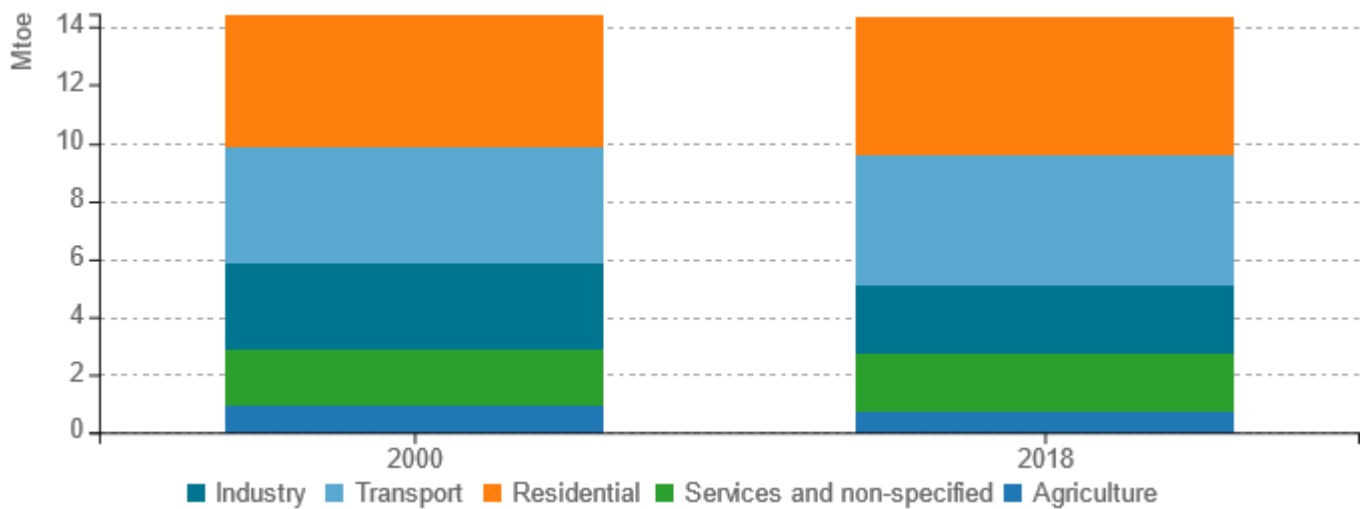


# Energy efficiency trends and policies

## Overview

In 2018 total final energy consumption was slightly lower than in 2000 (normal climate). Residential sector is the biggest consumption sector in Denmark and the consumption in 2018 is 4.73 Mtoe compared to 4.6 in 2000. Transport sector (excl. international air transport) is the second largest sector and the consumption has increased from 4.0 Mtoe in 2000 to 4.52 Mtoe in 2018. This is an increase of approx. 13% from 2000 to 2018. The industry sector has decreased from 2.96 Mtoe in 2000 to 2.35 Mtoe in 2018, a decrease of 21%.

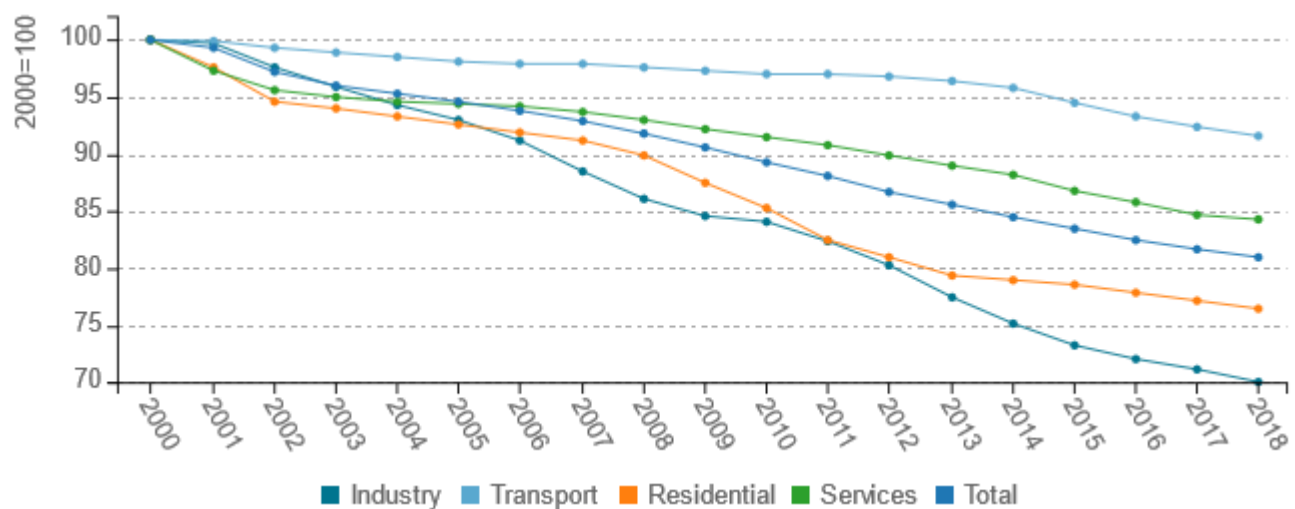
Figure 1: Final energy consumption by sector (normal climate)



Source: ODYSSEE

Energy efficiency for final consumers, as shown by ODEX, improved by an average of 1.2%/year from 2000 to 2018 (or 19%). Most improvement has been registered in industry (2.0%/year or 29.9%) and residential (1.5%/year or 23.5%).

Figure 2: Technical Energy Efficiency Index



The Danish government has a clear ambition: Denmark should be independent of fossil fuels by 2050. A key element in fulfilling this target is energy efficiency, along with an increased use of renewable energy. Energy efficiency will reduce energy consumption and it is together with renewable energy and electrification an important element in a cost-effective strategy to meet the long-term objectives. The actual government has set an objective that renewable energy in 2030 shall cover at least 55% of gross final energy consumption.

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

Measures	NEEAP measures	Description	Expected savings, impact evaluation	More information available
Danish energy efficiency obligation scheme	yes	Annual saving target from 2016 to 2020 at 10.1 PJ, equal to 2.6% of final energy consumption (excluding transport)	It is expected that the obligated companies will meet the target. Not all the savings are eligible under article 7 in EED	<a href="https://ens.dk/ansvarsomraader/energiselskabers-energisparsindsats">https://ens.dk/ansvarsomraader/energiselskabers-energisparsindsats</a>
Energy taxes on all energy used for space heating and on electricity	yes	The taxes on energy increase the energy prices paid by the consumer, and gives better incentives to reduce energy consumption	The taxes support other measures	
Danish Climate Agreement for energy and industry 2020, 22 of June 2020	yes	In regard to energy efficiency, it has been agreed in the Danish Climate Agreement for energy and industry to both expand and advance the launch of the subsidy scheme for private enterprises, the subsidy scheme for buildings, and finally also the subsidy scheme to replace oil and gas boilers with heat pumps and district heating. Furthermore, there has been allocated funds for a focused, not yet specified, energy efficiency initiatives. Finally, as a follow up point to the agreement of better utilization of surplus heating, it has been agreed to remove the tax on surplus heating if the supplier enters a voluntary agreement on energy efficiency.		

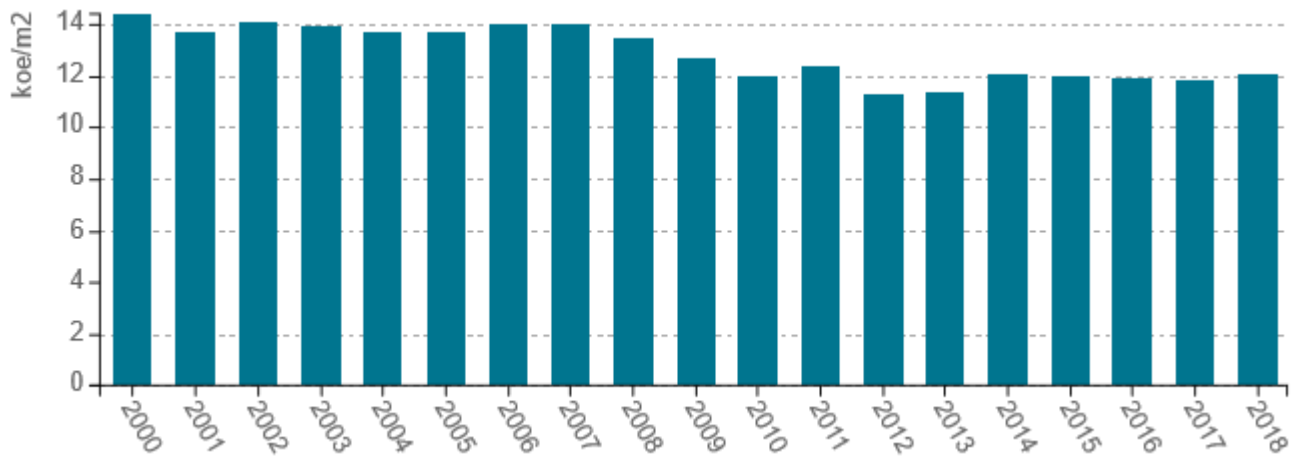
Source: MURE



### Buildings

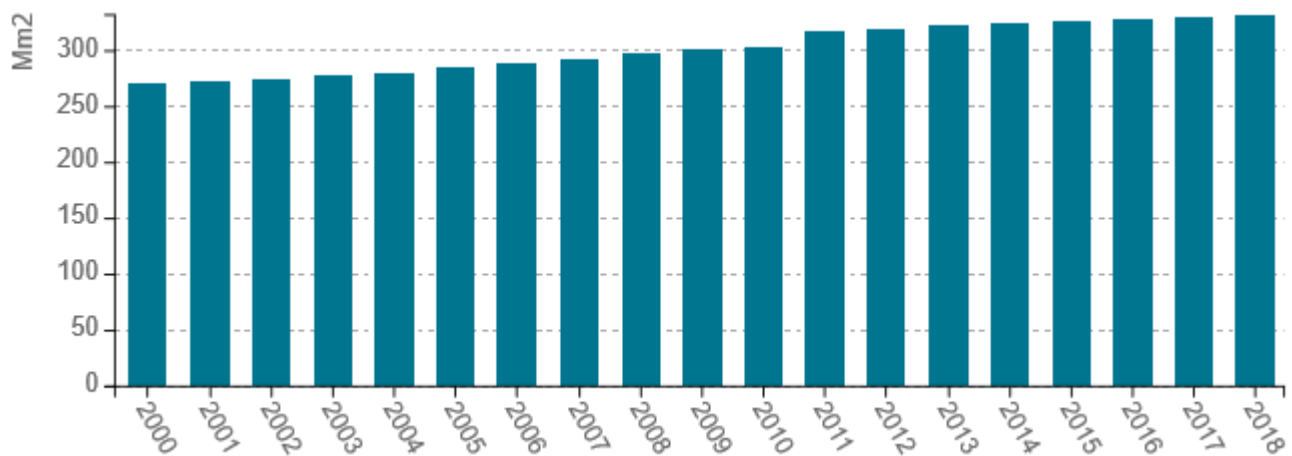
The energy consumption for heating per m<sup>2</sup> (normal climate, water heating included) has decreased by 1%/year in 2000-2018 from 14.4 to 12.1 koe/m<sup>2</sup>. Over 2000-2007 the energy consumption remained fairly stable. From 2008 to 2013, the energy consumption per m<sup>2</sup> decreased and was stable again from 2014. From 2017 to 2018, the energy consumption for heating per m<sup>2</sup> has increased by 2%. The total surface of permanently occupied dwellings has grown by 23% since 2000. In average this is an increase of 1.1%/year.

**Figure 3: Energy consumption of space heating per m<sup>2</sup> (normal climate)**



Source: ODYSSEE

**Figure 4: Total surface of permanently occupied dwellings**

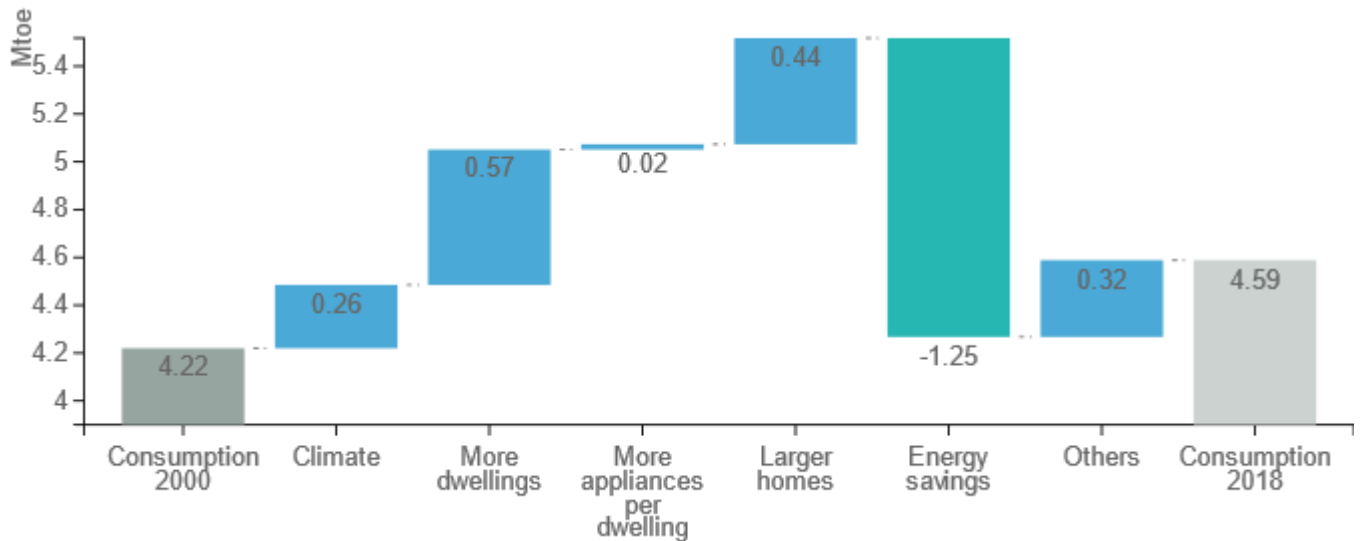


Source: ODYSSEE



Energy consumption for households has increased by 8.7% over the period 2000-2018. Two main drivers contributed to increase the energy consumption: more dwellings and larger homes. Energy savings are the largest driver for a decrease in the energy consumption.

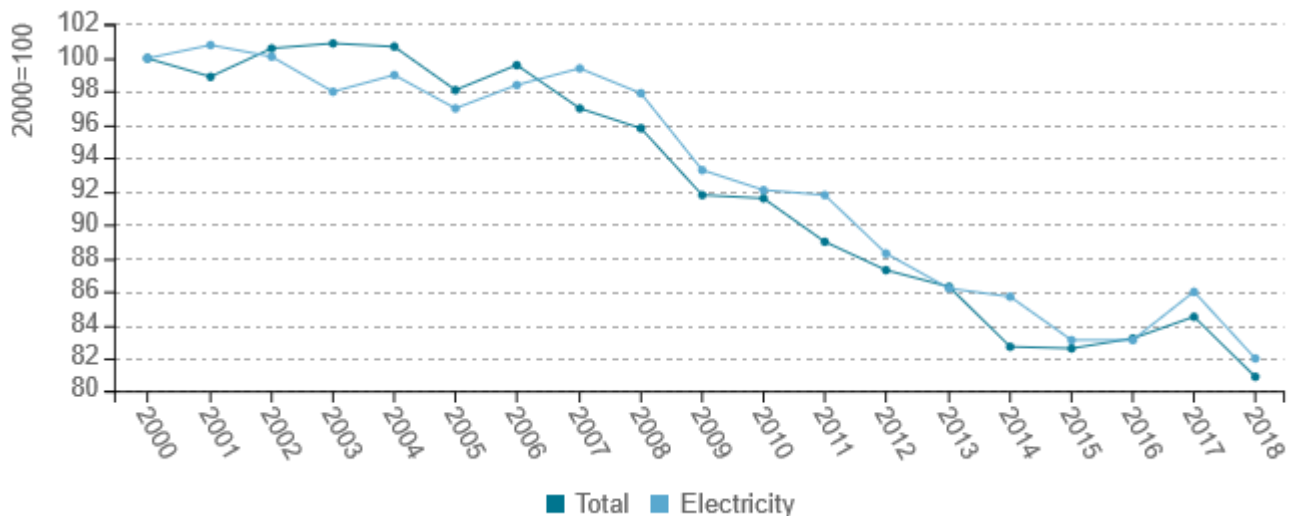
**Figure 5: Main drivers of the energy consumption variation of households**



Source: ODYSSEE

Energy consumption and electricity consumption per m<sup>2</sup> has decreased, by 19.1% and 18% respectively from 2000 to 2018. Electricity consumption per m<sup>2</sup> was quite stable until 2008, then decreased. Total energy consumption per m<sup>2</sup> has also decreased mainly since 2008.

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



Source: ODYSSEE



The policies and measures to promote energy efficiency in buildings are a combination of economic incentives – (taxes on energy), regulation (primarily the requirements in building codes both for new and existing buildings and energy certification of buildings) and information, training, etc. The energy efficiency obligation was also an important instrument to promote Investment for energy efficiency solutions in existing buildings.

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

Measures	Description	Expected savings, impact evaluation	More information available
Building code 2018	The codes set an absolute target for energy consumption in new buildings. For existing buildings, the codes have efficiency requirements which shall be met when a building is renovated.		<a href="https://bygningsreglementet.dk/">https://bygningsreglementet.dk/</a>
Digital tools at SparEnergi.dk	Sparenergi.dk offers a number of digital tools which can help users to improve their energy efficiency.		<a href="https://sparenergi.dk/">https://sparenergi.dk/</a>
Competitive subsidy scheme related to residential buildings	The subsidy scheme is related to residential buildings with the aim of achieving energy savings through renovation and conversion to heat pumps. The duration of the scheme is currently until 2026.		<a href="https://ens.dk/service/tilskudsstoetteordninger/bygningspuljen">https://ens.dk/service/tilskudsstoetteordninger/bygningspuljen</a>
Subsidy scheme to replace oil boilers with heat pumps	The scheme is implemented as a subsidy scheme with the objective to replace oil boilers with heat pumps in buildings located in areas without access to district heating or the gas grid. Duration of period 2021-2024.		<a href="https://ens.dk/service/tilskudsstoetteordninger/skrotningsordningen">https://ens.dk/service/tilskudsstoetteordninger/skrotningsordningen</a>
Buildinghub	The project aims to publish consumption data regarding electricity and heating on a digital platform. The consumption data is intended to be published with hourly values. In addition to the consumption data, the project aims to merge already existing building registers onto the platform. The purpose of the Buildinghub is to combine building data with consumption data to provide a foundation for data driven solutions within energy efficiency and flexible energy solutions.		

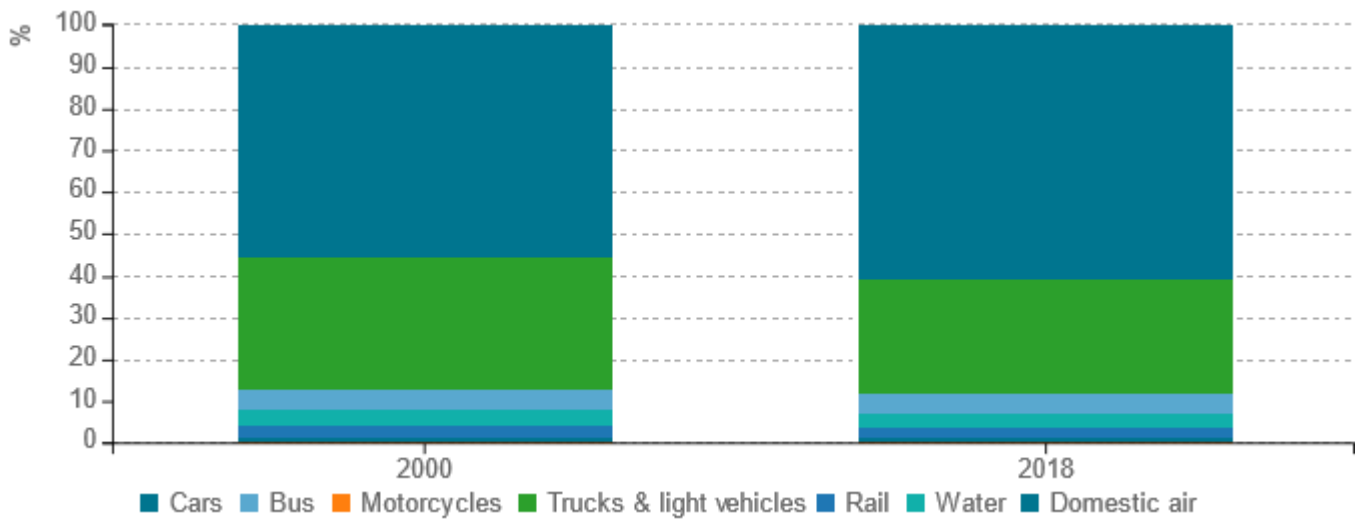
Source: MURE



**Transport**

From 2000 to 2018 the share of cars in transport energy consumption has increased from 55.5% to 60.7%. Domestic air transport represents 0.7% in 2018 (compared to 1% in 2000). The remaining is split between trucks and light vehicles (27.3%), bus (4.8%), water (3.6%) and rail (2.5%) in 2018.

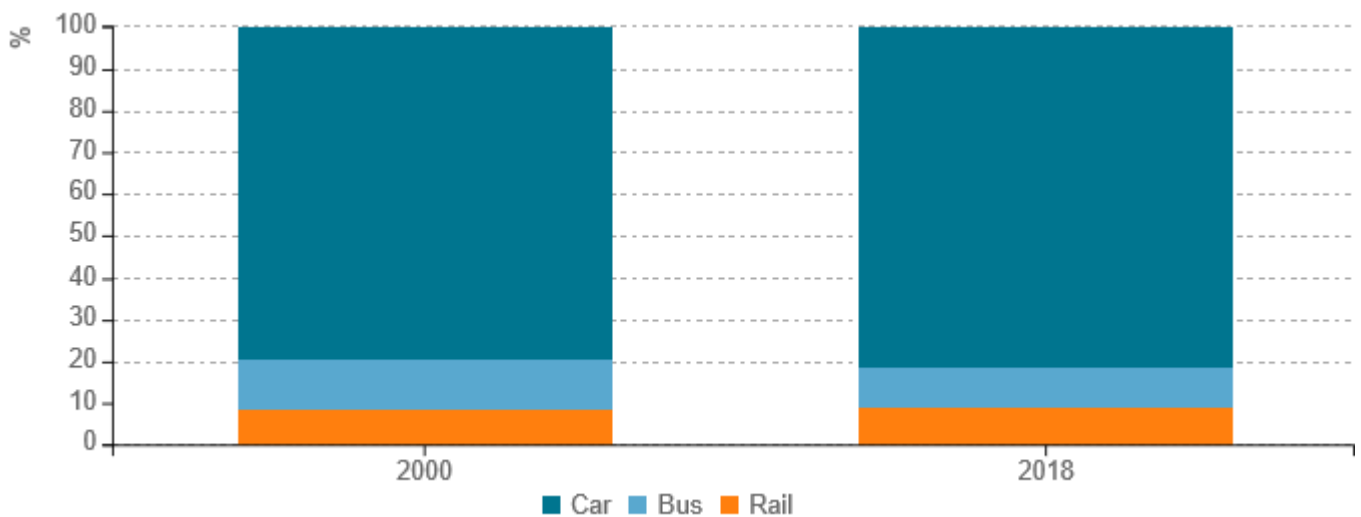
*Figure 7: Transport energy consumption by mode*



Source: ODYSSEE

Passenger traffic has increased by 17% between 2000 and 2018. The split of traffic between modes remains quite stable since 2000. Cars represent around 80% of the traffic of passengers. Transport of passenger by bus and rail both represents about 10% each.

*Figure 8: Modal split of inland passenger traffic*

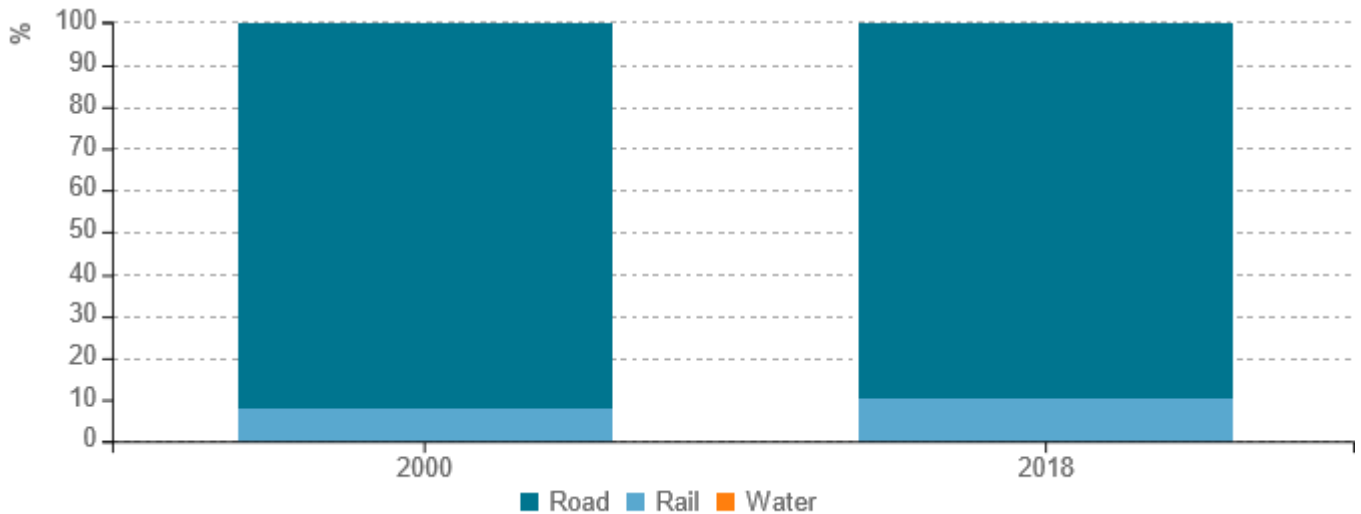


Source: ODYSSEE



Freight traffic has slightly decreased between 2000 and 2018 (-4%). The share of road freight transport has decreased from 92% to 90% in 2018. On the opposite, the share of rail freight traffic has increased in 2018 and represents 10% of the traffic (8% in 2000).

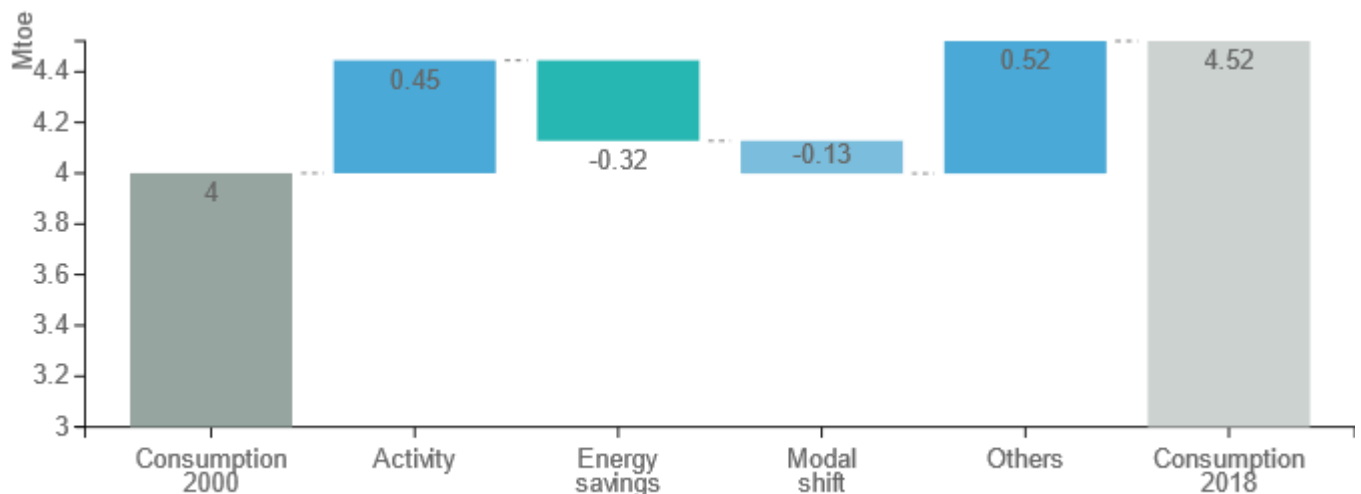
**Figure 9: Modal split of inland freight traffic**



Source: ODYSSEE

The energy consumption in the transport sector has increased from 4 Mtoe in 2000 to 4.52 Mtoe in 2018. The main drivers for the increase are more activity (more passenger traffic), and some other effects (e.g. behavior, decrease in load factors for trucks, etc.). Energy savings partly counterbalanced the activity effect and contributed to decrease the energy consumption (0.32 Mtoe).

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



Source: ODYSSEE



In Denmark, a number of initiatives have been taken to promote energy efficiency in the transport sector, among them, measures to improve energy efficiency in public transport, building of environmental zones in the bigger cities, mandatory refresher courses for professional drivers, which include ‘green driving’, and financial support for sustainable transport measures.

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

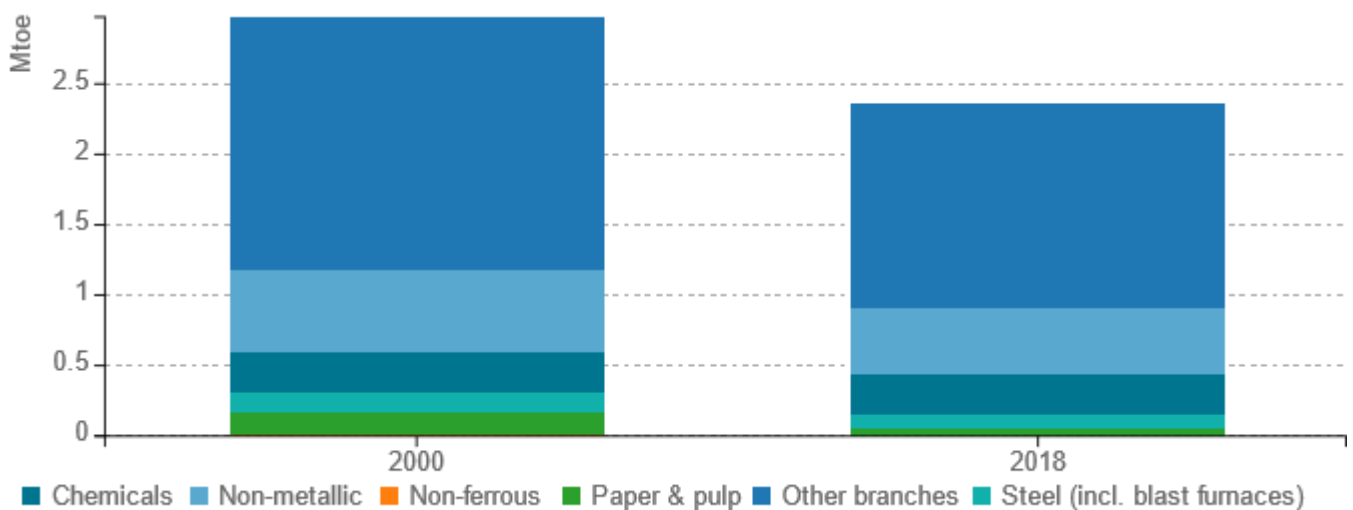
Measures	Description	Expected savings, impact evaluation	More information available
Tax on fuel	The taxes on motor fuels, which are increasing the prices.		
Environmental zones in bigger cities			
Tax reduction for new cars with low fuel consumption	New cars are highly taxed in Denmark. The taxes levels are linked to the cars energy efficiency, but also to other factors.		

Source: MURE

### Industry

Energy consumption in industry has decreased significantly from 2000 to 2018 by approx. 21%. In average, this is a decrease of 1.3%/year. Energy consumption in non-metallic industry has decreased from 0.59 Mtoe in 2000 to 0.47 Mtoe in 2018 (-20%).

Figure 11: Final energy consumption of industry by branch



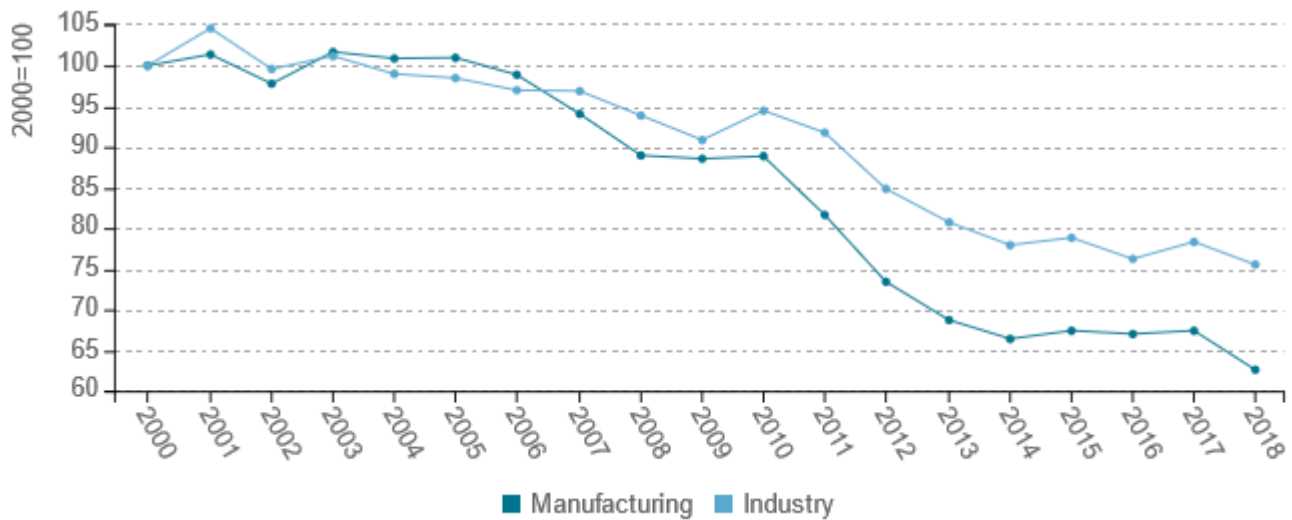
Source: ODYSSEE





The energy intensity of industry has decreased by almost 25% from 2000 to 2018. When focusing on the manufacturing sector only, the decrease has been approx. 37%. Energy intensity in the construction sector has decreased by 22%, which is less than the overall industry sector and explains the difference.

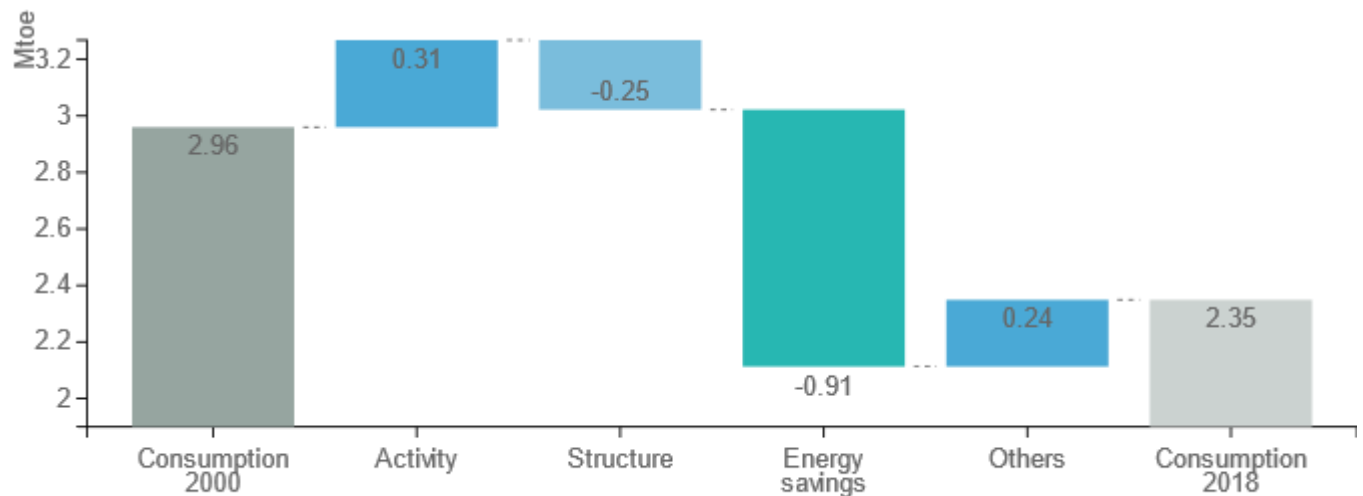
**Figure 12: Energy intensity of industry (at purchasing power parities)**



Source: ODYSSEE

The decreasing energy consumption in industry is mainly due to energy savings (0.91 Mtoe) and to a lesser extent to change of structure (0.25 Mtoe). In the opposite direction, activity and others have an increasing effect with a total of 0.55 Mtoe.

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



Source: ODYSSEE



The main important instrument in industry is the energy efficiency obligation scheme, but the voluntary agreement schemes are also important.

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

Measures	Description	Expected savings, impact evaluation	More information available
Energy audits in large enterprises	Mandatory energy audits for all large enterprises, requiring a screening of the entire energy consumption within the enterprise as well as a mapping of the saving potential.		<a href="https://ens.dk/ansvarso mraader/energibespare lser/virksomheder/ener gisyn-i-store- virksomheder">https://ens.dk/ansvarso mraader/energibespare lser/virksomheder/ener gisyn-i-store- virksomheder</a>
Voluntary agreement scheme for energy-intensive companies	In order to take part in the scheme, the enterprises enter into a three-year agreement, which requires them to develop, implement and maintain an energy management system which is certified in accordance with the DS/EN ISO 50001 standard and the Danish Energy Agency's supplementary requirements for the energy management system.		<a href="https://ens.dk/ansvarso mraader/energibespare lser/virksomheder/tilsk ud-til-elintensive- virksomheder">https://ens.dk/ansvarso mraader/energibespare lser/virksomheder/tilsk ud-til-elintensive- virksomheder</a>
Competitive subsidy scheme related to private enterprises	The scheme is implemented as a subsidy scheme with a competitive bidding procedure. Subsidy is granted based on the bidding of subsidy per saved kWh in the individual projects. Subsidies are first granted to the project with the lowest costs per saved kWh, then to the next representing the second lowest costs, and so forth. The scheme is aimed at achieving energy savings in businesses and is open to end user energy savings projects as regards all types of energy in most of the private sectors in Denmark and most types of activities in Denmark. Road transportation, shipping, and savings in the IT sector are exempt.		<a href="https://ens.dk/ansvarso mraader/energibespare lser/virksomheder/erhv ervstilskud-til- energieffektiviseringer">https://ens.dk/ansvarso mraader/energibespare lser/virksomheder/erhv ervstilskud-til- energieffektiviseringer</a>

Source: MURE

