Energy efficiency trends and policies

Overview

Final energy consumption in Sweden was almost 32 Mtoe in 2021. This figure implies a decrease since 2000, when consumption was almost 34 Mtoe. Transport consumption has shown a decrease in the last few years by 0.24 Mtoe, agriculture consumption has decreased by 0.16 Mtoe and industrial consumption by 1.25 Mtoe. Residential and service sectors show increased final energy consumption, with 0.30 Mtoe and 1.14 Mtoe increases respectively. Thus, there is an upward trend in residential and service sectors which is counterbalanced by downward trend in transport, agriculture and industry.

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

Source: ODYSSEE

Overall energy efficiency improved 24.4% between 2000 and 2021as measured by ODEX. The largest improvement, exceeding 30%, took place in residential and services sectors. Progress in transport and industry was more modest, 15.3% and 22.6%, 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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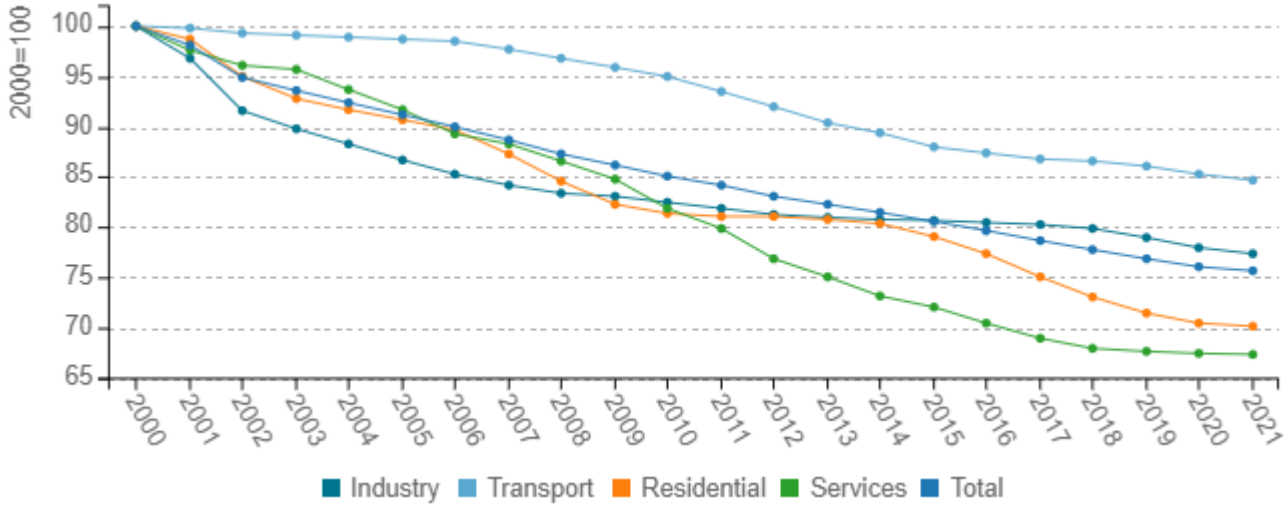
Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

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 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
Tax on energy and carbon dioxide	yes	A tax on energy was introduced in the 1950s. In 1992 a tax on emissions of carbon dioxide was introduced and soon these two taxes were de facto lumped together for practical purposes. Recently, efforts have been made to reduce the number of exceptions and to streamline taxation.	High to very high

Source: MURE

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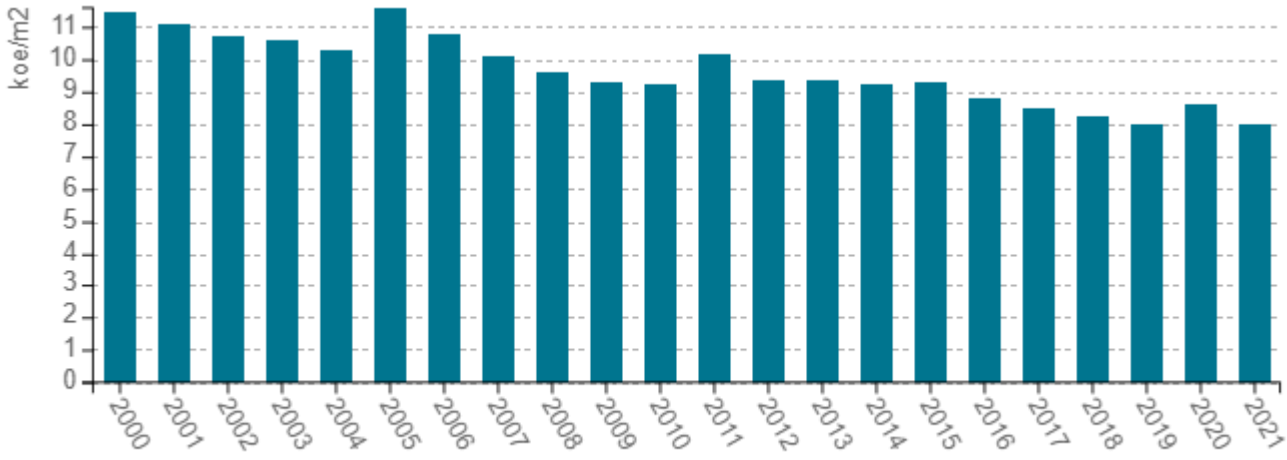
Buildings

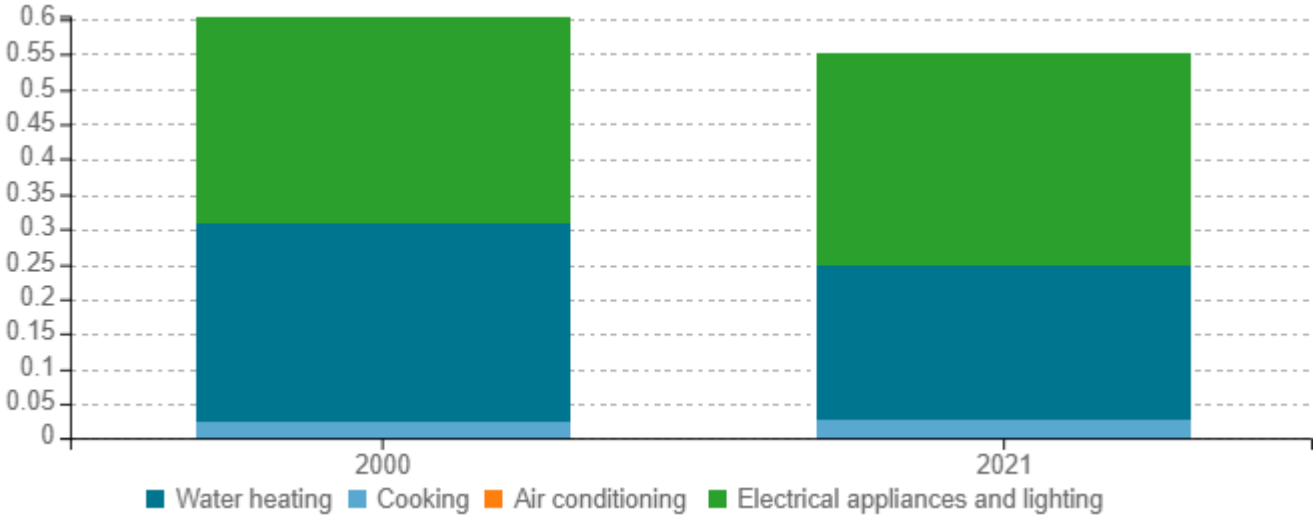
Energy consumption of space heating per m2 has shown a significant downward trend between 2000 and 2021, from 11.5 to 8.0 koe/m2, although there are of course annual variations. This is largely due to more energy efficient buildings (building materials, windows) or fuel substitution (e.g. installing heat pumps). Electrical appliances and lighting consumption has increased by 3.0 % between 2000 and 2021 to reach 0.30 toe per dwelling. On the contrary, water heating consumption per dwelling has decreased from 0.28 toe to 0.22 toe. There is also a slight increase in energy used for cooking.

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

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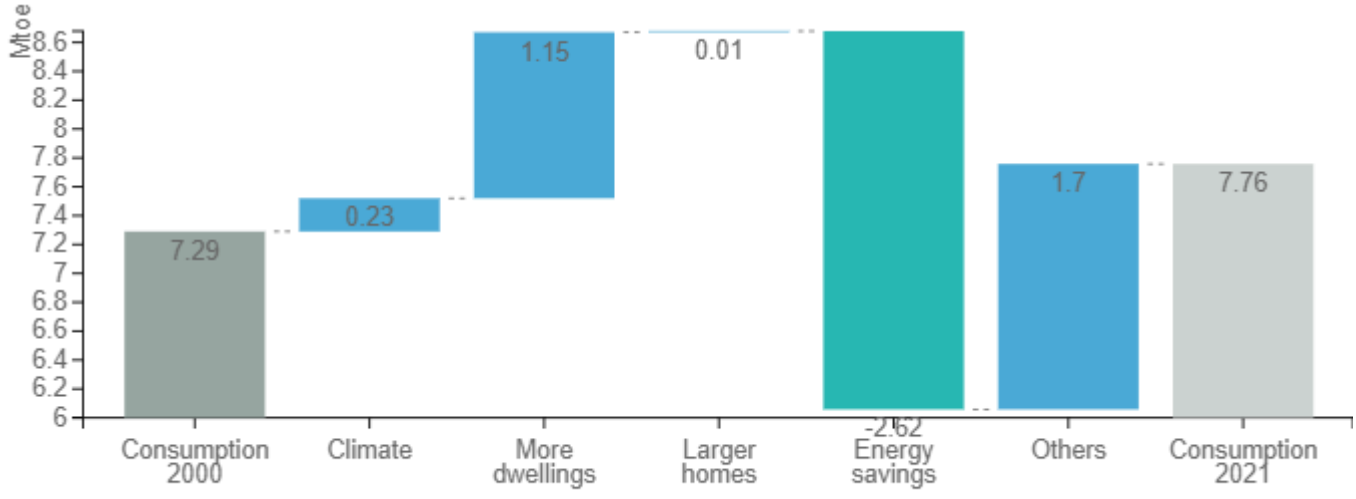
Total energy consumption increased by 0.47 Mtoe between 2000 and 2021, from 7.29 to 7.76 Mtoe. The single most important factor pulling down energy use is energy savings, amounting to 2.62 Mtoe. This is however counterbalanced by upward trends, such as the increasing number of dwellings, other effects and climate-related aspects.

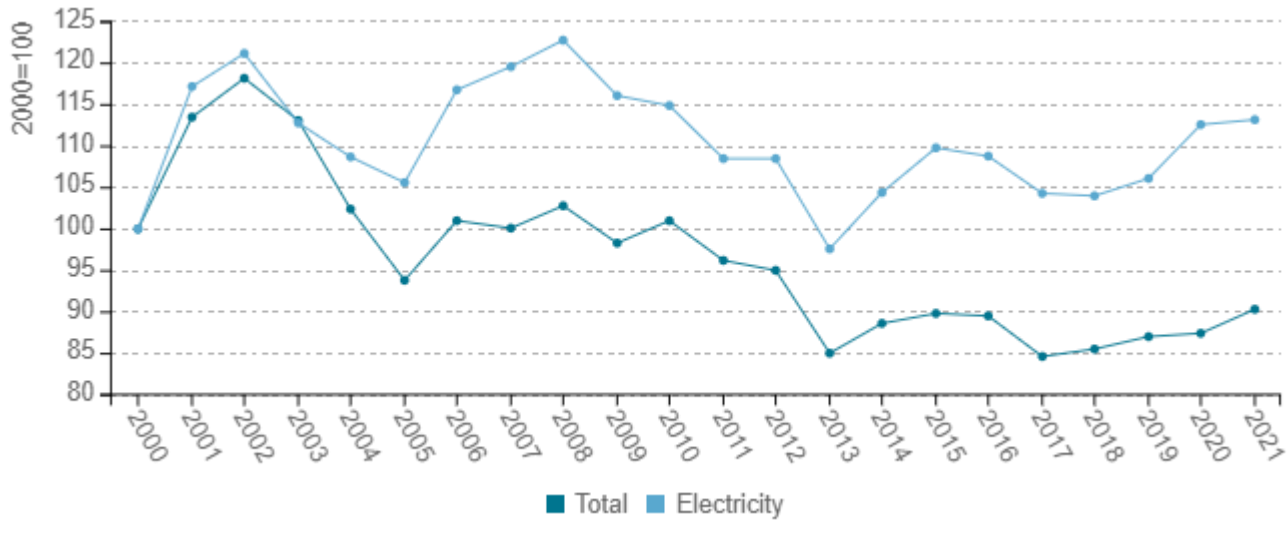
Figure 5: Main drivers of the energy consumption variation of households



Source: ODYSSEE

Electricity consumption per m2 in services have increased by 13.2% over the period 2000-2021. Energy consumption per m2 in services have decreased by 9.7% over the period 2000-2021.

Figure 6: Energy and electricity consumption 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

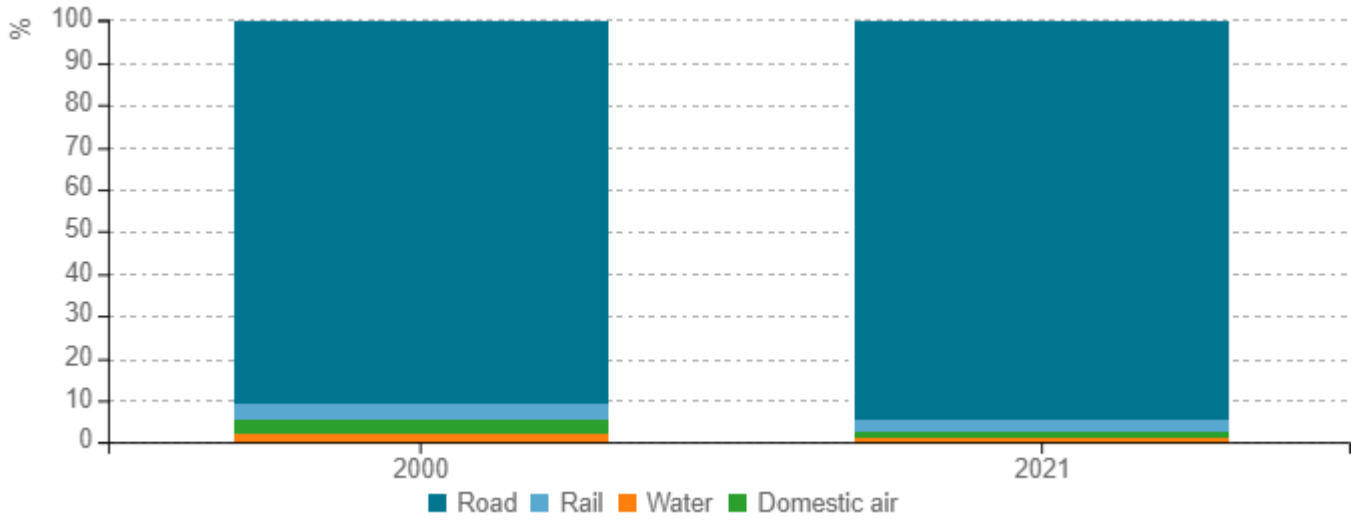
Measures	Description	Expected savings, impact evaluation
Technology procurement groups	Groups unite companies within a branch to conduct joint technology procurement, reducing the price of new energy-efficient technology	Medium, but there has been no numeric evaluation
Building code	Regulations on energy efficiency in new buildings	High

Source: MURE

Transport

The transport energy consumption has decreased by 3% between 2000 and 2021. The split between modes has remained very stable, dominated by road transport which accounts for 94.4%.

Figure 7: Transport energy consumption by mode



Source: ODYSSEE

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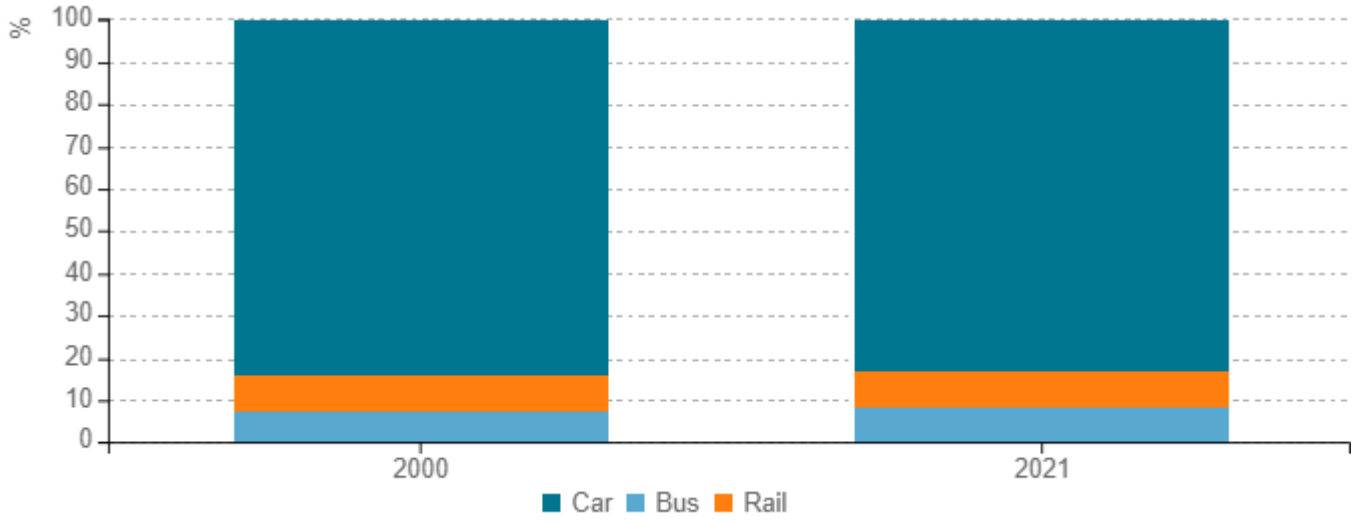
The share of rail in inland passenger traffic increased by 0.6 points between 2000 and 2021, which is partly a result of extensive campaigns. Share of cars decreased by 1.3 points and share of bus transport has increased by 0.7 points over the period 2000-2021.

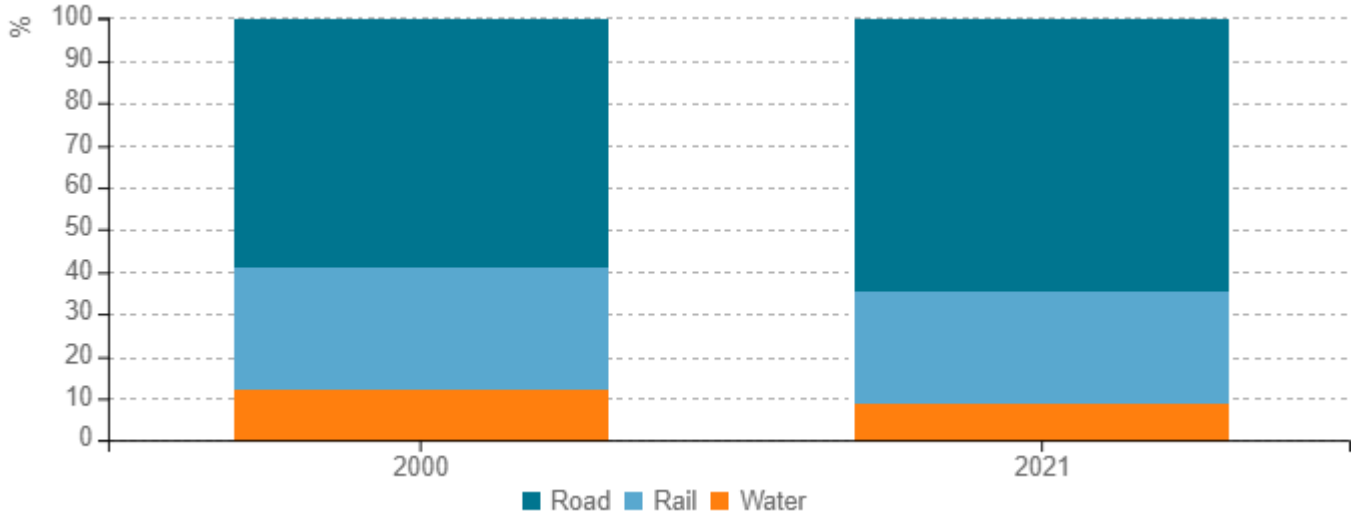
Figure 8: Modal split of inland passenger traffic



Source: ODYSSEE

For inland freight traffic, there was a significant increase in shift to road transport, from 58.9% to 64.8% over the period 2000-2021 to the detriment of rail and water transport.

Figure 9: Modal split of inland freight traffic



Source: ODYSSEE

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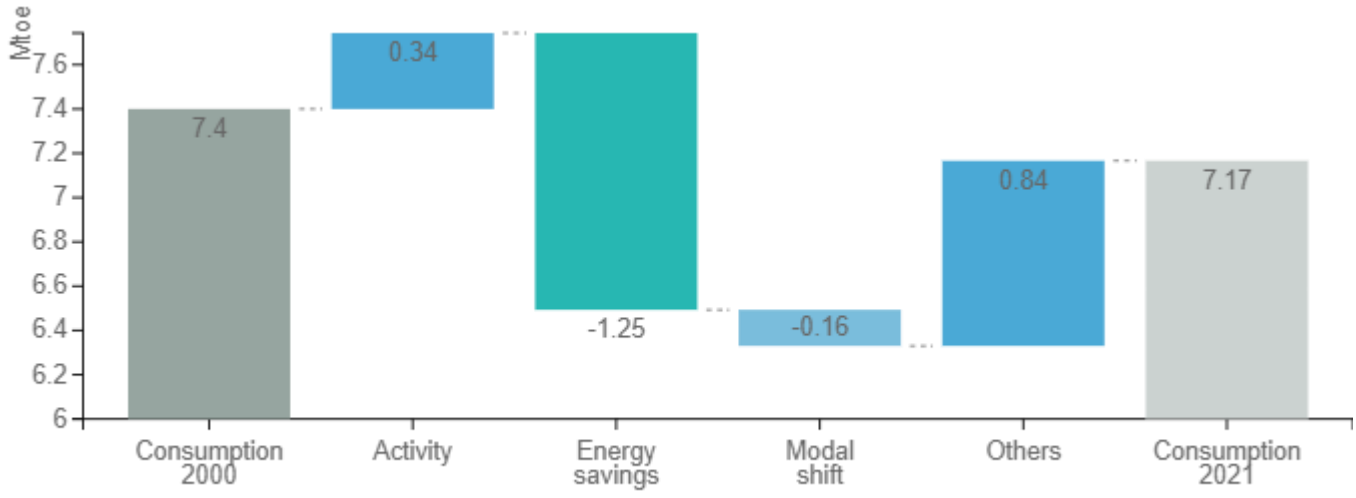
Energy consumption for transport decreased between 2000 and 2021 from 7.4 Mtoe to 7.17 Mtoe. The main reason behind the downward trend is increased energy savings. Modal shift plays a minor role.

Figure 10: 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	Description	Expected savings, impact evaluation
Tax on energy and carbon dioxide	A tax is levied on energy content regardless of energy source, but also on the carbon content. This gives those energy sources an edge which contain less carbon.	High impact

Source: MURE

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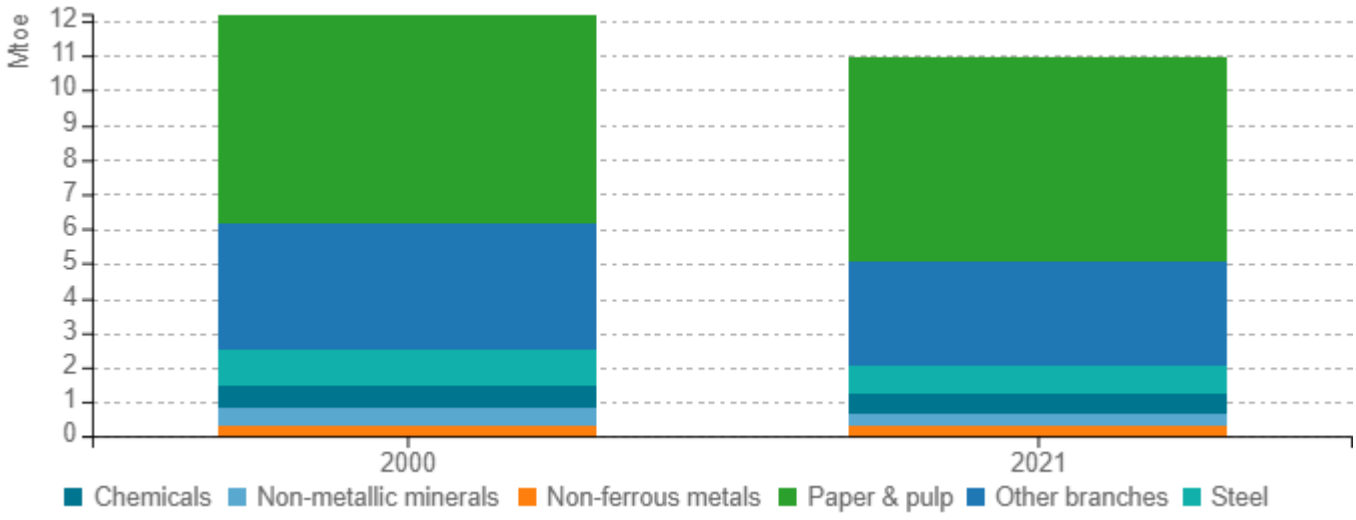
Industry

Between 2000 and 2021 total energy consumption in industry decreased by around 1.2 Mtoe, from 12.2 to 11 Mtoe. Paper and pulp industry, accounting for half of industry energy consumption, reduced its consumption from 6.0 Mtoe to 5.8 Mtoe. Steel industry consumption decreased by 23%, from 1.1 Mtoe to 0.8 Mtoe.

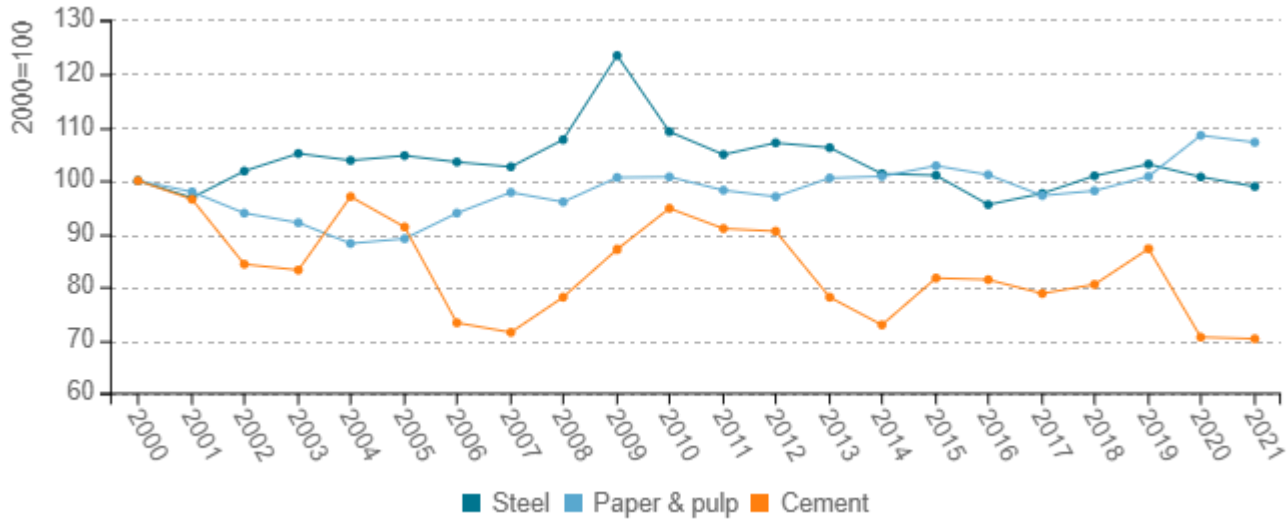
Figure 11: Final energy consumption of industry by branch



Source: ODYSSEE

In 2021, unit consumption of cement has fallen by 30% compared with 2000. For steel, the unit consumption was roughly the same in 2021 as in 2000. Paper and pulp unit consumption was 7% higher in 2021 compared to 2000.

Figure 12: Unit consumption of energy-intensive products (toe/t)



Source: ODYSSEE

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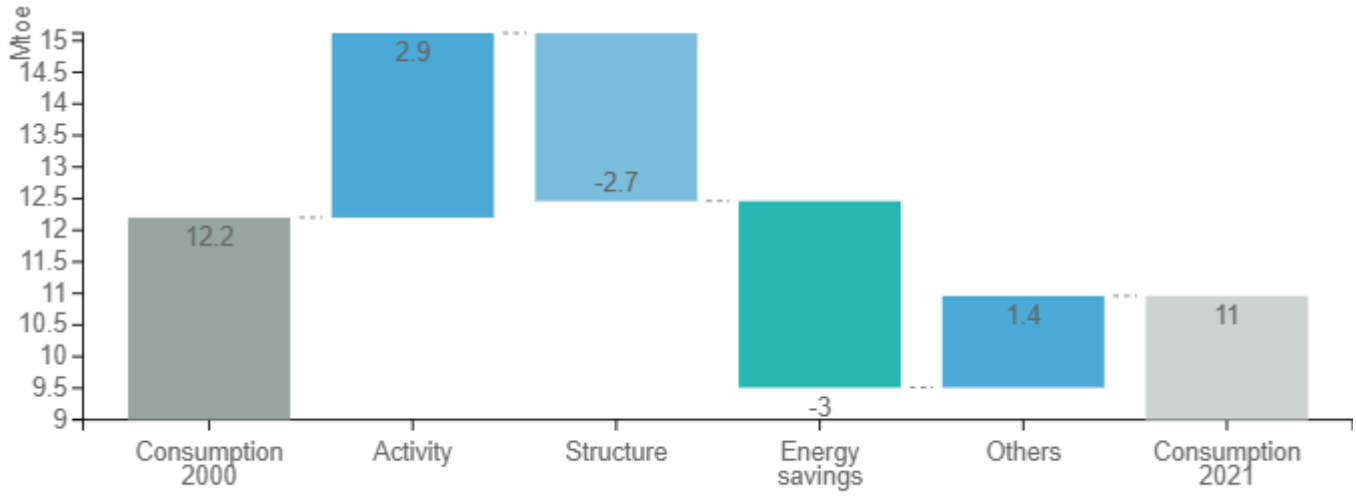
Total industrial energy consumption in 2000 was 12.2 Mtoe and in 2021, 11 Mtoe. The greatest impact in this reduction was due to energy savings, but also to some extent structural change. Upward pressure came from increased activity among others.

Figure 13: 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.

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

Measures	**Description**	**Expected savings, impact evaluation**
Networks for energy efficiency (according to branch)	Companies share their experience voluntarily on issues that affect them all	High

Source: MURE

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