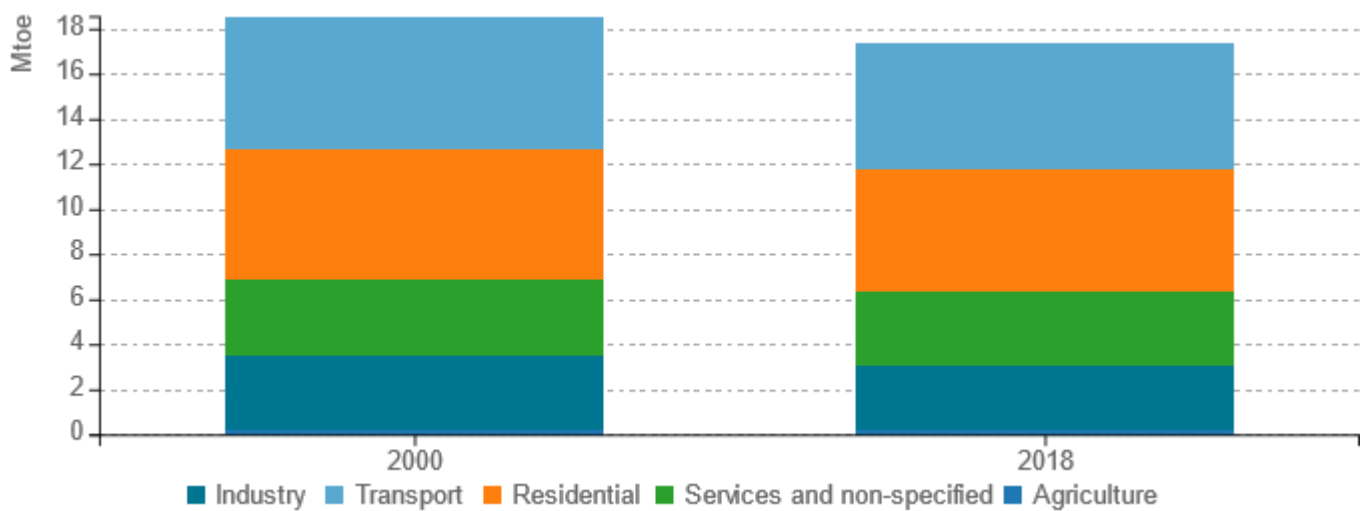


Energy efficiency trends and policies

Overview

From 2000 to 2018, Switzerland’s total final energy demand decreased from 18.4 to 17.3 Mtoe (i.e., by 6%). The transport sector remained the largest consumer, with a slight growth in the share of total final energy demand from 37% in 2000 to 40% in 2018. While the household and industry sectors both experienced a reduction in their shares of total final energy demand by 1% and 2% respectively (absolute change: -11% and -14%), the share of services in total final energy demand remained at 17% of total final energy demand.

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

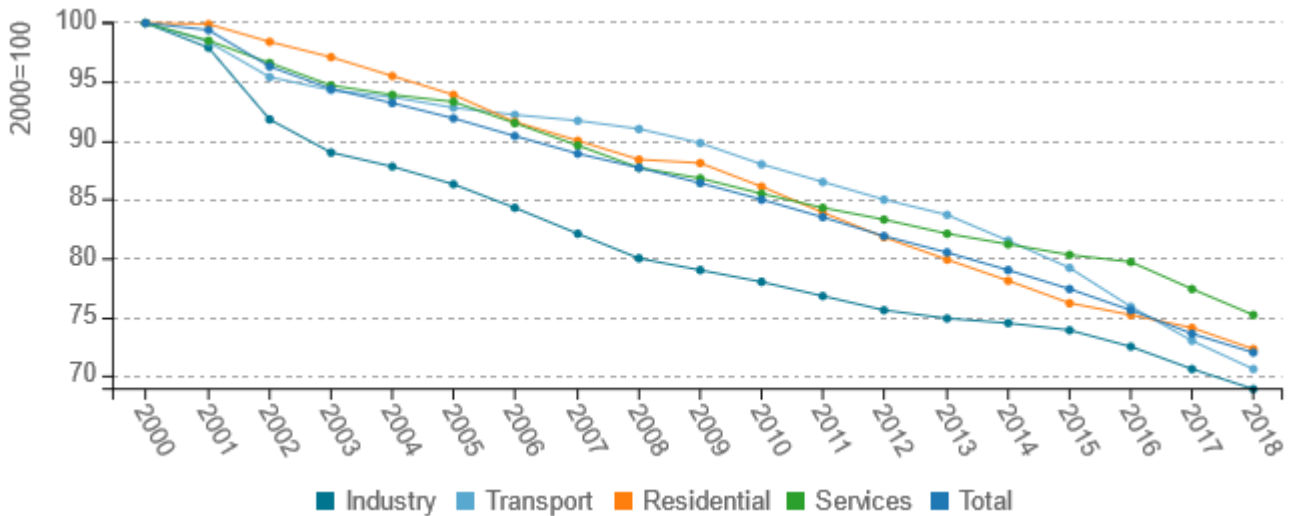


Source: ODYSSEE

Overall nation-wide energy efficiency of Switzerland improved at the rate of 1.7% p.a., as measured by the ODEX (28% total improvement) from 2000 to 2018. The energy efficiency of the industry sector improved at a rate of 2% p.a., making it the fastest improving sector in Switzerland. The transport sector improved its energy efficiency at 1.8% p.a., followed by the residential sector with an energy efficiency improvement rate of 1.5% p.a. With a rate of 1.4% p.a., the tertiary sector displayed the slowest improvement in energy efficiency from 2000 to 2018.



Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

In May 2017, the Swiss electorate accepted the new Federal Energy Act which prepares Switzerland for the energy transition by introducing new and modifying existing measures to reduce energy consumption, increase energy efficiency and promote the use of renewable energy. The law also prohibits the investment in new nuclear power plants. The Act for example defines reference values of -16% energy consumption per person until 2020 and -43% energy consumption per person until 2035 compared to 2000. The Act also aims to expand electricity production from new renewables to 4.4 TWh by 2020 and to 11.4 TWh by 2035. The Act represents the first bundle of measures under the Energy Strategy 2050. The Energy Act is currently being revised. The revised version includes binding reduction targets for energy and electricity consumption per capita for the years 2035 and 2050. In order to reach the targets of the Paris agreement, Parliament has also passed a revised version of the CO2 Act. However, the enforcement of the revised law depends on the outcome of a referendum to be held in the course of 2021. The revised CO2 Act includes measures like an increase of the existing CO2 levy up to a maximum of 210 CHF/tCO2.



Table 1: Sample of cross-cutting measures

Measures	NEEAP measures	Description	Expected savings, impact evaluation	More information available
CO2 Levy	no	The CO2 levy is a key instrument in order to achieve the Swiss CO2 emission targets as defined in the CO2 Act. The levy per ton of CO2 applies to fossil fuels such as oil, gas and coal but motor fuels are exempted. About one third of total CO2 emissions in Switzerland are covered by the levy. The tax creates an incentive for a more efficient use of fossil fuels and/or for a fuel switch to less carbon intensive sources by increasing their price. The price has been increased from 12 CHF in 2008 to 96 CHF/t CO2 in 2018.	By 2020: estimated mitigation impact of 1.2 MT of CO2 relative to reference scenario	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/search
Promotion of Electricity from Renewable Energy	no	Producers of renewable power can claim financial support for the produced energy. Since 2018 the support scheme is more market-oriented system and combines direct-marketing with a flexible premium. For (small) PV installations a one-off payment is in place. The Energy Act is currently being revised. The revised version provides for binding renewable production targets, an extension of the support measures until 2035 and a replacement of the feed-in tariff by investment contributions.	By 2018: financially supported renewable electricity production: 5.29 GWh	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/search
Minimum Energy Efficiency Requirements for Installations and Equipment	no	Newly sold installations and equipment must meet minimum requirements with respect to energy efficiency. As a rule, the minimum standards in Switzerland are aligned with the regulations of the European Union.	Currently, there is no quantitative impact evaluation available	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/search

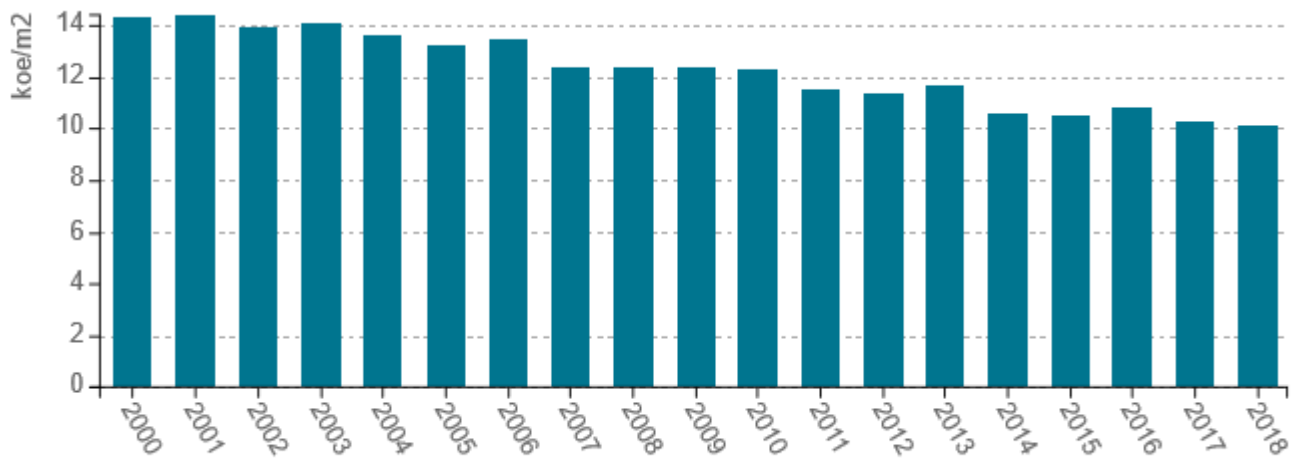
Source: MURE



Buildings

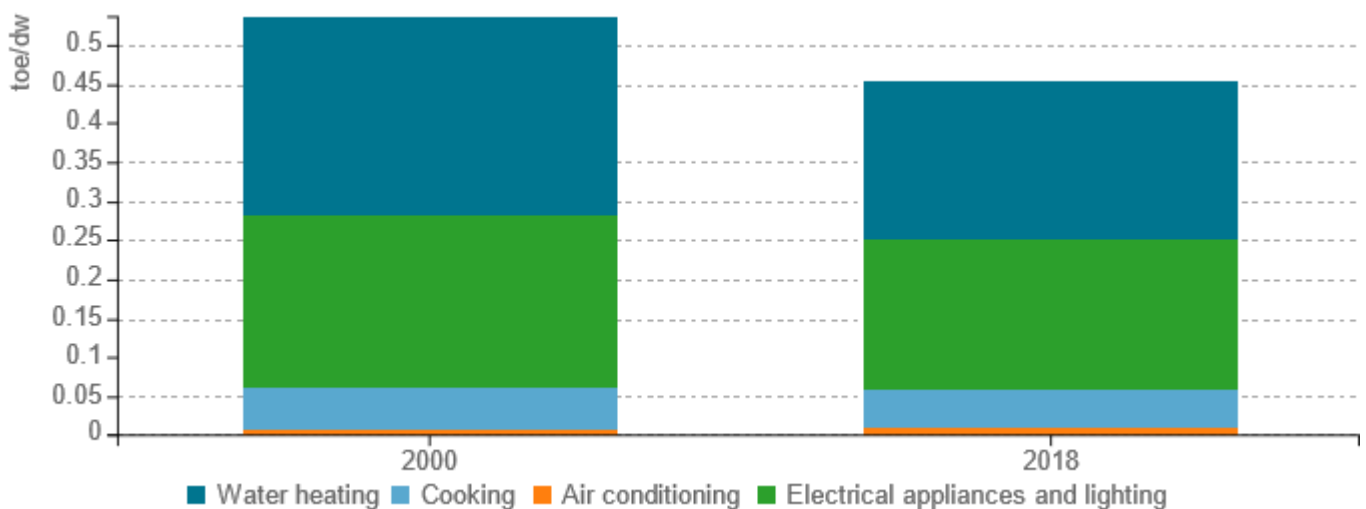
In 2018, space heating accounted for 67% of the sector’s final energy demand, electrical appliances for 14.2% and water heating for 14.8%. While energy demand of electrical appliances increased by 3.7% p.a. from 2000 to 2018, final energy demand for space heating (climate corrected) decreased by 0.9% p.a. over the same period. Final energy demand for water heating stayed almost constant and cooking increased slightly (by 0.6% p.a.). Hence residential final energy demand decreased by almost 0.5% p.a. from 2000 to 2018 thanks in particular to improved energy efficiency of space heating (by 2.0% p.a. and 2.5% p.a. decrease since 2000 and 2010, respectively).

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)

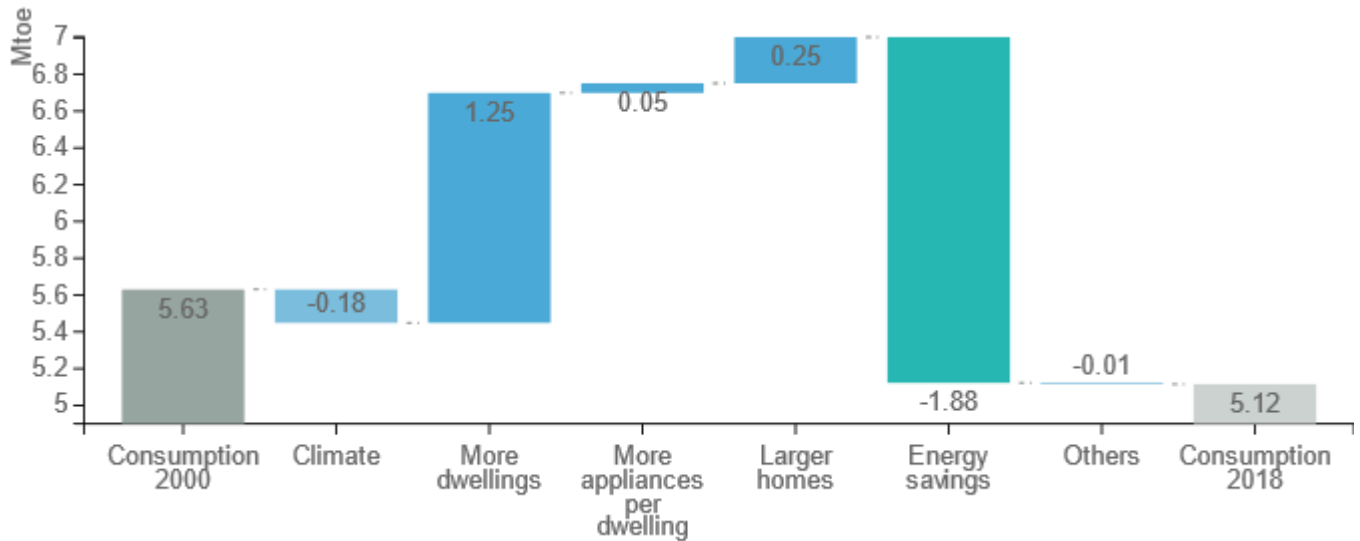


Source: ODYSSEE



The final energy consumption of residential buildings was 0.51 Mtoe lower in 2018 than in 2000. Although more dwellings (increase by 1.25 Mtoe) and lifestyles (0.05 Mtoe for “more appliances per dwelling” and 0.25 Mtoe for “larger homes”) led to higher energy consumption, this growth was overcompensated by energy savings (1.88 Mtoe) and warmer climate (0.18 Mtoe).

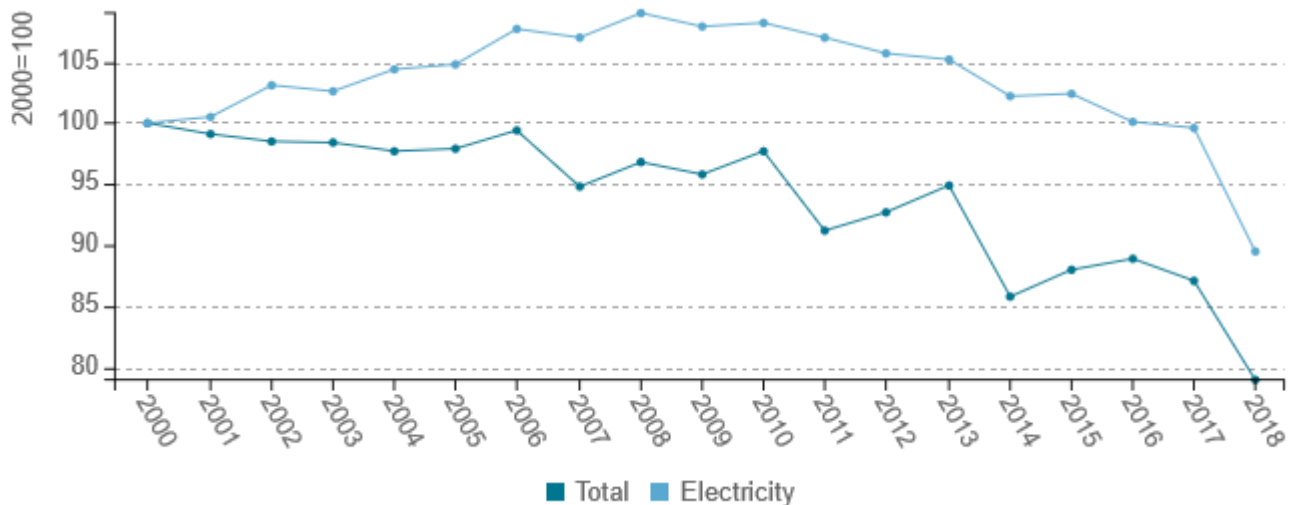
Figure 5: Main drivers of the energy consumption variation of households



Source: ODYSSEE

Final energy consumption per floor area for the service sector is decreased by 1% p.a. on average from 2000 to 2018. On the other hand, electricity consumption per area decreased by only 0.26 % p.a. over the same period despite the fact that the final electricity consumption increased by 0.2% p.a. between 2000 and 2018.

Figure 6: Energy and electricity consumption per m² (normal climate)



Source: ODYSSEE



In Switzerland, buildings are responsible for approximately 40% of total energy consumption. With the buildings program, the Federal Government in collaboration with the cantons aims to considerably reduce energy consumption and CO2 emissions in this sector. In addition to the buildings program, the cantons have established model ordinances that define minimum standards for new buildings targeting lower levels of energy consumption. The adoption of the updated standards (2014) into cantonal legislation, which for example foresees that new buildings do not exceed a maximum of 3.5 liter heating oil equivalents of thermal energy, is currently (2021) still ongoing. The revised CO2 Act, which has already been passed by parliament but is still subject to a referendum in the course of 2021 foresees that from 2023 onwards, no heating systems powered by fossil fuels may be installed in new buildings. When replacing heating systems in existing buildings, fossil systems are only permitted if the building is well insulated.

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

Measures	Description	Expected savings, impact evaluation	More information available
Buildings Program	The buildings program aims to promote energy-efficient refurbishments of buildings as well as investments in renewable energies, waste heat recovery and the optimization of building services technology. Owners of buildings can apply for subsidies and thus benefit from financial support, lower heating costs and an increased market value of their property. Part of program is financed through revenues from the CO2 levy.	By 2020: estimated mitigation impact of 1.0 MT of CO2 relative to reference scenario	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/446
Cantonal Energy Policies	Under the CO2-Act (Art. 9), the cantons are required to define standards that lead to the reduction of CO2-emissions in both new and old buildings. In this context, the cantons agreed to harmonize their building codes throughout Switzerland and established model ordinances (Mustervorschriften der Kantone im Energiebereich "MuKE").	By 2020: estimated mitigation impact of 1.8 MT of CO2 relative to reference scenario	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/33

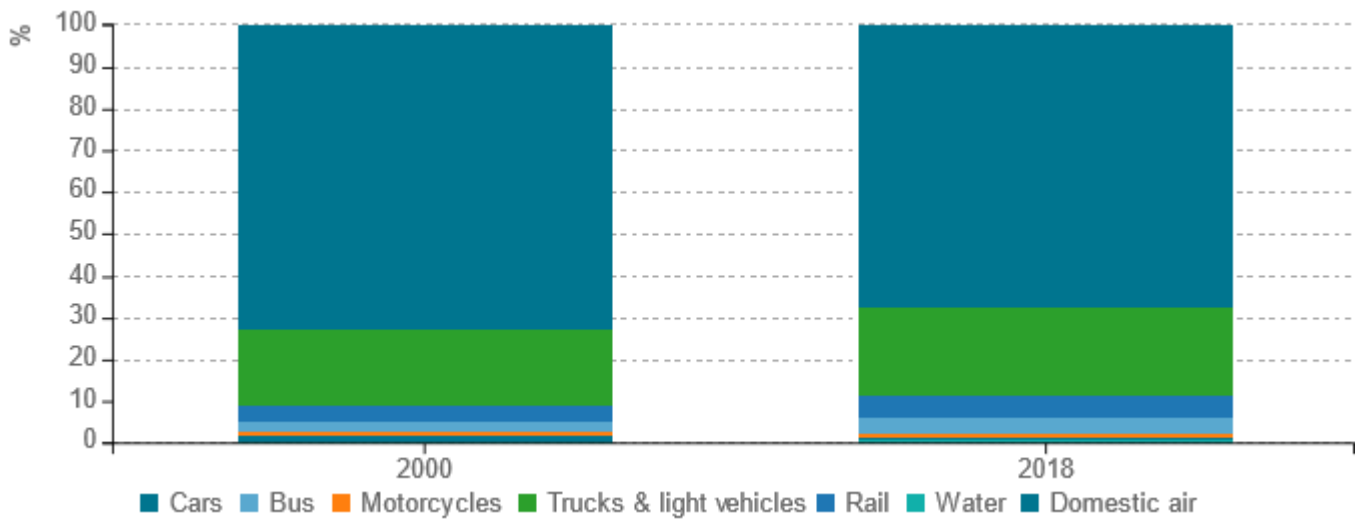
Source: MURE



Transport

Road transport continued to represent the lion’s share of the sector’s total final energy consumption (94.5% in 2000 to 93.7% in 2018). While the share of domestic air transport reduced from 1.4% to 0.7%, the share of rail transport increased from 3.9% to 5.0% during the same period.

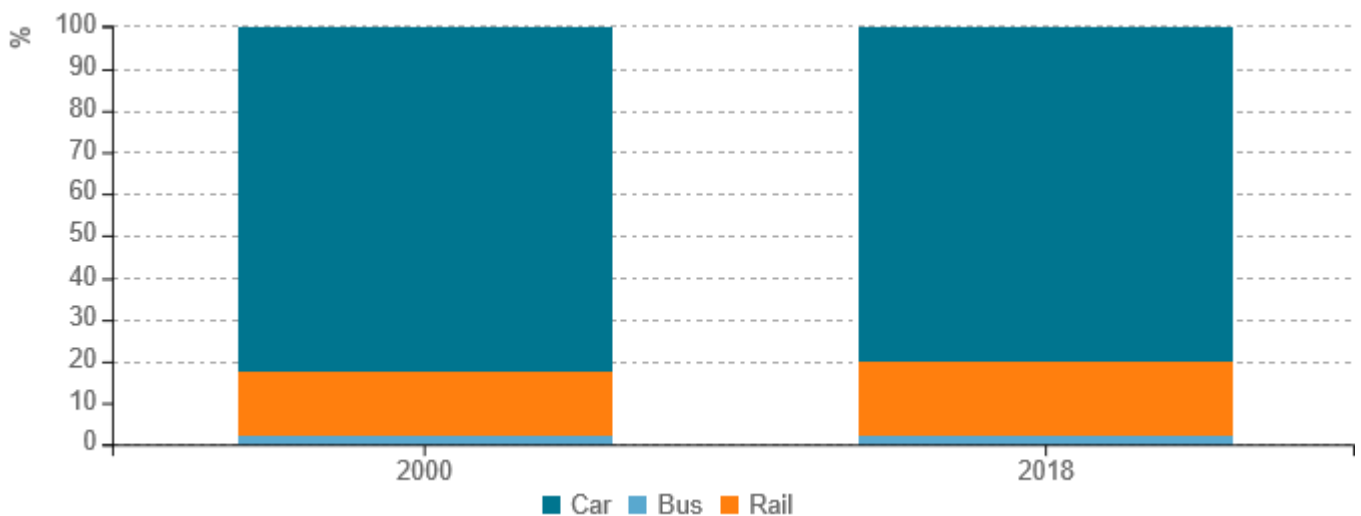
Figure 7: Transport energy consumption by mode



Source: ODYSSEE

Although the cars represented the largest share within the passenger transport, its share decreased from 82.2% to 79.8% during the years 2000 and 2018. While the share of rail transport grew from 15.4% to 17.9% during the same period, the share of buses remained stable.

Figure 8: Modal split of inland passenger traffic

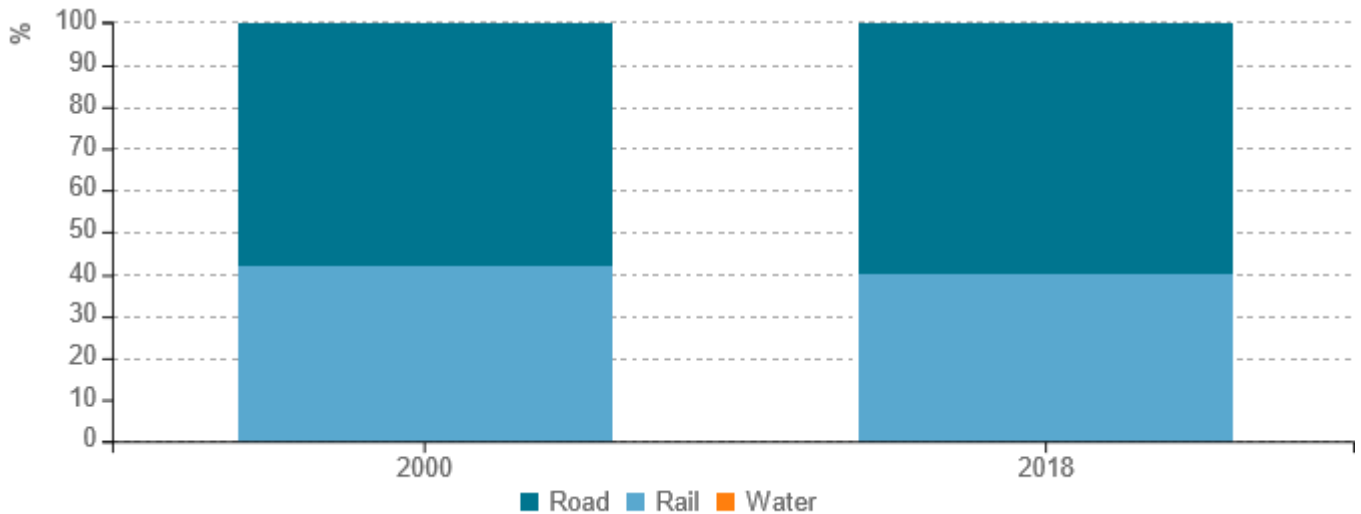


Source: ODYSSEE



The share of freight transport by road in total freight transport grew from 58% in 2000 to 60% in 2018. In the same period, the share of freight transport by rail dropped from 42% to 40%. Freight traffic by water is virtually non-existent in Switzerland.

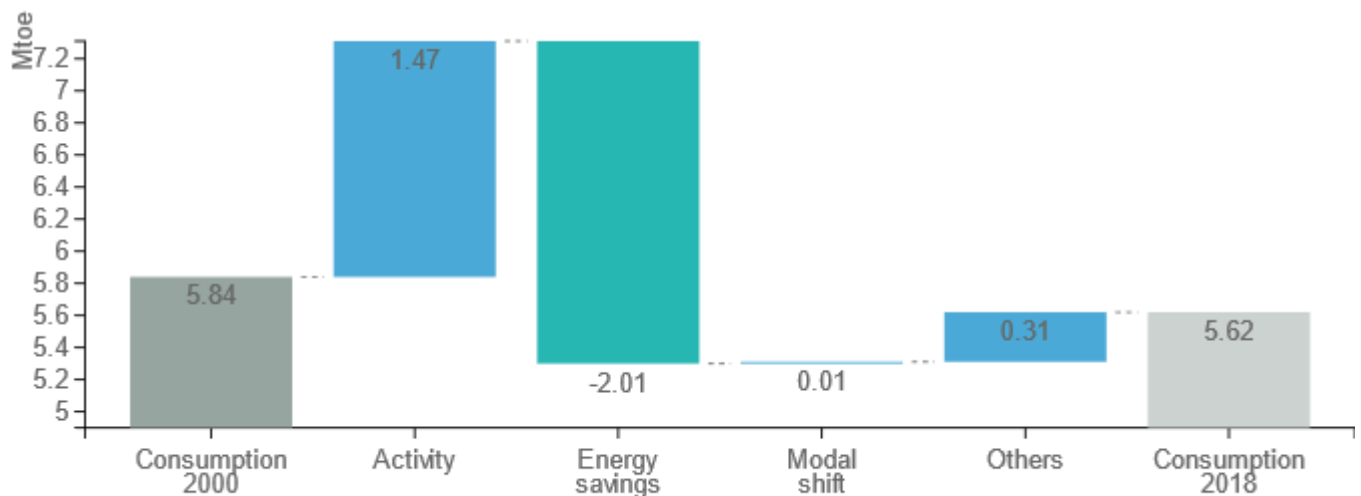
Figure 9: Modal split of inland freight traffic



Source: ODYSSEE

The total final energy demand of the transport sector hardly changed from 2000 to 2018 (decrease by 0.22 Mtoe, or 4%). Growth in the activity of the transport sector (measured in tkm for goods and pkm for passengers) was offset by higher energy efficiency resulting in the aforementioned slight reduction in the sector’s total final energy demand.

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



Source: ODYSSEE



Within the transport sector, various measures are intended to reduce CO₂ emissions and to internalize local external effects. However, no CO₂ tax is levied on motor fuels. Instead, part of the CO₂ emissions caused by motor fuel consumption must be compensated in other sectors via carbon offsets.

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

Measures	Description	Expected savings, impact evaluation	More information available
Heavy vehicle fee	The fee is levied on both domestic and foreign vehicles that exceed the maximum permissible total weight of 3.5 tonnes. The total amount charged depends on different characteristics of the vehicle such as total weight, emissions as well as the kilometres driven on the public highways in Switzerland and the Principality of Liechtenstein.	In 2020: estimated mitigation impact of 0.1 MT of CO ₂ relative to reference scenario	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1988
CO ₂ emissions regulations for passenger cars and light commercial vehicles	Switzerland adopted the CO ₂ emissions standards for new passenger cars and light commercial vehicles of the EU. The regulation defines maximum levels (on fleet average) of grams of CO ₂ per kilometer and corresponding penalties in case of breaches.	By 2020: estimated mitigation impact of 0.6 MT of CO ₂ relative to reference scenario	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1987
Compensation for CO ₂ emissions	Importers of transport fuels (e.g. mineral oil companies) are required to compensate a share of the CO ₂ emissions from the sold fuels under the current law (2020), the compensation must take place domestically. The revised but not yet enforced CO ₂ Act foresees a higher share of compensation, which however, can be partly realized abroad.	By 2020: estimated mitigation impact of 0.5 MT of CO ₂ relative to reference scenario	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1989

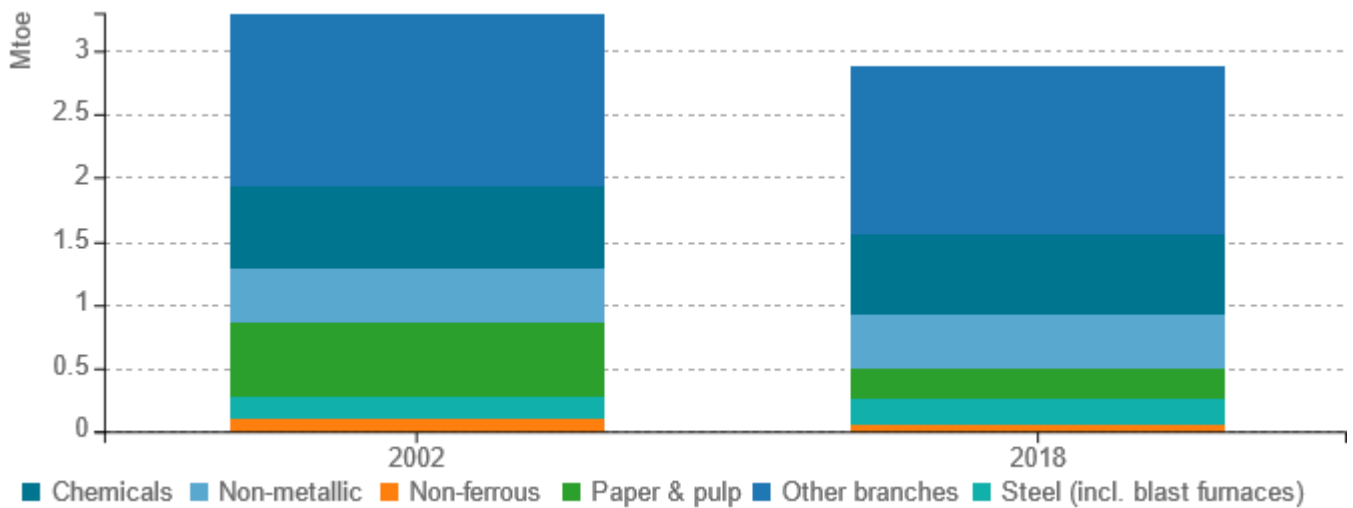
Source: MURE



Industry

The share of energy-intensive branches (metals, cement and paper) dropped from 39% in 2002 to 33% in 2018 while the share of chemical industry grew from 20% to 22% of the industry's total final energy demand. The total share of all other branches amounted to 41% and 45% respectively.

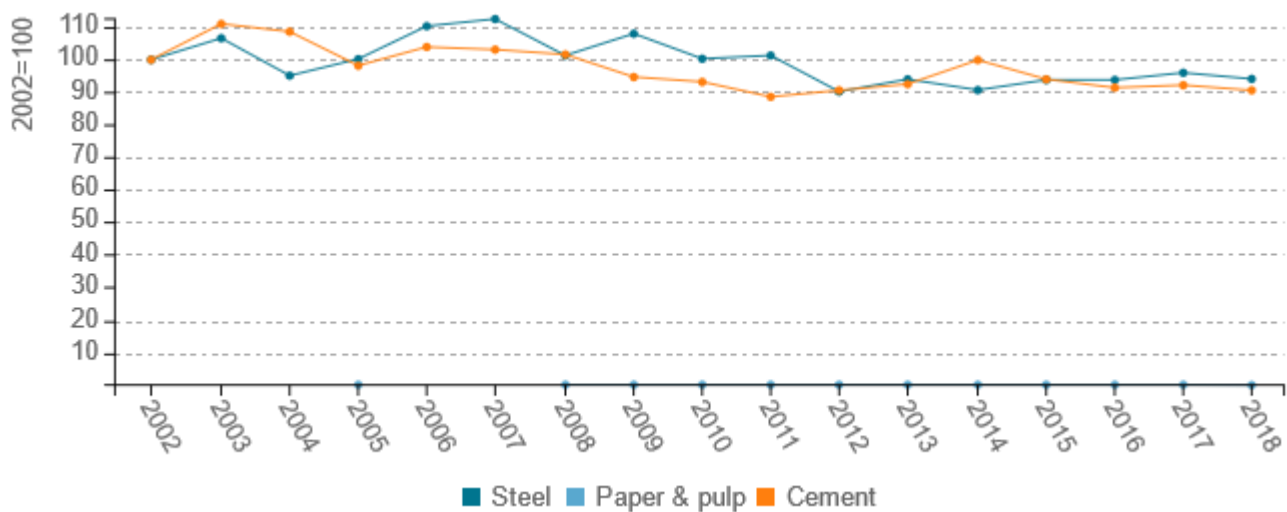
Figure 11: Final energy consumption of industry by branch



Source: ODYSSEE

The rate of energy efficiency improvement was slowest for the chemicals and food sector (0.9% and 0.6% p.a. respectively). Although the rate of paper production dropped during the years 2002 to 2018, the paper industry experienced the highest rate of energy efficiency improvement (3.4% p.a.). In contrast, energy efficiency in machinery and metal fabrication deteriorated from 2002 to 2018.

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

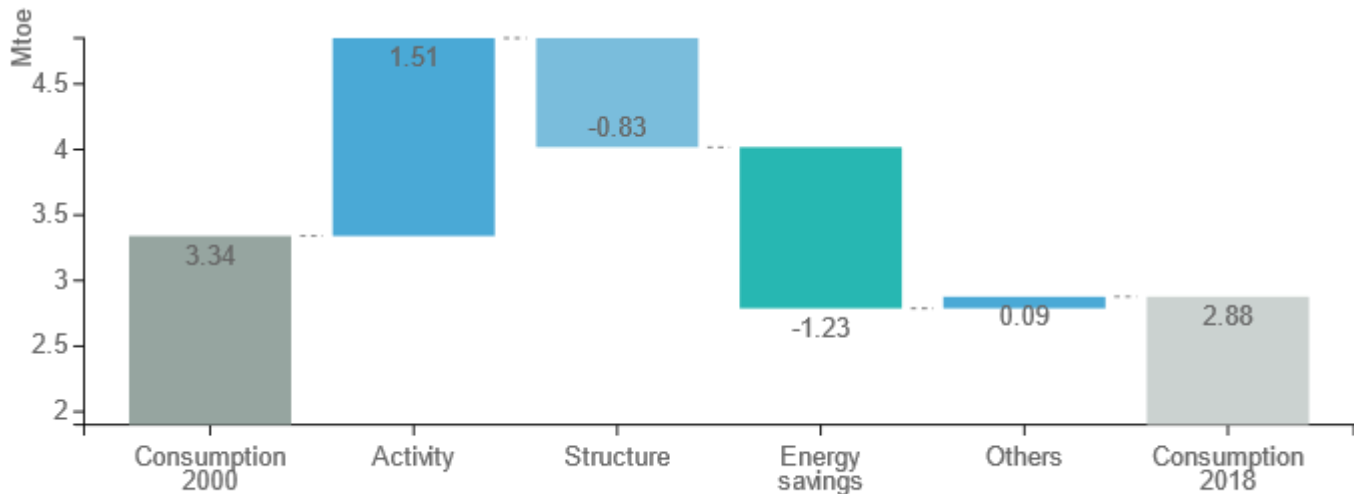


Source: ODYSSEE



Despite overall growth in the activity level of industry, the combined effect of a structural change towards less energy-intensive manufacturing and energy savings achieved during 2000 to 2018 caused the total final energy demand of the industry sector to drop at the average annual rate of 0.8%.

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



Source: ODYSSEE

Various measures exist in the industry sector which give a choice to companies of different sizes to choose their preferred option. Large and greenhouse gas intensive companies must participate in the Emissions trading scheme which is linked with the EU ETS since 2020. These companies are exempted from the CO₂ levy. Companies, which are not regulated by the ETS, can enter into an emission reduction target agreement, and will also be exempted from the levy.

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

Measures	Description	Expected savings, impact evaluation	More information available
Emissions trading system	The Swiss ETS covers around 50 installations from energy intensive industries, around 10% of Swiss greenhouse gas emissions. The Swiss ETS copied to a great part the European emissions trading rules and is linked to the EU ETS since 2020.	By 2020: estimated mitigation impact of 0.4 MT of CO ₂ relative to reference scenario	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1050
Emission reduction target agreements	Greenhouse-gas intensive companies can be exempted from the CO ₂ levy if they commit to reduce their emissions based on an emission reduction target agreement.	By 2020: estimated mitigation impact of 0.1 MT of CO ₂ relative to reference scenario	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1051

Source: MURE

