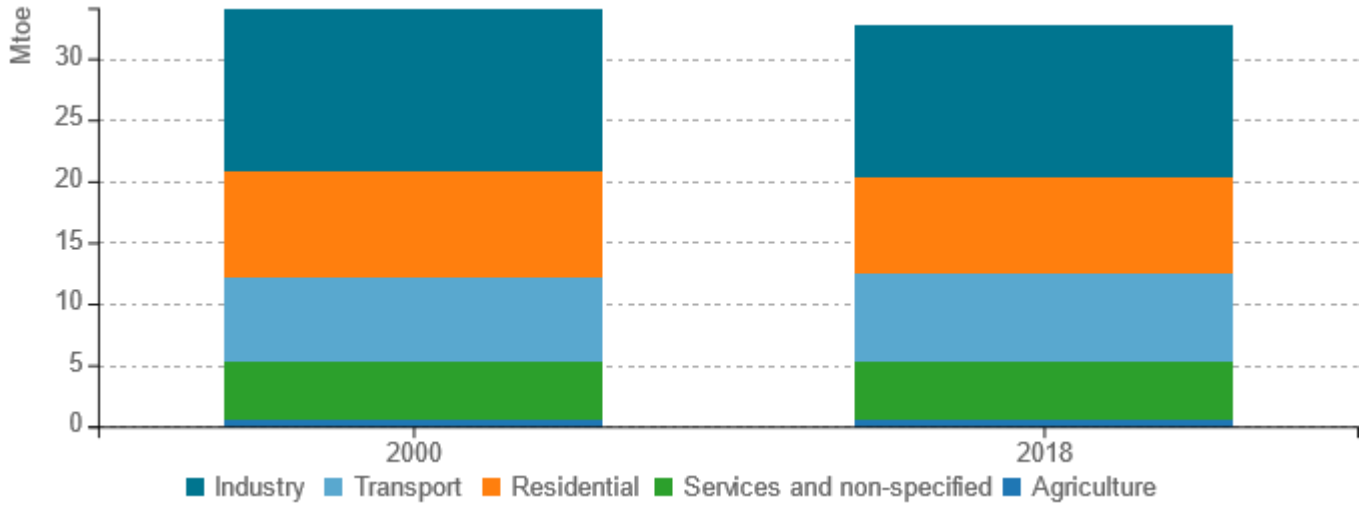
Energy efficiency trends and policies

Overview

Final energy consumption in Sweden was 32.6 Mtoe in 2018. This figure implies a decrease since 2000, when consumption was almost 34 Mtoe. Transport consumption has shown an increase in the last few years by 0.42 Mtoe and agriculture consumption has increased slightly by 0.02 Mtoe, such as services. As for industry and the residential sector, they have shown a decrease since 2000. Industry consumption has decreased by 0.8 Mtoe, and the residential sector by 0.93 Mtoe. Thus, there is an upward trend in transport which is counter balanced by a downward trend in industry and the residential sector.

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



Source: ODYSSEE

Overall energy efficiency improved 22.5% between 2000 and 2018 as measured by ODEX. The largest improvement, exceeding 30%, took place in residential and services sectors. Progress in transport and industry was more modest, 11.6% and 18%, 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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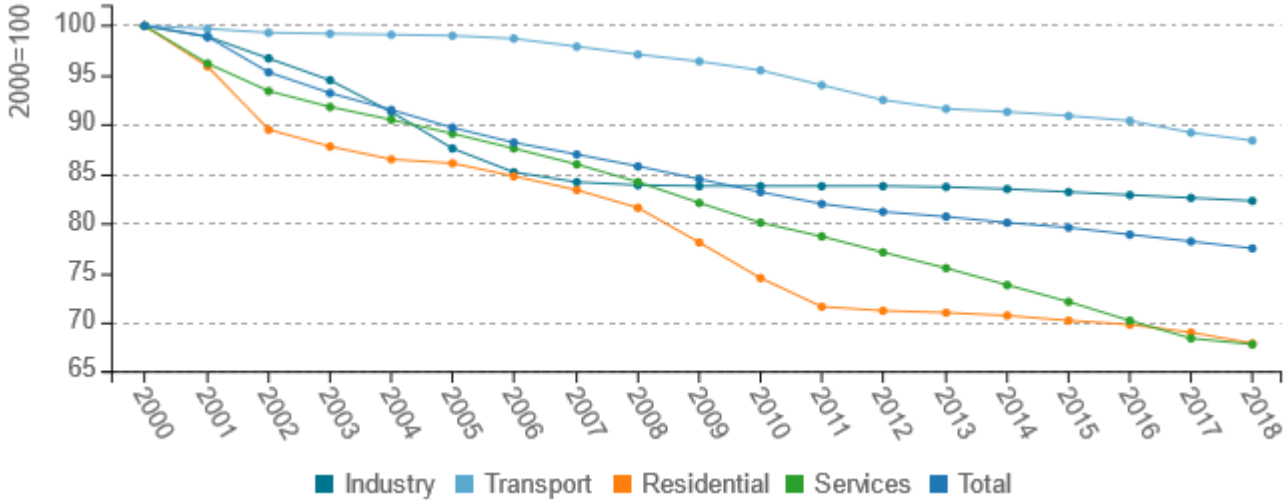
Figure 2: Technical Energy Efficiency Index



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 20% between 2008 and 2020, and 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 2020 is not available yet.

Table 1: Sample of cross-cutting measures

Measures	NEEAP measures	Description	Expected savings, impact evaluation	More information available
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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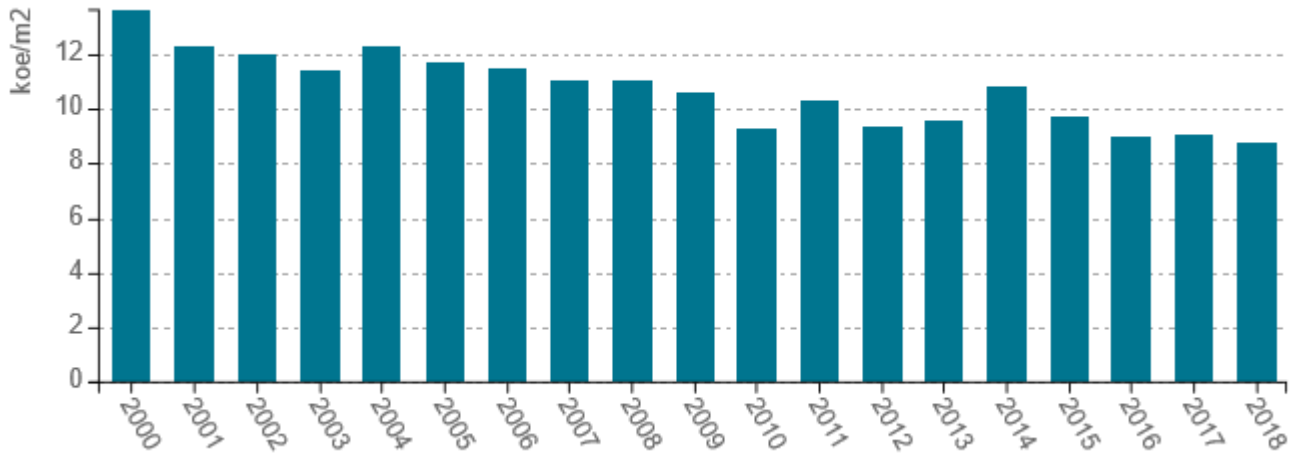
Buildings

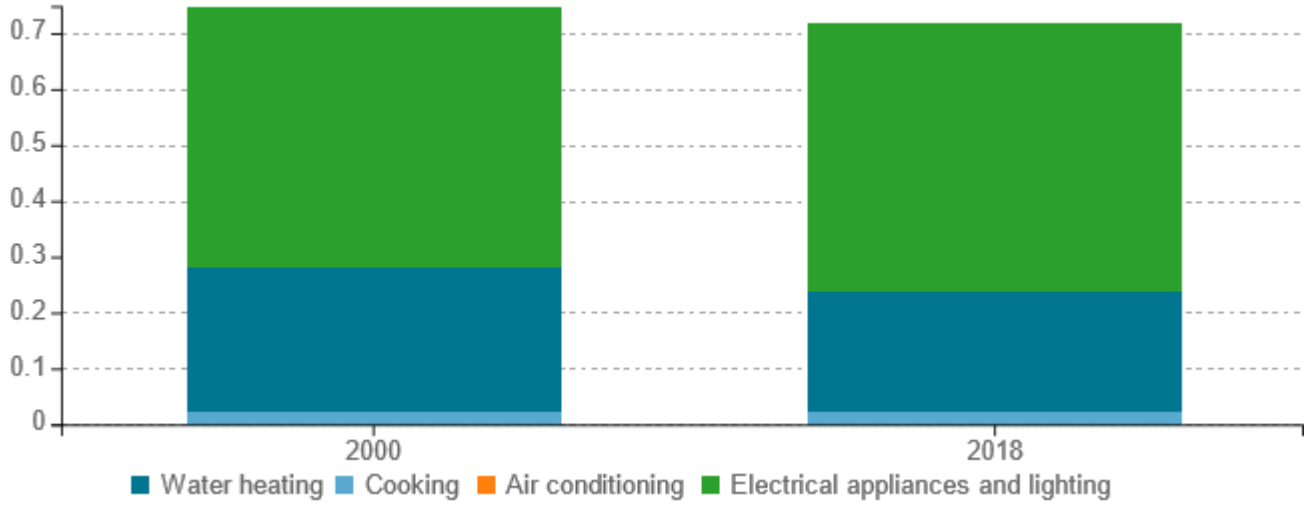
Energy consumption of space heating per m2 has shown a significant downward trend between 2000 and 2018, from 13.6 to 8.76 koe/m2, although there are of course annual variations. This is largely due to more energy efficient buildings (building materials, windows) or fuel substitution (e.g. installing heat pumps). Electrical appliances and lighting consumption has increased by 2.7% between 2000 and 2018 to reach 0.48 toe per dwelling. On the contrary water heating consumption per dwelling has decreased from 0.26 toe to 0.22 toe. There is also a slight decrease 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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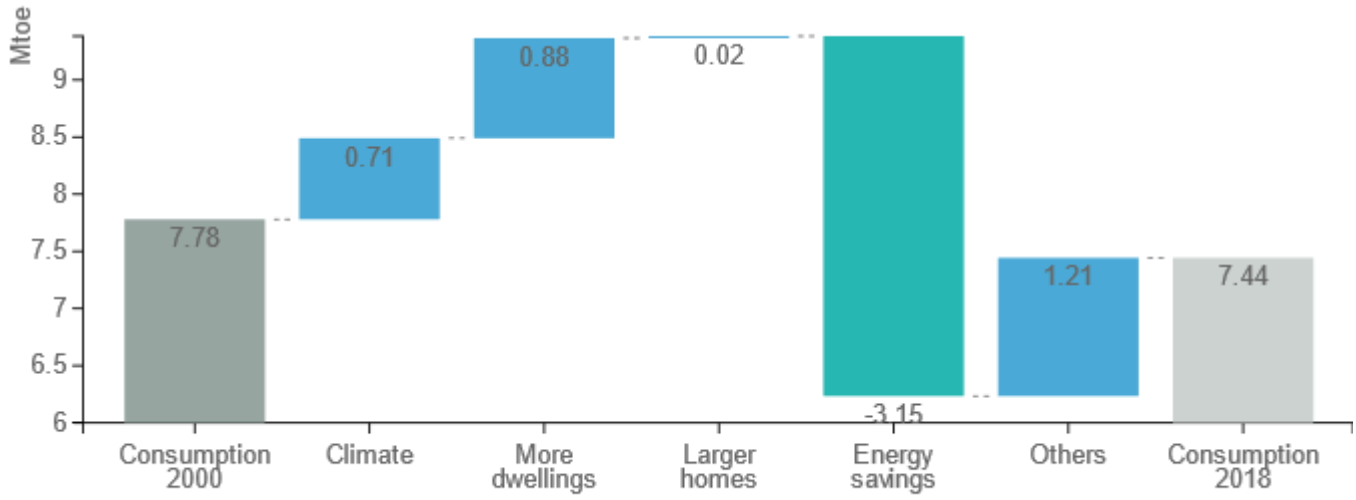
Total energy consumption decreased by 0.34 Mtoe between 2000 and 2018, from 7.78 to 7.44 Mtoe. The single most important factor pulling down energy use is energy savings, amounting to 3.15 Mtoe. This is however counterbalanced by upward trends, such as the increasing number of dwellings, climate-related aspects and other effects.

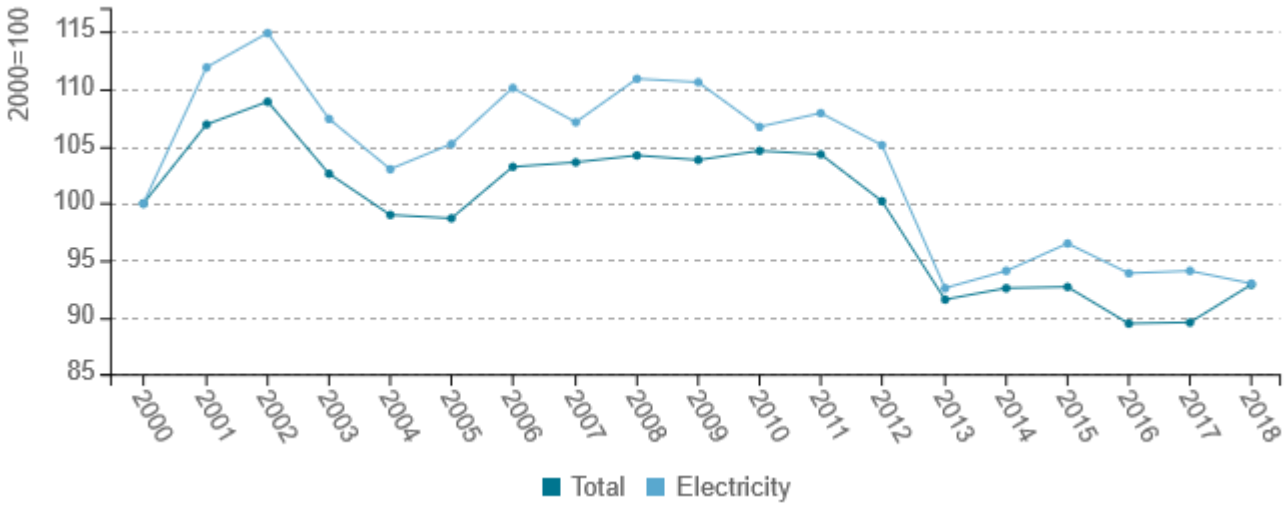
Figure 5: Main drivers of the energy consumption variation of households



Source: ODYSSEE

Both energy and electricity consumption per m2 in services have decreased by 7% over the period 2000-2018.

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

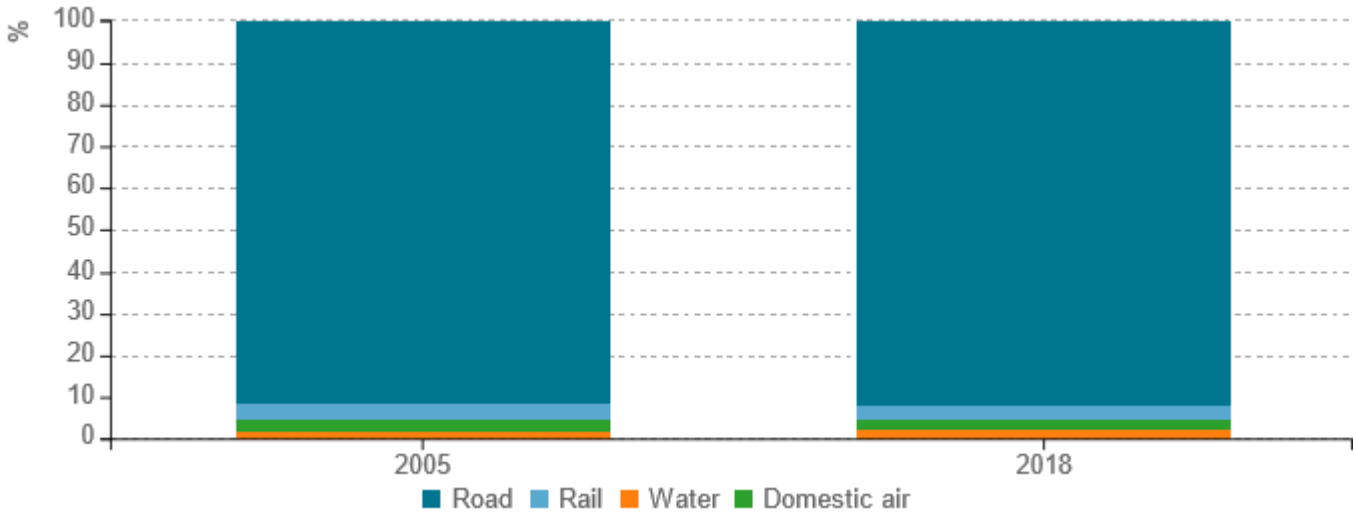
Measures	Description	Expected savings, impact evaluation	More information available
Technology procurement groups	Specific actors make their purchases of new technology jointly in order to lower prices	Medium, but there has been no numeric evaluation	
Building code	Regulations on energy efficiency in new buildings	High	

Source: MURE

Transport

Transport consumption has increased by 6% between 2000 and 2018. The split between modes has remained very stable, dominated by road transport which accounts for 92%.

Figure 7: Transport energy consumption by mode



Source: ODYSSEE

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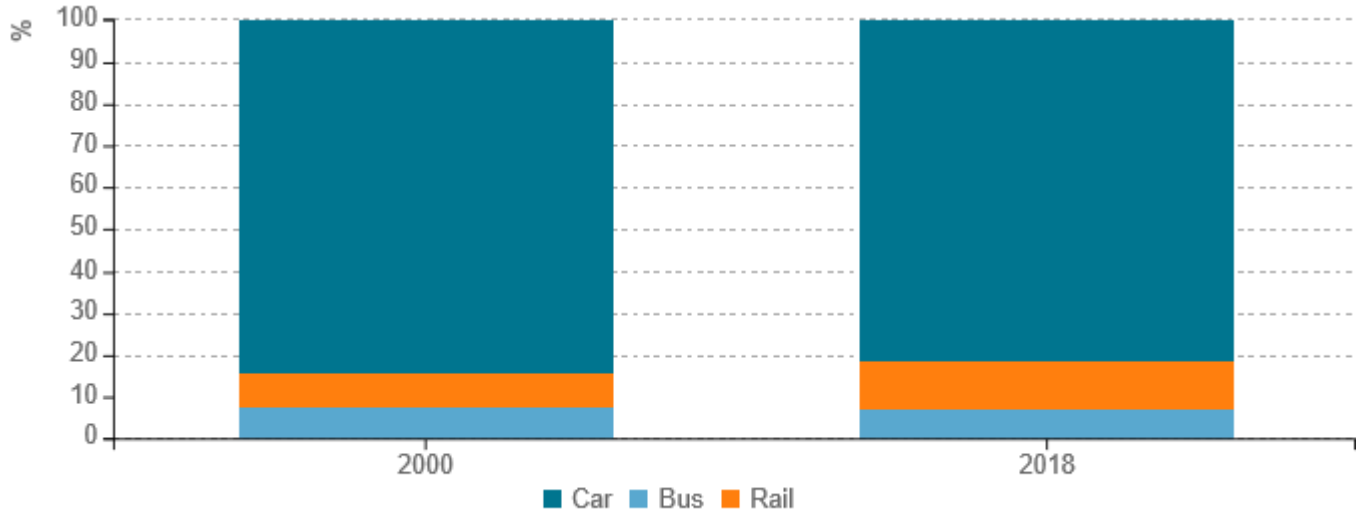
Passenger traffic increased by 16% over the period 2000-2018. The share of rail in inland passenger traffic increased from 8.3% to 11.4%, which is partly a result of extensive campaigns. Correspondingly, the share of cars decreased from 84.2% to 81.5%. Bus transport share decreased from 7.5% to 7%.

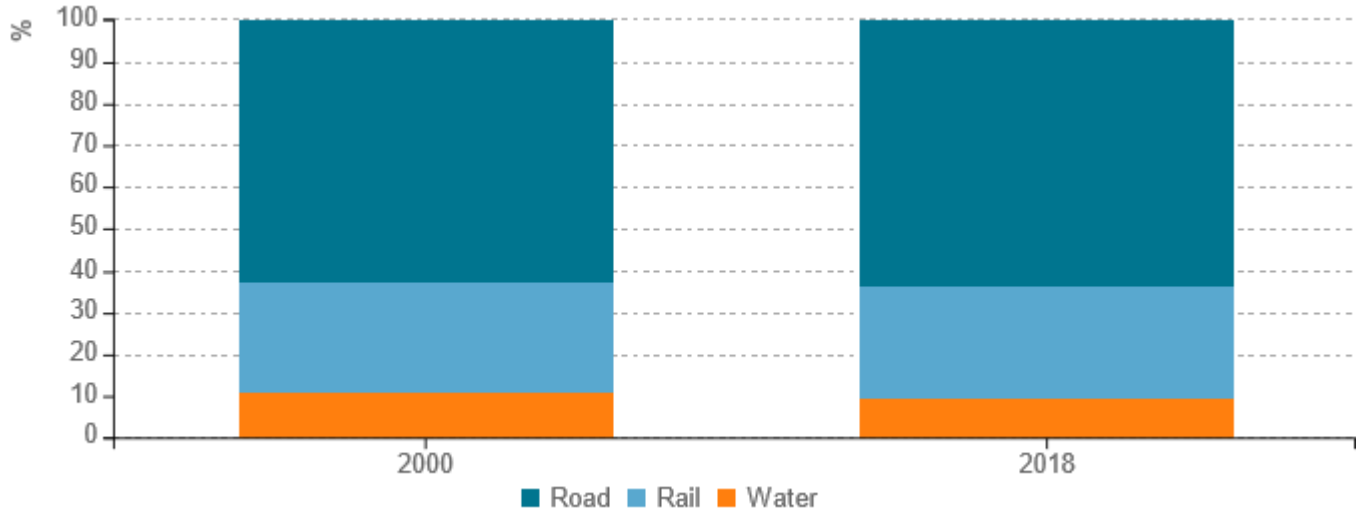
Figure 8: Modal split of inland passenger traffic



Source: ODYSSEE

Freight traffic increased by 10% between 2000 and 2018. There were only minor shifts in inland freight traffic: a slight increase in rail and road transport and correspondingly a slight decrease in water transport.

Figure 9: Modal split of inland freight traffic



Source: ODYSSEE

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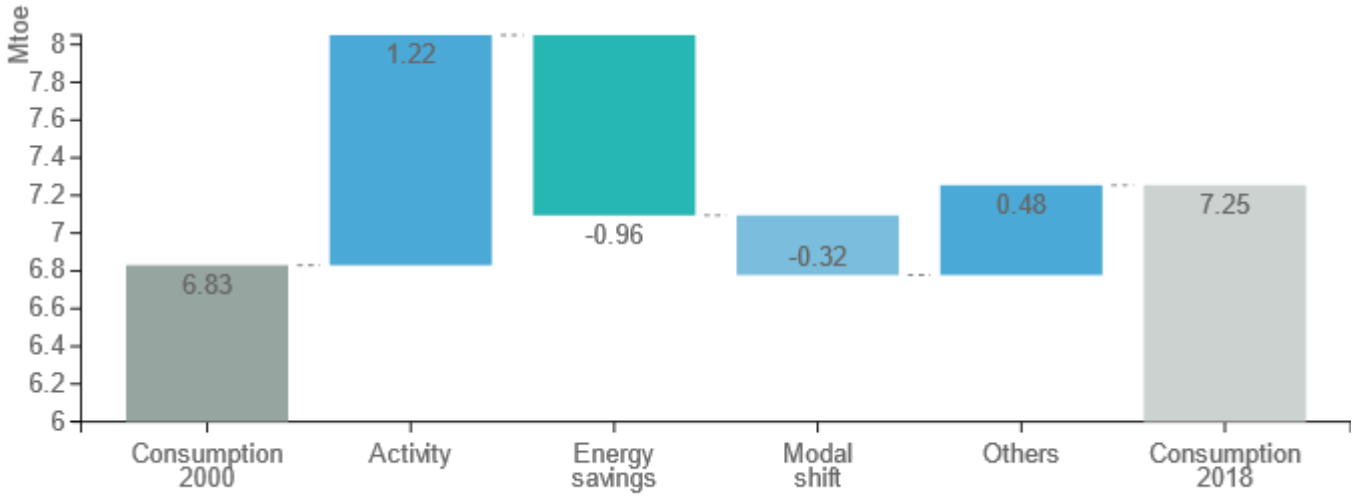
Energy consumption for transport increased between 2000 and 2018 from 6.83 Mtoe to 7.25 Mtoe. The main reason behind the upward trend is increased activity, which is only partly counterbalanced by energy savings. Modal shift plays a minor role.

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 bonus-malus system for private vehicles or support for electric cars).

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

Measures	Description	Expected savings, impact evaluation	More information available
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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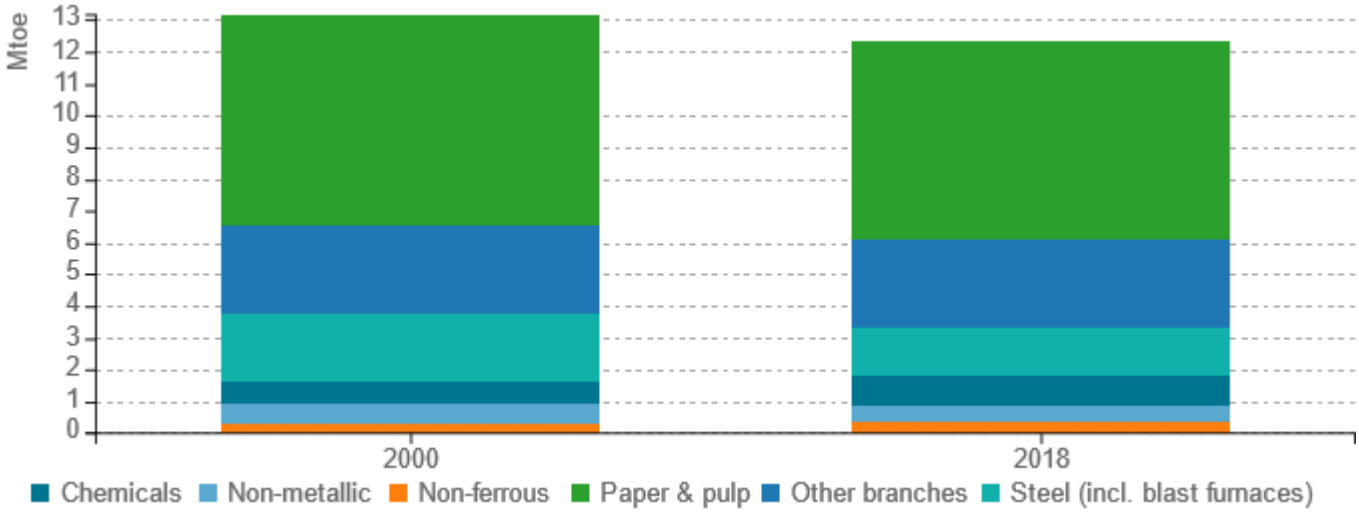
Industry

Between 2000 and 2018 total energy consumption in industry decreased by around 0.8 Mtoe, from 13.2 to 12.3 Mtoe. Paper and pulp industry, accounting for half of industry energy consumption, reduced its consumption from 6.6 Mtoe to 6.2 Mtoe. Steel industry consumption decreased by 28%, from 2.1 Mtoe to 1.5 Mtoe.

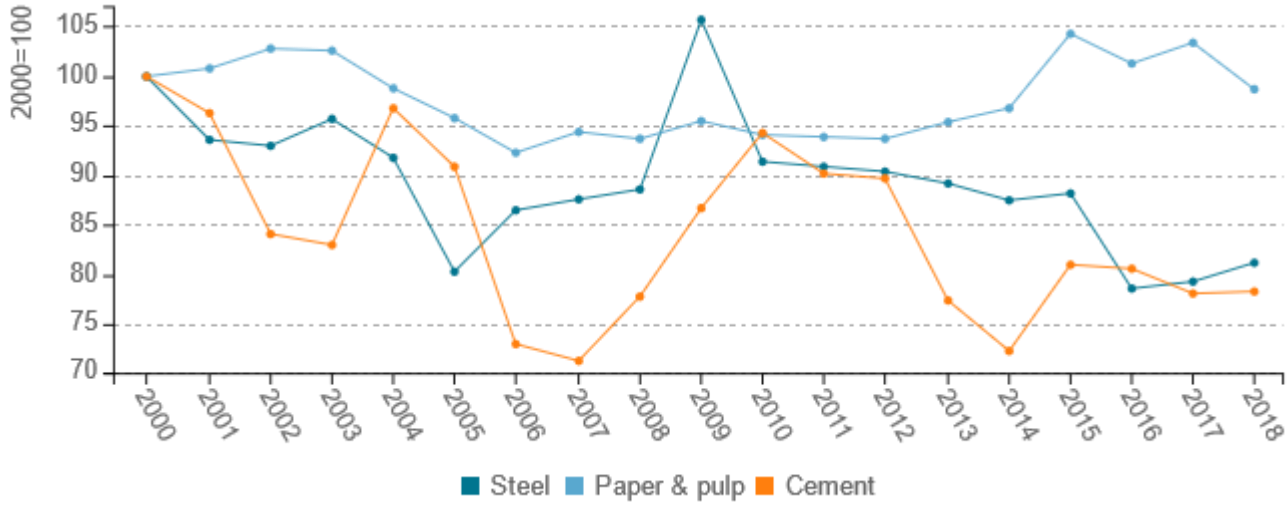
Figure 11: Final energy consumption of industry by branch



Source: ODYSSEE

In 2018, unit consumption of both steel and cement is roughly 80% of what it was in 2000. Paper and pulp unit consumption is at the same level in 2018 as in 2000.

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



Source: ODYSSEE

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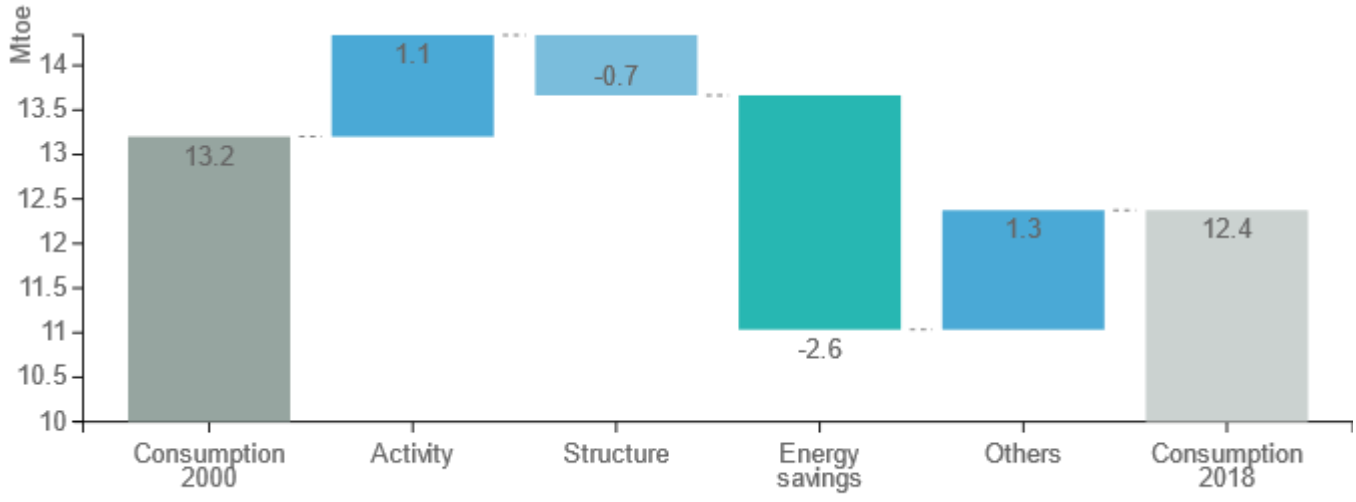
Total industrial energy consumption in 2000 was 13.2 Mtoe and in 2018, 12.4 Mtoe. The greatest impact in this reduction was due to energy savings, but also to some extent structural change. Upward pressure came from increased activity among others.

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	More information available
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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