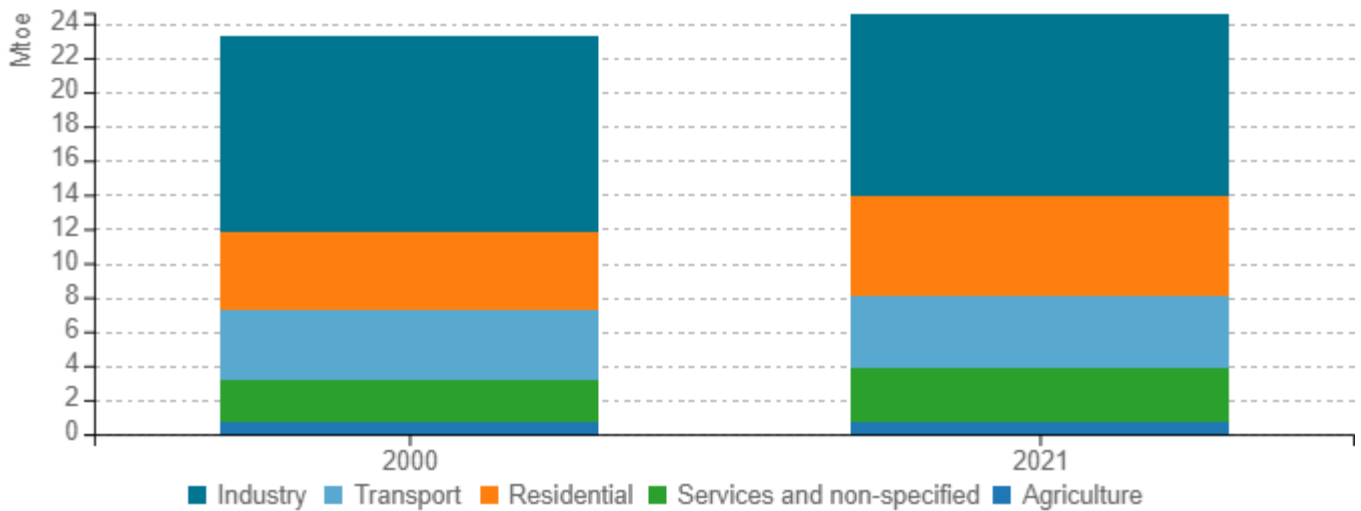


# Energy efficiency trends and policies

## Overview

Climate-corrected Total Final Energy Consumption (TFC) was 24.6 Mtoe in 2021, i.e., 6% over the 2000 level. Industry is the largest energy consuming sector accounting for 43% of the TFC in 2021 which is 6 percent points less than in 2000. The share of transport was 17% being close to the 2000 proportion. The share of all other sectors in TFC increased from 34% to 40% from 2000 to 2021.

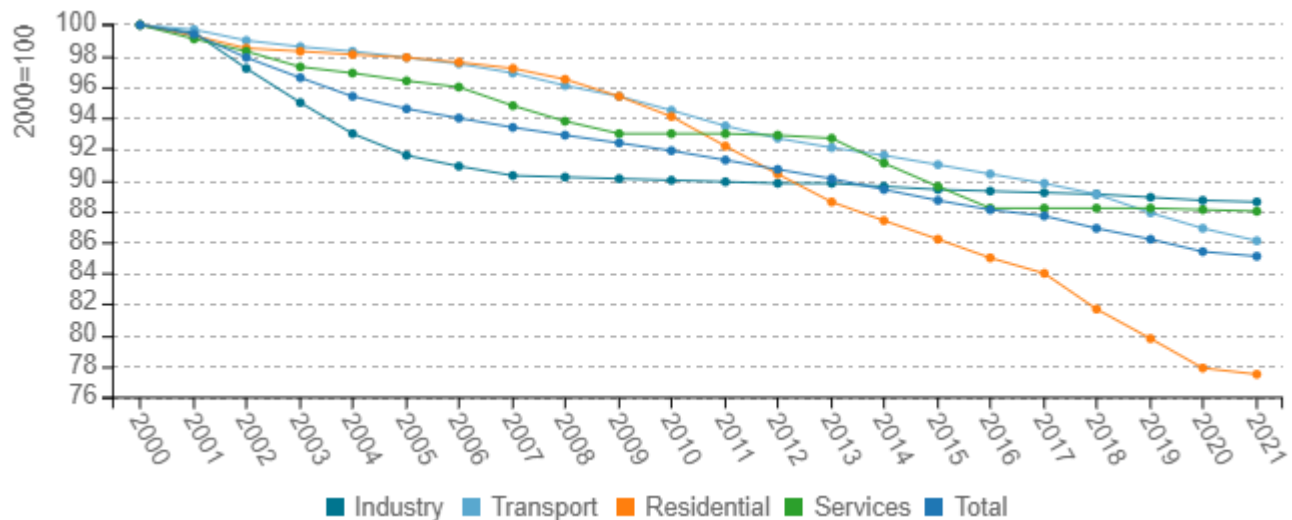
Figure 1: Final energy consumption by sector (normal climate)



Source: ODYSSEE

Energy efficiency of final energy consumption sectors, as measured by ODEX, improved by 14.9% over the 2000-2021 period. The ODEX level improved most in the residential sector and least in industry.

Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE



Finland's Integrated Energy and Climate Plan contains the national targets and the related policy measures to achieve the EU's energy and climate targets. With regard to energy efficiency, in accordance with the EED, Finland's indicative national energy efficiency target for 2020 was the 310 TWh absolute level of final energy consumption. The realised level was 271 TWh. The energy efficiency target to contribute to EU 2030 target in final energy consumption is 290 TWh.

**Table 1: Sample of cross-cutting measures**

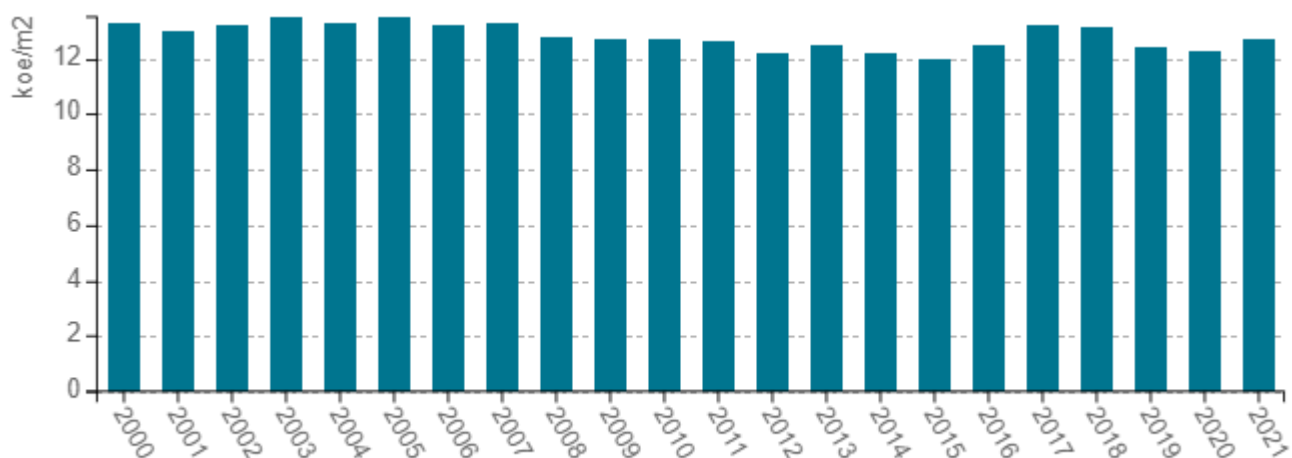
Measures	NECP measures	Description	Expected savings, impact evaluation
<a href="#">Eco-design</a>	yes	Implementation of the Eco-design Directive	High
<a href="#">National Energy and Climate Strategies</a>	no	Periodically updated strategies. The latest one is from 2022.	High

Source: MURE

### Buildings

As Figure 3 shows, unit consumption for space heating per m2 in households has declined by about 5% since 2000. Small annual variations in the long-term trend can be attributed to the fact that normalization with heating degree days does not "perfectly" correct the impact of weather. Figure 4 illustrates the proportion of different end-uses in households, excluding heating. Water heating continues to make the largest contribution, followed by appliances and lighting while the shares of cooking and air-conditioning continue to be negligible.

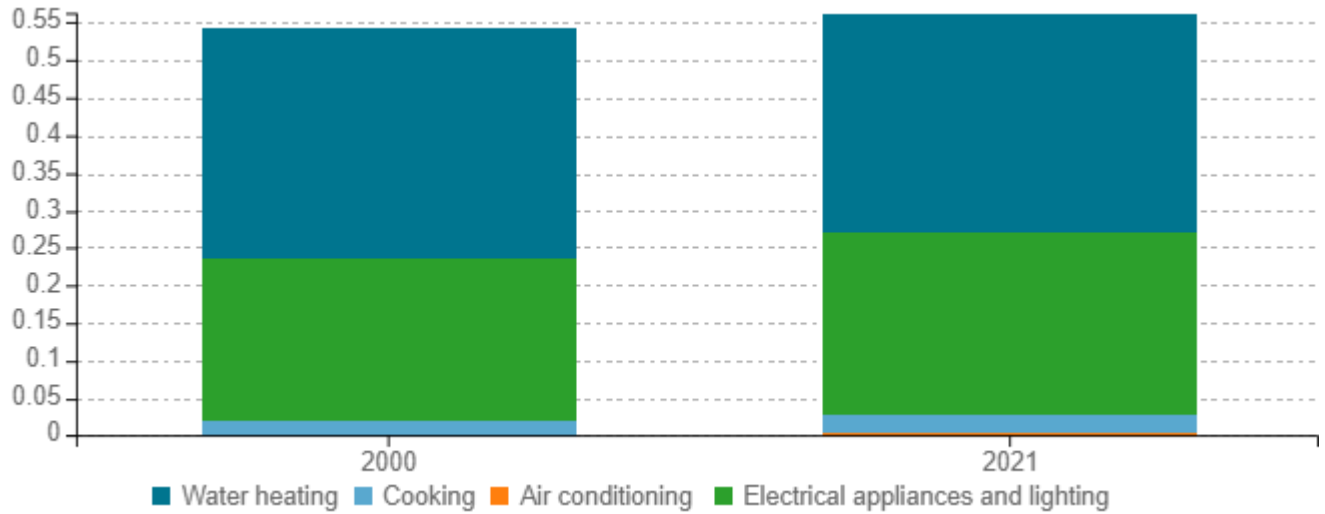
**Figure 3: Energy consumption of space heating per m2 (normal climate)**



Source: ODYSSEE



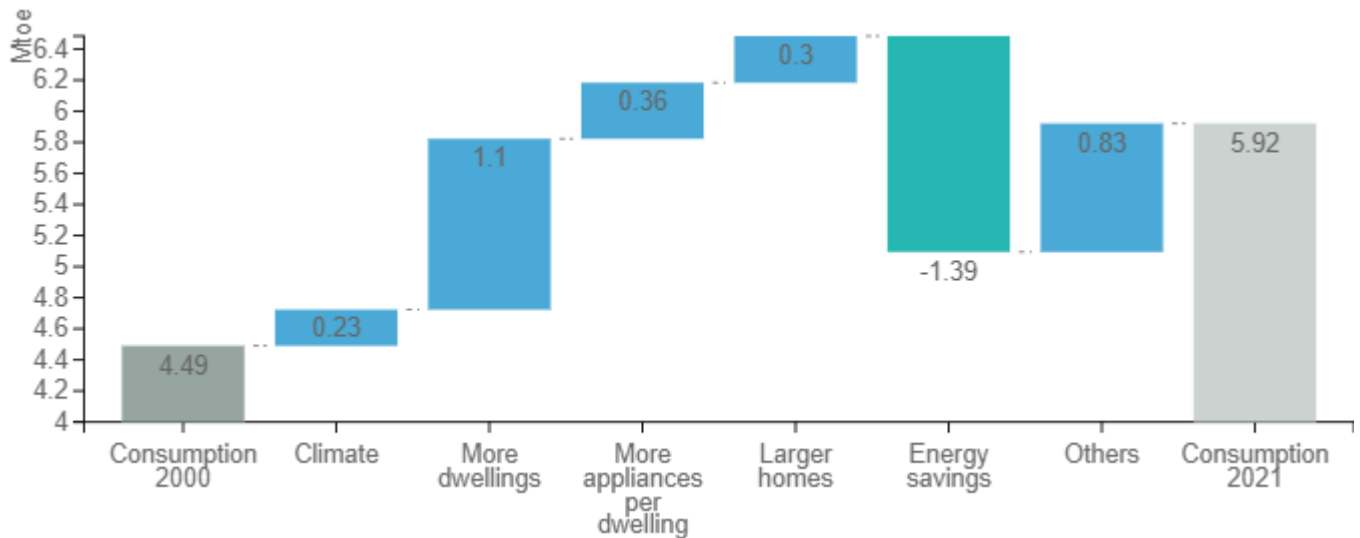
Figure 4: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

Energy consumption in the residential sector (Figure 5) has increased by 1.43 Mtoe (16.6 TWh) since 2000. It was driven upwards particularly by the continuously increasing number of dwellings and to some extent also the growing appliance stock. On the opposite, energy savings partially offset the effect of the drivers of consumption growth.

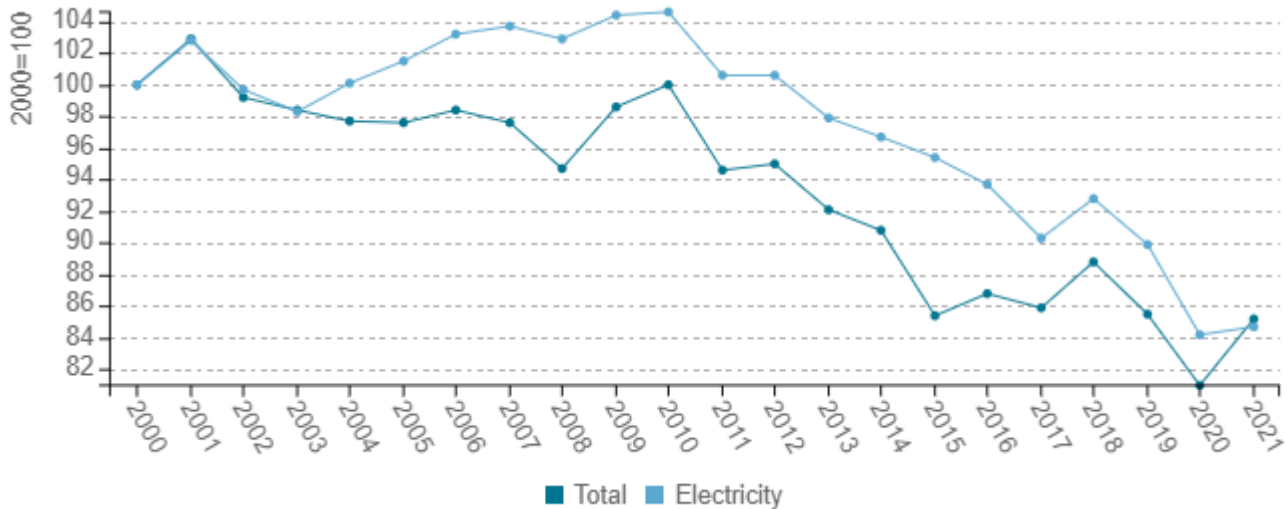
Figure 5: Main drivers of the energy consumption variation of households



Source: ODYSSEE

Both energy consumption and electricity consumption per m<sup>2</sup> have considerably declined in buildings after 2000. Important factors in the trends are increased use of heat pumps, eco-design requirements and other energy efficiency measures.

Figure 6: Energy and electricity consumption per m<sup>2</sup> (normal climate)



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 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

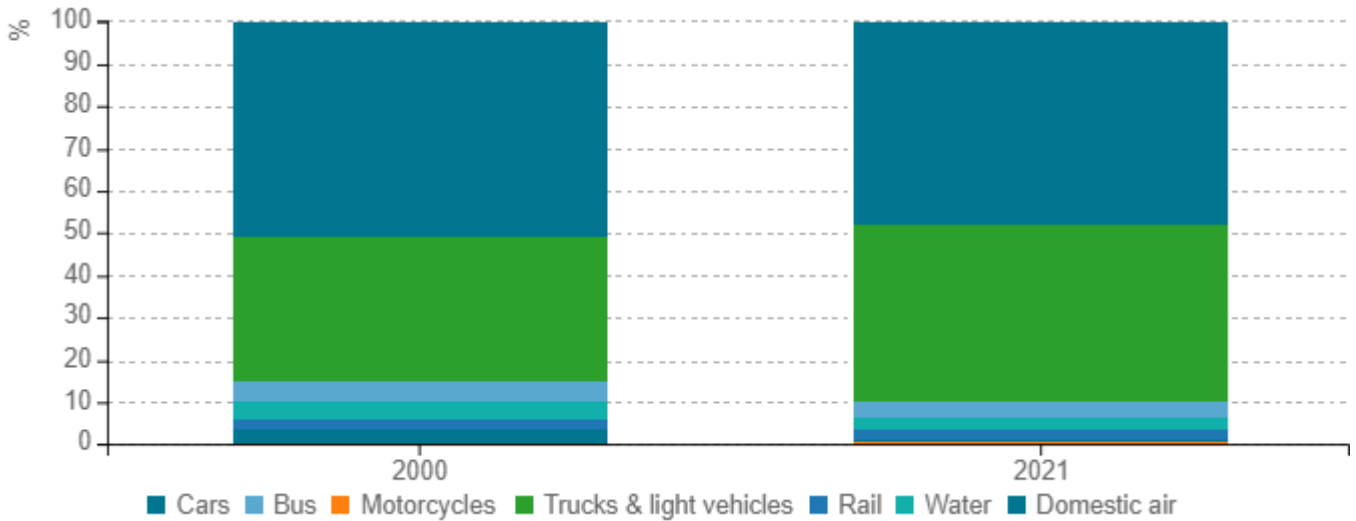
Measures	Description	Impact evaluation
<a href="#">Building regulations (2003, 2007, 2010, 2012), new buildings</a>	The most recent code implements primary energy requirements for the overall energy performance of buildings.	High
<a href="#">Building regulations, renovation</a>	These regulations implement the respective EPBD requirements in Finland.	High
<a href="#">Promotion of heat pumps in single family houses and terraced houses</a>	Tax rebate and information measures to encourage installation of different types of heat pumps.	High
<a href="#">Energy efficiency agreement for oil-heated buildings</a>	Voluntary energy efficiency agreement e.g. encouraging the replacement of old oil-fired boilers	High

Source: MURE

**Transport**

Cars account for 48% and trucks and light vehicles for 42% of energy consumption in transport. The most notable change since 2000 is the 7.6 percent point growth in the proportion of trucks and light vehicles.

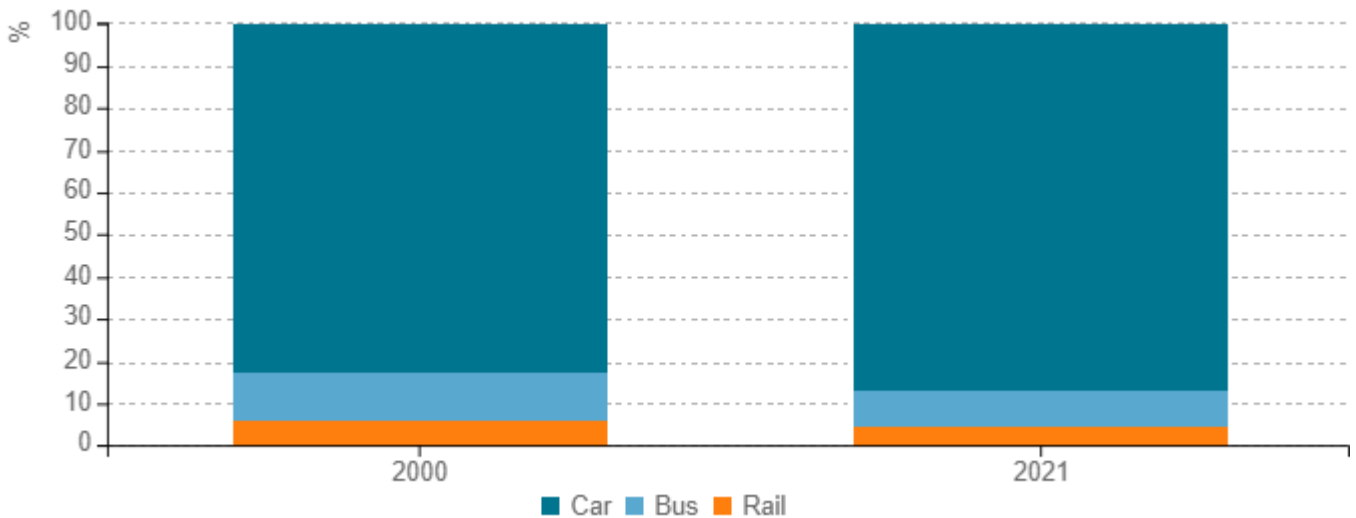
*Figure 7: Transport energy consumption by mode*



Source: ODYSSEE

Energy consumption on passenger transport is now at the same level as in 2000. Some modal shift has occurred away from public transport to private cars, at least partly driven by the covid crisis.

*Figure 8: Modal split of inland passenger traffic*

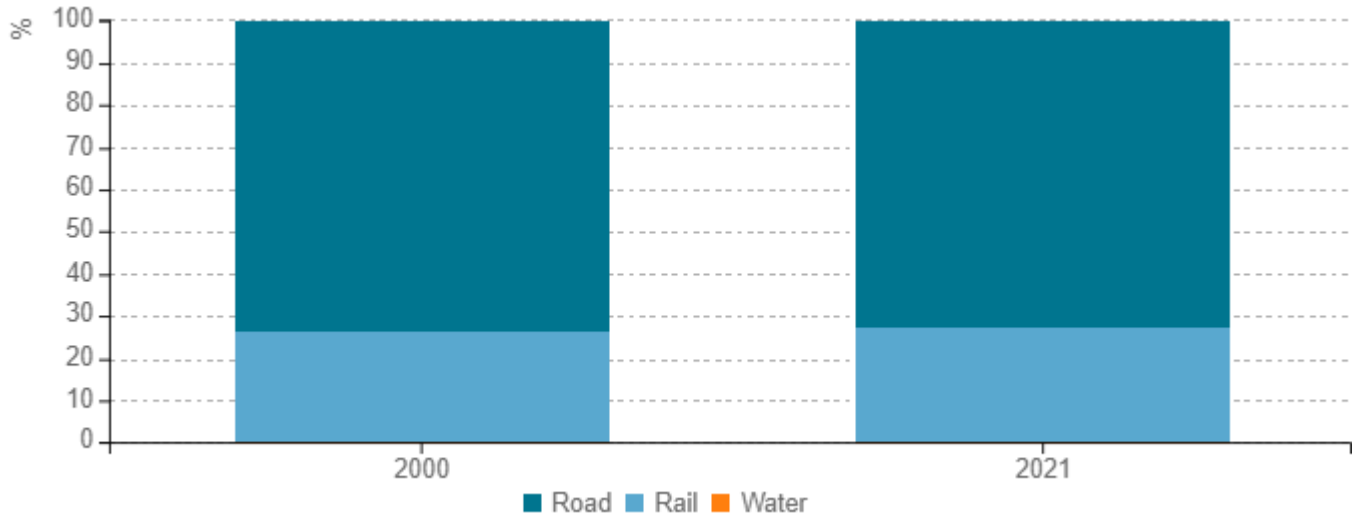


Source: ODYSSEE



In freight transport, there has been a modest modal shift from trucks to rail transport. The proportion of rail transport increased by one percentage point after 2000.

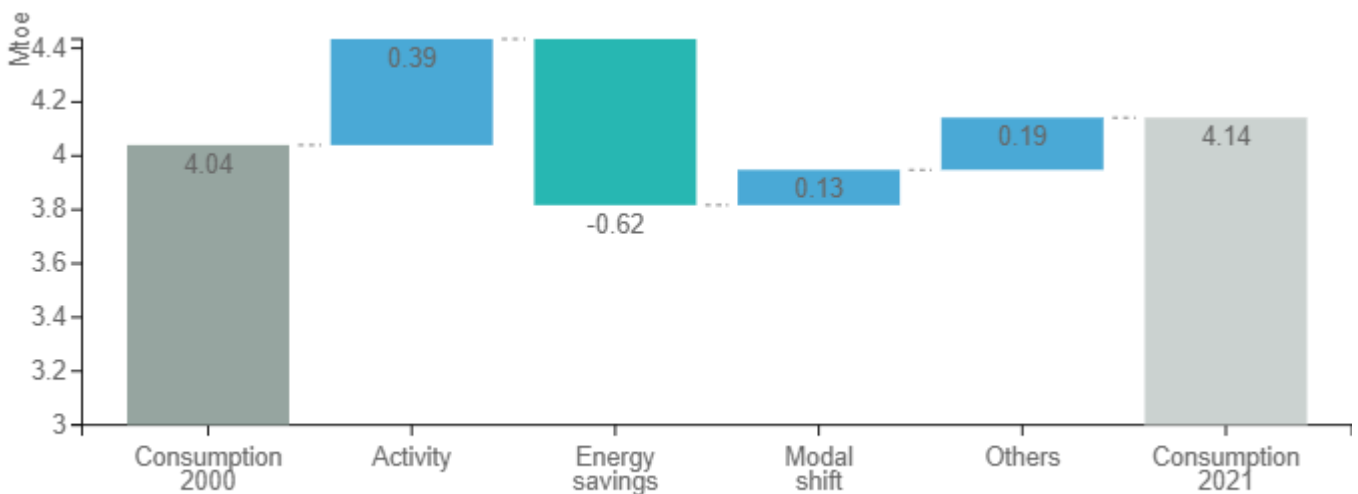
Figure 9: Modal split of inland freight traffic



Source: ODYSSEE

In 2021, energy consumption of transport was 2.5% higher than in 2000. Energy savings more than compensated the changes in the activity levels (e.g. more traffic), but were offset by other factors which contributed to the growth. These is a shift from mass goods (e.g. paper) to parcelled goods and increased empty runs due to logistical challenges related to customer needs.

Figure 10: Main drivers of the energy consumption variation in transport



Source: ODYSSEE



Energy improvements in new vehicles are taking place because of the CO2 emission norms, taxation favouring less emitting cars and information measures. However, the pace of fleet renewal in Finland is among the slowest in Europe causing some delay in seeing the full benefit of these measures. Measures are in place to support public transport and to promote non-motorized modes. In road transport of goods, allowing larger and heavier trucks to enter the roads is making some contribution.

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

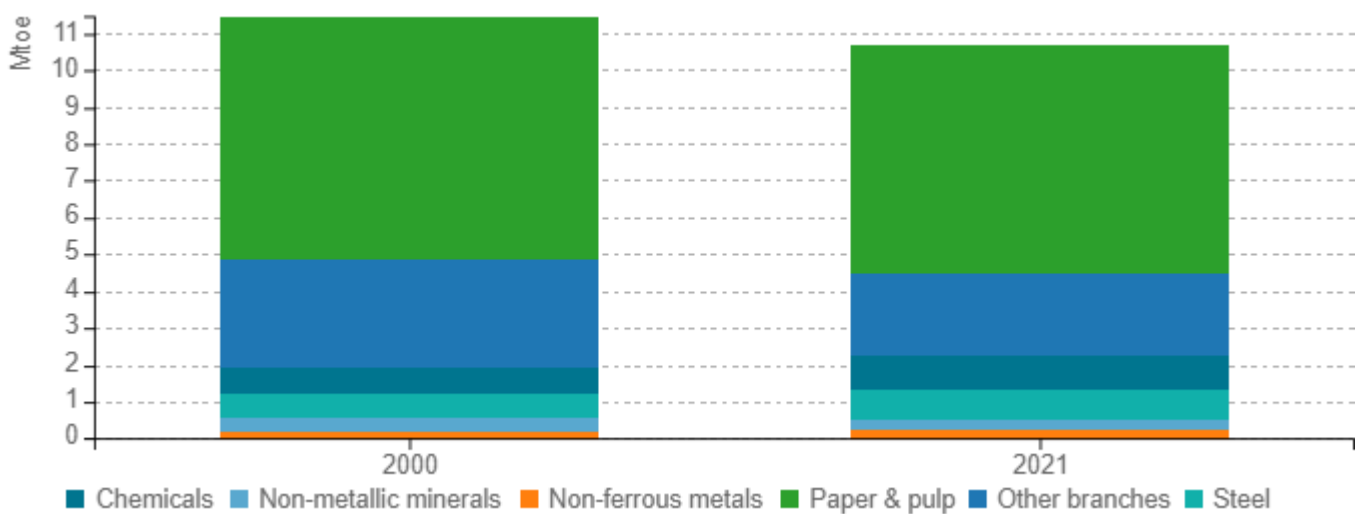
Measures	Description	Expected savings, impact evaluation
<a href="#">Energy efficiency improvement of cars</a>	Implementation of the CO2 emission norms improves the energy efficiency of new cars.	High. Impact evaluation shows the combined impact of emission norms, emission-based taxation and information measures.
<a href="#">Fuel taxation</a>	Taxes on transport fuels are much higher than required by the EU energy tax directive. Also the VAT level is clearly higher than stipulated by the VAT directive.	High. Notified for EED Art. 7.

Source: MURE

### Industry

In 2021, energy consumption in industry was 10.7 Mtoe, i.e. 7% under the 2000 level. The energy-intensive pulp and paper, chemical and steel industries are the largest energy consumers, with 58%, 9% and 8% shares, respectively.

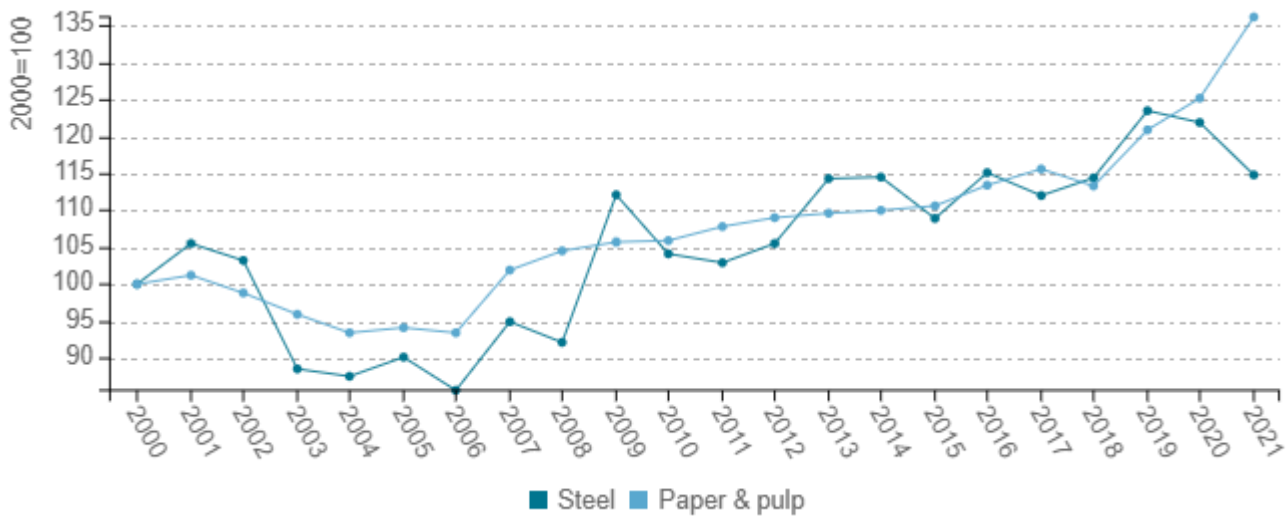
**Figure 11: Final energy consumption of industry by branch**



Source: ODYSSEE

The specific energy consumption of paper and pulp as well steel production is at a higher level than in 2000. Factors like capacity utilization rates, product mix, growing production of kraft pulp for exports and even climate have an impact on both the national level of specific consumption and country comparisons.

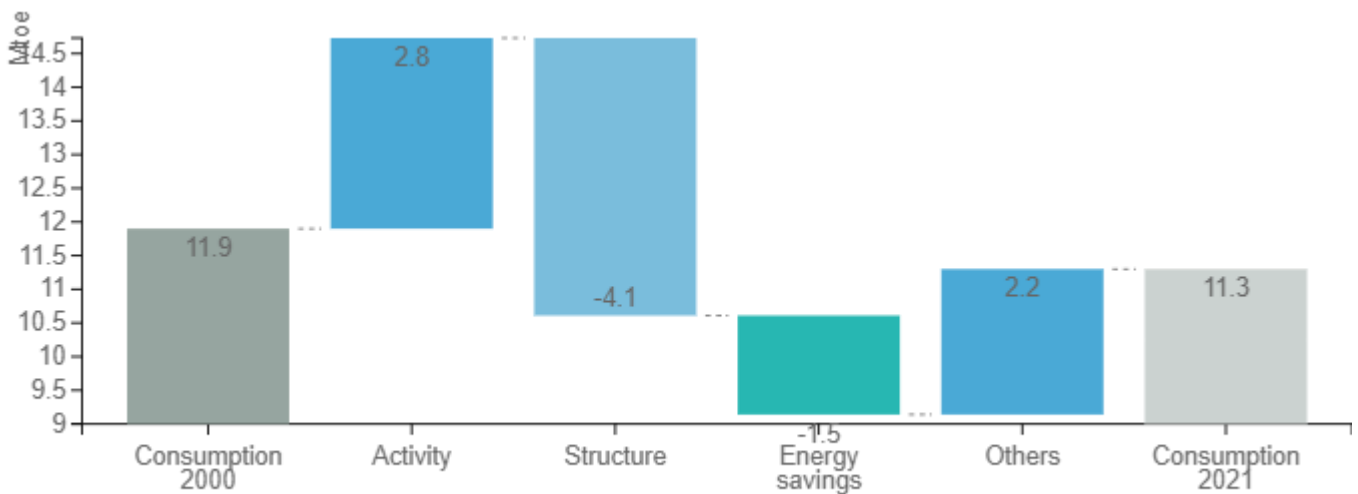
**Figure 12: Unit consumption of energy-intensive products (toe/t given as index)**



Source: ODYSSEE

The observed decline in industrial energy consumption in 2000-2021 is driven by energy savings together with structural changes towards less energy consuming branches. At the same time, industrial activity has grown.

**Figure 13: Main drivers of the energy consumption variation in industry**



Source: ODYSSEE





The first voluntary agreements to save energy in industry were launched in 1997 and the third generation has started for the period 2017-2025. This is the main measure in industry. Monitoring results show that energy savings from these agreements are very high. Energy audits have made a major contribution, but subsidized energy audits are available now only for those falling outside the scope of mandatory energy audits.

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

Measures	Description	Expected savings, impact evaluation
<a href="#">Energy efficiency agreement for industries</a>	The energy efficiency agreement is a framework contract signed by competent ministries with the business sector. Individual companies join the agreement by an accession document.	High
<a href="#">Energy audits</a>	Subsidized voluntary energy audits for companies not mandated to carry them out.	High

Source: MURE