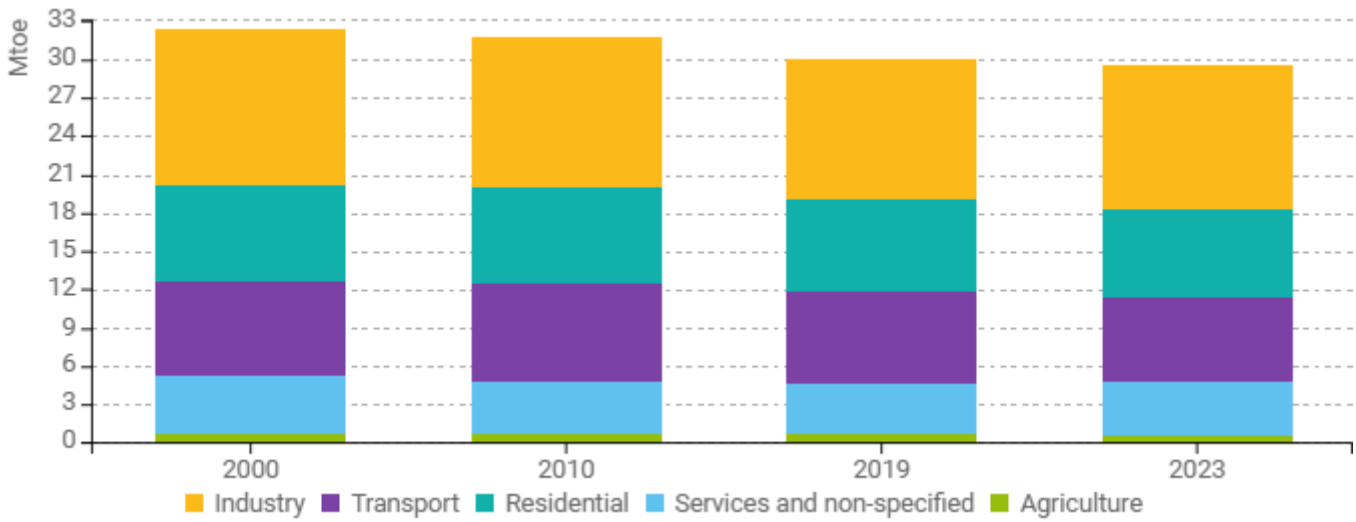
Energy efficiency trends and policies

Overview

Final energy consumption in Sweden was around 29.6 Mtoe in 2023. This figure implies a decrease by 2.6 Mtoe since 2000, when consumption was almost 32.2 Mtoe. Energy consumption in the transport sector has shown a decrease by 0.8 Mtoe between 2000 and 2023. During the same period, industrial consumption decreased by 1.0 Mtoe and residential sector by 0.46 Mtoe. The service sector, including non-specified activities, saw an increase by 0.35 Mtoe.

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



Source: ODYSSEE

Overall energy efficiency improved by 1.12 %/year or 25.8% between 2000 and 2023 as measured by ODEX. The largest improvement, exceeding 1.6%/year (31% in total), took place in residential and services sectors. Progress in transport and industry was more modest, 0.8%/year (19.5%) and 1.2%/year (23.6%), respectively. It is worth noticing that only developments in the transport sector actually follow the overall trend. In industry, energy efficiency improvements, as measured by ODEX, were significant before 2006 (i.e. before the onset of the crisis), but since then little progress can be observed. Meanwhile, progress in the residential sector and services has been rather rapid and persistent.

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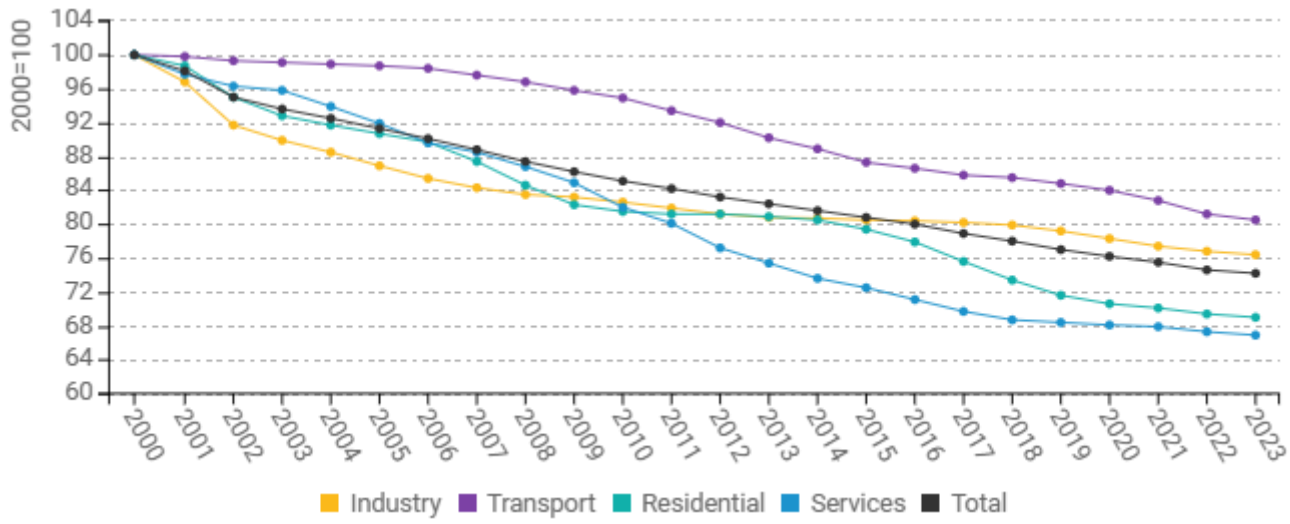
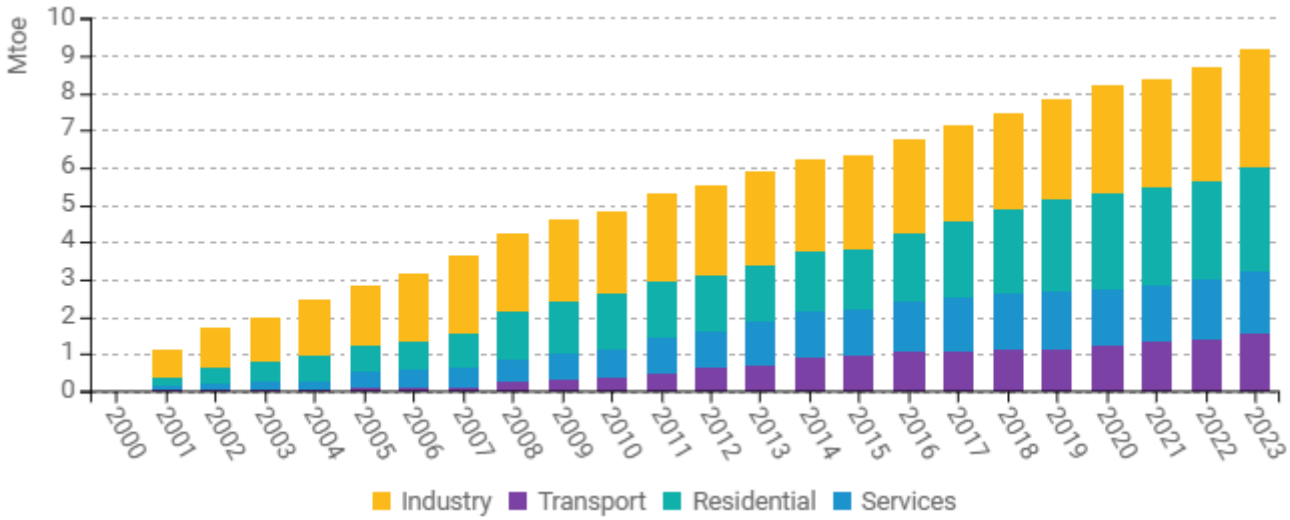
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

In 2023, Swedish energy savings highlight notable improvements across key sectors. Industry achieved the largest savings at 3.14 Mtoe, followed by residential at 2.8 Mtoe, services at 1.65 Mtoe, and transport at 1.58 Mtoe. The base year of 2000 sets the reference at zero, with consistent increases observed annually. The data underscores the effects of various efficiency initiatives, particularly in industry and households.

Figure 3: Energy savings by sector



Source: Odyssee

Swedens total energy supply changed from 50.6 Mtoe in 2000 to 44.3 Mtoe in 2023. Decreases in final consumption (-2.7), consumption in the power sector (-2), other transformations (-1.4) and non-energy uses (-0.3) collectively reduced overall supply. All these factors result in a net decline of 6.3 Mtoe over the period. Particularly lower non-energy uses and final consumption contribute to Sweden's reduced total energy supply in 2023 compared to 2000.

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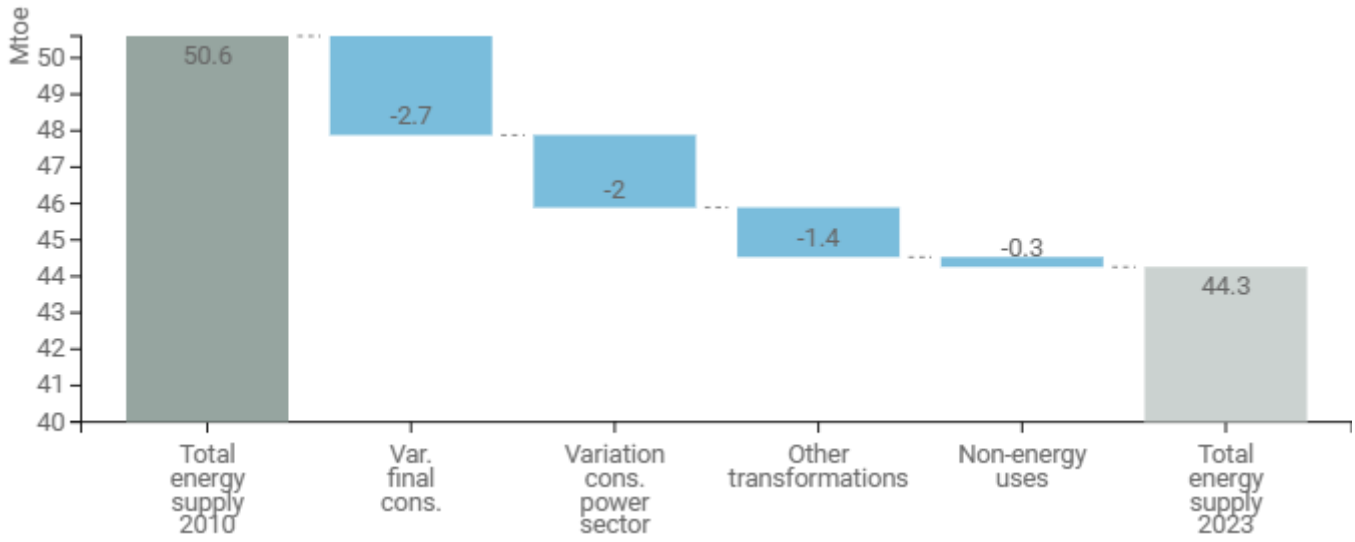
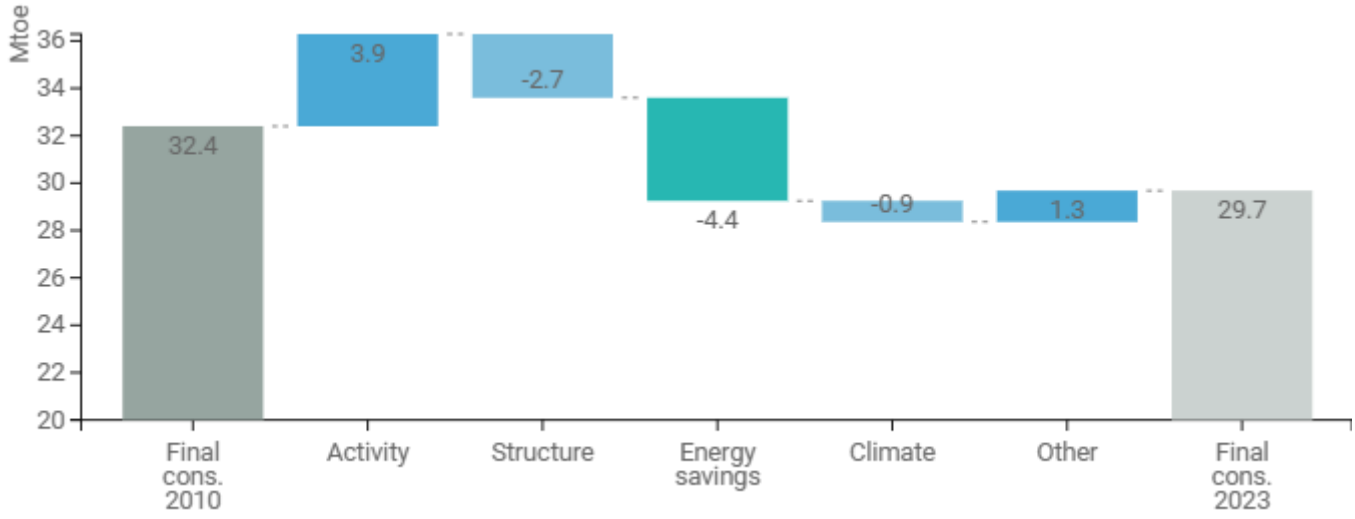
Figure 4: Main drivers of the total energy supply variation



Source: Odyssee

Sweden's final energy consumption decreased by 2.7 Mtoe, from 2000 (32.4 Mtoe) to 2023 (29.7 Mtoe). The largest upward driver is activity increase, adding 3.9 Mtoe, while Energy savings reduce consumption by 4.4 Mtoe. Structural changes, mostly in industry, account for a 2.7 Mtoe decrease, and ''other'' factors add 1.3 Mtoe, offsetting some of the declines. This demonstrates that despite economic and societal growth, efficiency gains and structural shifts have contained final energy consumption.

Figure 5: Main drivers of the final energy consumption variation



Source: Odyssee

The foundation for Swedish energy efficiency policy is the tax on energy and carbon dioxide emissions. However, the effects stem not only from the tax itself, but also from the concurrent effects of other policy instruments. The tax creates a general incentive for action for reduced energy use, but because of its broad approach, further

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instruments are needed to target specific groups of users. Sweden has a national energy efficiency target for a reduction of the ratio between primary energy consumption and GDP by 50% for the period 2005-2030. Already by 2017 a reduction of 20% was registered. However, because primary energy consumption and GDP do not correlate in a 1:1 relation, there always exists a risk that the gains in one or several years in a row may be reversed in subsequent years. Data for 2021 show 33% reduced energy use.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
Support for developing energy and climate actions among public bodies/ Stöd för att utveckla energi- och klimatarbete hos offentliga aktörer	No	Project for capacity building in the areas of energy and climate, such as cooperation, method development, and dissemination of experiences.	1.26 TJ
Klimatsynk - national cooperation for energy and climate	Yes	The purpose of Klimatsynk synchronized approach is to avoid overlapping projects and to disseminate new knowledge between regions.	3.77 TJ
Support for developing energy and climate actions among public bodies/ Stöd för att utveckla energi- och klimatarbete hos offentliga aktörer	No	The Swedish Energy Agency distributed a total of EUR 5 million (annually approximately EUR 1.5 million) between 20016 and 2019 to local and regional public bodies for actions promoting energy and climate targets.	1.26 TJ

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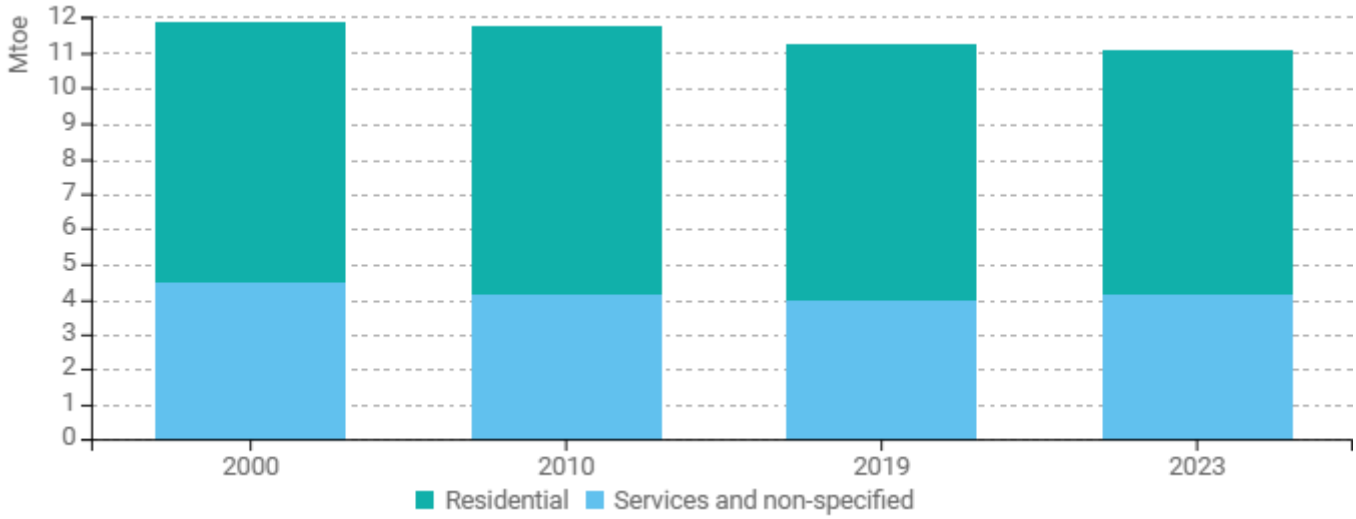
Energy and carbon tax/energi- och koldioxidskatt	No	This is a fundamental policy measure for energy efficiency. Most other policy measures revolve around the taxation, which provides a clear and coherent framework for various types of actions.	

Source: MURE

Buildings

Sweden's final energy consumption in residential buildings sector has decreased by 0.48 Mtoe at normal climate between 2000 and 2023. Over the same period, consumption in the services sector decreased by 0.35 Mtoe.

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



Source: Odyssee

Swedish households' final energy consumption, adjusted for climate variations, has shifted by end-use between 2000 and 2023. Space heating decreased by around 20% from 5.18 Mtoe to 4.04 Mtoe, and water heating by 14% from 1.19 Mtoe to 1.06 Mtoe, indicating some efficiency gains or changes in heating pratices. Meanwhile, energy consumption for electrical appliances and lighting increased by 22% from 1.24 Mtoe to 1.53 Mtoe.

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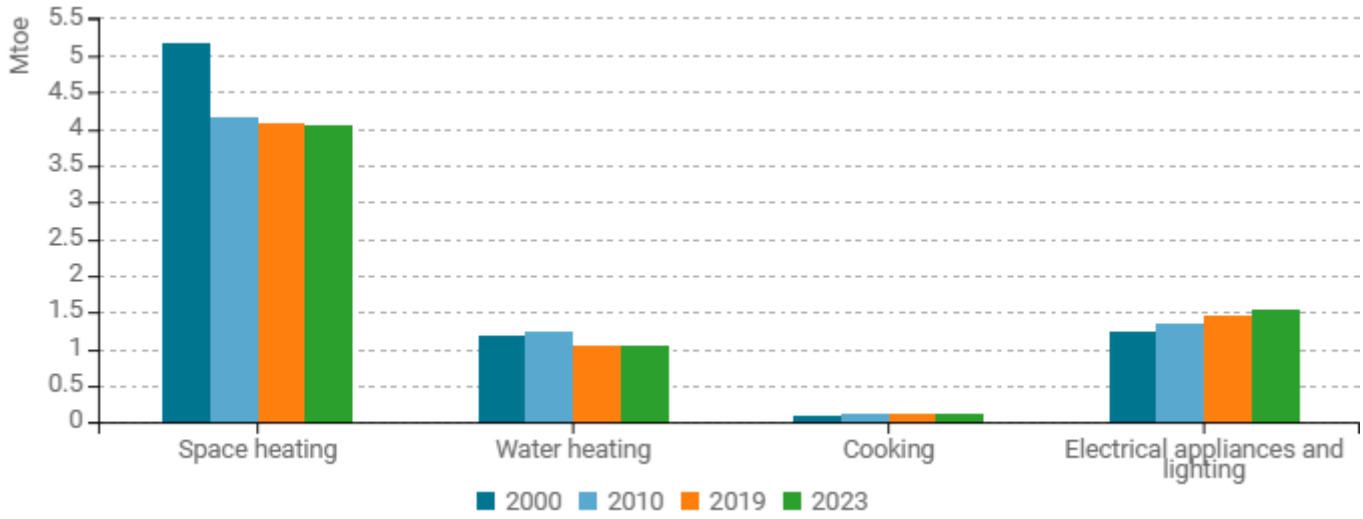
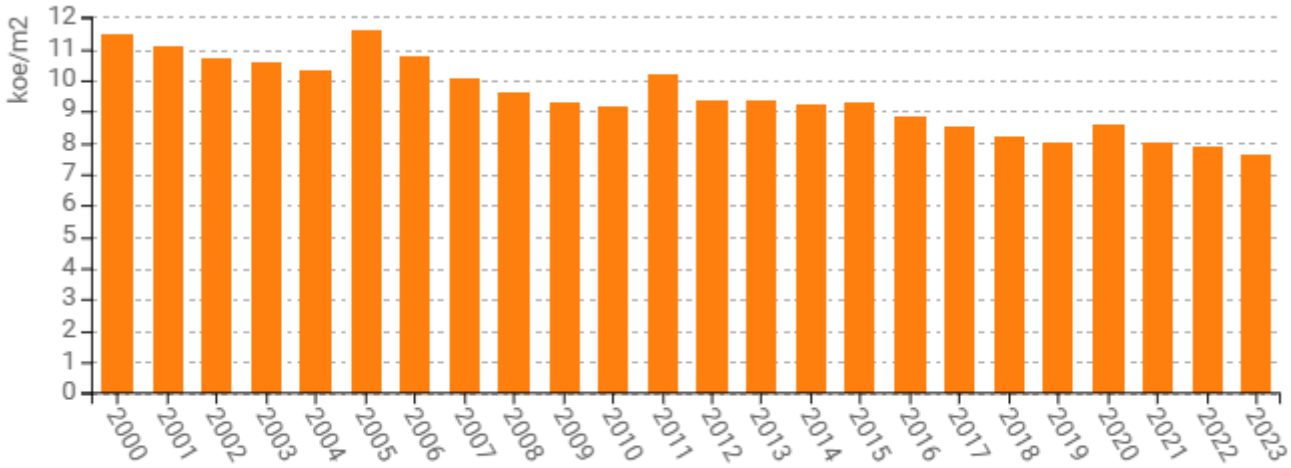
Figure 7: Energy consumption by end-use of households (with climatic corrections)



Source: Odyssee

Energy consumption of space heating per m2 has shown a significant downward trend between 2000 and 2022, from 11.5 to 7.64 koe/m2 (-1.7%/year), although there are of course annual variations. This is largely due to more energy efficient buildings (building materials, windows) or fuel substitution (e.g. installing heat pumps). Electrical appliances and lighting consumption has increased by 3.0 % between 2000 and 2023 to reach 0.329 toe per dwelling. On the contrary, water heating consumption per dwelling has decreased from 0.28 toe to 0.227 toe (-1.1%/year). There is also a slight increase in energy used for cooking.

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



Source: ODYSSEE

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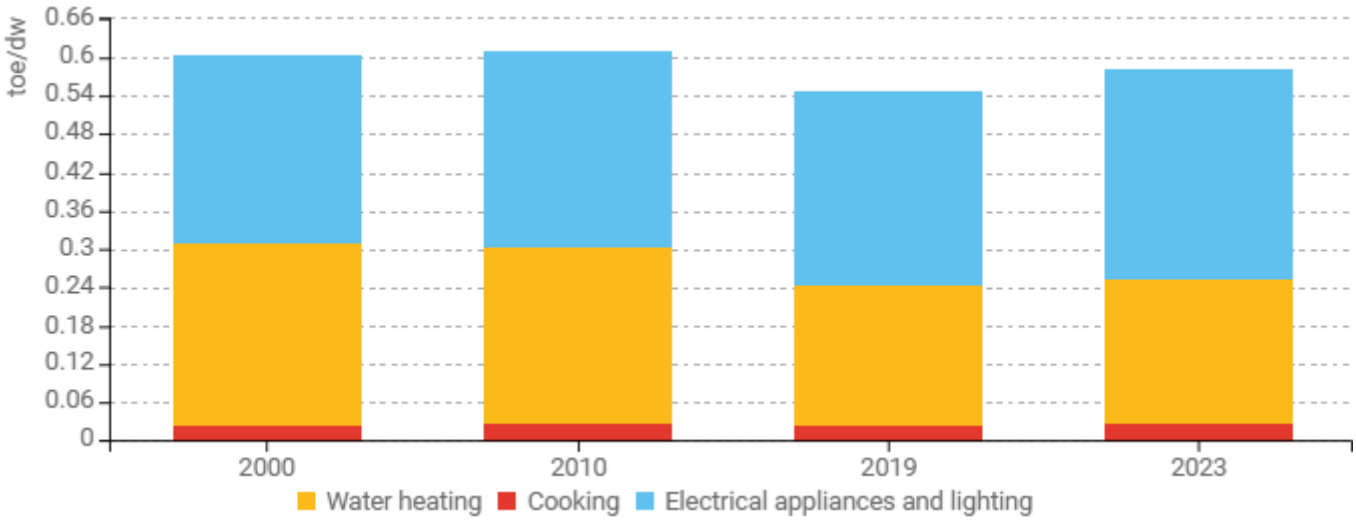
Consumption per dwelling for water heating has decreased 20% over the period 2000-2023, with a change in shares of 8% (going from 47% to 39). The second large evolution was in electrical appliances and lighting, who increases 11% over the period, improving by 7.6% the shares, passing from 49% in 2000 to 56 in 2023.

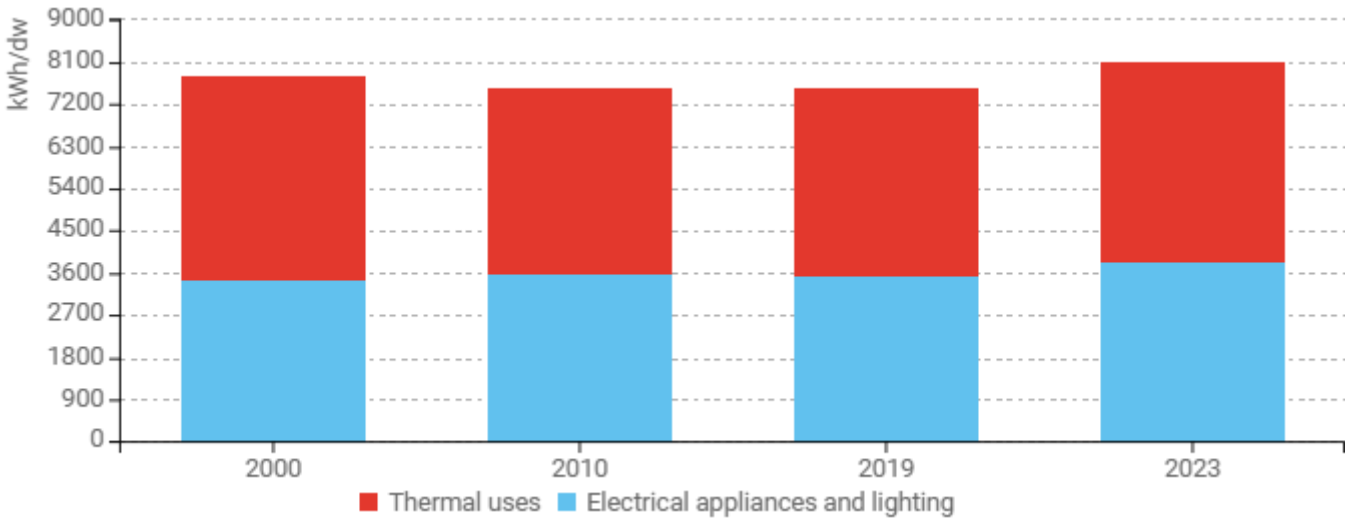
Figure 9: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

Figure 10 below shows that Swedish household's electricity consumption per dwelling, adjusted for climate variation, has shifted between 2000 and 2023. Thermal uses (e.g. heating systems) decreased from 4390 kWh/dw to 4293 kWh/dw which indicates efficiency gains or changed heating practices. Electricity for appliances and lightning rose from 3432 kWh/dw to 3821 kWh/dw.

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



Source: Odyssee

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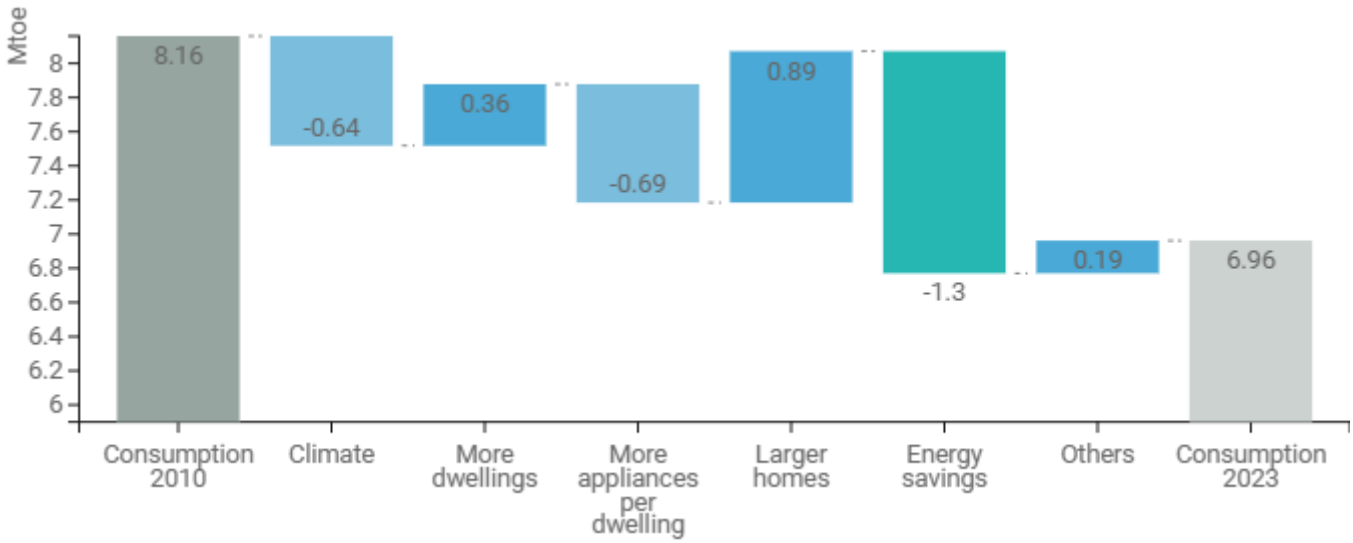
Total energy consumption of households decreased by 1.2 Mtoe between 2000 and 2023, from 8.12 to 6.96 Mtoe. The single most important factor pulling down energy use is energy savings, amounting to 1.3 Mtoe. This is however counterbalanced by upward trends, such as the increasing number of dwellings, more appliances per dwelling and larger homes.

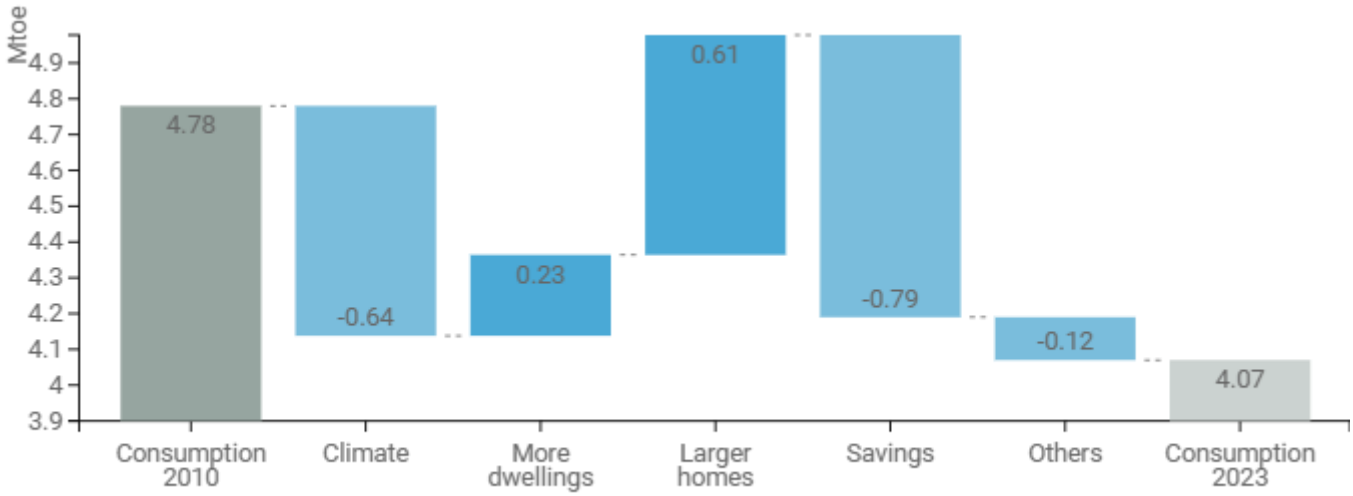
Figure 11: Main drivers of the energy consumption variation in households



Source: ODYSSEE

Between 2010 and 2023, space heating consumption for households decreased by 0.75 Mtoe from 4.78 Mtoe to 4.07 Mtoe. Single most important factor pulling down energy used in space heating is savings by 0.79 Mtoe. Activity and larger homes are factors that are pulling upp the energy use.

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



Source: Odyssee

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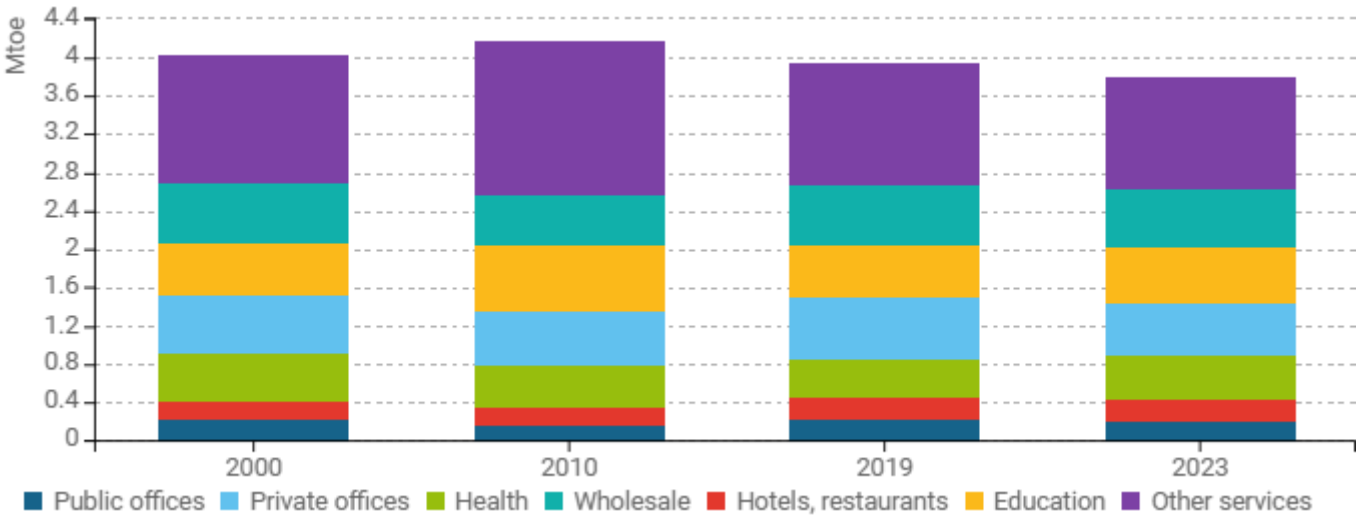
Most notable change is in the services by branch is ''Other services'', which dropped from 1.35 Mtoe to 1.17 Mtoe between 2000 and 2023. Energy consumption in health services also declined, from 0.52 Mtoe to 0.458 Mtoe, while hotels and restaurants increased from 0.18 Mtoe to 0.24 Mtoe. Other branches remained relatively stable, exhibiting only minor fluctuations in energy use.

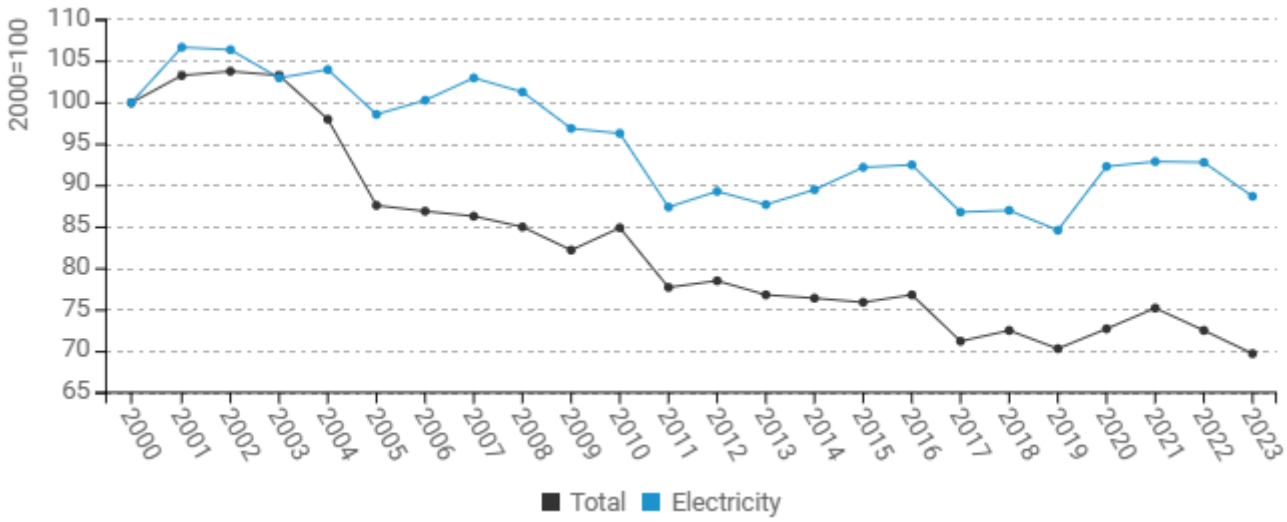
Figure 13: Final energy consumption of services by branch



Source: Odyssee

Electricity consumption per m² in services decreased by 11.3 % over the period 2000-2023, while total energy consumption per m2 in services decreased by 30.3 % over the period 2000-2023. Overall, there was a constant decline in total energy consumption while the decrease in electricity consumption was more modest and the annual variations were significant.

Figure 14 - Energy and electricity consumption per employee/per m2 in services (normal climate)



Source: ODYSSEE

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In Sweden taxes on energy and carbon dioxide are a powerful instrument for energy efficiency. It has been proved that the energy savings resulting from taxation has had a major impact in the reduction of energy use. However, taxation is supported by other policy instruments, for instance technology procurement groups. By this is meant that certain actors jointly make purchases of new technology in order to put a downward pressure on prices. There are currently three of them affecting buildings. One is directed towards landlords of commercial buildings, one for landlords of residential buildings and one for builders of individual homes. Moreover, Sweden has since the 1950's had energy efficiency requirements in the building code, which is updated at least once a decade. The building code applies to new buildings, on which stricter energy efficiency requirements each time the building code is updated.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Programme for buildings with very low energy use (LÅGAN)	Yes	Usually perceived as a part of technology procurement groups.	0.97 TJ
EU-related: Energy Performance of Buildings (2002/91/EC) amendment (2018/844/EU)	Yes	The prime responsibility for actions implementing this directive is with the Swedish National Board of Housing, Building, and Planning (Boverket), which is the issuing authority of the Building Codes (Byggregler). Currently, a project of simplifying these are under way.	0.32 TJ
Investment support for photovoltaic cells	Yes	The support programme was running between 2000 and 2020. The purpose was to encourage the use of solar heating technology for heat supplies to detached houses and apartment buildings and to promote an efficient and environmentally beneficial utilization of energy. . The support was 20 % of the total costs. The scheme was funded by SEK 736 million in 2019.	0.32 TJ

Source: MURE

Transport

The transport energy consumption has decreased by 8.5% between 2000 and 2023. The split between modes has remained very stable, dominated by road transport which accounts for 92%.

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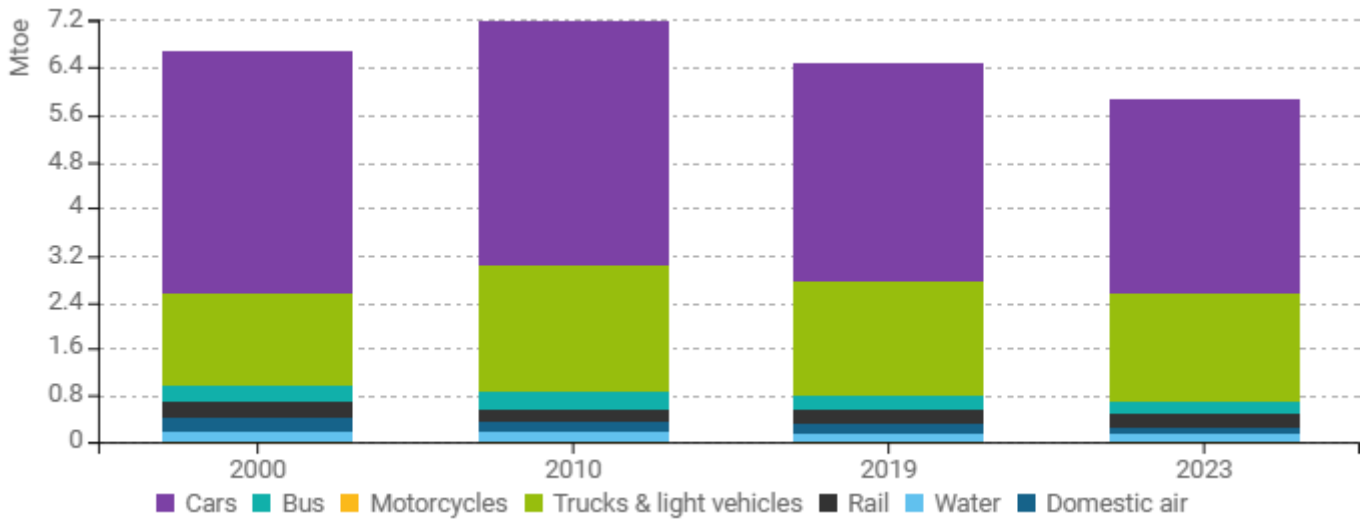
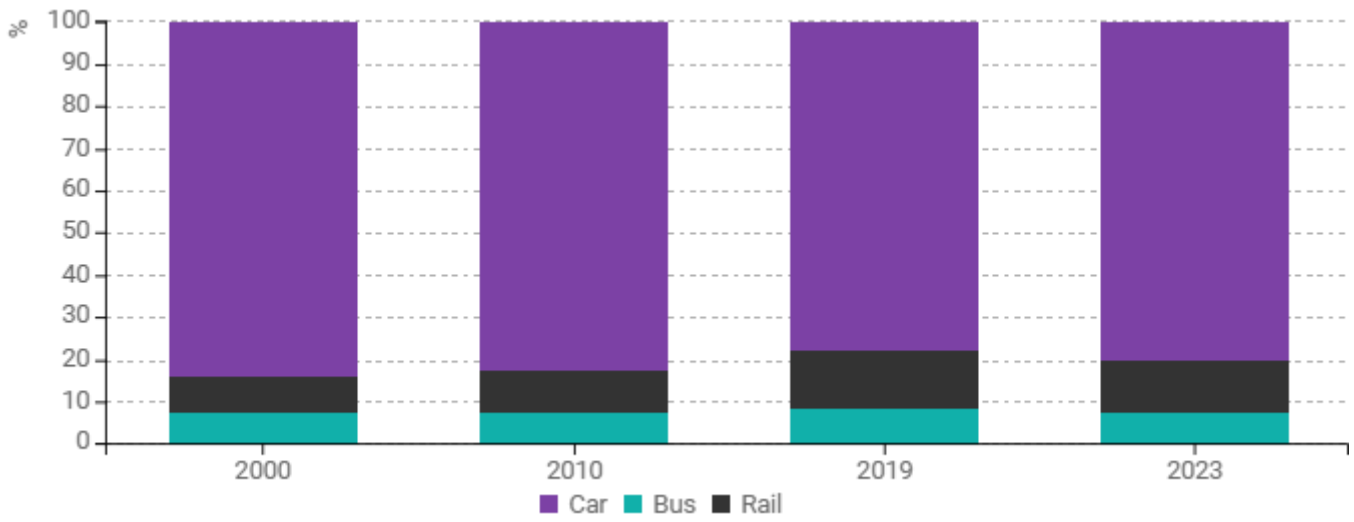
Figure 15: Transport energy consumption by mode



Source: ODYSSEE

The share of rail in inland passenger traffic increased by 3.9 % points between 2000 and 2023 to 12.2%, which is partly a result of extensive campaigns. Share of cars decreased by almost 4% points and share of bus transport has remained stable over the period 2000-2023

Figure 16: Modal split of inland passenger traffic



Source: ODYSSEE

For inland freight traffic, there was a significant shift to road transport, from 58.9% to 63.6% over the period 2000-2023 to the detriment of rail and water transport.

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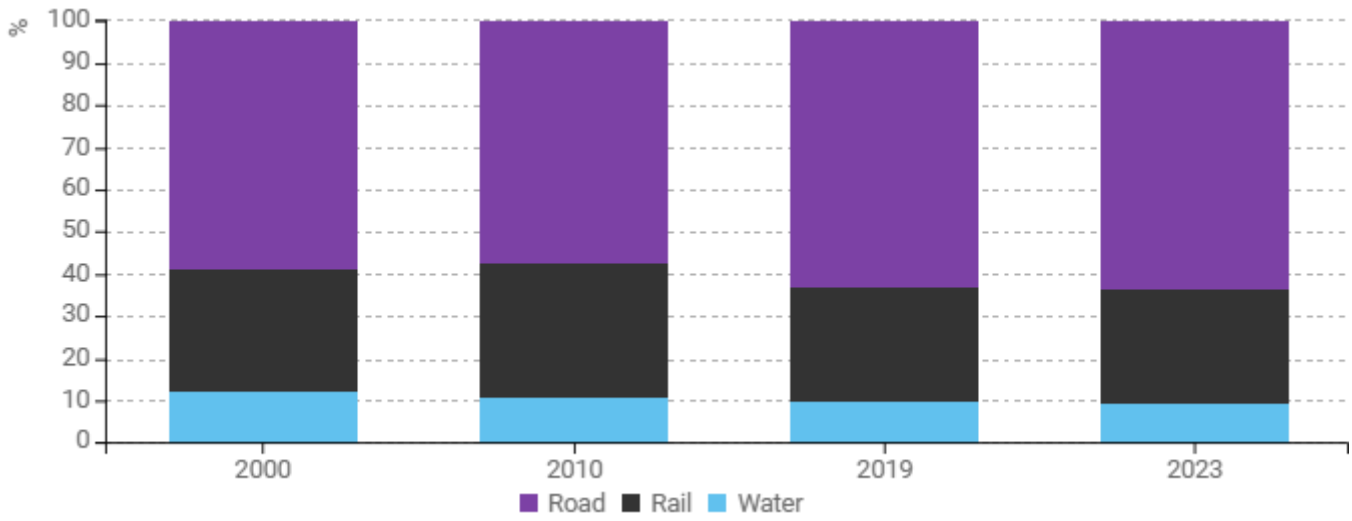
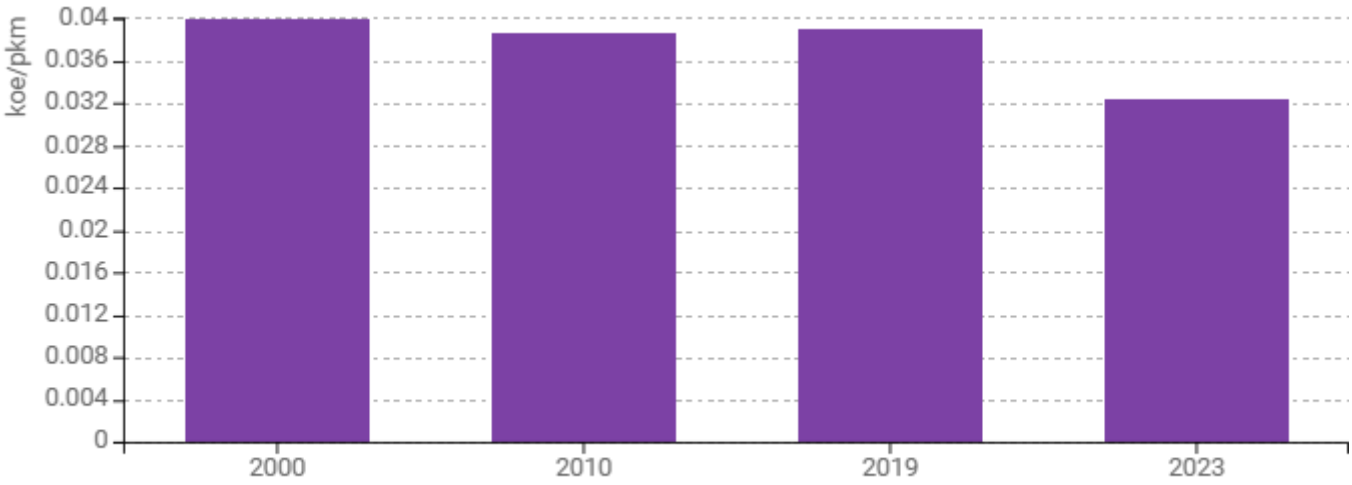
Figure 17: Modal split of inland freight traffic



Source: ODYSSEE

The energy consumption of cars per passenger-km decreased by about 9.3% (-0.4%/year) between 2000 and 2023, with a more significant reduction since 2019 (-2.6%/year).

Figure 18: Energy consumption of cars per passenger-km



Source: ODYSSEE

Energy consumption for transport decreased by 0.48 Mtoe between 2010 and 2022 from 7.62 Mtoe to 6.6 Mtoe. The main reason behind the downward trend is increased energy savings (-1.23 Mtoe). Modal shift plays a minor role.

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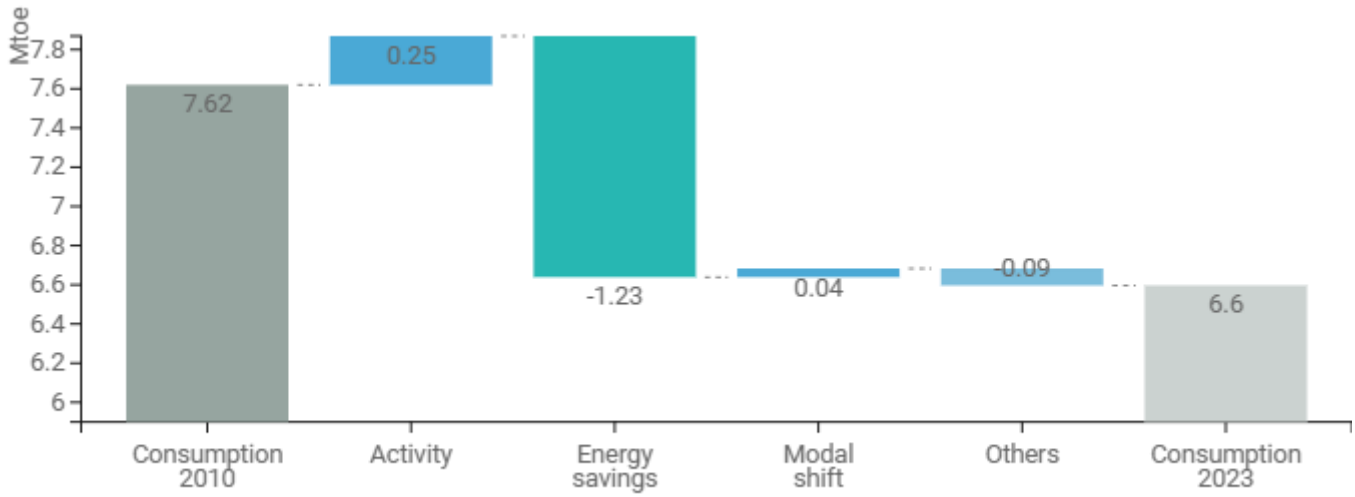
Figure 19: Main drivers of the energy consumption variation in transport



Source: ODYSSEE

The most important policy instrument in the transport sector is tax on energy and carbon dioxide. In addition to this, there are numerous specific policy instruments (such as malus system for private vehicles and fuel blending mandate).

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Greenhouse gas reduction mandate / Fuel blending mandate	Yes	Fuel suppliers subject to the obligation to GHG emissions by increasing the blending of petrol and diesel with biofuels. This measure increases fuel costs and thereby increases the incentive to switch to more energy efficient vehicles and more efficient fuel consumption.	0.30 TJ
Government Procurement of Low-emission Vehicles and Transportation	Yes	In order to reduce GHG emissions, vehicles and transport services must become more efficient. By working strategically with procurement and setting requirements for, for example, electricity or renewable fuels, public procurement can lead to development in the right direction. Public Procurement Act (lagen om offentlig upphandling), Utilities Procurement Act (lagen om upphandling inom försörjningssektorerna), Concessions Procurement Act (lagen om upphandling av koncessioner) are applied to procurement. The goal is to reduce GHG emissions from domestic transport by 70% by	0.30 TJ

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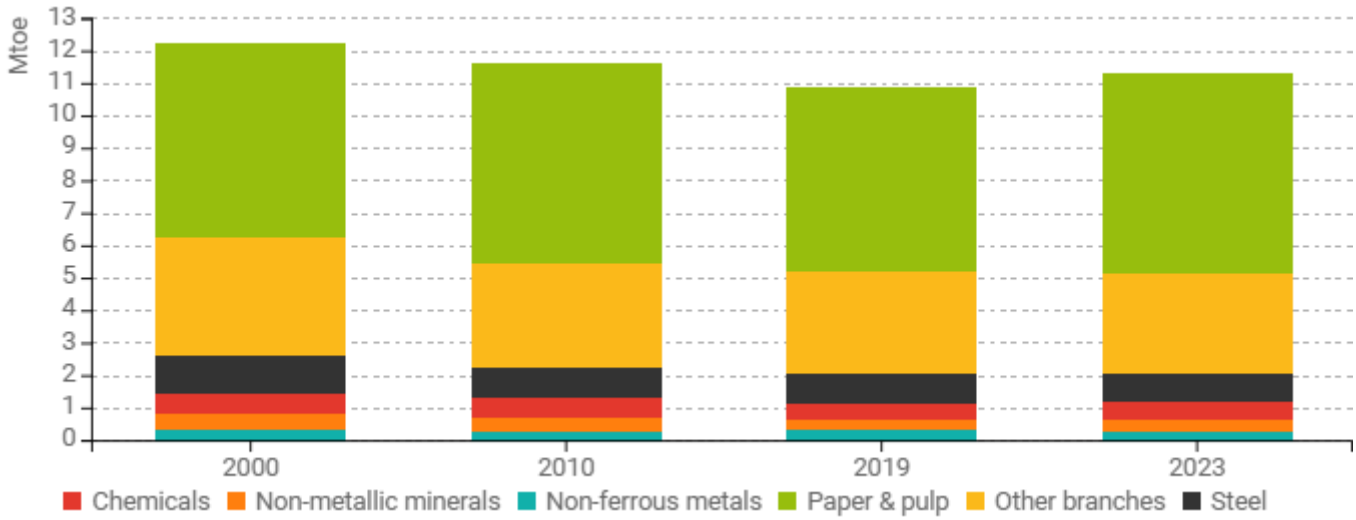
		2030. To achieve this goal, vehicles and transport services must become more efficient and be powered by electricity and renewable fuels. Environmentally friendly transports also contribute to, for example, cleaner air in cities. Climate requirements for tires make it possible to reduce the vehicle's fuel consumption. Tires with less rolling resistance also reduce noise.	
Low-emission zones	Yes	Municipalities can decide to exclude certain vehicles from particularly environmentally sensitive areas. From January 1, 2020, municipalities can introduce low-emission zones class 1, 2 or 3 in their municipality.	0.30 TJ

Source: MURE

Industry

Between 2000 and 2023 energy consumption in industry decreased by 0.86 Mtoe, from 12.2 to 11.34 Mtoe. Paper and pulp industry, which account for half of industry energy consumption saw an increase in consumption by 0.18 Mtoe. Steel industry consumption decreased by roughly 25%, from 1.1 Mtoe to 0.88 Mtoe.

Figure 20: Final energy consumption of industry by branch



Source: ODYSSEE

Unit consumption of cement has fallen by 1.2%/year (27 %) from 2000 to 2023. For steel, the unit consumption increased by 9% between 2000 and 2023. Paper and pulp unit consumption was 26% higher in 2023 compared to 2000.

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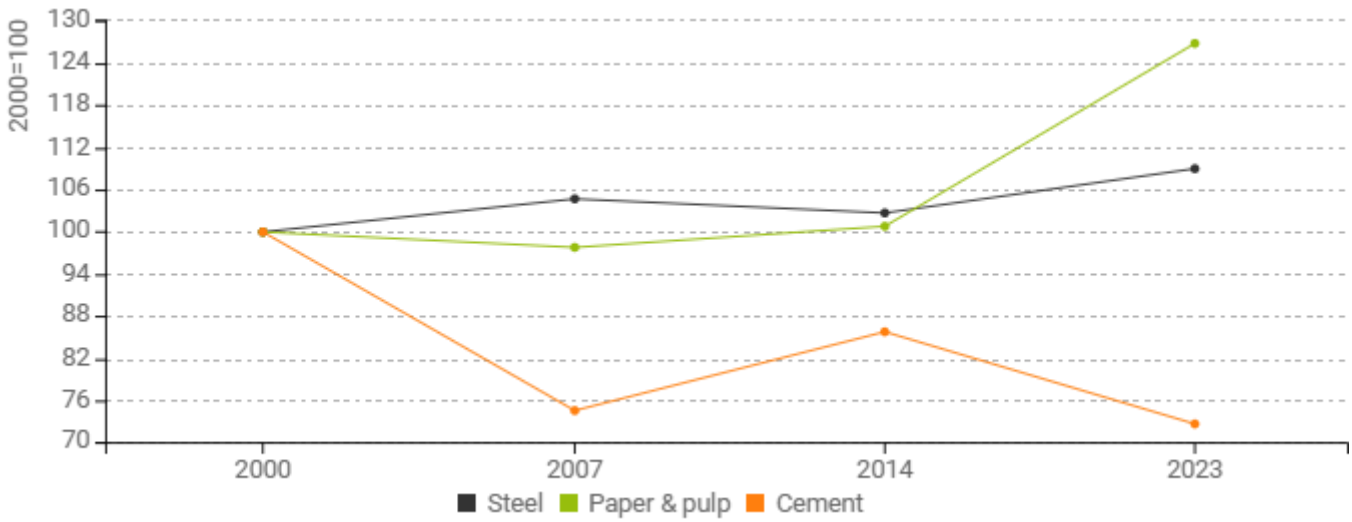
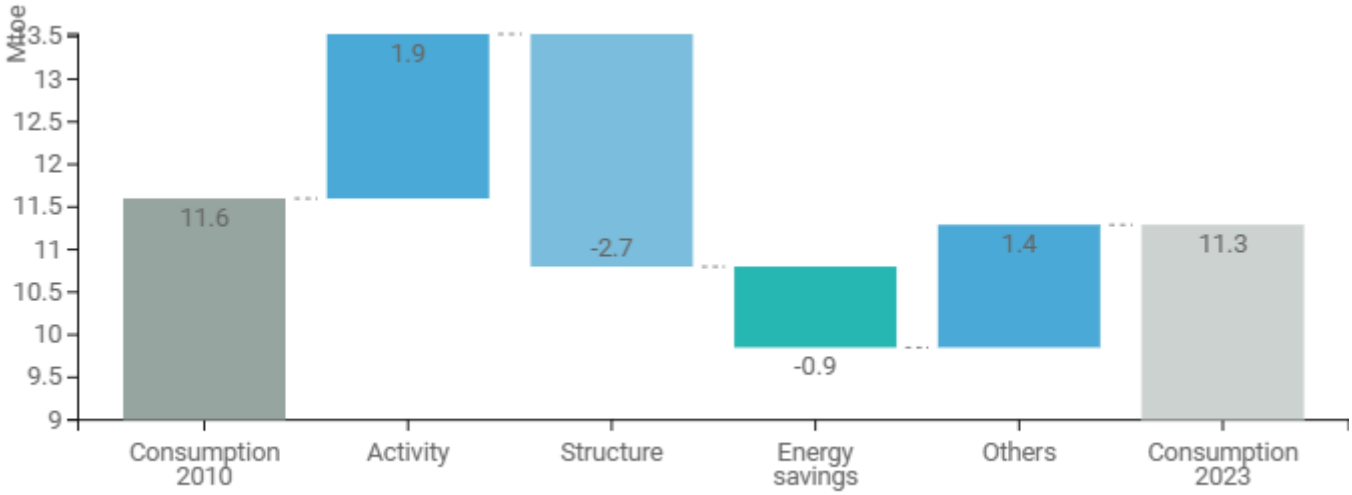
Figure 21: Unit consumption of energy-intensive products (toe/t)



Source: ODYSSEE

Total industrial energy consumption decreased by 0.3 Mtoe between 2010 (11.6 Mtoe) and 2023 (11.3 Mtoe). The greatest impact in this reduction was due to energy savings (-0.9 Mtoe), and structural change (-3 Mtoe). Upward pressure came from increased industrial activity (+1.9 Mtoe).

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



Source: ODYSSEE

There are, and have been, several policy instruments directed towards industry, both large industry and SMEs. Between 2008 and 2014 there was a programme in place whereby large energy consuming industries were allowed some relaxation on certain taxes if they committed themselves to verifiable measures for energy efficiency. Moreover, there are energy efficiency networks according to branch. Even if the companies are competitors, they have many issues in common, such as energy efficiency.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
Regional energy efficiency networks/Regionala energieffektiviseringsnätverk	No	Regional cooperation for SMEs	0.46 TJ
Industry stride/Industriklivet	Yes	This is a comprehensive measure focusing primarily on emissions reduction, but where energy efficiency is included. It has been running since 2018 consisting of numeous individual projetcs.	N/A
National Regional Fund Programme / Nationella Regionalfondsprogrammet	No		0.46 TJ

Source: MURE

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