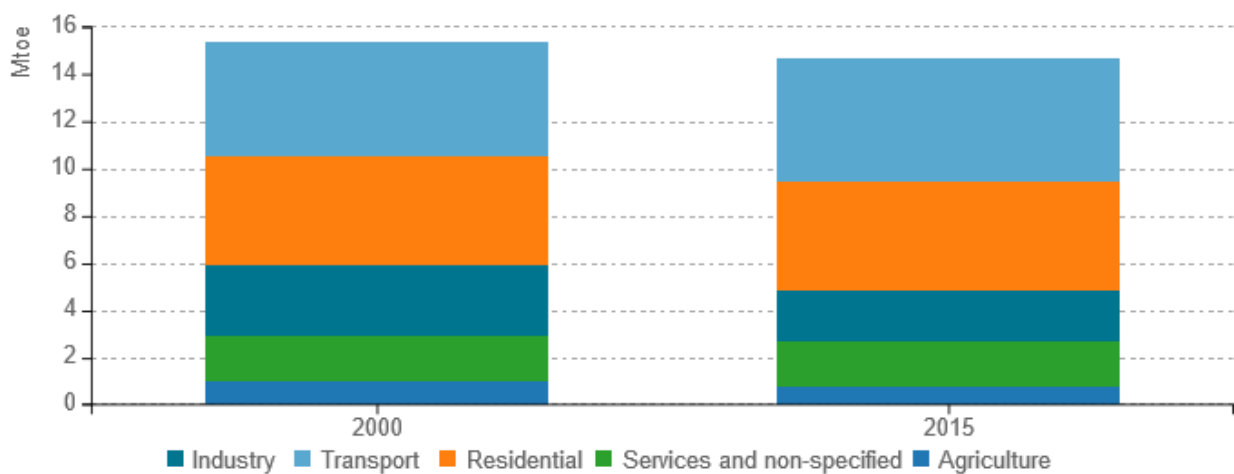


# Energy efficiency trends and policies

## Overview

In 2015 final energy consumption was slightly lower than in 2000 (normal climate). Final energy consumption in the agricultural sector decreased from 0.97 Mtoe in 2000 to 0.773 in 2015 corresponding to a decrease of 2%/year. In the services and non-specified sectors final energy consumption have decreased from 1.96 Mtoe to 1.92 Mtoe corresponding to a decrease of 0.1%/year. Industry sector and transport sectors have changed from 2.96 Mtoe and 4.82 Mtoe to 2.16 Mtoe and 5.2 Mtoe, respectively corresponding to a decrease of 2%/year and an increase of 5%/year. Residential sector has not changed during the period. Transport sector consumes the biggest share of energy consumption on sector level.

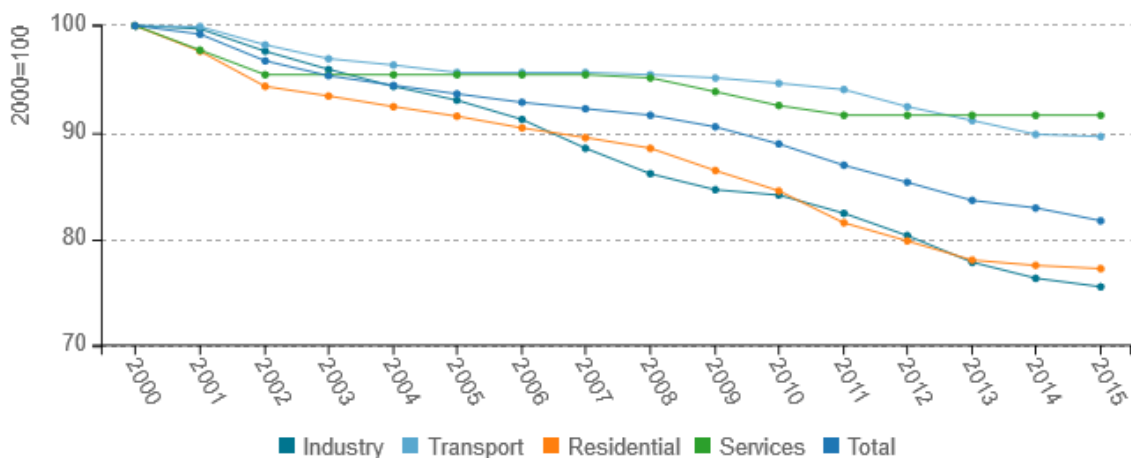
Figure 1: Final energy consumption by sector (normal climate)



Source: ODYSSEE

Energy efficiency for final consumers, as shown by ODEX, improved by an average of 1%/year from 2000 to 2015 (or 18%). Most improvement has been registered in industry (2%/year or 25%) and residential (2%/year or 23%). For the transport and services sectors, gains are lower (less than 10% since 2000) with slow progress since the economic crisis.

Figure 2: Technical Energy Efficiency Index (ODEX)



Source: ODYSSEE



Horizon 2020  
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The Danish government has a clear ambition: Denmark should be independent of fossil fuel 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 50 pct. of final energy consumption (EU definition).

Table 1: Sample of cross-cutting measures

Measures	NE EA P me as ure s	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 pct. 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/energibesparelser/energiselskabers-energispareindsats">https://ens.dk/ansvarsomraader/energibesparelser/energiselskabers-energispareindsats</a>
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	

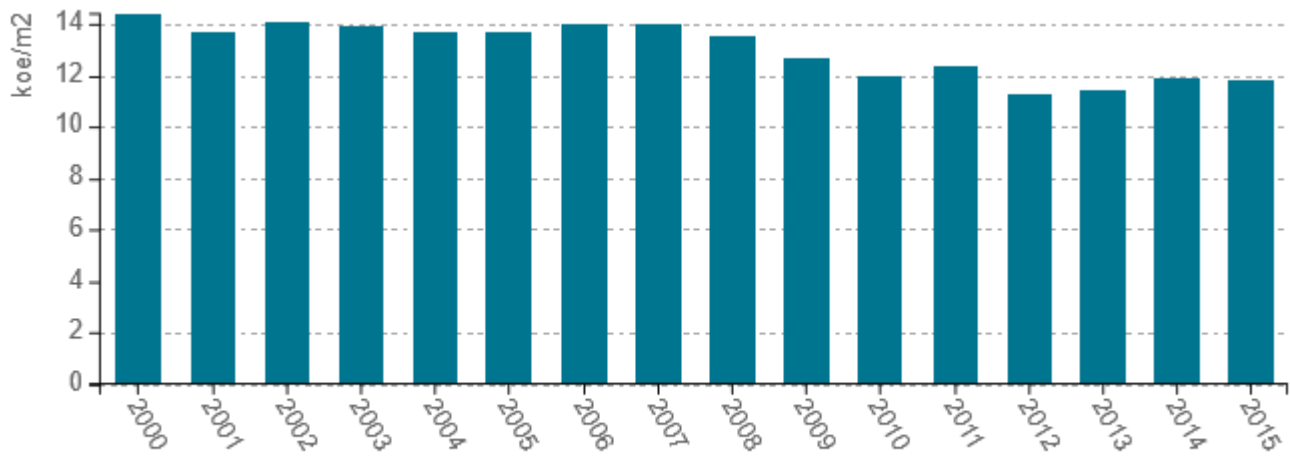
Source: MURE

## Buildings

The energy consumption for heating per m<sup>2</sup> (normal climate) has decreased by 1%/year over the years 2000 to 2015 from 14.4 koe/m<sup>2</sup> to 11.8 koe/m<sup>2</sup>. In the period from 2000 to 2007 the energy consumption is fairly stable. From 2008 the energy consumption per m<sup>2</sup> decreased. Note: Water heating included in space heating. Figure 4 shows that electricity consumption for electrical appliances per dwelling has decreased slightly from 2000 to 2015 with an average of 0.2%/year. Cooking has decreased with an average of 2%/year during the years 2000 to 2015. The decrease is the result of more energy efficient appliances and lighting which more the outweighed the increased number of appliances.

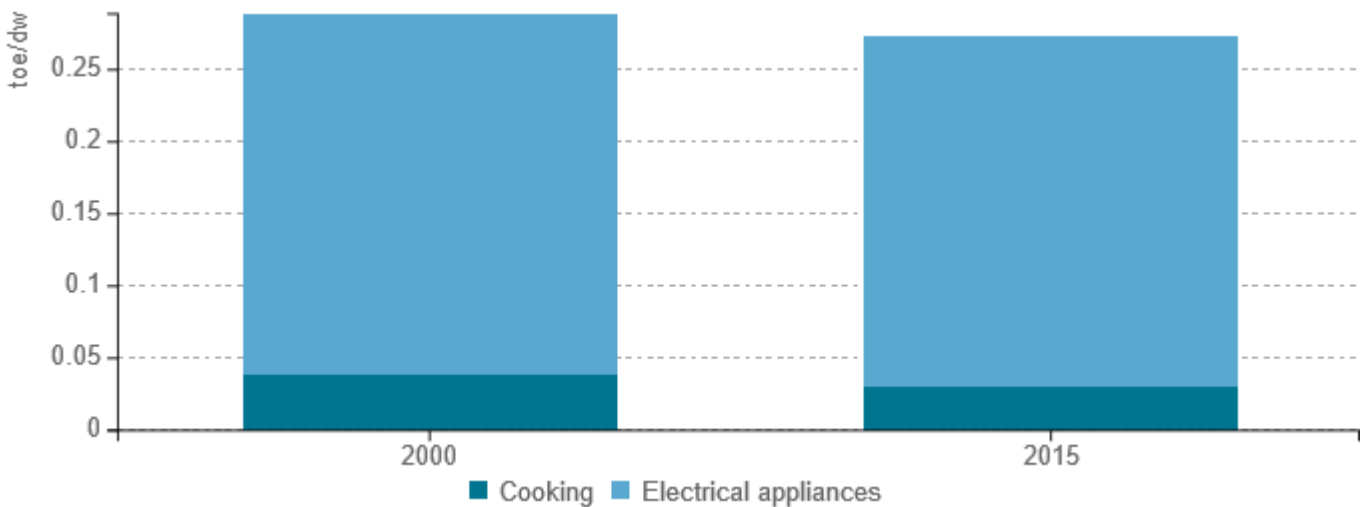


Figure 3: Energy consumption of space heating per m2 (normal climate)



Source: ODYSSEE

Figure 4: Electricity consumption by end-use per dwelling

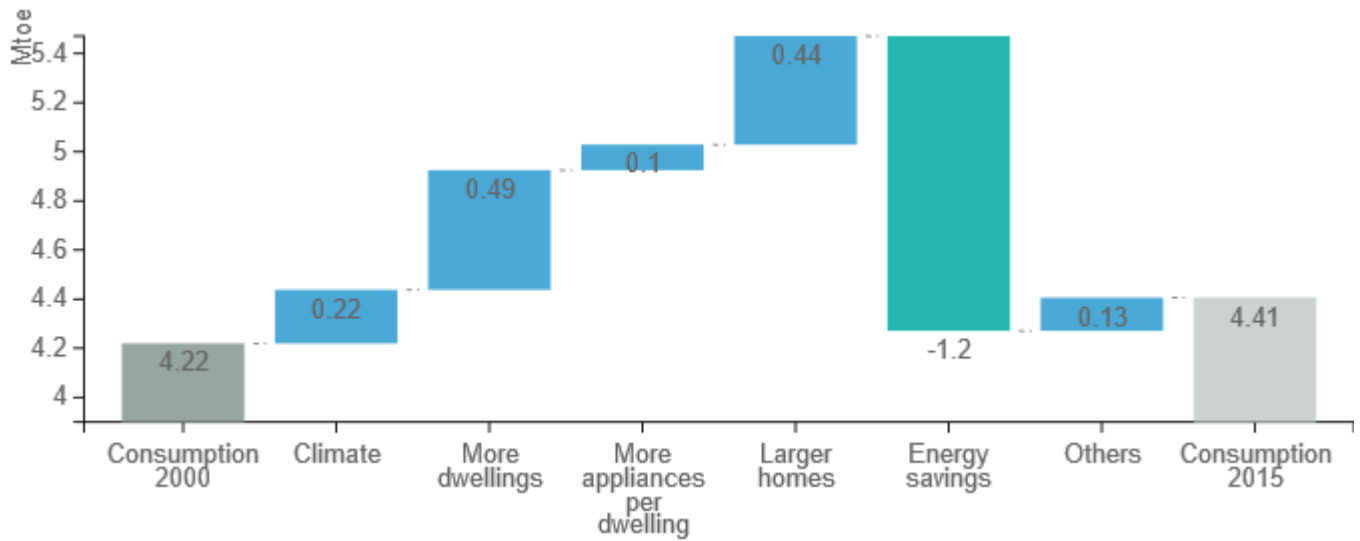


Source: ODYSSEE

Energy consumption for households has increased slightly by 0.3%/year in the period from 2000 to 2015. On the one hand, two main drivers contribute to increase the energy consumption : more dwellings (0.5 Mtoe) and change in lifestyles (0.5 Mtoe). On the other hand, energy savings (1.2 Mtoe) tend to decrease the energy consumption. As a result, the energy consumption of residential is rather stable over the period 2000-2015.



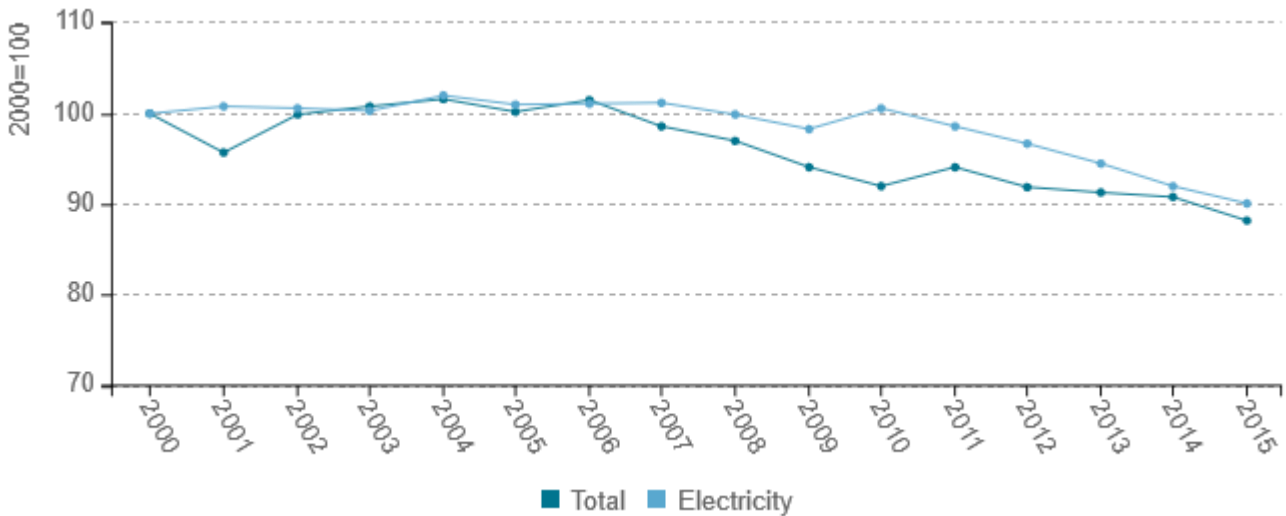
Figure 5: Main drivers of the energy consumption variation in households



Source: ODYSSEE

Energy consumption and electricity consumption per employee has decreased, by 12% and 10% respectively. Electricity consumption per employee was quite stable until 2010, then decreased. Total energy consumption per employee has decreased mainly since 2007.

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



Source: ODYSSEE

The policies and measures to promote energy efficiency in buildings are a combination of - economic incentives given by the taxes on energy- regulation primarily by the requirements in the building codes both for new and existing buildings and energy certification of buildings- information, training, etc. The energy efficiency obligation is 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 2015	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.		
Bedre Bolig	Focuses on, among other things, developing cooperation between home owners and financial institutions, enabling financial advisers to better advise their customers on the financing of energy improvement projects. This means that, in connection with the establishment of the scheme, a calculation program and a report format has been developed which gives the financial institutions a solid basis on which to assess the potential savings that could be made in a building and to facilitate the dialogue between home owner and bank.		
Digital tools at SparEnergi.dk	Sparenergi.dk offers a number of digital tools which can help users to improve their energy efficiency. Examples can be found in the NEEAP 2017, page 21		

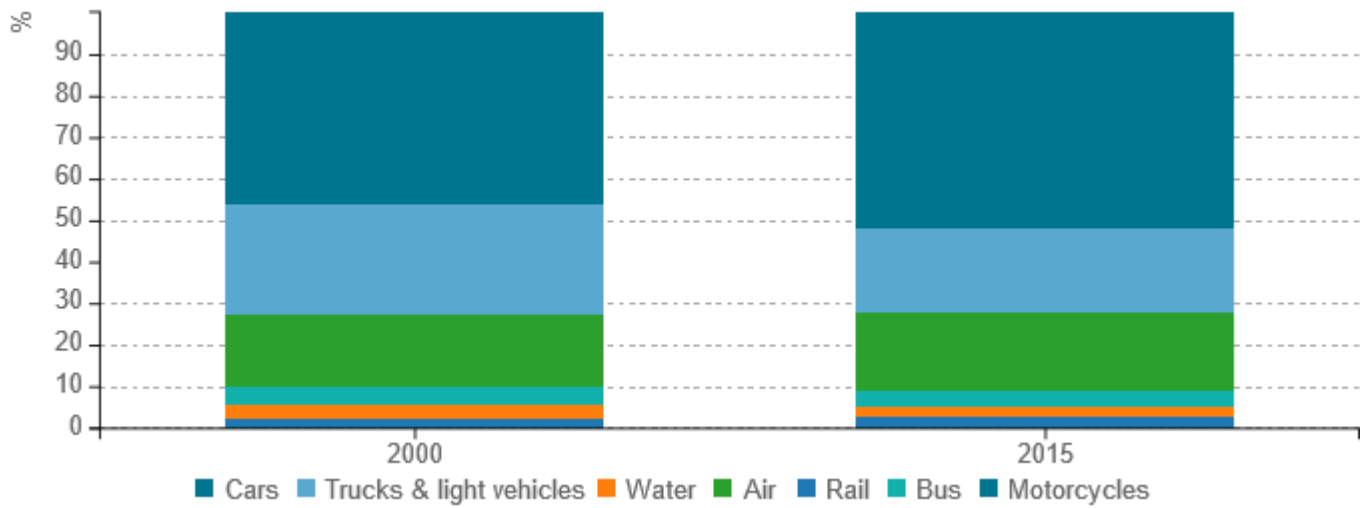
Source: MURE



**Transport**

From 2000 to 2015 the share of cars in transport energy consumption has increased from 46% to 52% in 2015. Air transport represents 19% in 2015 (against 17% in 2000). The remaining is split among trucks and light vehicles (20%), rail (2%) and bus (4%).

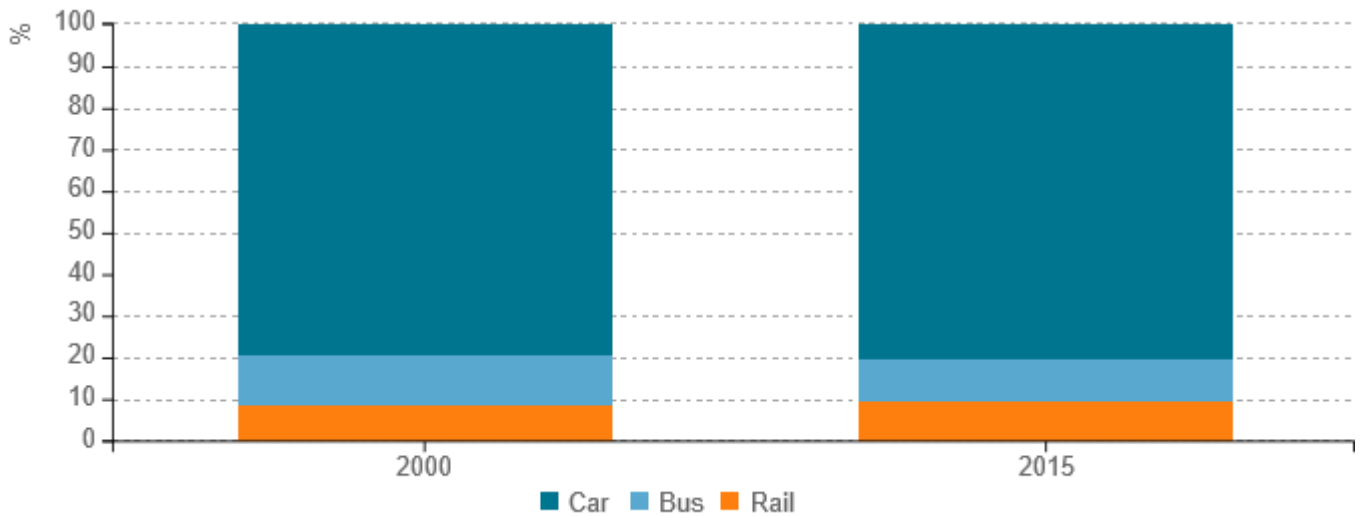
*Figure 7: Split of the transport energy consumption by mode*



Source: ODYSSEE

The split of traffic between modes remains quite constant 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: Share of transport in passenger traffic*

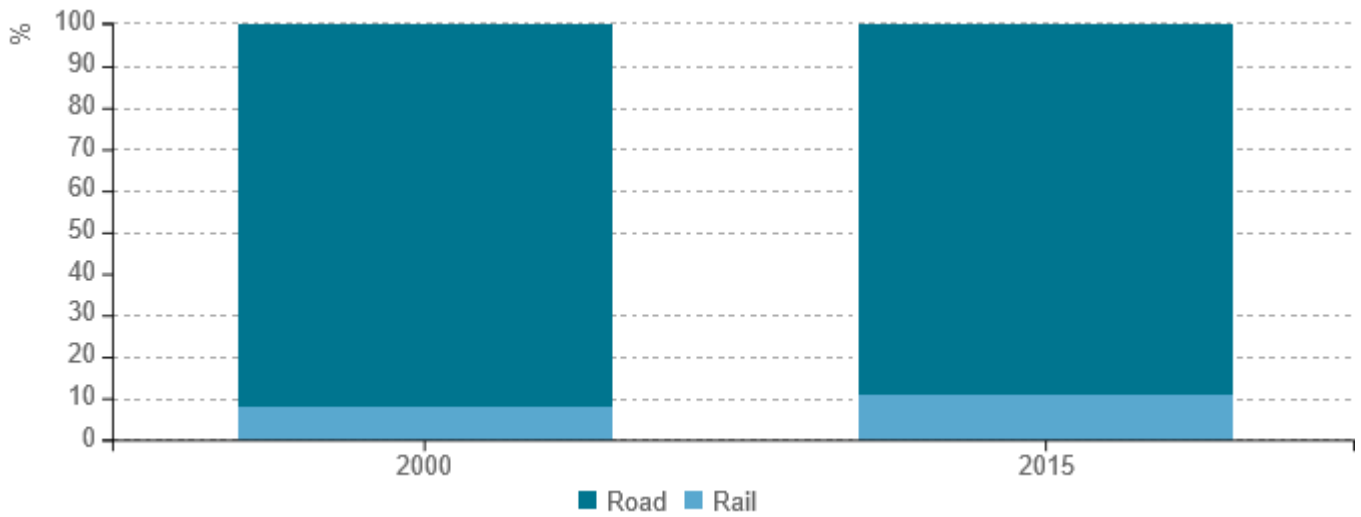


Source: ODYSSEE



The share of transport of freight by road has decreased from 92% to 89% in 2015. On the opposite, the share of rail freight traffic has increased slightly in 2015 and represents 11% of the traffic (8% in 2000).

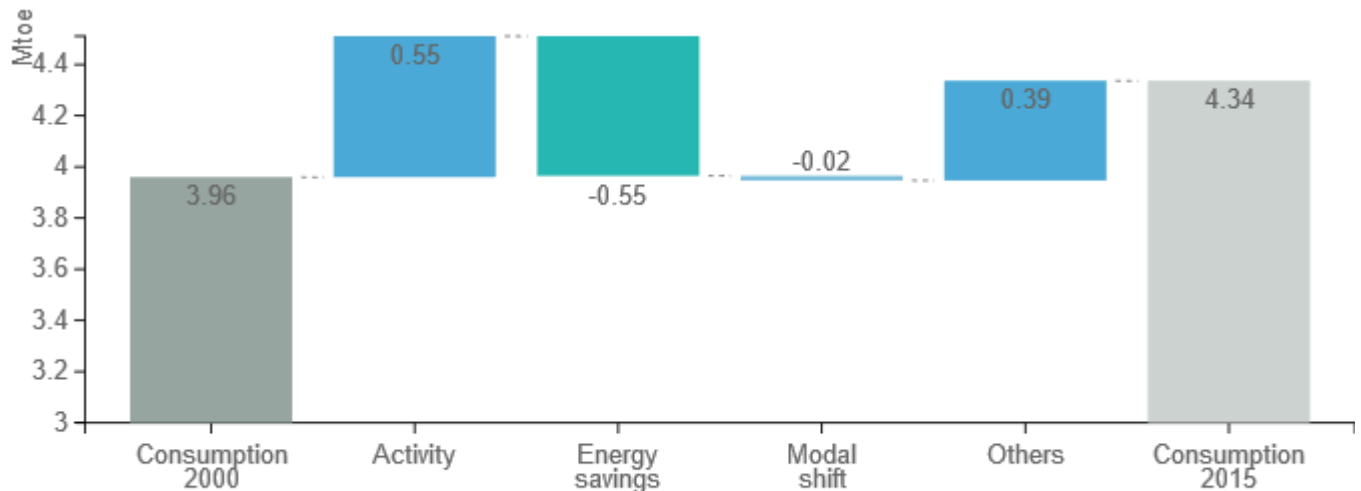
Figure 9: Share of modes in freight traffic



Source: ODYSSEE

The energy consumption in the transport sector has increased by 0.6%/year from 4 Mtoe to 4.3 Mtoe. The main drivers for the increase is more activity (e.g. more traffic), and some other effects (e.g. behavior, decrease in load factors for trucks etc). Energy savings counterbalanced the activity effect and tend to decrease the energy consumption (0.6 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 other things measures which can 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: Policies and measures into force in the transport sector**

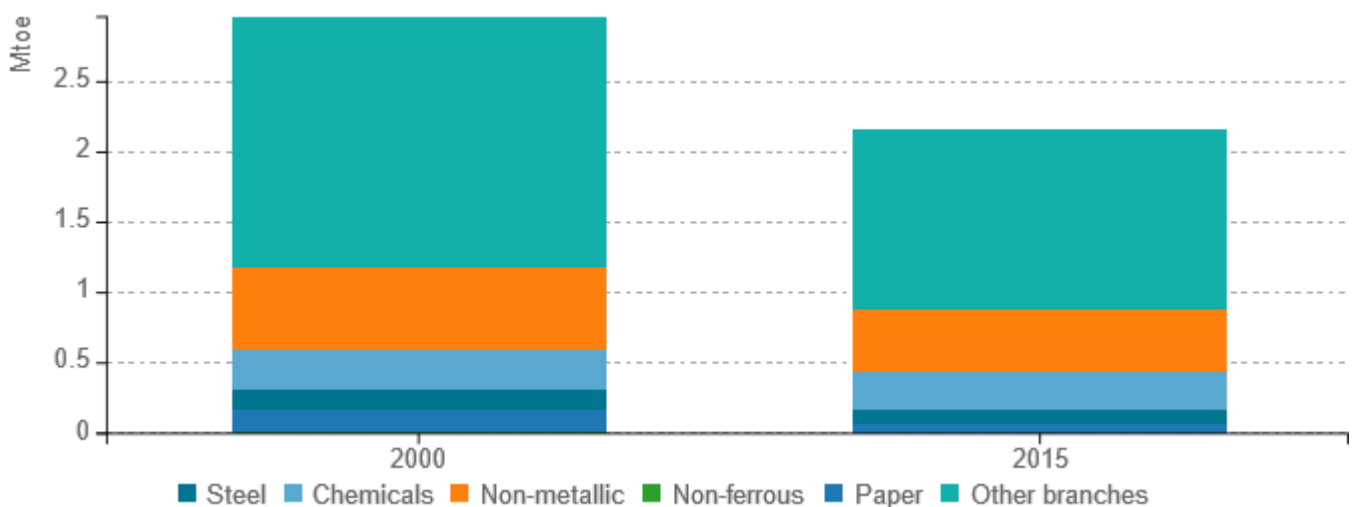
Measures	Description	Expected savings, impact evaluation	More information available
Tax on fuel	The taxes on fuels used for transport are increasing the prices.		
Environmental zones in bigger cities			
Tax reduction for new cars with low fuel consumption	New cars are highly taxed in Denmark. The taxes level 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 2015 with about 25%. It is especially the consumption in the manufacturing sector that has decreased. The food, beverages and tobacco sector is the main contributor of energy consumption in the manufacturing sector. Note: In 2015 non-ferrous is a part of steel.

**Figure 11: Final energy consumption by branch**



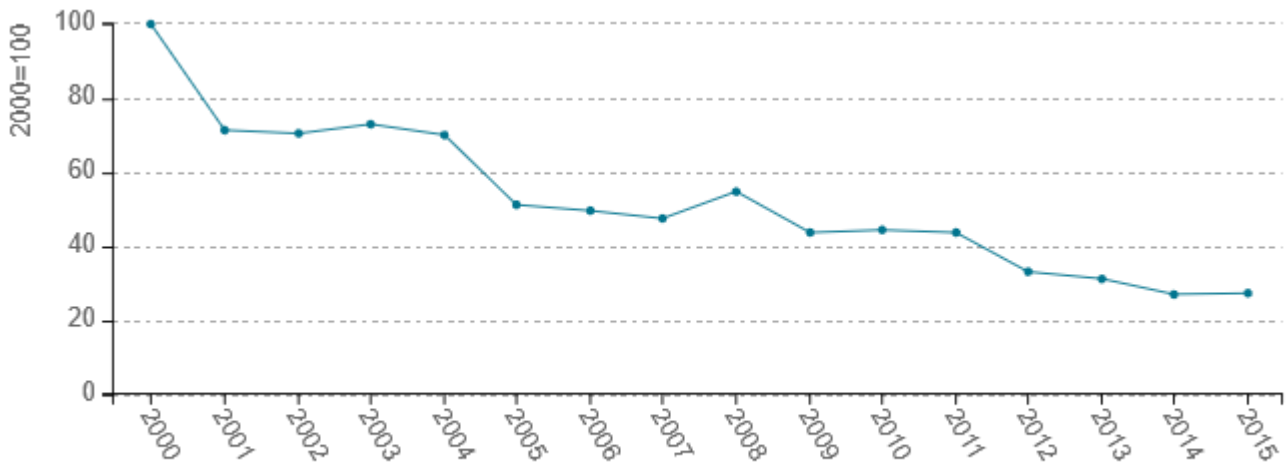
Source: ODYSSEE





The energy consumption per tonne of paper produced has decreased by 8%/year from 2000 to 2015. This may be an effect of a reduced paper production.

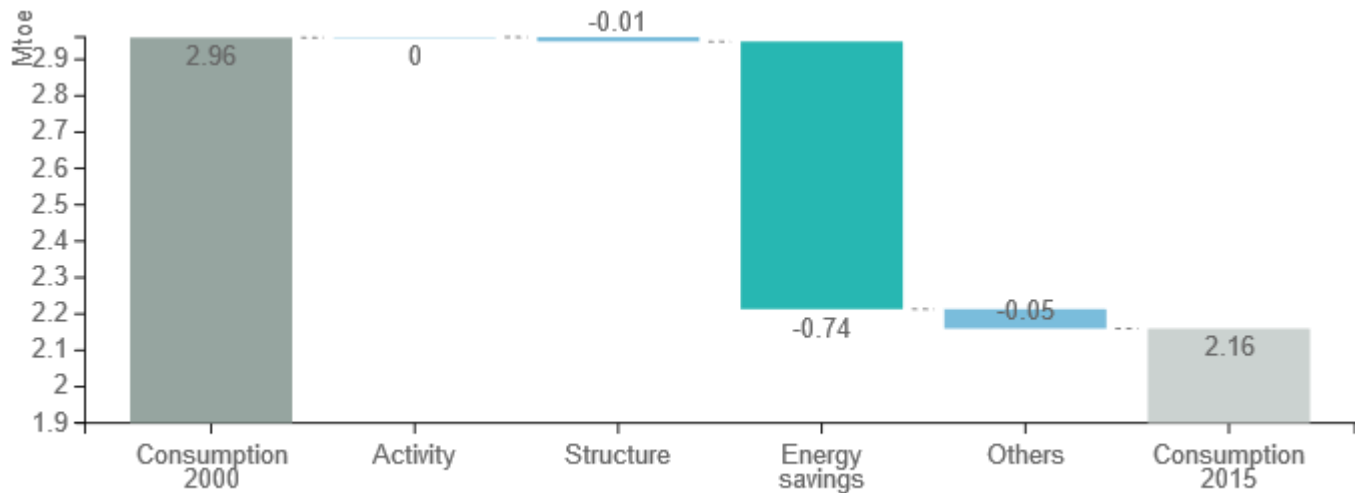
Figure 12: Unit consumption of energy-intensive products (toe/t)



Source: ODYSSEE

The decreasing energy consumption in industry is mainly due to energy savings due to technical improvement of the machineries and processes.

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



Source: ODYSSEE



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

*Table 4: Policies and measures into force in industry*

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.		
Energy efficiency obligation scheme	About 60 % of the reported savings are in private enterprises.	Evaluations shows that it has had an important impact on the efficiency improvements	
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.		

Source: MURE

