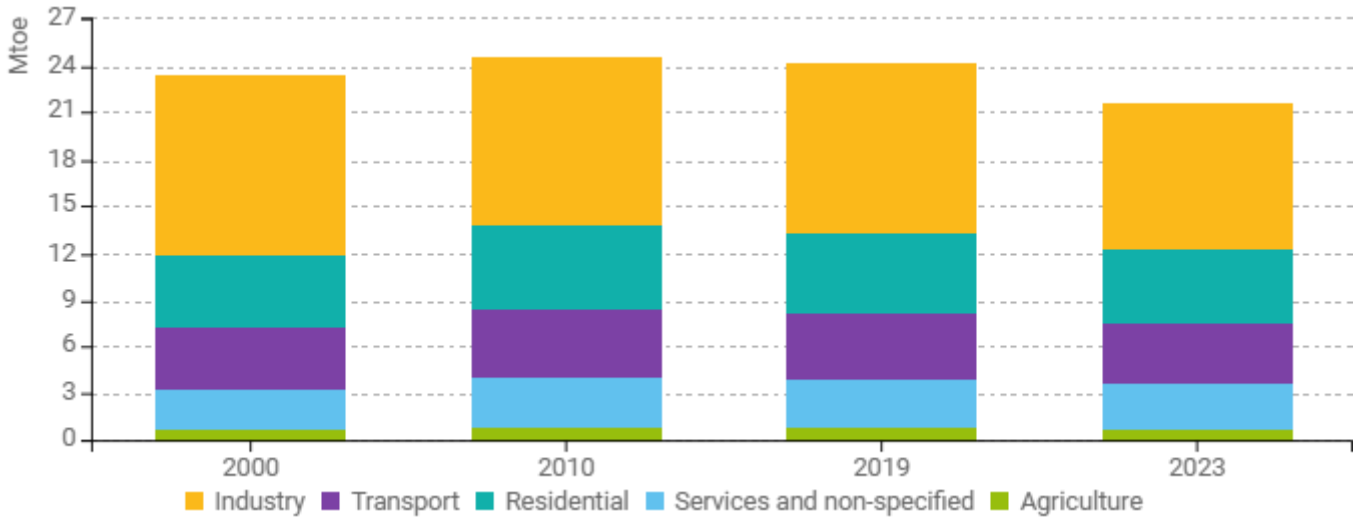
Energy efficiency trends and policies

Overview

Climate-corrected total final energy consumption (TFC) was 22 Mtoe in 2023, which is 12% below the 2010 level. Industry was the largest energy-consuming sector, accounting for 43% of TFC in 2023, followed by the residential sector (22%), transport (18%), services (14%) and agriculture (3%). Sectoral shares have remained largely stable over the period 2010–2023.

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



Source: ODYSSEE

Energy efficiency in final energy consumption, as measured by ODEX, improved by 9 points over the period 2010–2023. The largest improvement was observed in the residential sector (20 points), while the smallest improvement occurred in industry (2 points).

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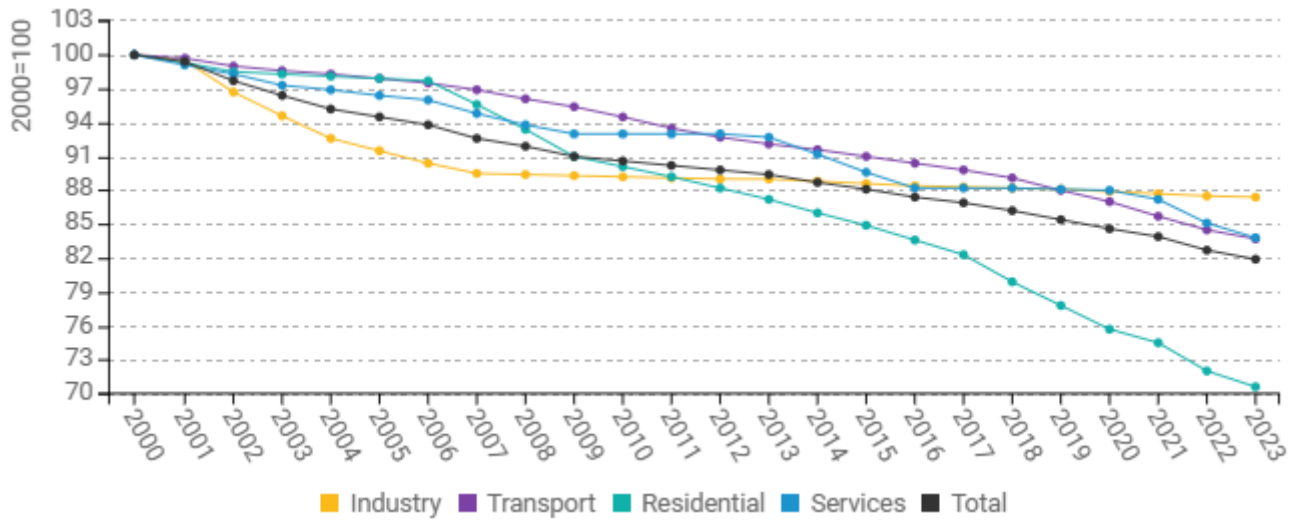
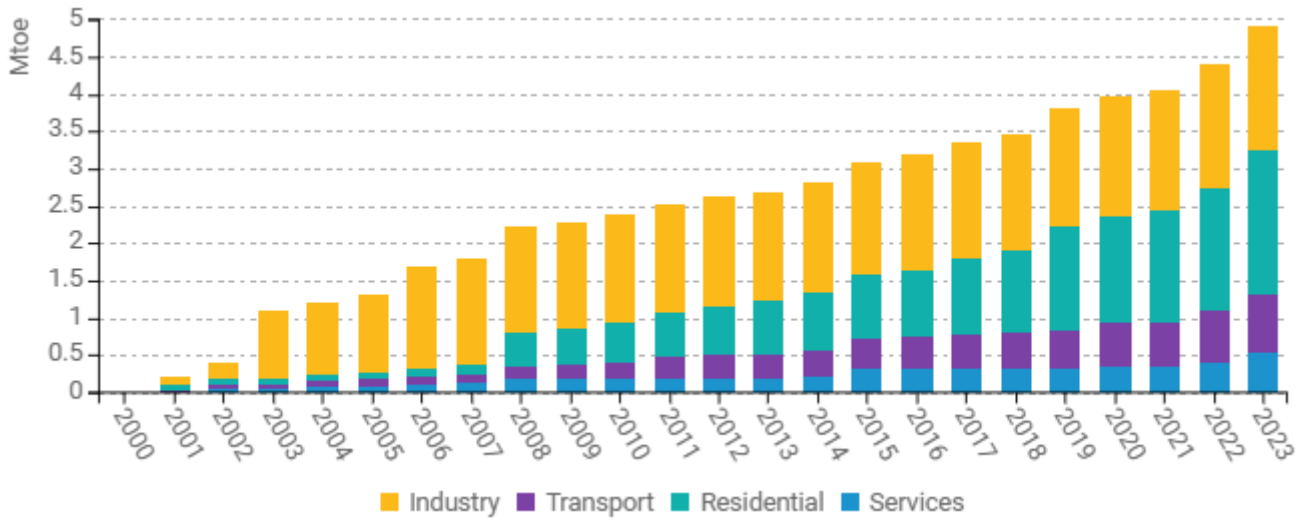
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

Energy savings achieved over the period 2000–2023, calculated using top-down Odyssee indicators, amounted to 4.9 Mtoe by 2023. Households contributed the largest share of savings (1.9 Mtoe), followed by industry (1.7 Mtoe). Note: There is a break in the statistical data series for the residential sector in 2007–2008.

Figure 3: Energy savings by sector



Source: Odyssee

Finland's total energy supply was 33 Mtoe in 2023, representing a decrease of 3.8 Mtoe compared with 2010. Changes in the power mix, non-energy use and other transformation processes contributed only marginally to this decline, while final energy consumption decreased by 3.5 Mtoe.

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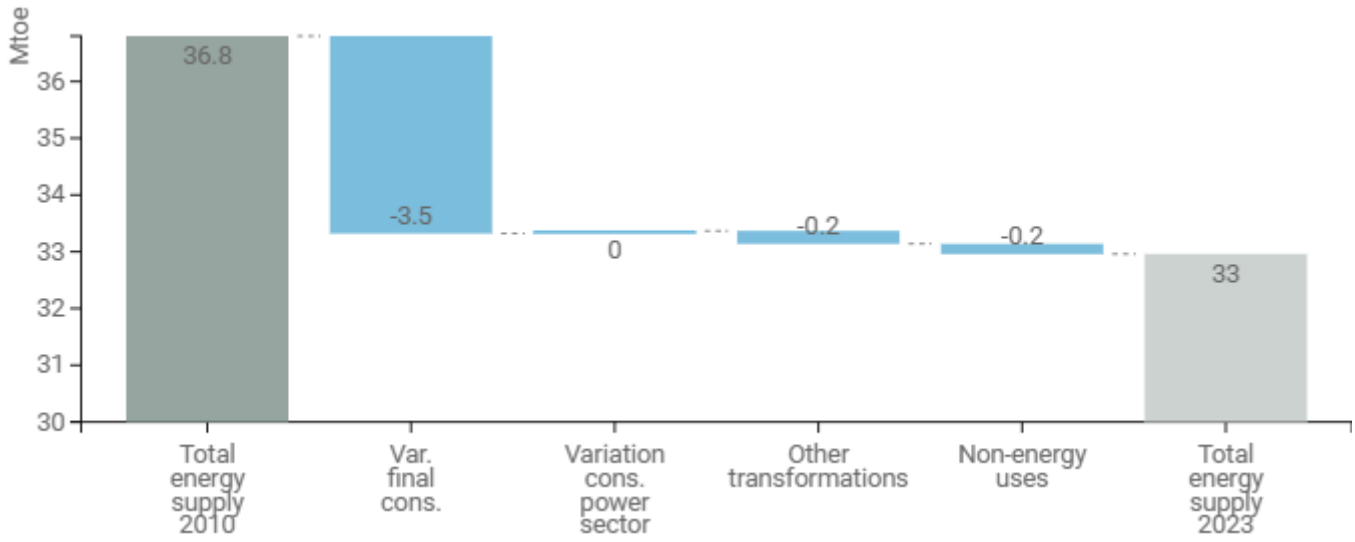
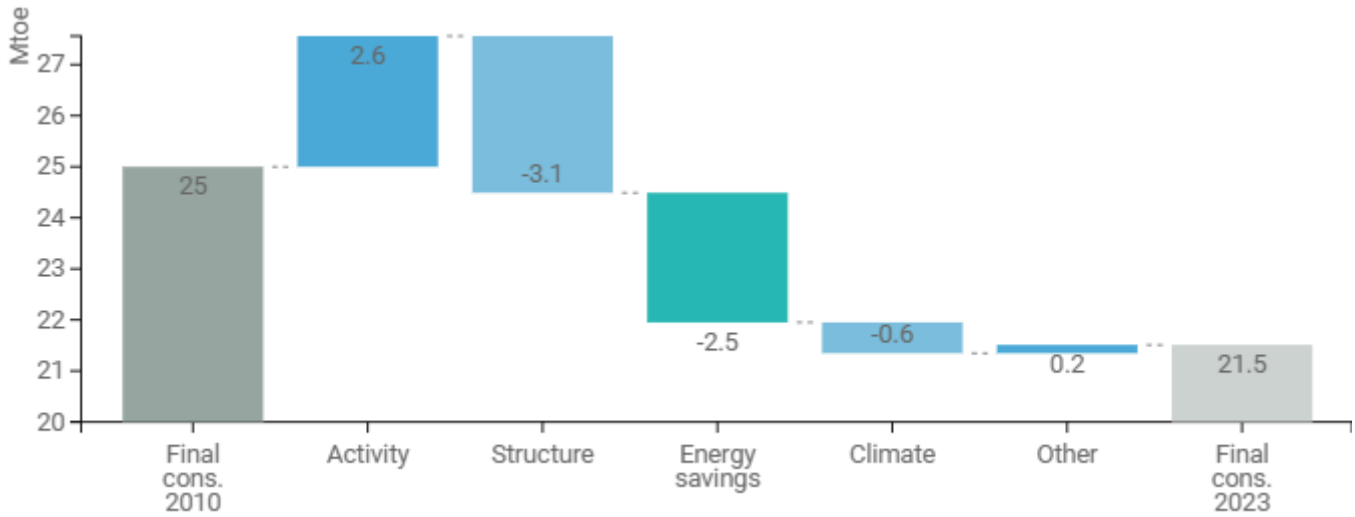
Figure 4: Main drivers of the total energy supply variation



Source: Odyssee

In 2023, final energy consumption was 3.5 Mtoe below the 2010 level, corresponding to a reduction of 14%. Several factors had opposing effects that partly offset each other. Increased economic activity raised energy consumption by 2.6 Mtoe, while structural changes and energy savings, as measured by ODEX, reduced consumption by 3.1 Mtoe and 2.5 Mtoe, respectively.

Figure 5: Main drivers of the final energy consumption variation



Source: Odyssee

Finland's Integrated Energy and Climate Plan of June 2024 contains the national targets and the related policy measures to achieve the EU's energy and climate targets. In accordance with the EED (2012), Finland's indicative national energy efficiency target for 2020 was 310 TWh absolute level of final energy consumption. The realized

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level was 271 TWh. The energy efficiency target to contribute to EU 2030 target in final energy consumption is capping Finland's final energy consumption at 239.6 TWh, calculated with EED (2023) Annex 1 formula.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
Green Deals	No	In Finland, Green Deal agreement sectors/topics cover, e.g., the automotive sector, the non-road mobile machinery sector and emission-free worksites (Green Deal on sustainable procurements)	
Finland's Recovery and Resilience Plan	No	EU Member States must present a national Recovery and Resilience Plan (RRP) in order to receive funding from the Recovery and Resilience Facility (RRF). The Plan forms part of the Sustainable Growth Program for Finland. The Council of the EU formally approved the plan by written procedure on 29 October 2021. The four priorities of the Plan are 1) Green transition, 2) Digitalization, 3) Employment and skills and 4) Health and social services.	
Act on eco-design and energy labelling	No	The Act transposes the EU directive into Finnish legislation setting mandatory minimum standards and establishing energy labels for energy-using products used in different sectors.	57.6 PJ in 2030

Source: MURE

Buildings

Climate-corrected final energy consumption has declined by 11% in residential buildings and 8% in service sector buildings from 2010 to 2023. In contrast, floor area in the services sector increased by 25% and in dwellings by 16%, and the number of households increased by 13% over the same period.

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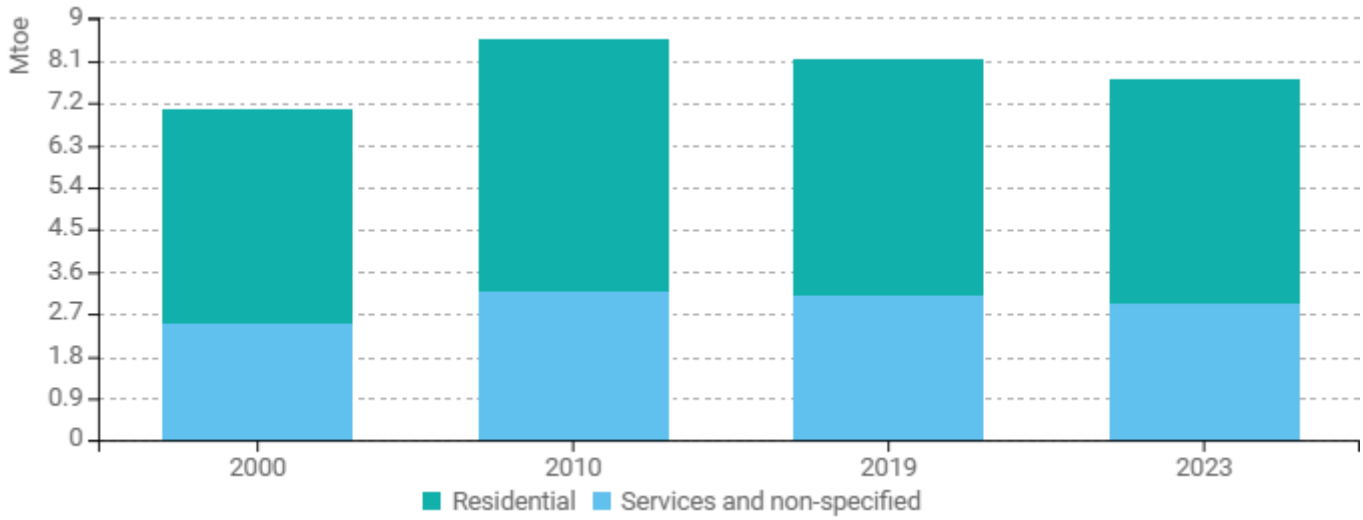
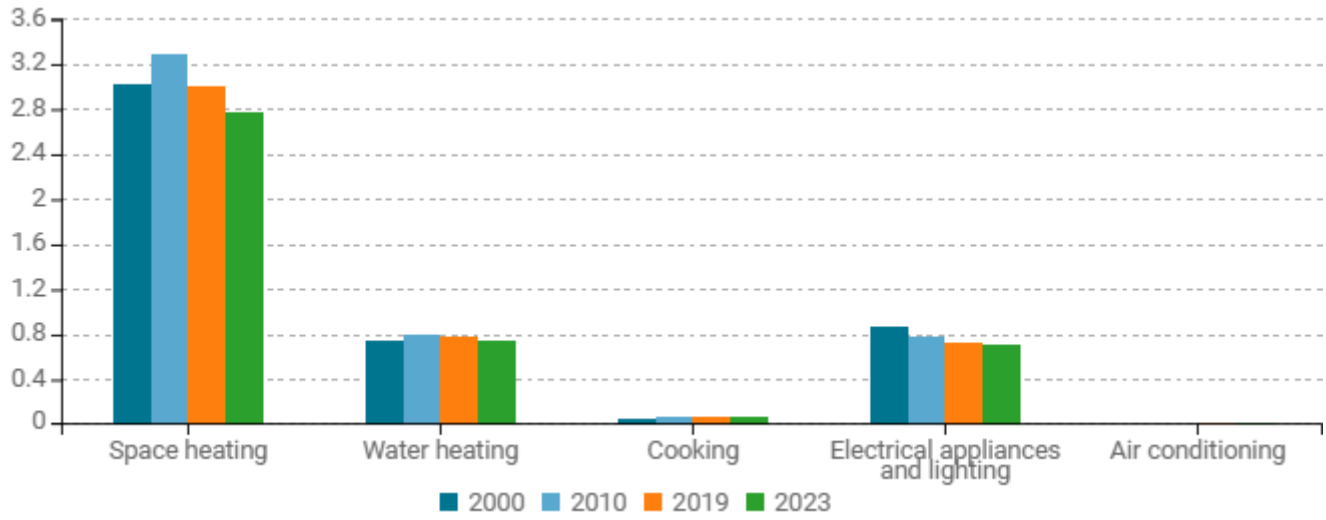
Figure 6: Final energy consumption in buildings (with climatic corrections)



Source: Odyssee

Figure 7 illustrates the distribution of household energy consumption by end use. For 2023 Space heating dominates, accounting for 65% of total consumption. Water heating and appliances and lighting each represent 17%, while cooking and air conditioning make only marginal contributions 1%.

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



Source: Odyssee

Climate-corrected unit consumption for space heating per square meter in households has declined by about 28% since 2010, corresponding to an average annual reduction of 2.5% (Figure 8). The increased use of different types of heat pumps has contributed significantly to this trend. Small year-to-year variations in the long-term trend can be attributed to the fact that normalization using heating degree days does not fully eliminate the impact of weather conditions.

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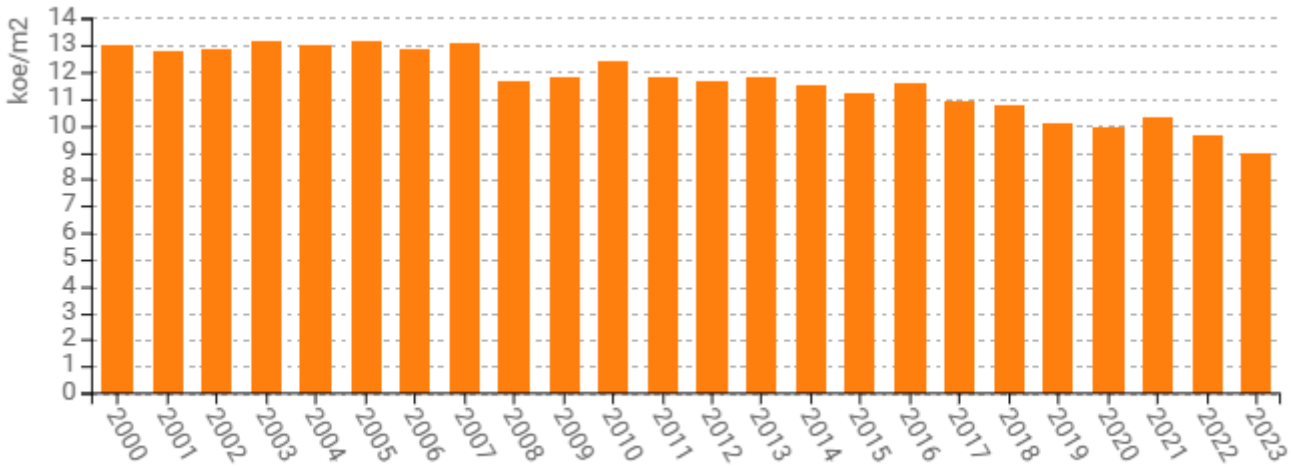
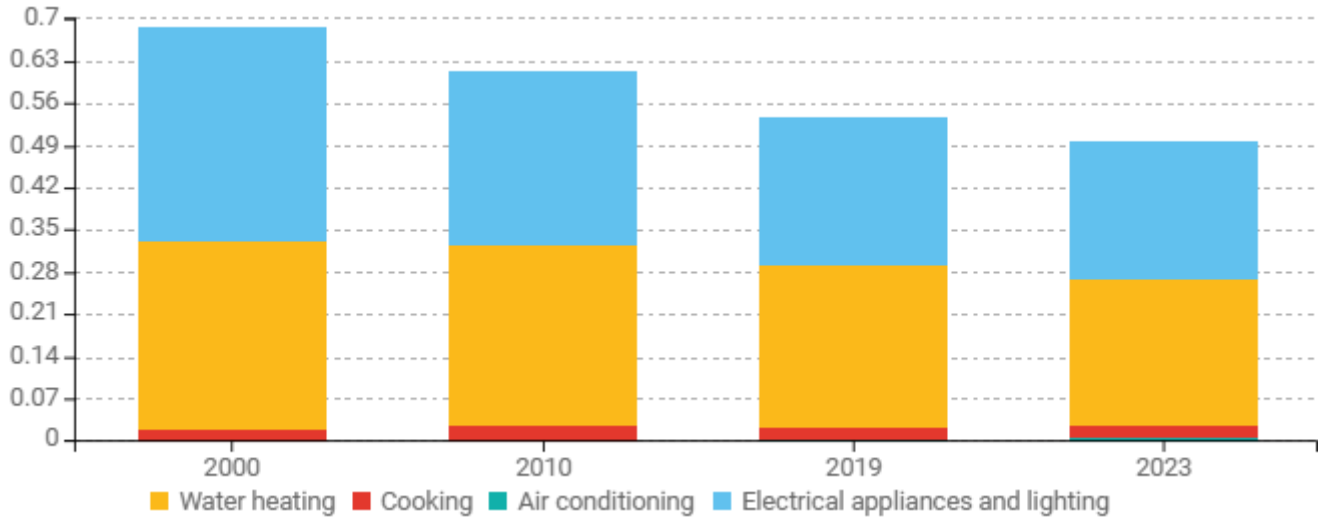
Figure 8: Energy consumption of household space heating per m2 (with climatic corrections)



Source: ODYSSEE

Energy consumption for water heating in dwellings decreased by 7% between 2010 and 2023, corresponding to an average annual reduction of 1.5%. Over the same period, energy use for lighting declined by 60% (-1.7% per year), while consumption by electric appliances fell by 3%. Eco-design policies have contributed significantly to reducing household electricity use. Other end uses, namely air conditioning and cooking, remain negligible.

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



Source: ODYSSEE

Climate-corrected electricity consumption per dwelling has gobally declined by 12% since 2010. The most significant annual evolution reduction has occurred in lighting (–6.9%), while electricity use for appliances has also decreased (–0.3%). Electricity consumption for thermal uses has fallen by 0.5%; although the number of heat pumps has increased, they often replace direct electric heating.

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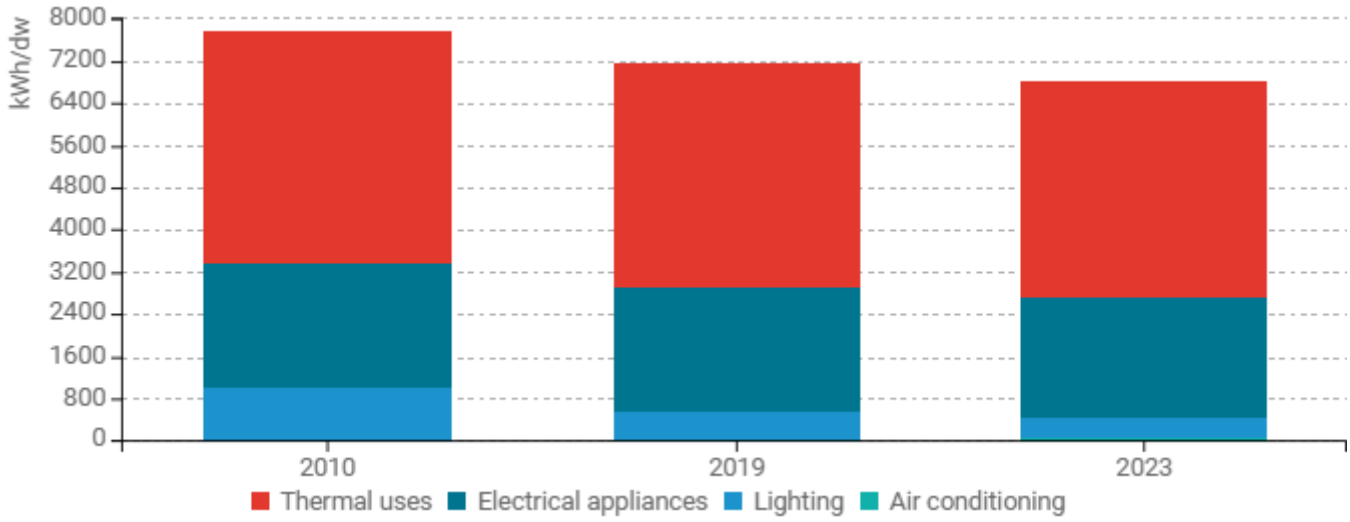
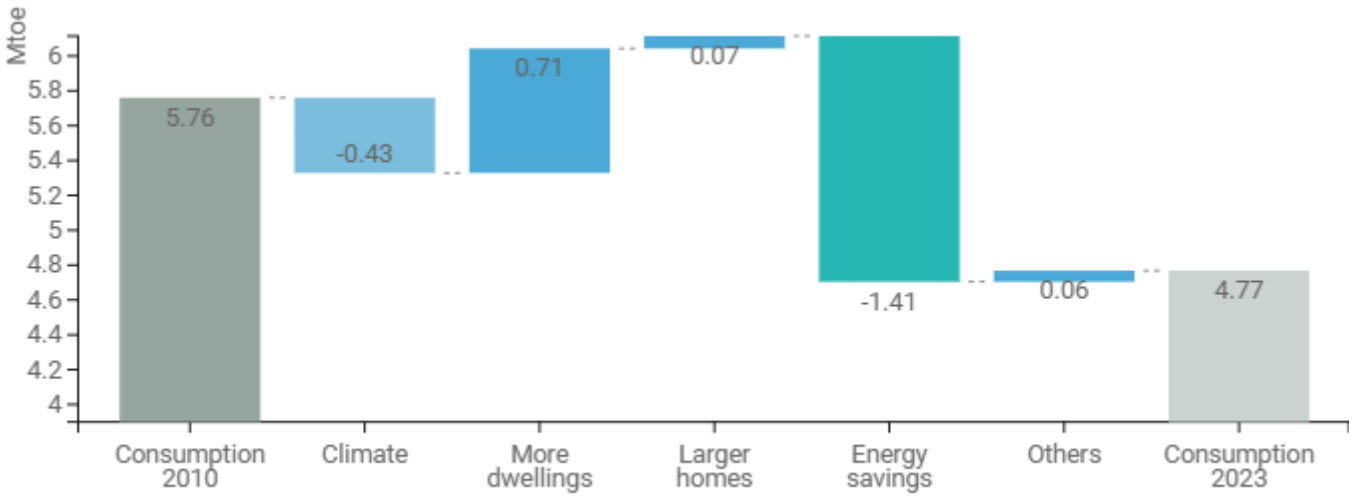
Figure 10: Electricity consumption per dwelling by end-use (with climatic corrections)



Source: Odyssee

Energy consumption in the residential sector has declined by 1 Mtoe since 2010. The continuous increase in the number of dwellings has exerted upward pressure on consumption, while the average dwelling size has remained broadly unchanged since 2010. However, energy savings have more than offset the impact of the growing number of households.

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



Source: ODYSSEE

Energy consumption for space heating in households has declined by 0.92 Mtoe (–25%) compared with the year 2000. Energy savings have more than offset the impact of the increase in the number of occupied dwellings. In addition, differences in weather conditions reduced consumption by 0.43 Mtoe between 2010 and 2023.

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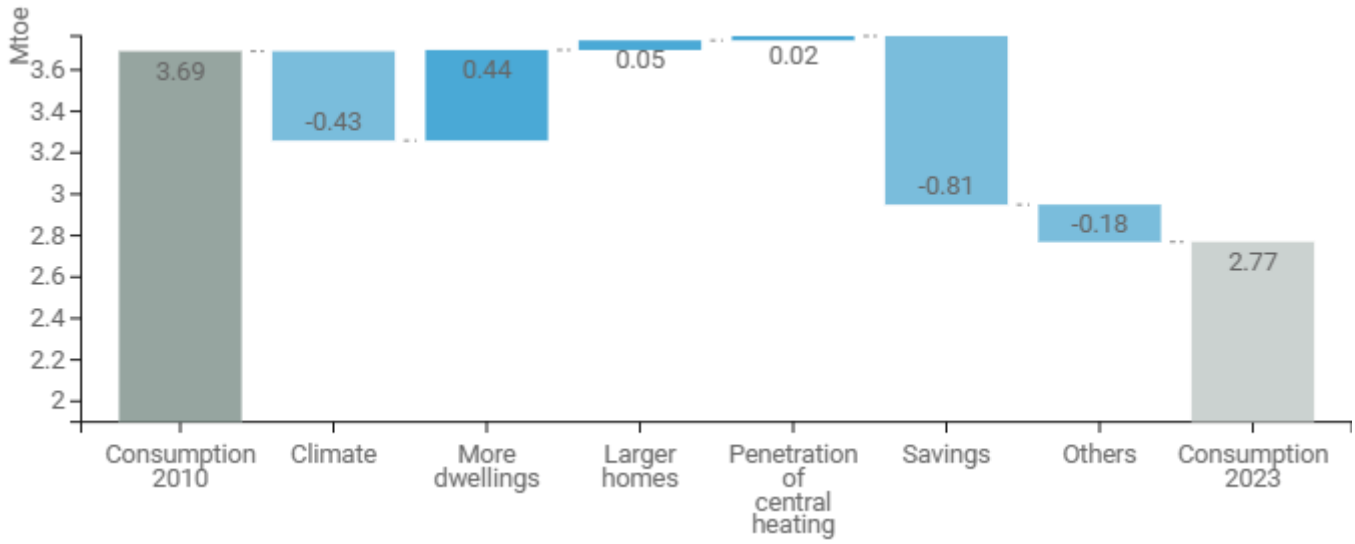
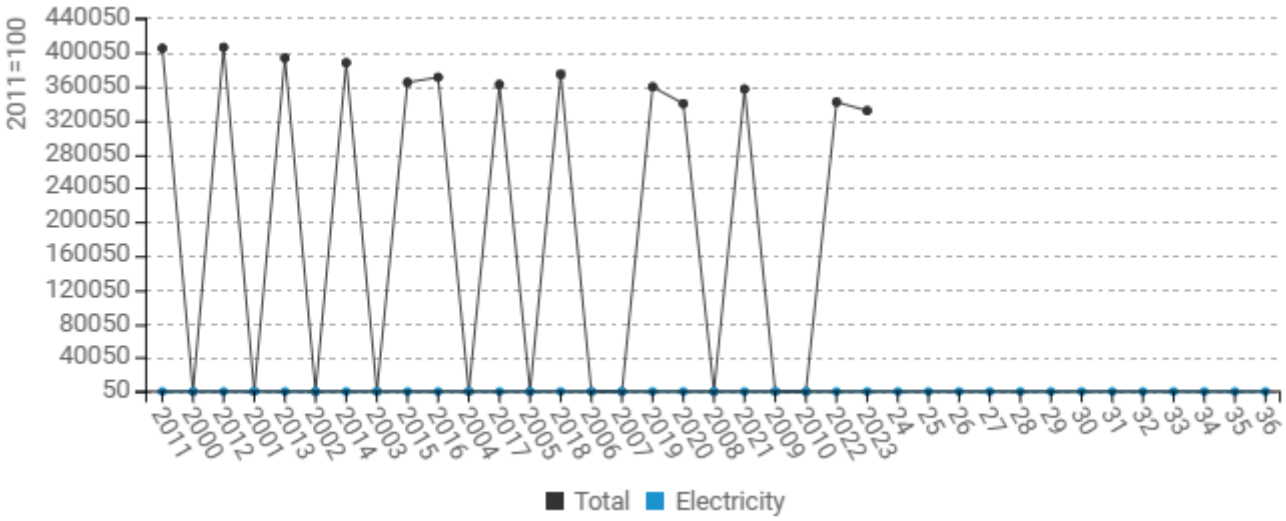
Figure 12: Main drivers of the space heating consumption variation of households



Source: Odyssee

In the services sector, electricity consumption per square meter has declined by 25% and total energy consumption by 23% since 2010.

Figure 13: Energy and electricity consumption per m2 in services (with climatic corrections)



Source: ODYSSEE

In Finland, thermal building regulations were first introduced in 1976 and have become increasingly demanding thereafter. The building code for building renovation took force in 2013. Legislation governing nearly-zero energy buildings was issued in December 2016. The number of heat pumps has been growing rapidly as they are promoted in existing houses by income tax rebates, in oil heated households by subsidies and by information measures. Ground-source heat pump is the most popular main heating system in new single-family houses. There

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are energy efficiency agreements and an energy audit scheme in place in the private services sectors and for municipalities and joint municipalities.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Decree on improving the energy performance of buildings undergoing renovation or alteration	Yes	National implementation of the EPBD directive regarding buildings undergoing renovation or alteration.	9.80 TJ
Regulations for nearly-zero energy buildings	Yes	Regulations for nearly-zero energy buildings took force on 1 January 2018.	
Energy Efficiency Agreement of the Property and Building Sector - Rental Property Action Plan	Yes	Voluntary energy efficiency agreement for rental properties (dwellings) the period 2017-2025 and a new period 2026-2035.	Cumulative total savings for EED Art 8 in 2030 are reported together with the energy efficiency agreement for industry (see IND-FI1108)
Energy Efficiency Agreement of the Property and Building Sector - Commercial	Yes	Voluntary energy efficiency agreement for commercial properties for the period 2017-2025 and a new period 2026-2035.	Cumulative total savings for EED Art 8 in 2030 are reported together

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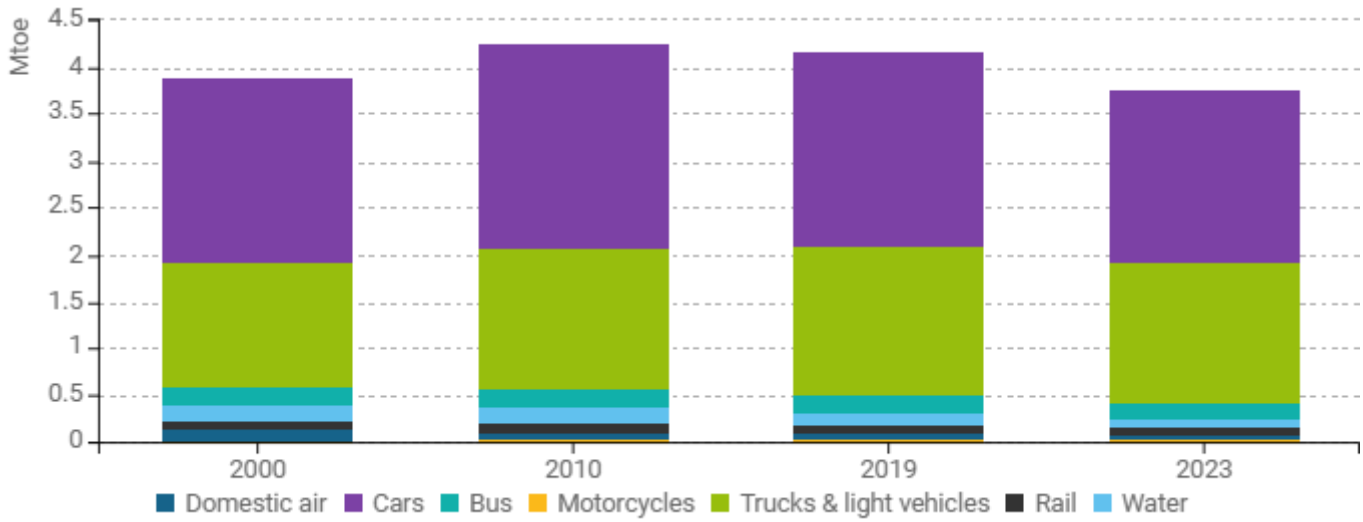
Property Action			with the energy efficiency agreement for industry (see IND-FI1108)

Source: MURE

Transport

Energy consumption in the transport sector is now 10% below the 2010 level. Energy use has declined across all transport modes except buses. Cars account for 49% of total transport energy consumption, while trucks and light commercial vehicles represent 40%.

Figure 14: Transport energy consumption by mode



Source: ODYSSEE

Passenger traffic of is now 0.3% below the 2010 level. Use of cars and buses has declined, while use of rail transport has increased.

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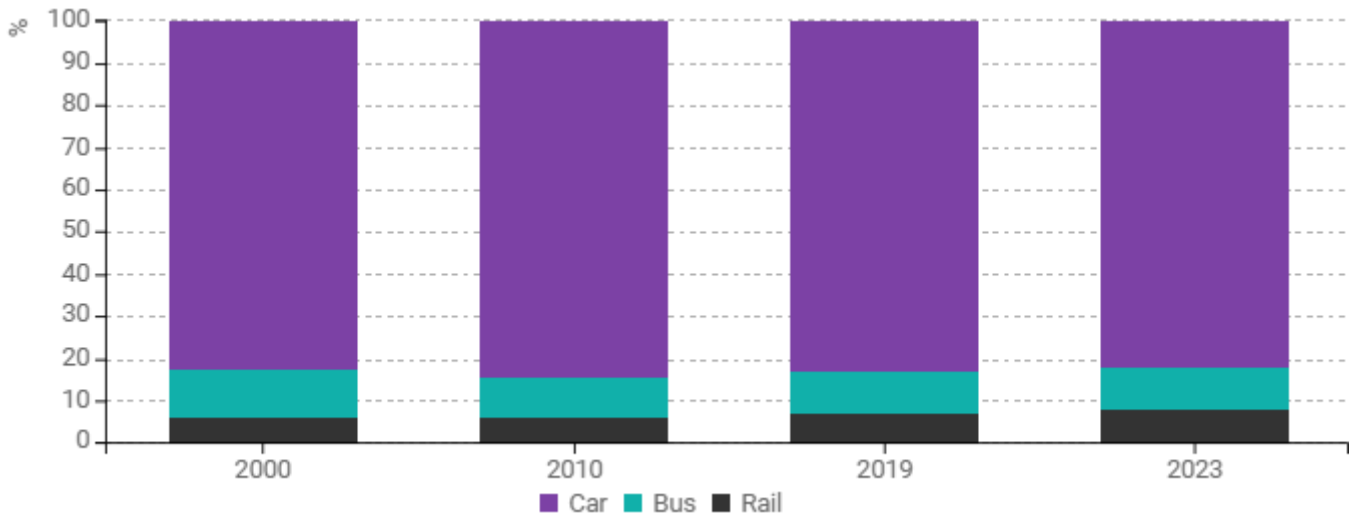
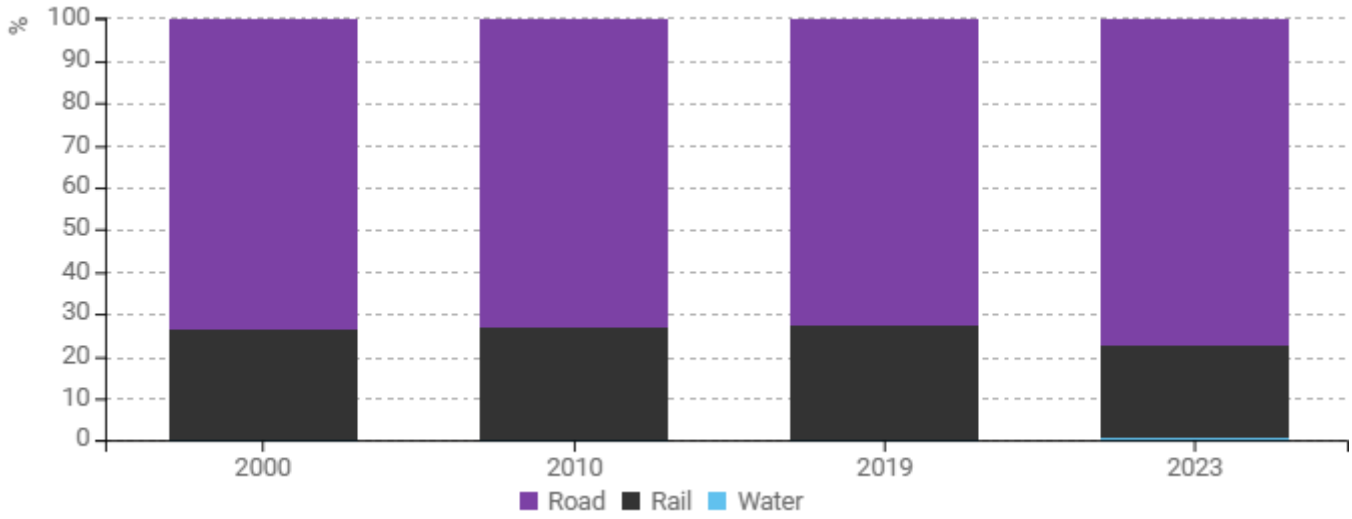
Figure 15: Modal split of inland passenger traffic



Source: ODYSSEE

Between 2010 and 2023, the volume of road freight transport increased by 5%, while rail freight transport declined by 19%.

Figure 16: Modal split of inland freight traffic



Source: ODYSSEE

Energy consumption of cars per passenger-km has declined by 11% since 2010. While new cars are more energy efficient, the sluggish fleet renewal rate slows down the process.

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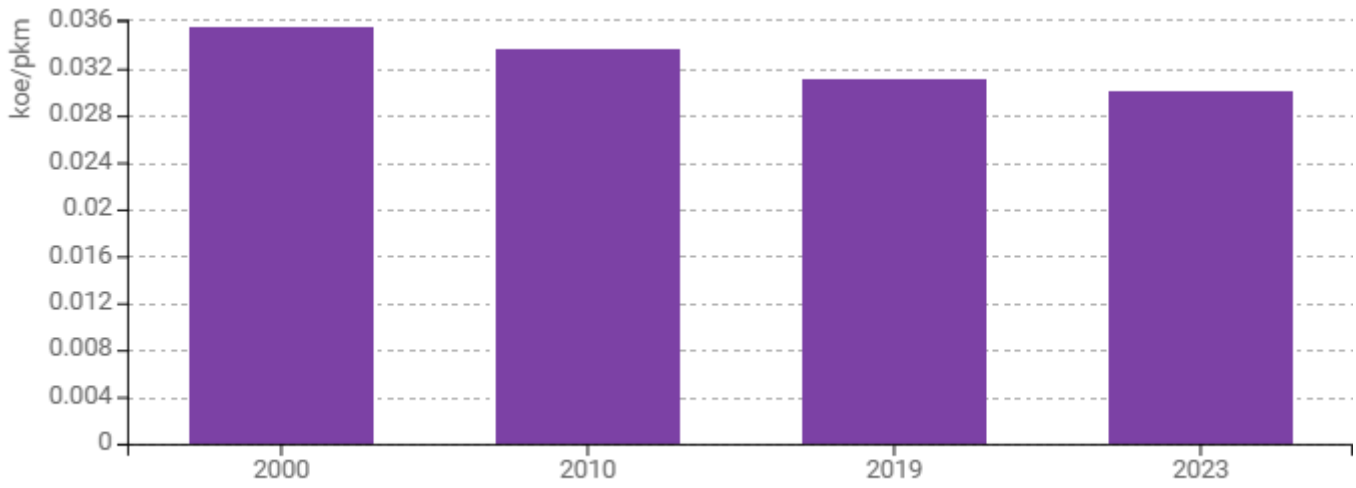
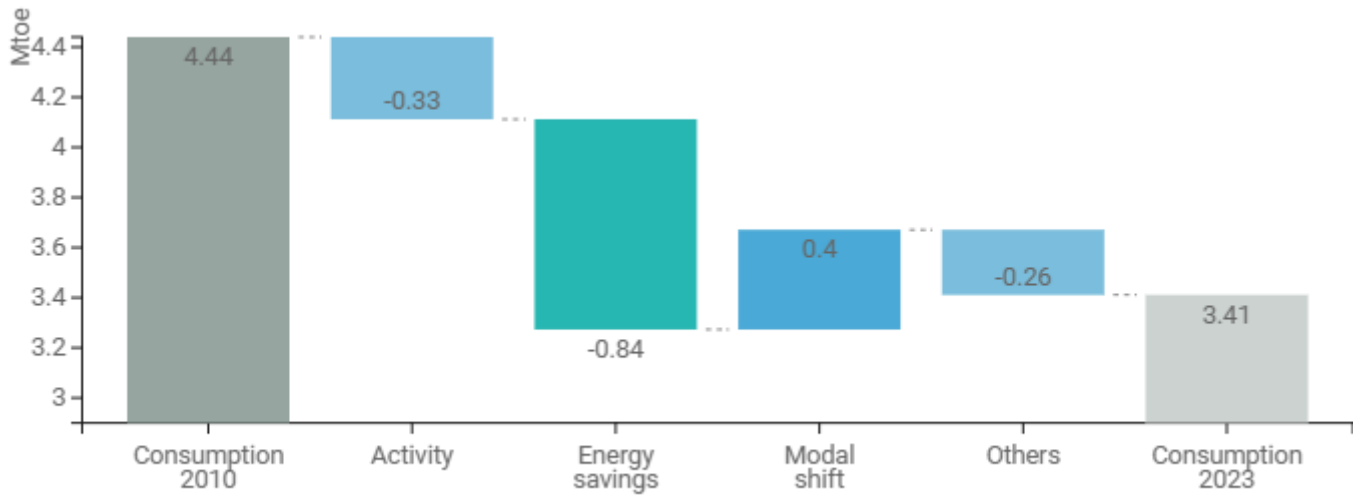
Figure 17: Energy consumption of cars per passenger-km



Source: ODYSSEE

In 2023, transport energy consumption was 0.56 Mtoe (13%) lower than in 2010. Energy savings more than offset the impact of a higher share of road transport (modal shift). Changes in activity levels, measured by transport volumes, were negligible.

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



Source: ODYSSEE

Improvements in the energy efficiency of new vehicles are being driven by CO_2 emission standards, taxation that favors lower-emission cars, and information measures. However, the renewal rate of the vehicle fleet in Finland is among the slowest in Europe, which delays the full realization of the benefits of these measures. Policies are also in place to support public transport and promote non-motorized modes of travel. In road freight transport, allowing larger and heavier trucks has also contributed to improved efficiency.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Energy efficiency of new heavy-duty vehicles	Yes	The first-ever EU-wide CO2 emission standards for heavy-duty vehicles, adopted in 2019, set targets for reducing the average emissions from new lorries for 2025 and 2030.	2.20 TJ
Improving the energy efficiency of new vans	Yes	Part of 2019 NECP measures "Improving the energy-efficiency of vehicles" up to 2020 and "Improving the energy-efficiency of cars and vans (additional measures)" in 2021-2030.	1.03 TJ
Procurement of clean and energy-efficient road transport vehicles	No	Directive 33/2009 aimed to improve the environmental impact and energy economy of vehicles procured in the public sector. The Directive was transposed into national legislation by Law 1509/2011. The national implementation of the revised Clean Vehicles Directive (EU/2019/1161) in underway (Dec 2020).	
Taxation of transport fuels	Yes	High taxes are used to manage consumption of transport fuels	5.1 PJ

Source: MURE

Industry

In 2023, energy consumption in industry amounted to 9.2 Mtoe, which is 14% below the 2010 level. The energy-intensive pulp and paper industry is by far the largest industrial subsector, accounting for 55% of total industrial energy consumption, followed by the chemical industry (9%) and steel production (8%).

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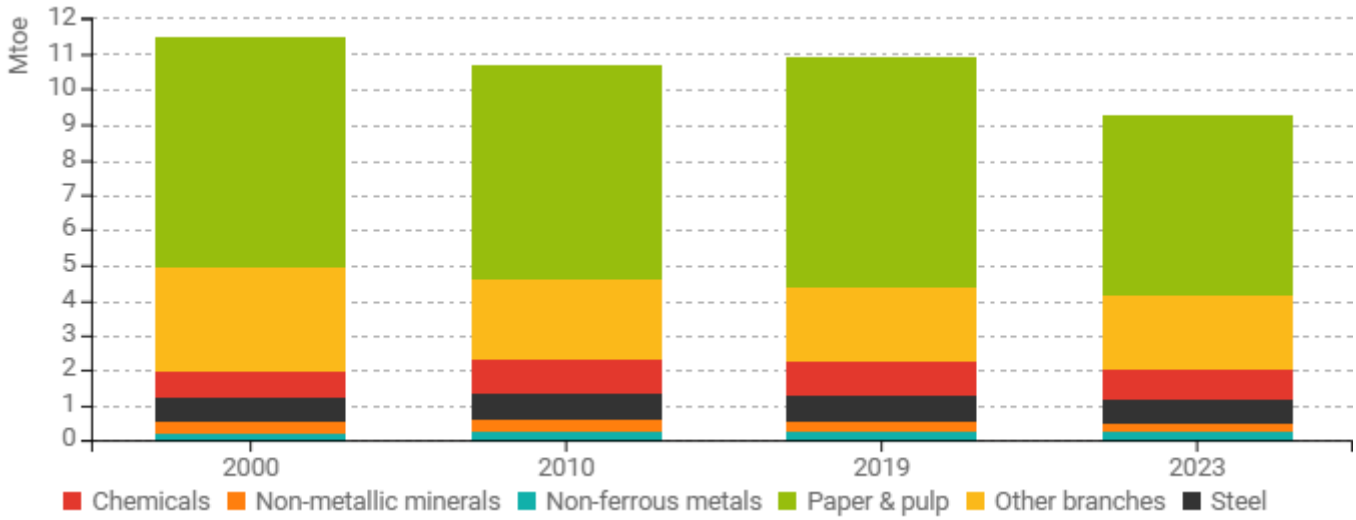
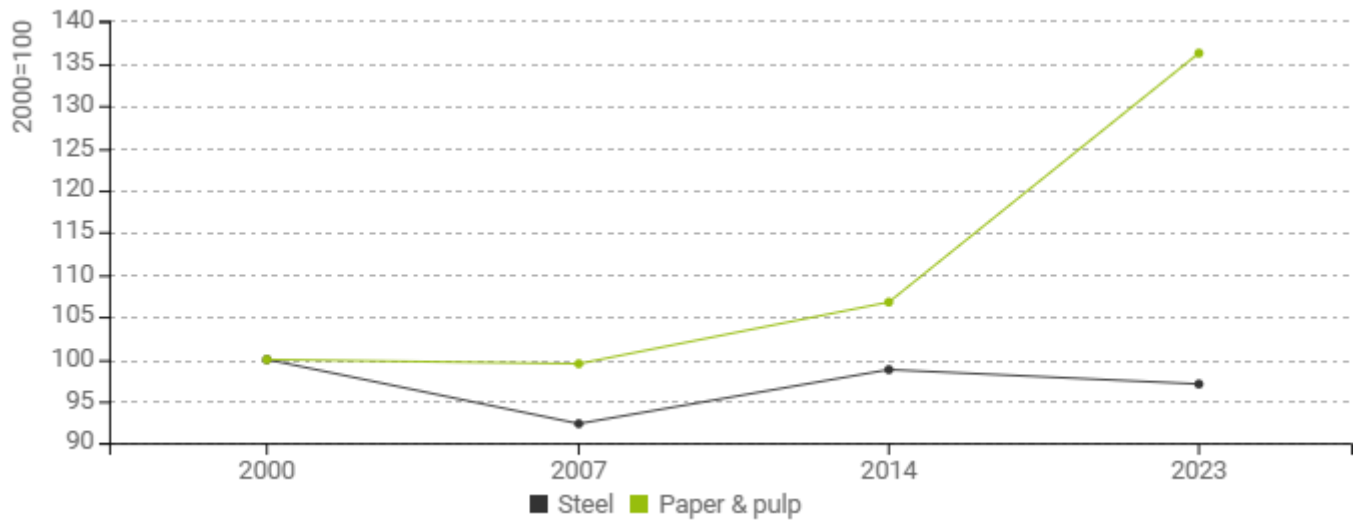
Figure 19: Final energy consumption of industry by branch



Source: ODYSSEE

Unit energy consumption in steel production was 7% lower in 2023 than in 2010. In contrast, unit consumption in the pulp and paper industry increased: while output declined by 37%, energy use fell by only 17%. This reflects high baseload demand and the limited flexibility of large-scale continuous processes.

Figure 20: Unit consumption of energy-intensive products (toe/t)



Source: ODYSSEE

The decline in industrial energy consumption observed between 2010 and 2023 was mainly driven by structural changes towards less energy-intensive industries (–3.3 Mtoe). In contrast, growth in industrial activity increased energy consumption by 1.33 Mtoe. Energy savings estimated using Odyssee top-down indicators differ from bottom-up monitoring results, which indicate a very high level of savings.

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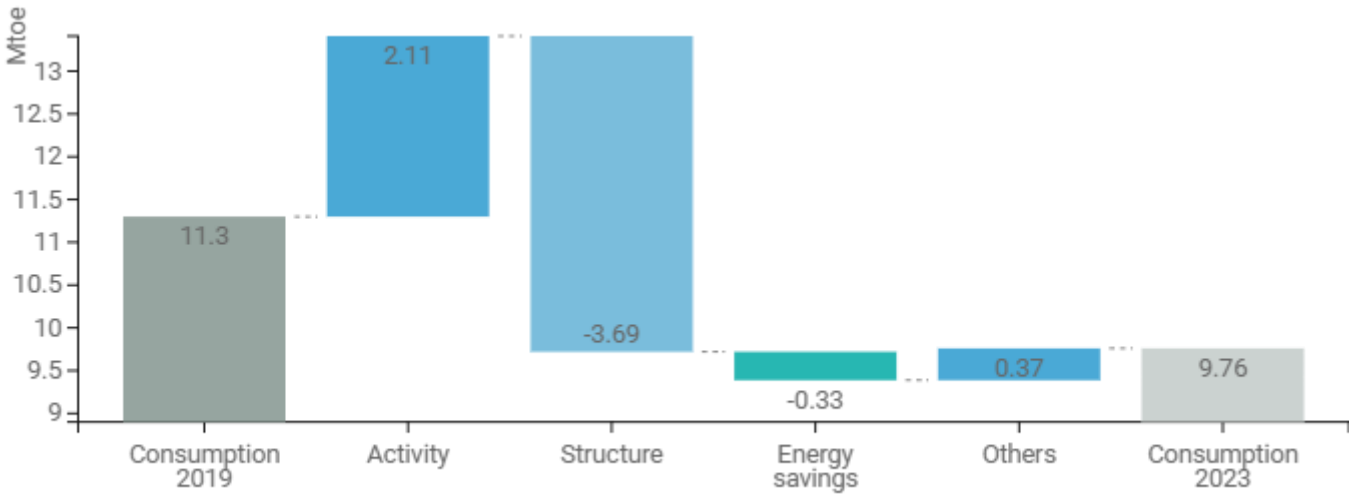
Figure 22: Main drivers of the energy consumption variation in industry



Source: ODYSSEE

The first voluntary energy efficiency agreements in industry were launched in 1997. The current third generation covers the period 2017–2025, and new agreements will run from 2026 to 2035. These agreements are the main energy efficiency measure in industry. Monitoring results show that the energy savings achieved are very high. Energy audits have contributed significantly, but subsidized audits are now available only for companies outside the scope of mandatory energy audits.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Energy Efficiency Agreement of Industry	Yes	Third generation of voluntary energy efficiency agreement for different industries for 2017-2025 and a new period for 2026-2035. The former agreement periods were 1997-2007 and 2008-2016.	54.99 TJ (includes the impact service, municipal and real estate sector agreements)
In-depth energy audits	Yes	A new in-depth energy audit model for heavy industries.	

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Subsidies for energy audits and energy investments	Yes	Subsidies are available for energy audits and energy efficiency investments. However, audit subsidies apply only to those not subject to mandatory energy audits stipulated by the EED Directive.	Savings partly overlap with those of the voluntary agreements. Therefore, not reported separately.

Source: MURE

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