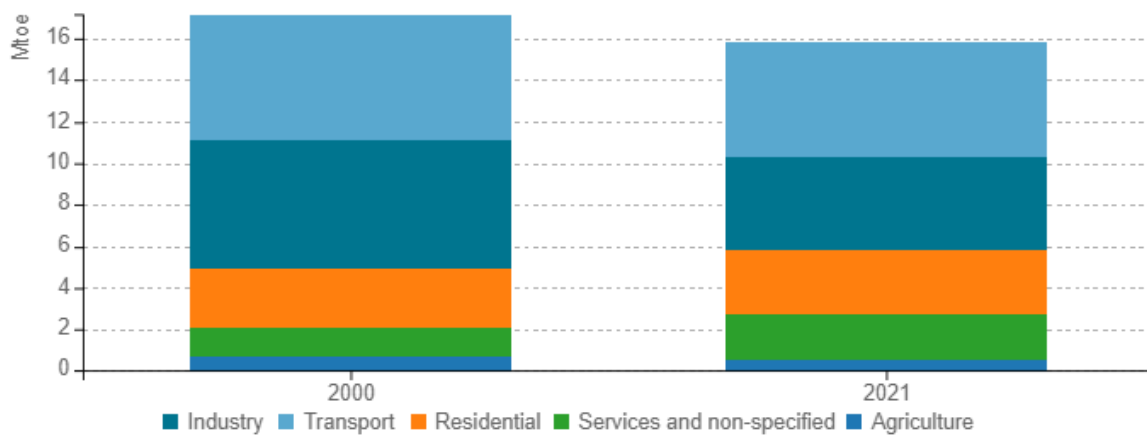


# Energy efficiency trends and policies

## Overview

In 2021, the final energy consumption in Portugal was 15.8 Mtoe, 7.7% lower than in 2000. The transport sector was the largest energy consumer, corresponding to 34.7% of final energy consumption in 2021, followed by the industry sector, with 28.5%, the residential buildings sector, with 19.5% and the services sector, with 14%. The industry, agriculture and transport sectors reduced their energy consumption by 28%, 27% and 8%, respectively, between 2000 and 2021. However, the buildings and services sector increased their consumption by 10% and 59%, respectively, in the same analysis period.

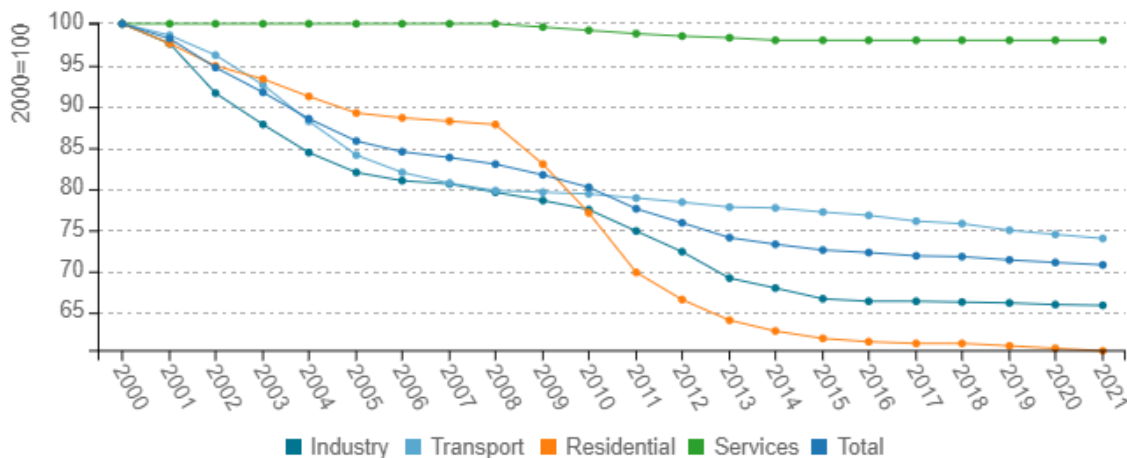
Figure 1: Final energy consumption by sector (normal climate)



Source: ODYSSEE

The technical index of energy efficiency in the economy (ODEX) decreased by 29% in the period between 2000 and 2021, with an average annual decrease of approximately 1.6%. In the same period, and although all sectors contributed to this improvement, the residential sector had the greatest energy efficiency increase (2.4%/year). The industry, transport and services sectors followed a similar trend as the global ODEX, with an annual improvement of 2.0%, 1.4% and 0.1%, respectively, in the period between 2000 and 2021.

Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE



The ECO.AP 2030 program places the Public Administration as a leader in the adoption of energy and resources efficiency measures, contributing to the decarbonization and energy transition of the public sector. It sets specific targets to reduce energy, water and material consumption, as well as greenhouse gas emissions in facilities related to buildings, equipment, fleets and infrastructure, including electric mobility. ECO.AP 2030 establishes objectives to reduce primary energy consumption by 40%, ensure that 10% of energy consumption comes from renewable sources, reduce water and material consumption by 20%, and achieve an energy renewal rate and 5% water in public buildings by 2030. The Environmental Fund is a financial instrument that supports the implementation of measures considered in national energy and environmental policies to achieve sustainable development objectives, including national and international goals related to climate change, water resources, waste and nature conservation. It is worth pointing out the creation of a single environmental fund to optimize the financing of environmental policies. The Building Energy Certification System, established via the Decree-Law No. 101-D/2020, highlights the importance of buildings in the fight against climate change, introducing more demanding requirements to increase buildings sustainability. It introduces ambitious energy efficiency targets, and financial incentives for renovation focusing on energy performance, aligned with the EPBD and other European Union guidelines.

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

Measures	NECP measures	Description	Expected savings, impact evaluation
<a href="#">Energy Efficiency Program in Public Administration (ECO.AP 2030)</a>	yes	ECO. AP 2030, Public Administration is at the forefront, as a model in adopting measures to improve efficiency and other resources, establishing a set of objectives and goals that contribute to the decarbonization and energy transition of its activities.	High
<a href="#">Environmental Fund</a>	yes	The Environmental Fund is a financial instrument that aims to support environmental policies to pursue sustainable development objectives, contributing to the fulfilment of national and international objectives and commitments, particularly those related to climate change, water resources, waste and conservation of nature and biodiversity, financing entities, activities or projects.	High
<a href="#">Decree-Law No. 101-D/2020, Establishes the requirements applicable to buildings to improve their energy performance and regulates the Building Energy Certification System</a>	yes	The decree-law addresses the importance of buildings in the fight against climate change, promoting energy efficiency and establishing ambitious goals. It proposes changes to regulations to modernize and make buildings more sustainable. It highlights the granting of financial incentives for the renovation of buildings with a focus on improving energy performance. The decree aims to establish requirements for the design and renovation of buildings, regulate energy certification and implement European Union directives.	Low

Source: MURE

The ODYSSEE-MURE project is co-funded by the European Union.

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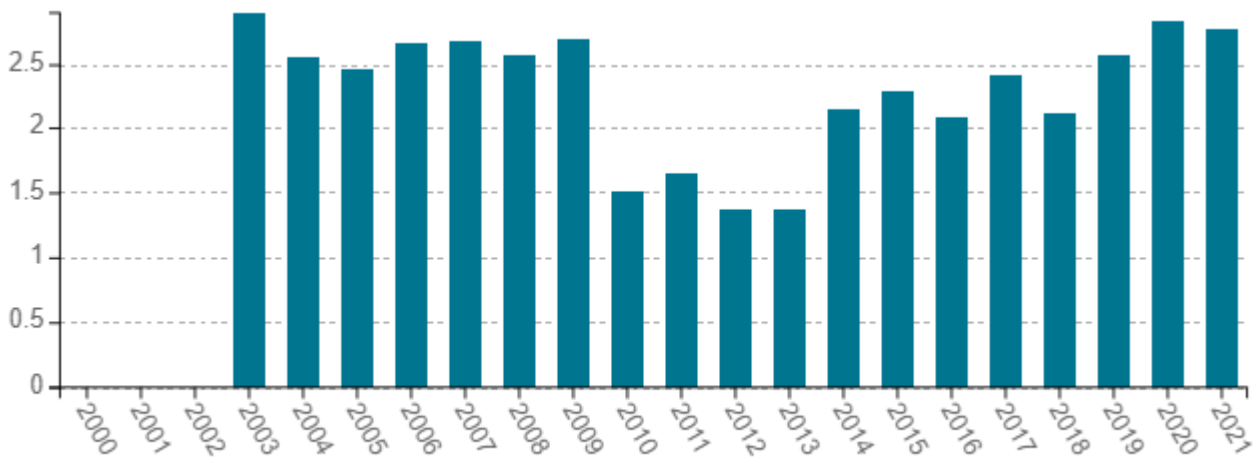


Co-funded by  
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### Buildings

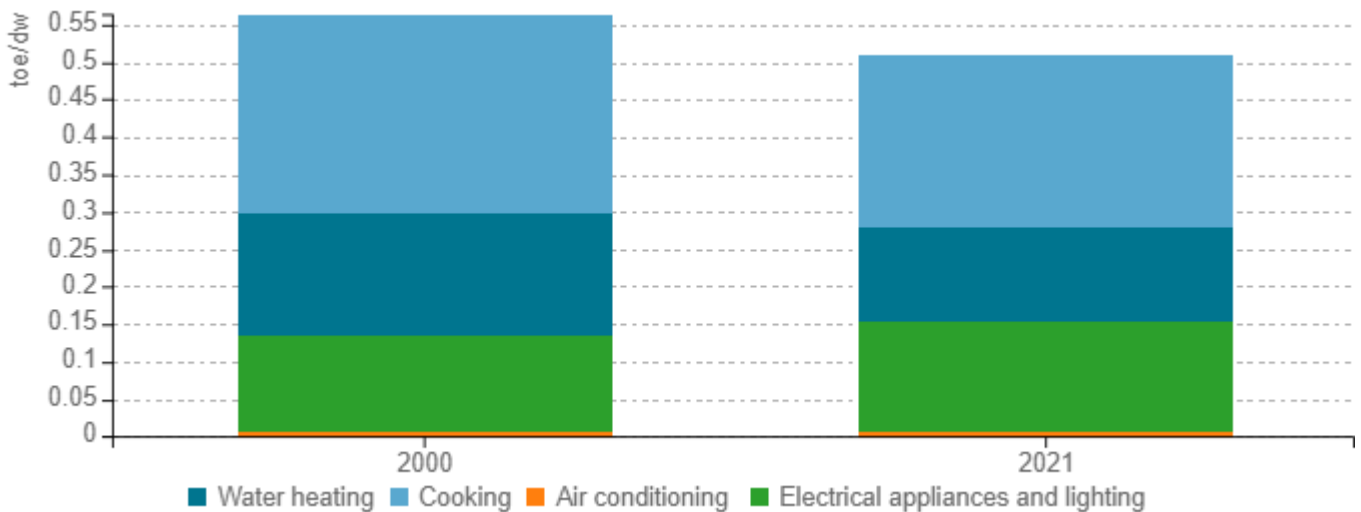
The residential sector represented in 2021 19.5% of the total energy consumption (3.10 Mtoe). As for space heating needs, the energy consumption per m<sup>2</sup> decreased by 4% compared to 2003. Looking at the distribution of the final energy consumption of households, space heating represents the largest share of the consumption with 33% and increased by 15% compared to 2000. Space heating excluded, preparation of meals is the end-use with the highest energy consumption per dwelling, which decreased by 13% since 2000. Domestic hot water energy consumption per dwelling decreased by 24%. Final energy consumption per dwelling of electrical appliances and lighting is the third most consuming end-use. Final energy consumption related to air conditioning is marginal. Consumption per dwelling for each of these two end-uses increased by 15% compared to the year 2000.

Figure 3: Energy consumption of space heating per m<sup>2</sup>



Source: ODYSSEE

Figure 4: Energy consumption per dwelling by end-use (except space heating)

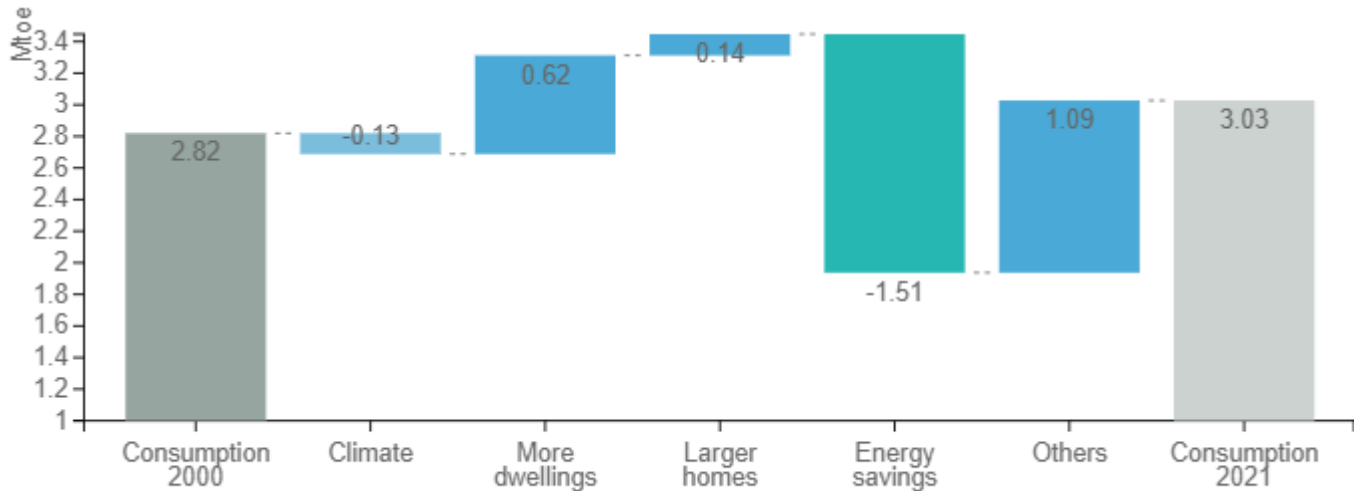


Source: ODYSSEE



In 2021, the final energy consumption in the residential sector increased by 7% compared to 2000. This is mainly due to the increase in the number of dwellings (0.62 Mtoe), larger dwellings (0.14 Mtoe) and other factors (1.09 Mtoe). Energy savings (-1.51 Mtoe) and climate (-0.13 Mtoe) have tended to reduce consumption, but not enough to result in a decrease in this sector in 2021.

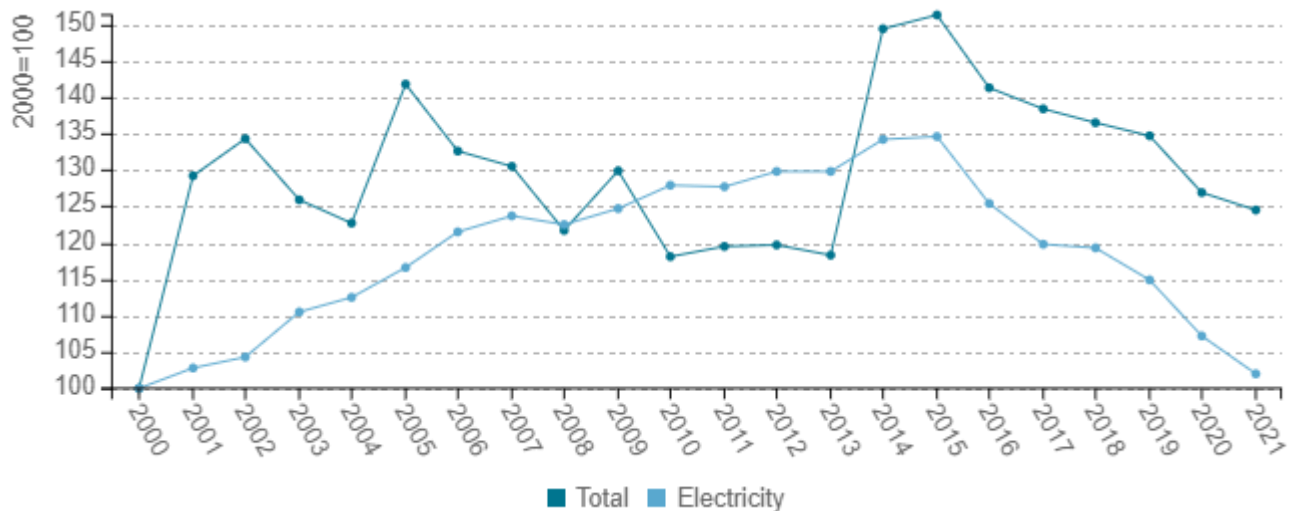
Figure 5: Main drivers of the energy consumption variation in households



Source: ODYSSEE

In the service buildings sector, the final energy consumption per worker in 2021 increased by 25% compared to 2000, however, since 2015 there has been a decreasing trend. Regarding electricity consumption per worker, consumption increased by 4% compared to 2000, following the trend in energy consumption mentioned above.

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



Source: ODYSSEE

The Financial Instrument for Urban Rehabilitation and Revitalization (IFRRU 2020) was established by the Council of Ministers Resolution (RCM) no. 84-O/2016 on the 30th of December, with the goal of consolidating various funding sources to support urban rehabilitation across Portugal. IFRRU 2020 serves as a financial instrument to facilitate investments in urban renewal throughout the country. To stimulate investment, IFRRU 2020 combines European funds from PORTUGAL 2020, funds from entities like the European Investment Bank and the Development Bank of the Council of Europe, along with commercial banking funds. The process for funding is streamlined, requiring a single application without restrictions on the entity seeking financing or the future use of the renovated building. Applications can be submitted to selected banks through their commercial network at any time, without specific application periods or limits on the number of applications per candidate. IFRRU 2020 has a financing capacity of 1.4 billion euros, generating an estimated investment of around 2 billion euros. Its objective is to enhance the sustainability of cities, enhance inhabitants' quality of life, and create new opportunities for economic and social development in urban centers.

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

Measures	Description	Expected savings, impact evaluation
<a href="#">Financial Instrument for Urban Rehabilitation and Revitalization (IFRRU 2020)</a>	This program combines different sources of financing and creates a main instrument that provides funds for renovation measures and supports easy access conditions. There are no restrictions related to the nature of the entity requesting financing or the future use of the renovation building. The measure also aims to improve the sustainability of cities and social development in urban centers.	Low

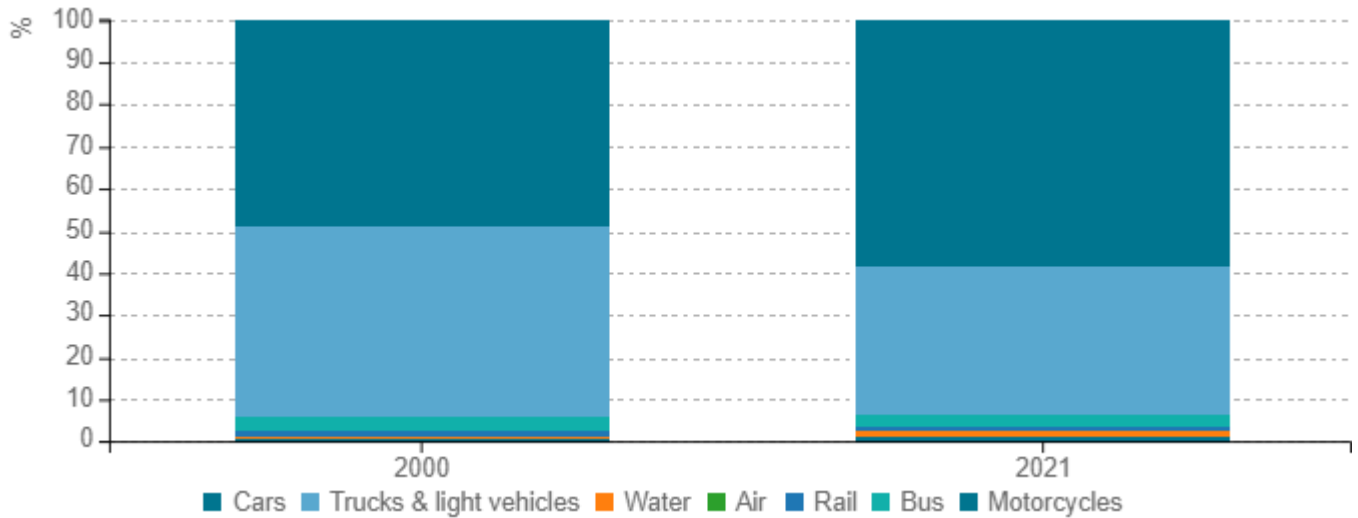
Source: MURE



**Transport**

In 2021, the transport sector represented 35% of total final energy consumption (5.5 Mtoe). Road transport was responsible for 95.6% of this consumption, air transport for 2.2% and rail and inland waterways transport for 2.2% (together). Considering road transport, cars are responsible for 57% of total energy consumption, the transport of goods (trucks and light duty vehicles) for 34%, and buses and motorcycles for 3% and 1%, respectively.

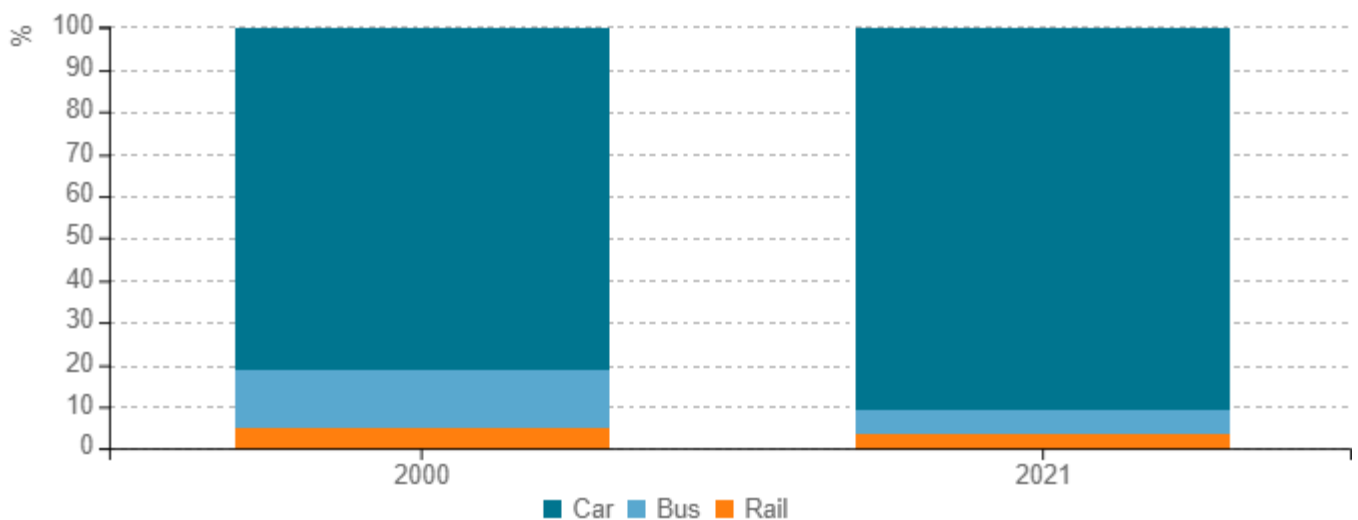
*Figure 7: Split of the transport energy consumption by mode*



Source: ODYSSEE

The main type of passenger transport continues to be the car, with a share of 91% in 2021. As for public transport, buses and trains continue to have a low representation in passenger transport, 5.7 % and 3.6%, respectively, in 2021. Between 2000 and 2021 trends have been almost constant, with an increase in the use of cars by 28% and a decrease in the use of buses and trains by 52% and 22%, respectively.

*Figure 8: Share of transport modes in passenger traffic*

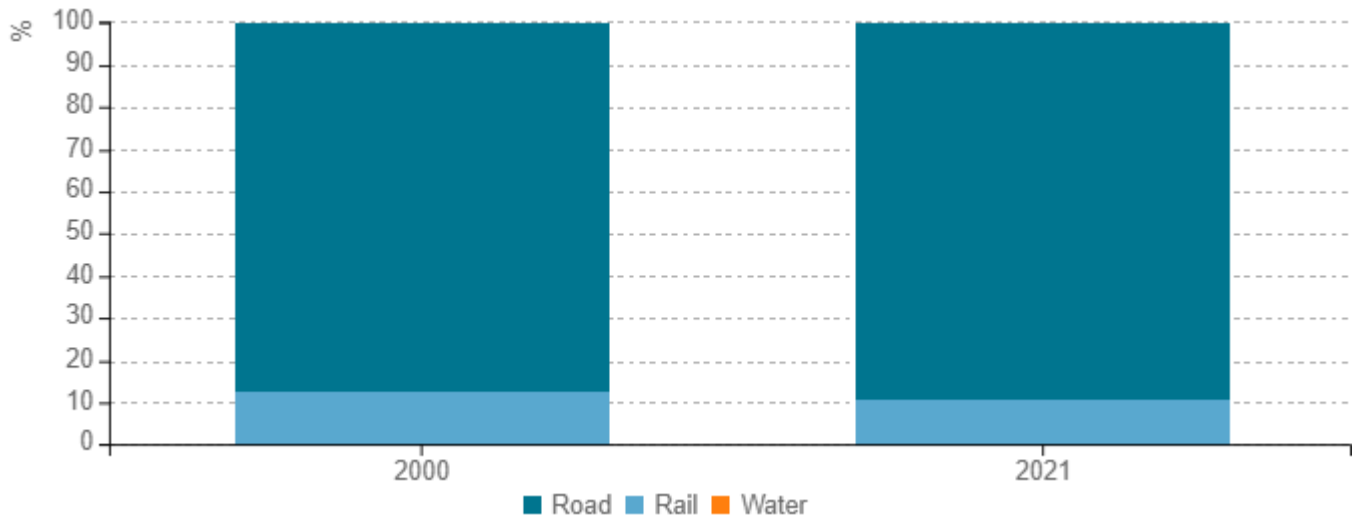


Source: ODYSSEE



The transport of goods has remained constant over the years. Concerning 2021, road transport continued to be the most used transport with a percentage of 89%, representing a slight increase of 1% between 2000 and 2021. Rail transport represents a far lower percentage, 11%, which has decreased by 14% when compared to 2000.

Figure 9: Share of modes in freight traffic



Source: ODYSSEE

Since 2000, the energy consumption in the transport sector has decreased by 0.5 Mtoe, mostly due to the energy savings resulting from the effects of technology (which contributed to reducing the energy consumption by 1.85 Mtoe). However, the effect of activity, i.e. the increase in traffic by 1 Mtoe, the modal shift by 0.43 Mtoe and other effects by 0.57 Mtoe, has contributed to increase the energy consumption.

Law No. 32/2013 of Portugal laid the foundations for the adoption and use of intelligent transport systems (ITS), aligning with Directive No. 2010/40/EC of the European Parliament. ITS leverage information and communication technologies to enhance the efficiency, safety and sustainability of road transport. The legislation covers all sides of road transport, including infrastructure, vehicles, users, traffic management and connections with other modes of transport. Its goal is to develop a suite of ITS applications to provide users with real-time traffic updates, multi-modal travel planning tools, road safety alerts, emergency calls and safe parking for commercial and heavy vehicles.

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

Measures	Description	Expected savings, impact evaluation
<a href="#">Implementation and use of intelligent transport systems</a>	Law No. 32/2013 of 10 May established the legal framework for the implementation and use of Intelligent Transport Systems (ITS), transposing into national legislation the European Parliament Directive No. 2010/40/EC of 7 July 2010/40/EC, which defines a framework for the implementation of intelligent road transport systems, including interfaces with other modes of transport.	Low

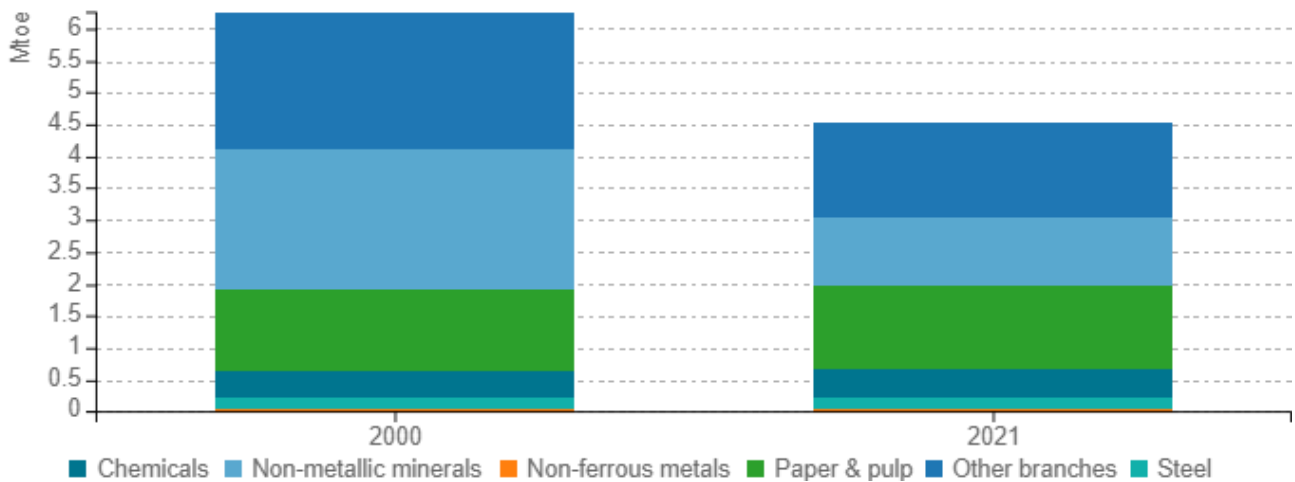
Source: MURE



### Industry

In 2021, the industry sector represented 29% of total final energy consumption (4.5 Mtoe). The decreasing trend is evident since 2000, with a significant lower consumption (-1.7 Mtoe, that is, -28%). The paper industry was responsible for 29% of this consumption, with an increase of 5% compared to the year 2000 ; this industry has shown a growth trend in recent years. Energy intensive industries, namely the paper and pulp, non-metallic minerals, chemical, steel and non-ferrous metals industries represent 29%, 23%, 10%, 4% and 1%, respectively, in 2021. The industry that decreased the most in final energy consumption in 2021 compared to 2000 was the non-metallic industry, with a decrease of 52%.

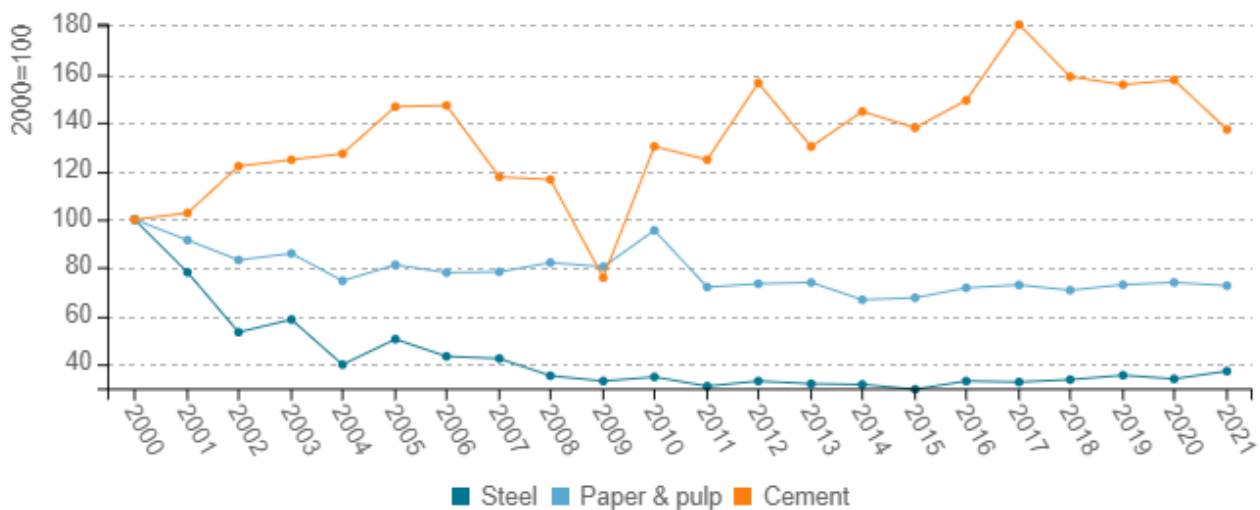
Figure 11: Final energy consumption by branch



Source: ODYSSEE, steel including blast furnaces

In energy-intensive industries, the cement industry represents, since 2000, the highest growth, with an increase of 37% in 2021. Nonetheless, since the peak in 2017, energy consumption per produced unit has steadily decreased. In the opposite trend, the steel and paper production industry has been gradually reducing their unit consumption, since 2000.

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



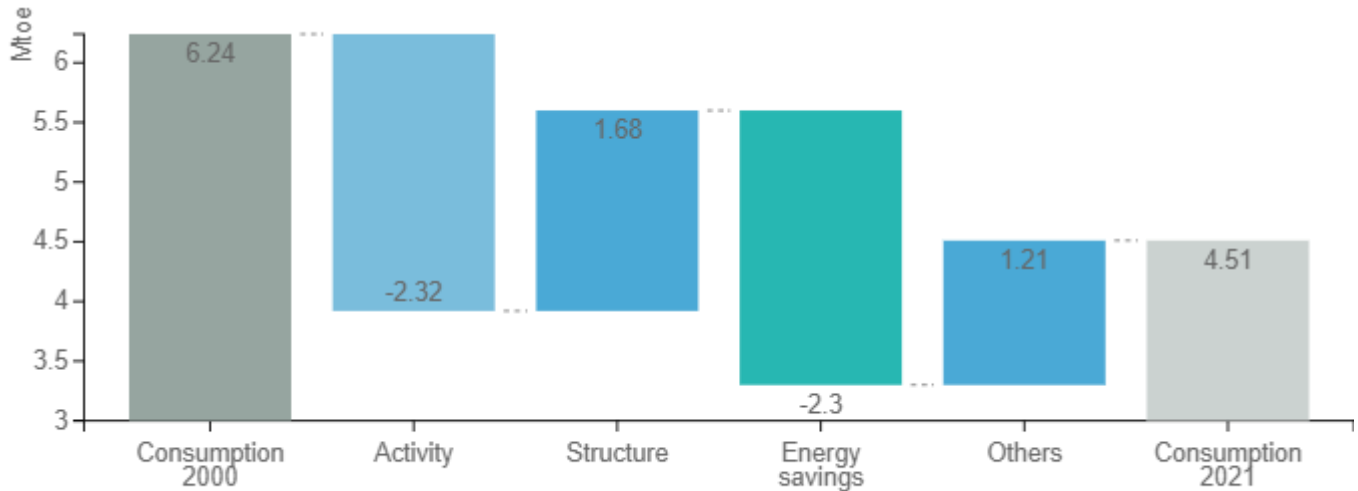
Source: ODYSSEE





The gradual reduction in energy consumption in the industrial sector since 2000 is essentially due to two factors: energy savings through the adoption of more efficient technology (2.3 Mtoe) and the reduction in industrial activity (2.32 Mtoe). Structural effect and other effects had an inverse trend, contributing to an increase in energy consumption by 2.89 Mtoe.

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



Source: ODYSSEE

The Energy Intensive Consumption Management System (EICMS), which replaced the previous Regulation on Energy Consumption Management in the industry sector, established a system for managing and monitoring energy consumption for companies and installations with intensive energy consumption (above 500 toe/year). Under this mandatory regulation, the definition of energy-intensive installations has been extended to non-SMEs, expanding the scope of the previous regulation.

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

Measures	Description	Expected savings, impact evaluation
<a href="#">Intensive Energy Consumption Management System (EICMS)</a>	Promote the increase of energy efficiency through the modification of production processes, the introduction of new technologies and the behaviours changes. The EICMS applies for all companies and facilities (also named “Operators”) that have an annual consumption over 500 toe/year, imposing binding energy audits, with a 8-year periodicity.	Medium

Source: MURE