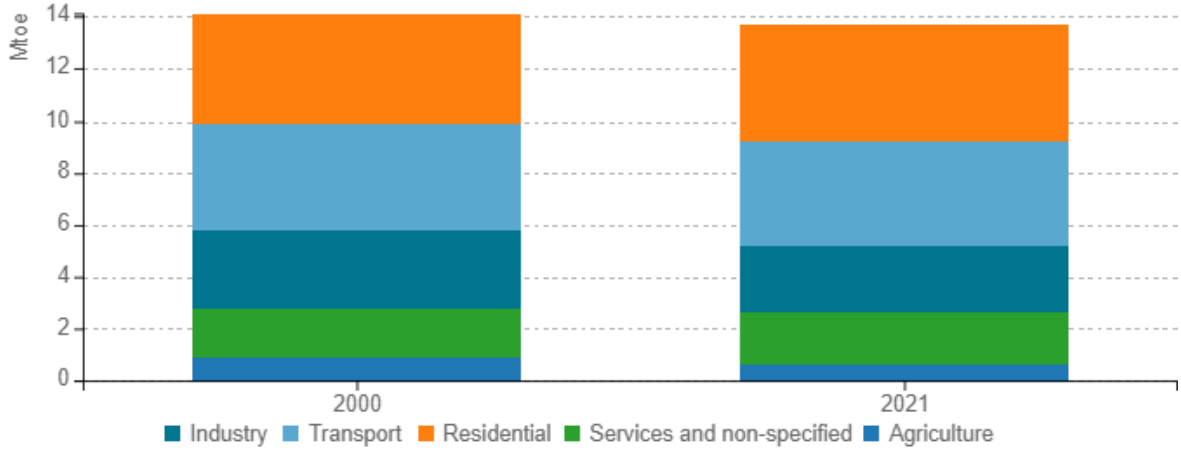
Energy efficiency trends and policies

Overview

In 2021 total final energy consumption was 3% lower than in 2000 (normal climate). Residential sector is the biggest consumption sector in Denmark and the consumption in 2021 is 4.44 Mtoe compared to 4.23 in 2000. Transport sector (excl. international air transport) is the second largest sector and its consumption has decreased from 4.07 Mtoe in 2000 to 4.05 Mtoe in 2021. The energy consumption in the service sector has increased from 1.87 Mtoe in 2000 to 2.02 Mtoe in 2001. The industry sector has decreased from 3.01 Mtoe in 2000 to 2.53 Mtoe in 2021, a decrease of 16%.

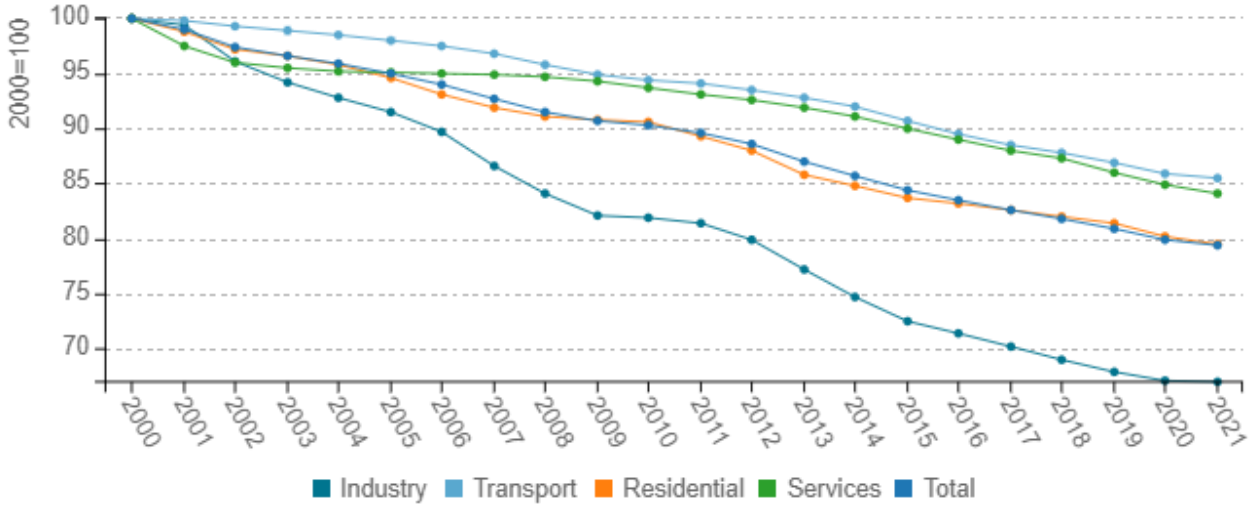
Figure 1: Final energy consumption by sector (normal climate)



Source: ODYSSEE

Energy efficiency for final consumers, as shown by ODEX, improved by an average of 1.1%/year from 2000 to 2021 (or 21% in total). Most improvement has been registered in industry (1.9%/year or 33% in total) and residential (1.1%/year or 20.5% in total).

Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE

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The Danish government has a clear ambition: Denmark is to be climate neutral by 2050. A key element in fulfilling this target is energy efficiency along with an increased use of renewable energy.

Table 1: Sample of cross-cutting measures

Measures	NECP measures	Description	Expected savings, impact evaluation
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
Energy taxes on all energy used for space heating and on electricity used in households, the public sector etc.	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

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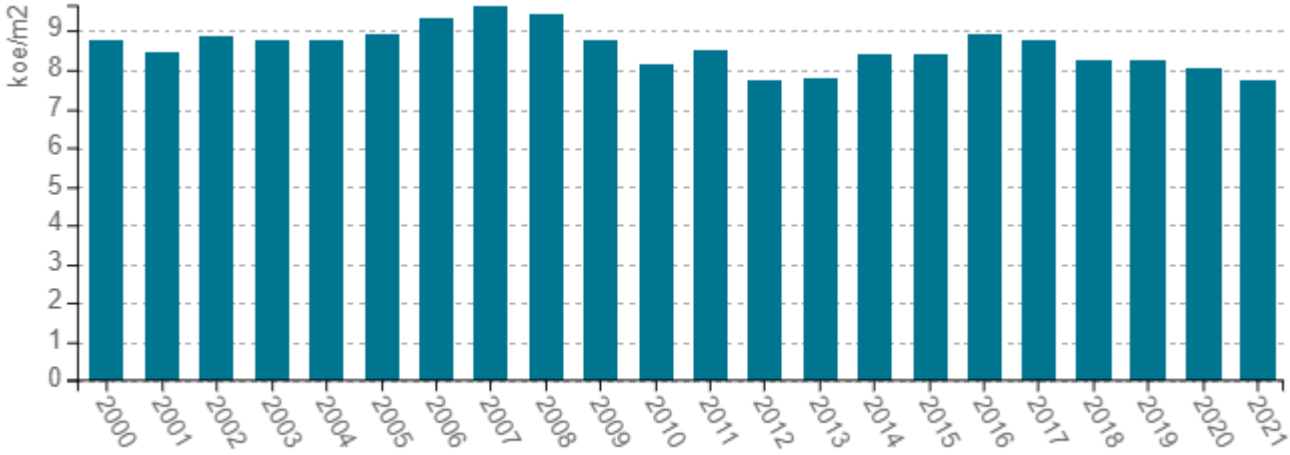
Buildings

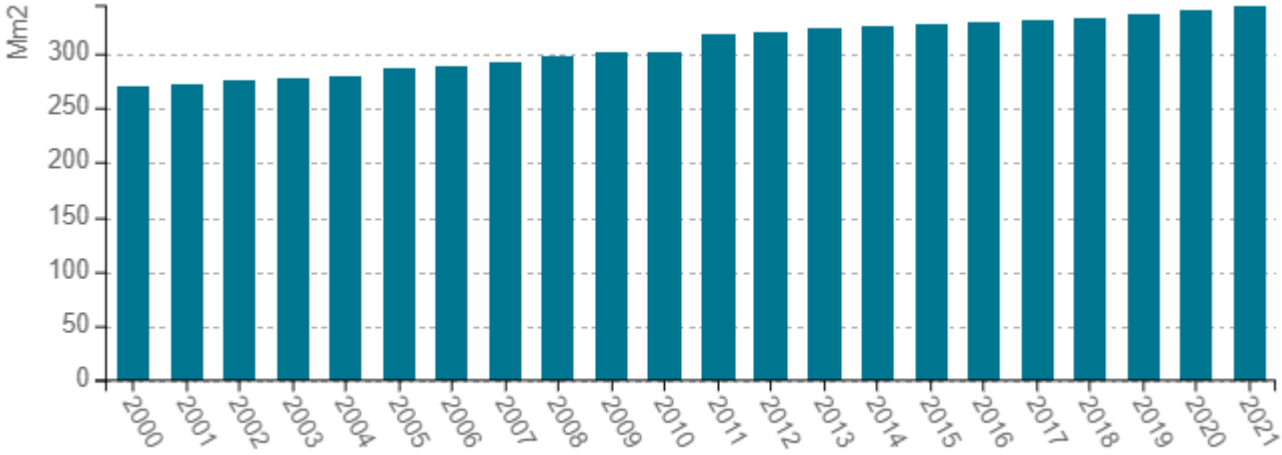
The energy consumption for space heating per m2 has decreased by 0.6%/year in 2000-2021 from 8.77 to 7.76 koe/m2. The total surface of permanently occupied dwellings has grown by 27% since 2000. In average this is an increase of 1.1%/year.

Figure 3: Energy consumption of space heating per m2 (normal climate)



Source: ODYSSEE

Figure 4: Total surface of permanently occupied dwellings



Source: ODYSSEE

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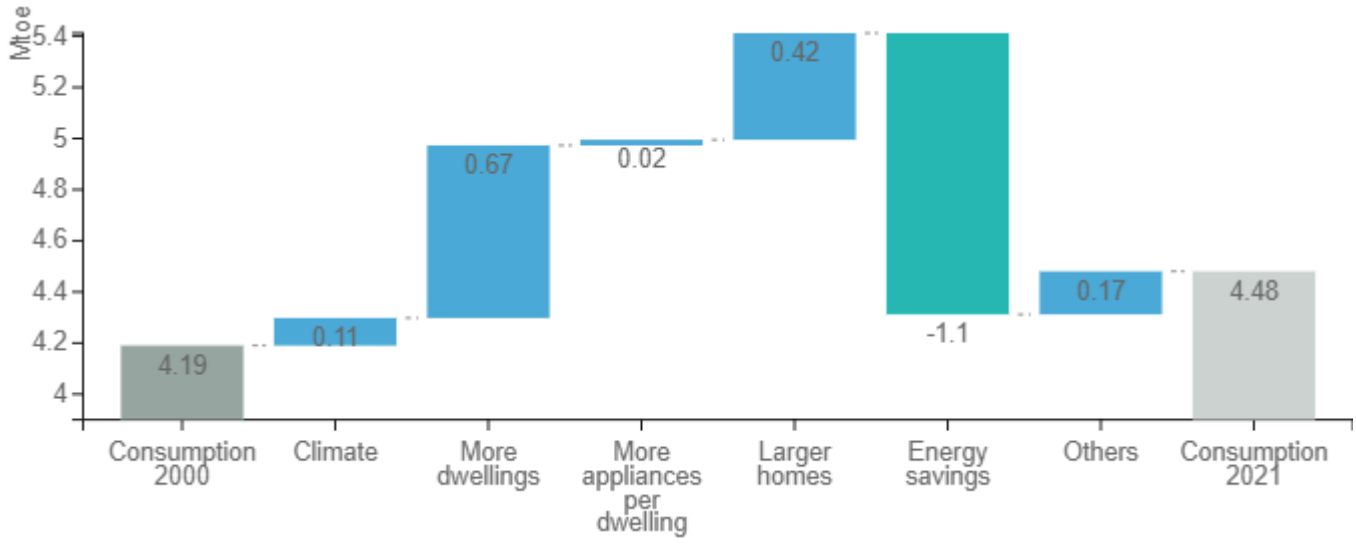
Energy consumption for households has increased by 6.9% over the period 2000-2021. Two main drivers contributed to increase the energy consumption: more dwellings and larger homes. On the other hand, energy savings are the largest driver for a decrease in the households' energy consumption.

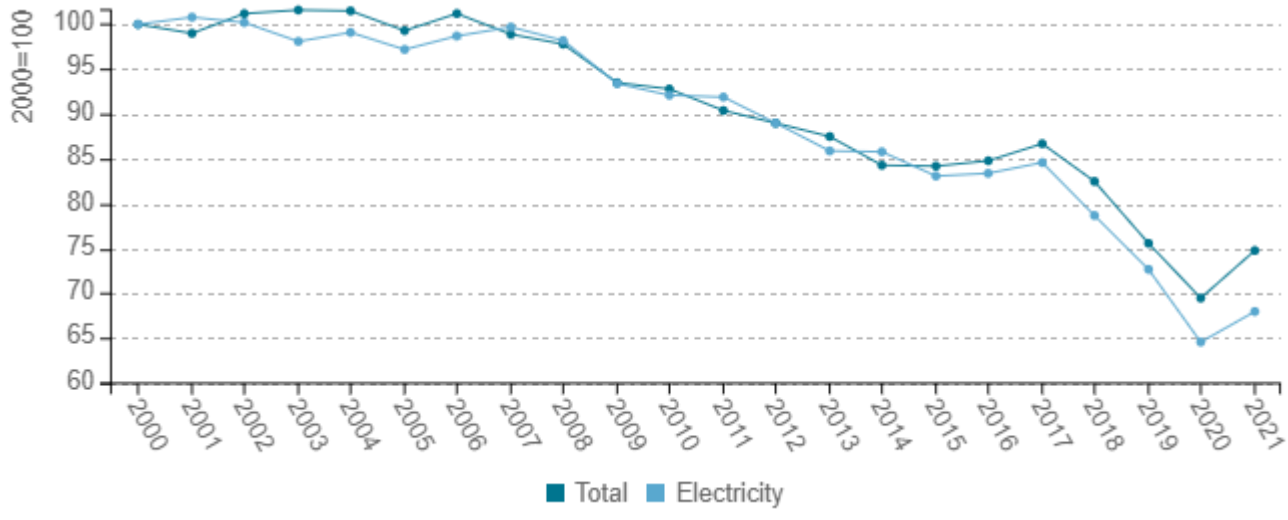
Figure 5: Main drivers of the energy consumption variation of households



Source: ODYSSEE

Energy consumption and electricity consumption per m2 has decreased by 25.2% and 32% respectively from 2000 to 2021. Both electricity and total energy consumption per m2 was quite stable until 2008, then decreased. The increased consumption from 2020 to 2021 is related to the low consumption levels in 2020 due to the COVID19 pandemic.

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



Source: ODYSSEE

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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
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.
Digital tools at SparEnergi.dk	Sparenergi.dk offers a number of digital tools which can help users to improve their energy efficiency.
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.
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.
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

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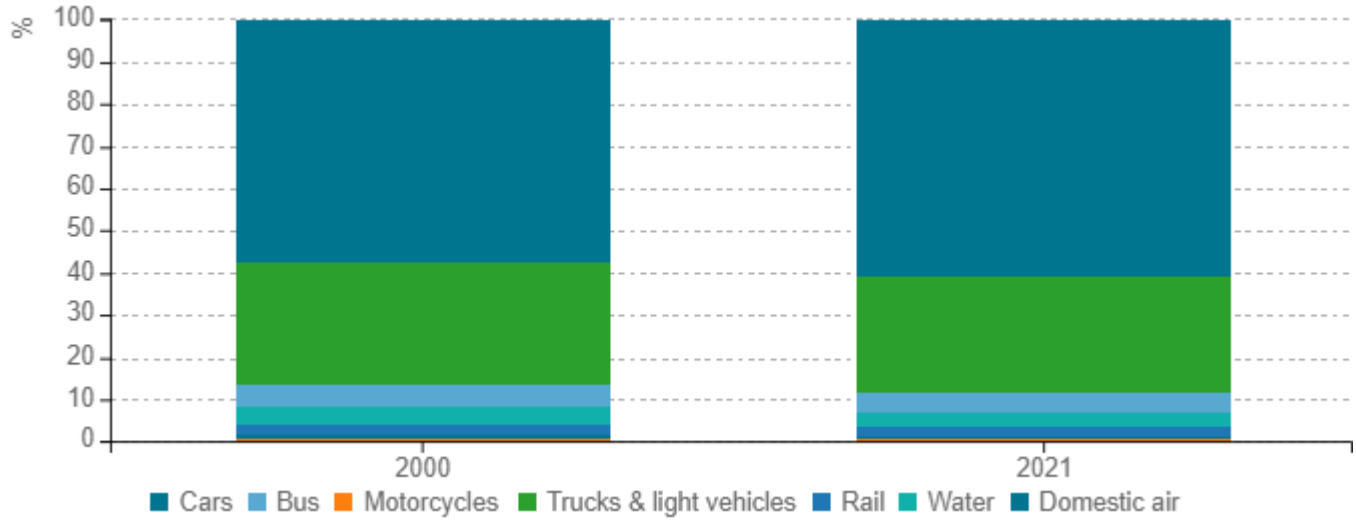
Transport

From 2000 to 2021 the share of cars in transport energy consumption has increased from 57.3% to 60.9%. Domestic air transport represents 0.5% in 2021 (compared to 1.1% in 2000). The remaining is split between trucks and light vehicles (27.6%), bus (4.5%), water (3.5%) and rail (2.5%) in 2021.

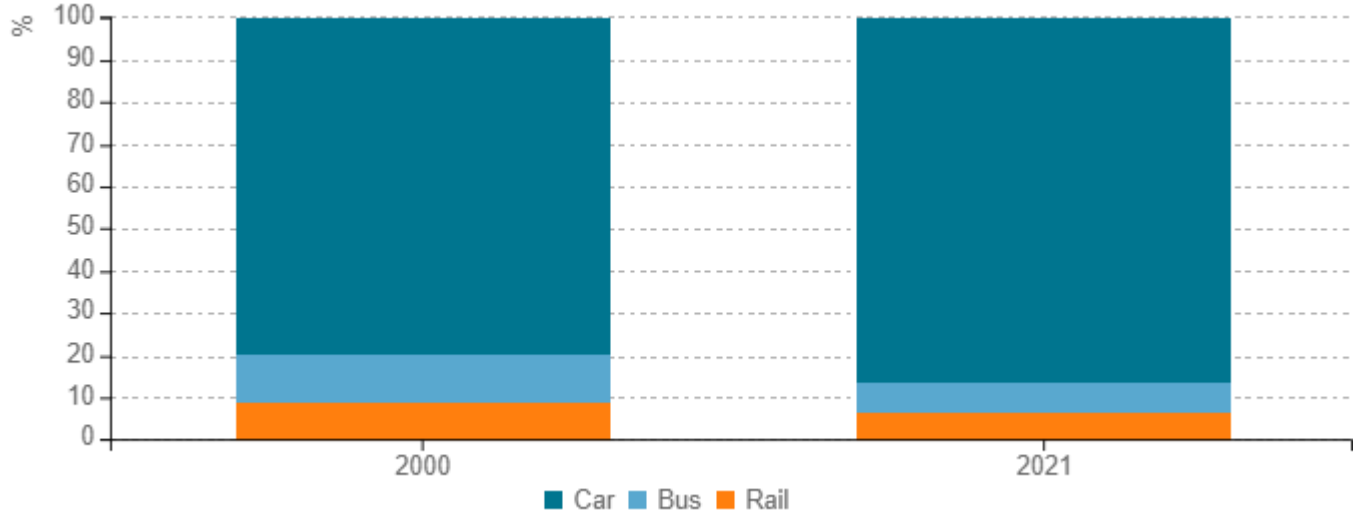
Figure 7: Transport energy consumption by mode



Source: ODYSSEE

Passenger traffic increased by 7.4% between 2000 and 2021. In 2021, cars represent 86.3% of the traffic of passengers compared to 79.6% in 2000. Transport of passenger by bus decreased from 11.7% in 2000 to 7.1% in 2021. Transport of passengers by rail decreased from 8.7% to 6.6% in 2021.

Figure 8: Modal split of inland passenger traffic



Source: ODYSSEE

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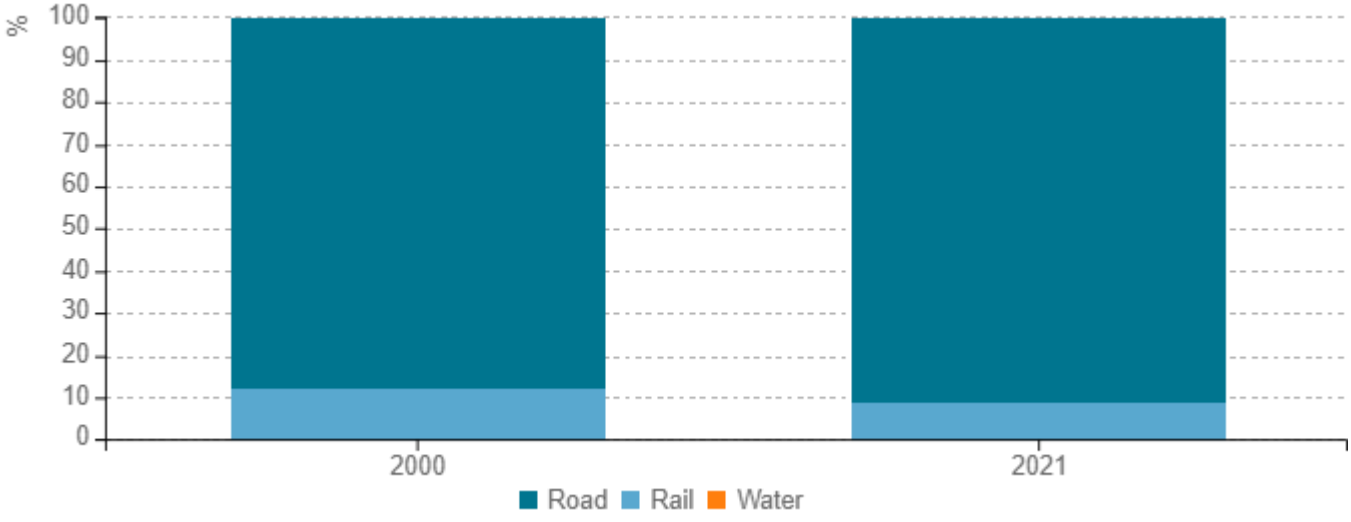
The share of road freight transport has increased from 88% in 2000 to 91.3% in 2021. On the opposite, the share of rail freight traffic has decreased in 2021 and represents 8.7% of the traffic compared to 12% in 2000.

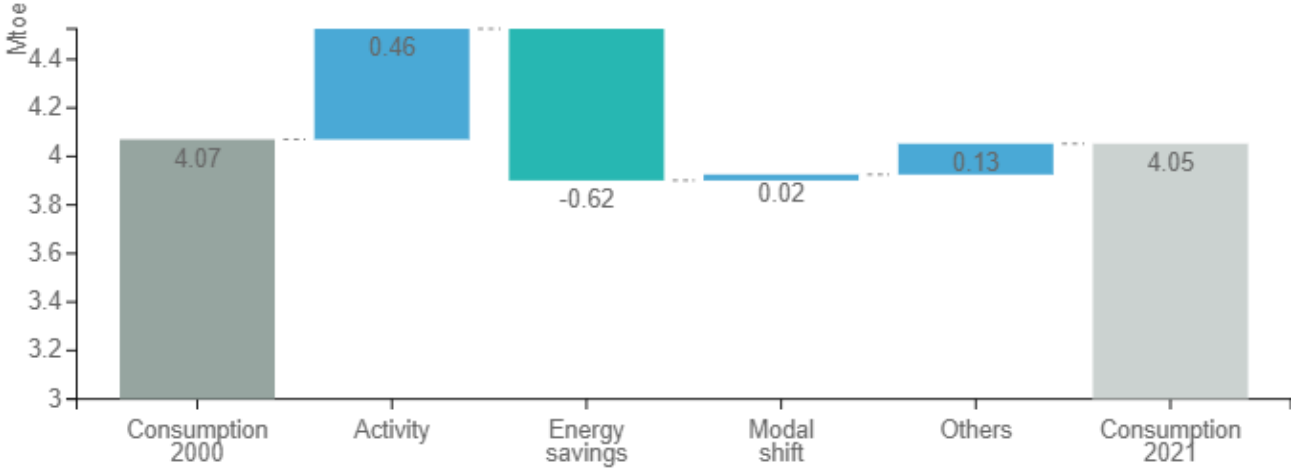
Figure 9: Modal split of inland freight traffic



Source: ODYSSEE

The energy consumption in the transport sector has decreased from 4.07 Mtoe in 2000 to 4.05 Mtoe in 2021. The main drivers for the increase are more activity (more passenger traffic), and some other effects (e.g. behaviour, decrease in load factors for trucks, etc.). Energy savings counterbalanced the activity effect and contributed to decrease the energy consumption (0.62 Mtoe).

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



Source: ODYSSEE

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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

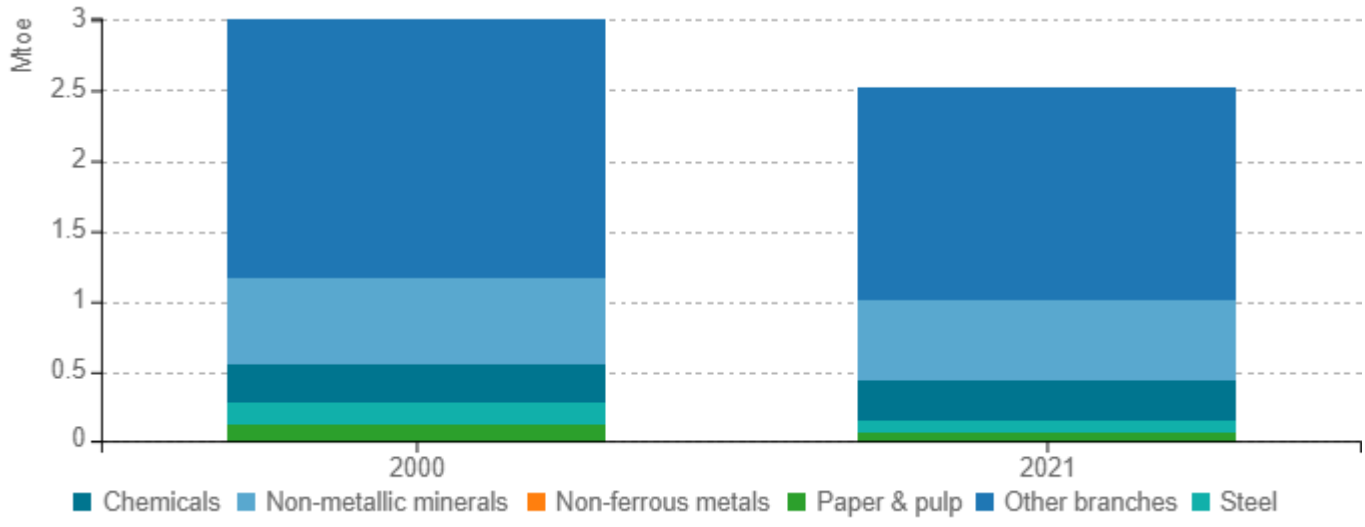
Measures	Description
Tax on fuel	The taxes on motor fuels, which are increasing the prices.
Environmental zones in bigger cities	
Tax reduction for new cars with low fuel consumption	New cars are highly taxed in Denmark. The taxes levels are linked to the cars energy efficiency, but also to other factors.

Source: MURE

Industry

Energy consumption in industry has decreased significantly from 2000 to 2021 by 16%. This is an average decrease of 0.8%/year. Only the chemical industry shows an increased of 1% from 2000 to 2021. Energy consumption in paper and pulp industry has decreased from 0.13 Mtoe in 2000 to 0.07 Mtoe in 2021 (-48%).

Figure 11: Final energy consumption of industry by branch



Source: ODYSSEE

The energy intensity of industry has decreased by 25.6% from 2000 to 2021. When focusing on the manufacturing sector only, the decrease has been 41% from 2000 to 2020.

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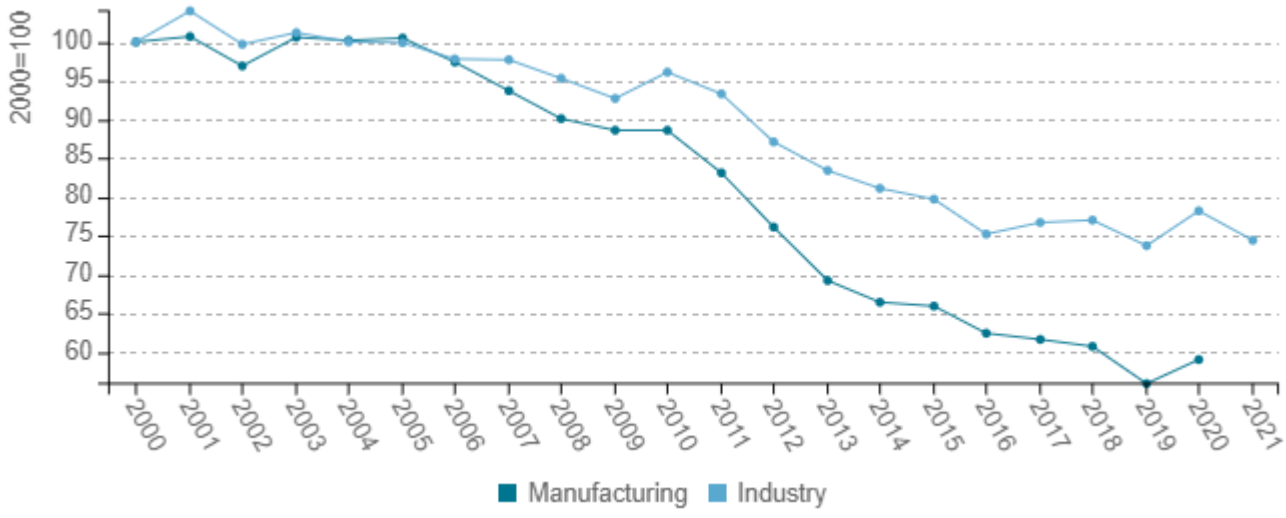
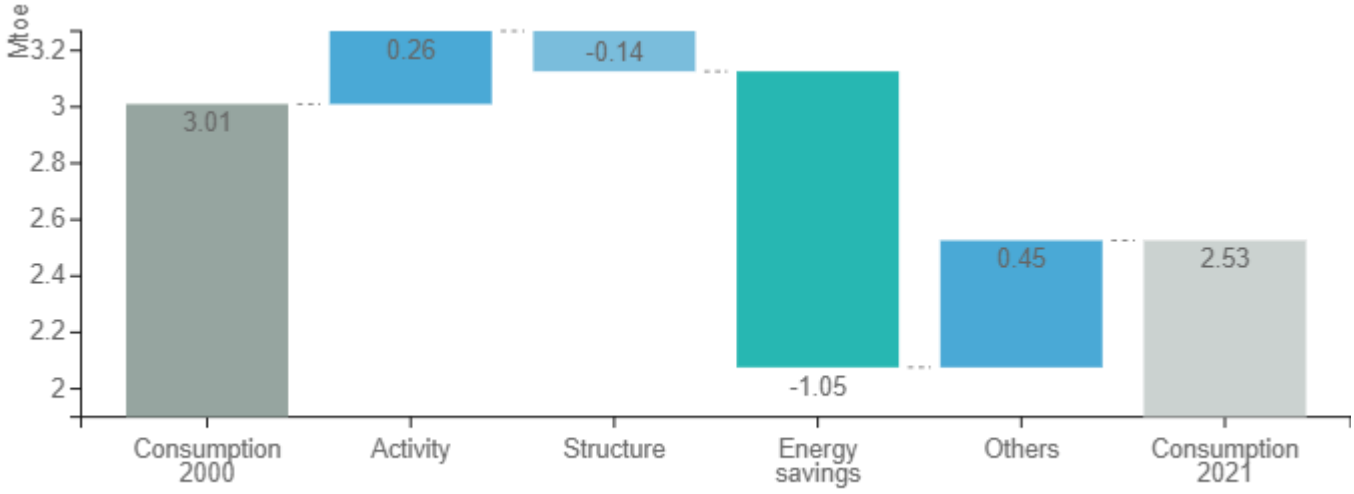
Figure 12: Energy intensity of industry (at purchasing power parities)



Source: ODYSSEE

The decreasing energy consumption in industry is mainly due to energy savings (1.05 Mtoe) and to a lesser extent to change of structure (0.14 Mtoe). In the opposite direction, activity and others have an increasing effect with a total of 0.71 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.

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

Measures	Description
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.
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.
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.

Source: MURE

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