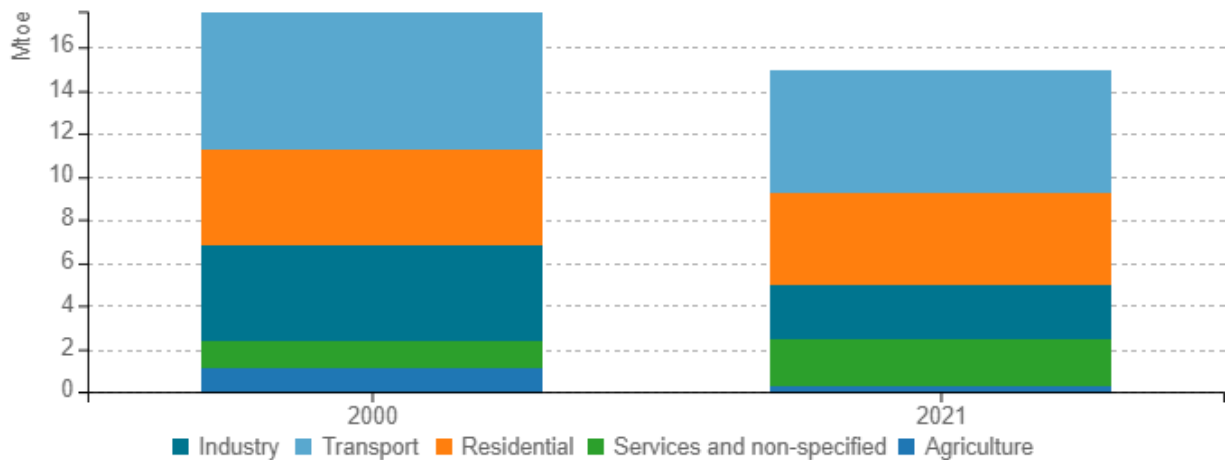


Energy efficiency trends and policies

Overview

In Greece, total final energy consumption decreased by almost 15% from 2000 to 2021. Transport is the largest consuming sector holding 38% of the final energy use in 2021, showing a decrease of 12% in the period from 2000 to 2021. Residential sector is the second consuming sector holding 29% of the final energy use, showing a decrease of about 2%. Industry with a share of 17% of the final energy use in 2021 decreased by almost 43%, while services have a share of 14% of the final energy use and showed an increase of 65% (Figure 1).

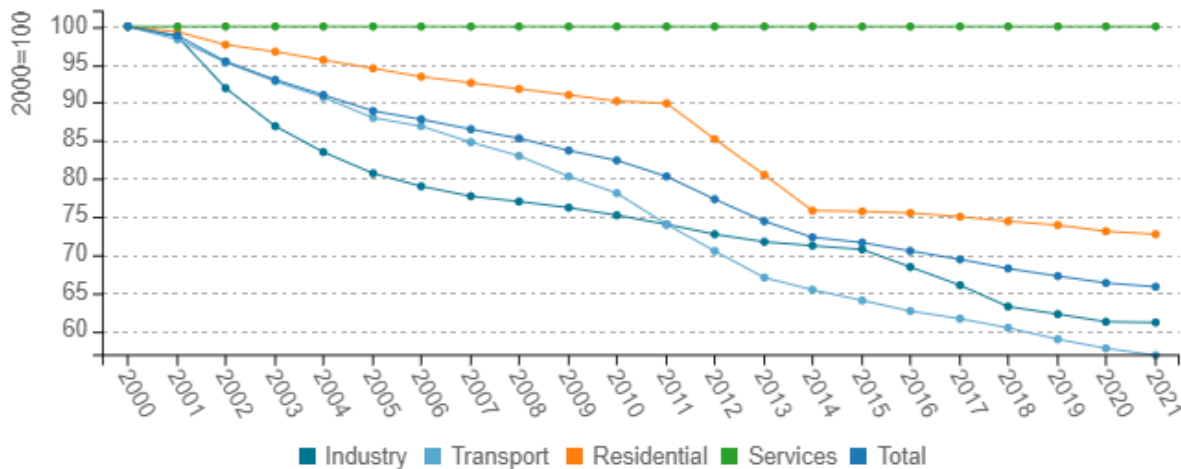
Figure 1: Final energy consumption by sector (normal climate)



Source: ODYSSEE

Over the period 2000 to 2021, the energy efficiency of final consumers, as measured by ODEX indicator improved by 34% (Figure 2). The largest improvement (i.e. decrease in ODEX) was registered by the transport sector with 43% (excluding international air transport), then by industry with 39% and by households with 27%, while services had the lowest improvement (0%). The implementation of measures together with the impact of the economic recession are the main reasons behind the decrease in the ODEX indicator.

Figure 2: Technical Energy Efficiency Index



Source: ODYSSEE



Under Article 7 of the EED, Greece had a target of achieving cumulated energy savings for 3,333 thousand tonnes of oil equivalent (ktoe) or 140 PJ between 2017 and 2020. In its National Energy Efficiency Action Plan of 2017, the government indicated a number of measures in different sectors to achieve this target. Data on achieved energy savings show that the Energy Efficiency Obligation Scheme (EEOS) in Greece overachieved the target of 14 PJ, reaching 61.4 PJ of cumulated energy savings. Greece’s Energy Efficiency Obligation Scheme (EEOS) started in 2017 and is managed by the CRES. Obligated parties are electricity, gas, oil products suppliers or retailers whose market share is higher than 1%. The number of obligated parties was 35 in 2022. From 2017 to 2020, the EEOS exceeded its target demand reduction by 80%, with annual savings growing from 7.3 PJ to 36 PJ. A new cycle of energy savings is expected under the EED for EU countries from 2021 to 2030. Greece is expected to achieve cumulative energy savings of 7,299 ktoe or 305 PJ by the end of this period.

Table 1: Sample of cross-cutting measures

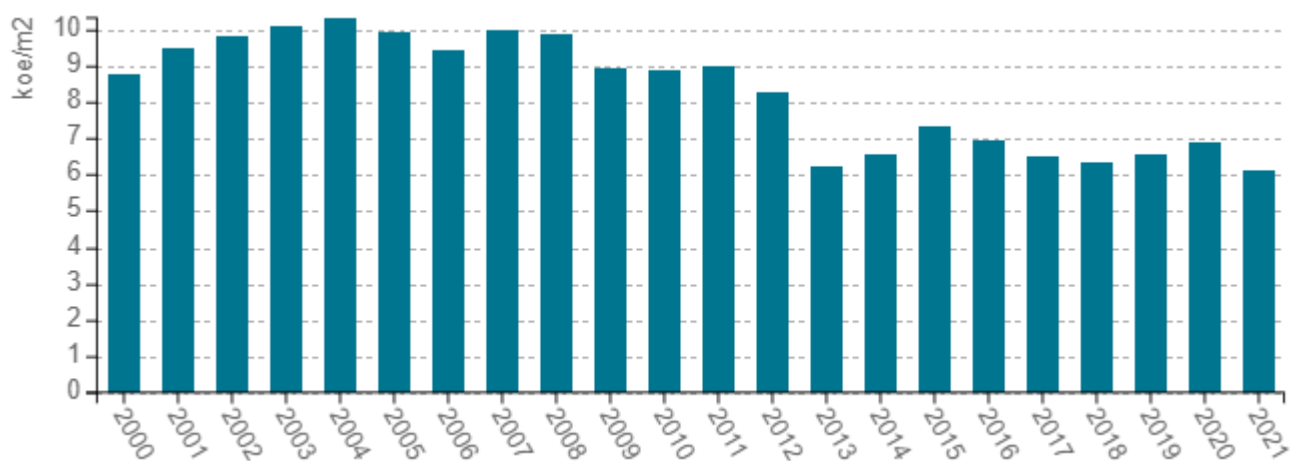
Measures	NECP measures	Description	Expected savings, impact evaluation
Energy efficiency obligation schemes	yes	Energy distributors and/or retailers have an obligation to achieve end-use energy savings.	Cumulative savings 2021-2030: 7,299 ktoe

Source: MURE

Buildings

As shown in Figure 3, the energy consumption of space heating per m2 with climatic correction decreased by 30% between 2000 and 2021 in Greece (from 8.77 koe/m2 in 2000 to 6.11 koe/m2 in 2021). This reduction in unit energy consumption is mainly due to the retrofitting of existing buildings, as well as due to behavioural changes (economic recession, energy poverty, etc.). In Figure 4, it can be seen that specific consumption of the end-uses of electrical appliances and lighting, water heating, cooking and air-conditioning increased in 2021, compared to 2000. AC specific consumption is almost 4 times higher in 2021, compared to 2000, but has still a small share. There is also an increase in specific consumption of electrical appliances and lighting (+25%) and water heating (+21%). Similarly, cooking and AC consumption per dwelling have increased by 56% and 310% respectively.

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



Source: ODYSSEE

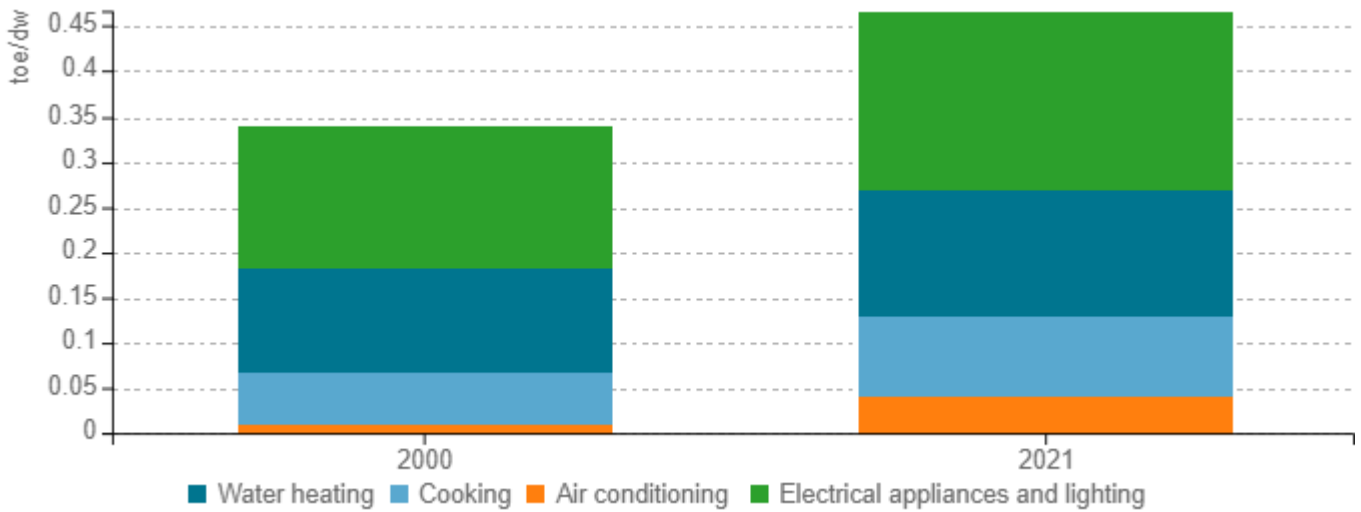
The ODYSSEE-MURE project is co-funded by the European Union.

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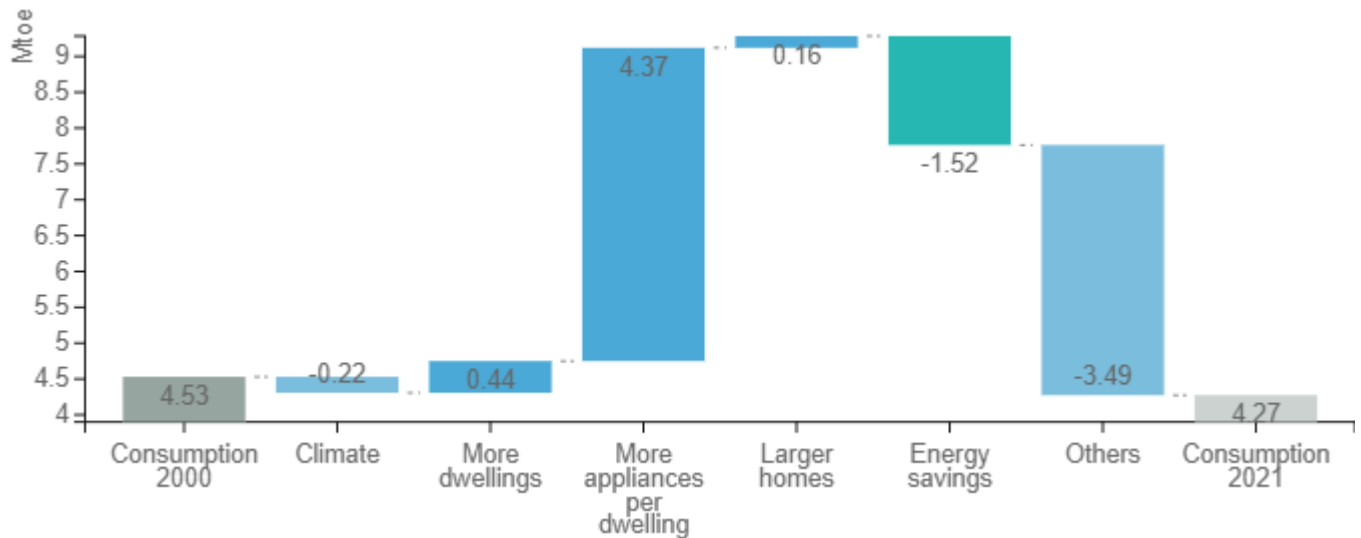
Figure 4: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

Total final residential consumption was 6% lower in 2021, compared to 2000 (Figure 5). Although the number of occupied dwellings and appliances per dwelling increased, energy savings offset their effect. Energy savings can be attributed to the retrofitting of existing buildings and standards for new buildings and appliances, but also to behavioural changes linked to economic recession (energy poverty, etc.).

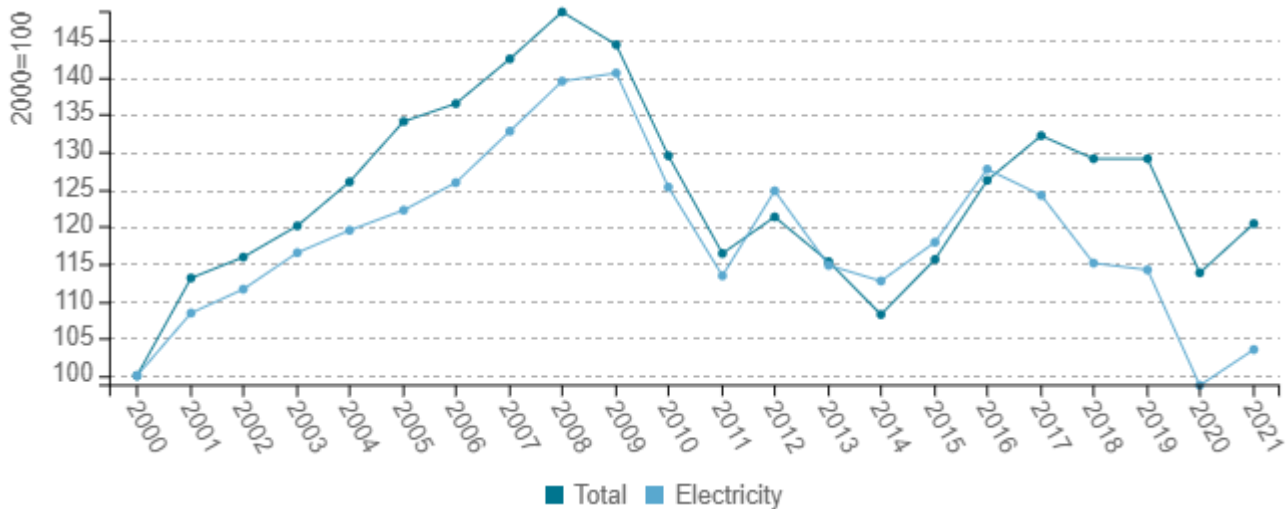
Figure 5: Main drivers of the energy consumption variation of households



Source: ODYSSEE

The energy and electricity consumption in Greece followed almost the same trend over 2000-2021, as shown in Figure 6. In 2021, the energy consumption per m² in normal climate reached the levels of 2002, while the electricity consumption per m² decreased sharply in 2020 and approached the levels of 2000, before following an upward trend in 2021.

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



Source: ODYSSEE

Energy efficiency improvement in the residential sector is a combination of regulatory measures for new buildings, which set more strict thermal insulation requirements and minimum requirements for the efficiency of heating and cooling systems as well as for hot water production, and on the other hand support measures for retrofitting the existing building stock. The "Saving at home" programme is a national programme for residential sector, offering financial support for interventions in building envelope, heating/cooling systems, and installation of RES for domestic hot water production. It was first launched in 2011 and the type of financial support offered was a subsidy ranging from 15% to 70% based on income criteria, with a low-interest loan for the remaining investment. Basic requirement of the programme was the issuing of EPC before and after the interventions.

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

Measures	Description
'Saving at home' programme II	This program was implemented in the period 2018-2019 and involved grants and low-rate loans for energy efficiency interventions for approximately 63.840 beneficiaries.
The "Saving-Autonomous" programme	This measure provides incentives for making residential buildings more energy efficient, resulting in lower energy needs, reduction of greenhouse gas emissions and therefore protection of the environment. The programme provides grants or loans for refurbishment works.
"Recycle - Change my appliance" programme	The aim of the "Recycle - Change my appliance" programme was to provide financial aid to households for replacing their old electrical appliances with new, environmentally friendly and more energy-efficient ones.

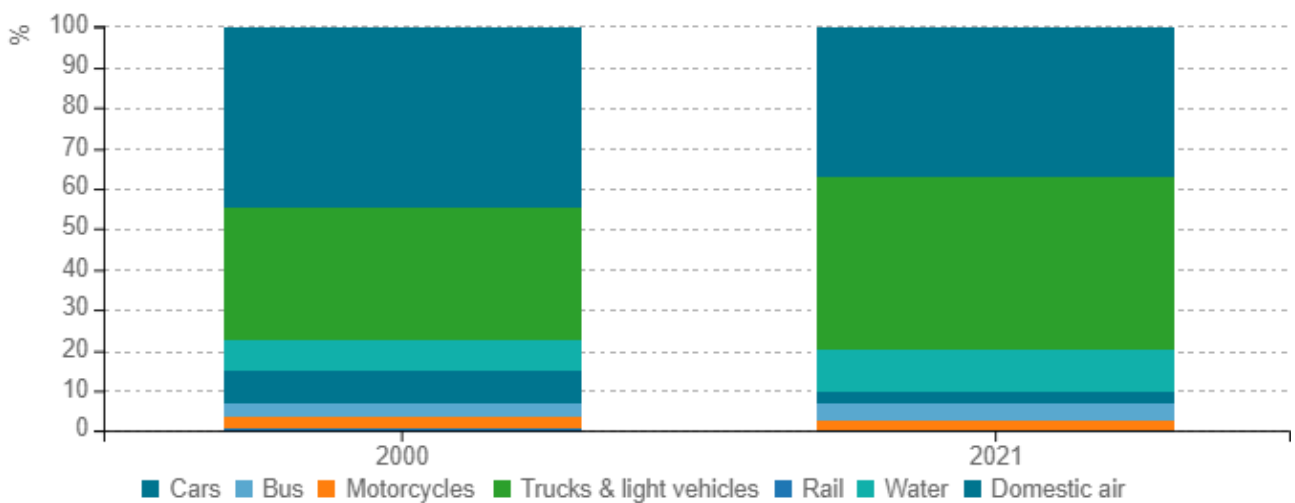
<p>The “Rooftop Photovoltaics” programme</p>	<p>The “Rooftop Photovoltaics” programme enables thousands of households and farmers to generate the electricity they need and save money. Beneficiaries of the programme are households and farmers who will be able to install their own small photovoltaic unit, combined with a storage system (battery).</p>
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Source: MURE

Transport

In 2021, trucks and light vehicles accounted for 43% of the transport consumption, followed by cars with 37% share, water with 10% and buses with 4.5% (Figure 7).

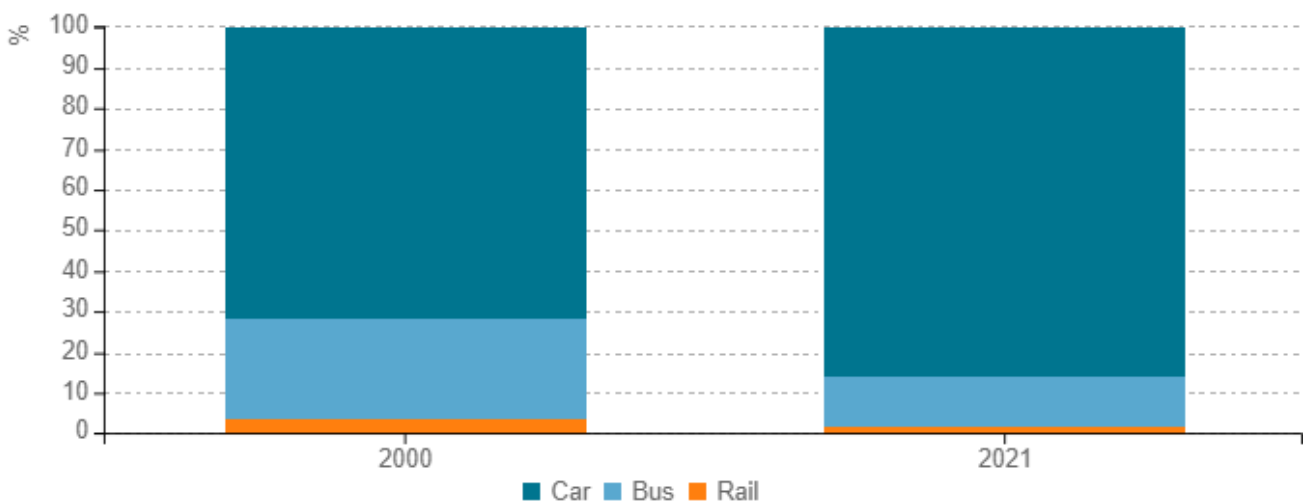
Figure 7: Transport energy consumption by mode



Source: ODYSSEE

Cars represented 86.2% of passenger traffic in 2021, followed by buses with 12.2% and rail with only 1.7%. The share of cars increased by almost 15 points in comparison to 2000, leading to a reduction in buses and rail transport by 12.5 points and 1.8 points respectively (Figure 8).

Figure 8: Modal split of inland passenger traffic

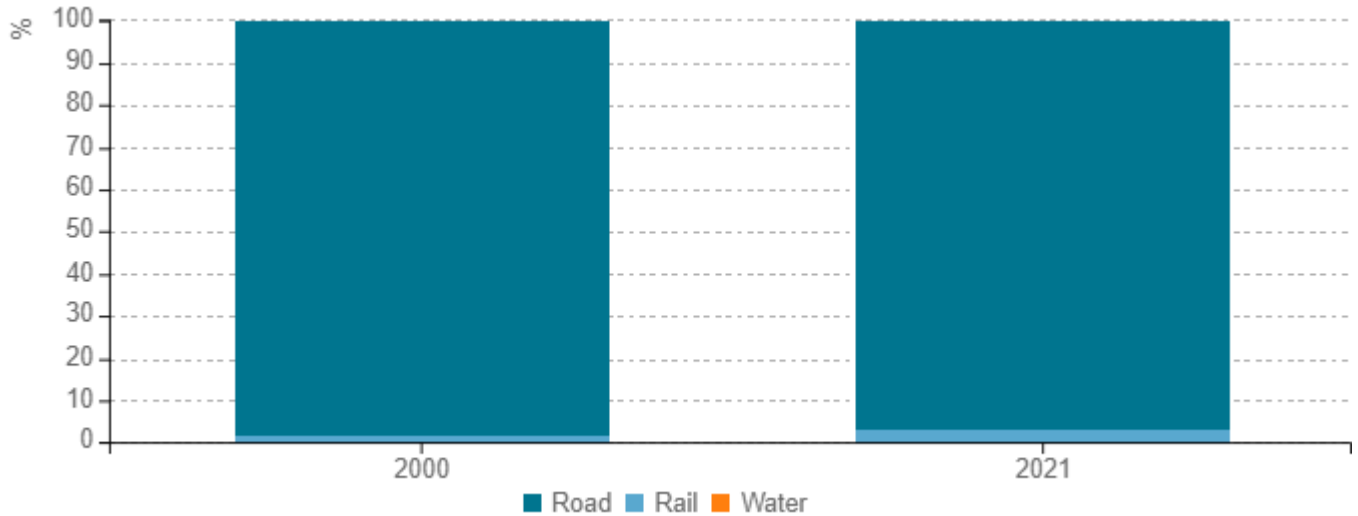


Source: ODYSSEE



The breakdown of freight transport remained the same between year 2000 and 2021. Road freight transport was dominant in 2021 with 97.1% share, while rail freight transport only accounted for 2.9% (Figure 9).

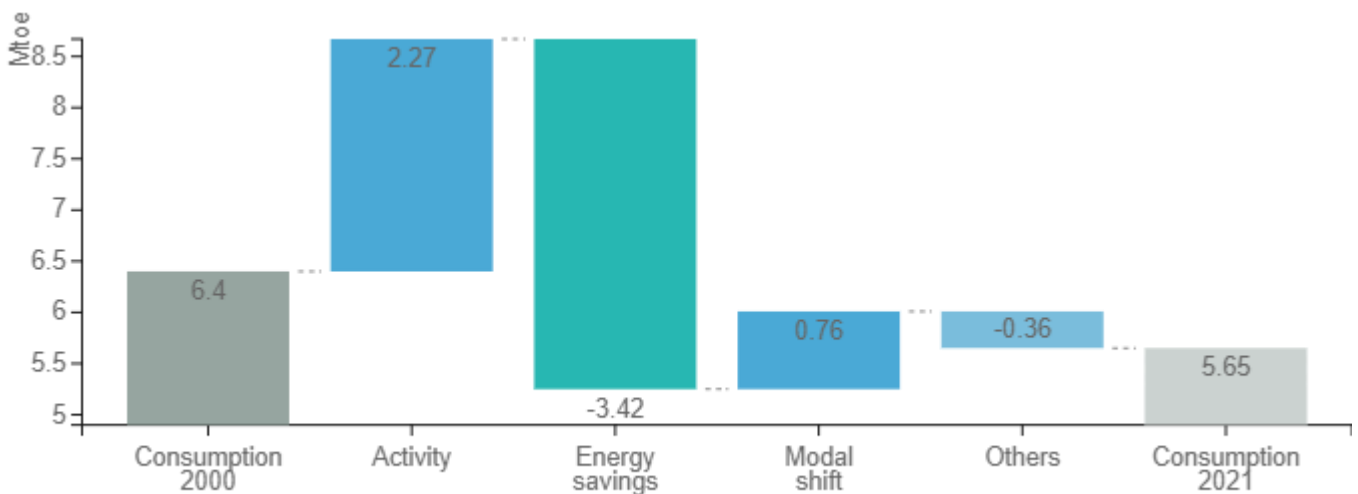
Figure 9: Modal split of inland freight traffic



Source: ODYSSEE

Greece's total final energy consumption for transport decreased by 12% from 2000 to 2021. The increasing activity contributed to a rise of 2.27 Mtoe, while the energy savings from the implementation of energy efficiency improvement measures contributed to the decrease of transport sector final energy consumption by 3.42 Mtoe (Figure 10).

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



Source: ODYSSEE



Greece's National Energy and Climate Plan (NECP), published in December 2019, provides a comprehensive overview of the progress made towards the EU 2030 targets and gives the measures implemented in the transport sector. The development of energy efficiency improvement mechanisms, such as transport infrastructure projects and resharing of public transport system, as well as the establishment of regulations such as the introduction of electromobility and the linking of vehicle taxation to energy efficiency and CO2 emissions, led to the achievement of energy savings (Figure 10). The Greek government aims to improve the efficiency of the transport sector and reduce its impact on climate by increasing electrification and the use of alternative fuels and promoting a modal shift to public transport.

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

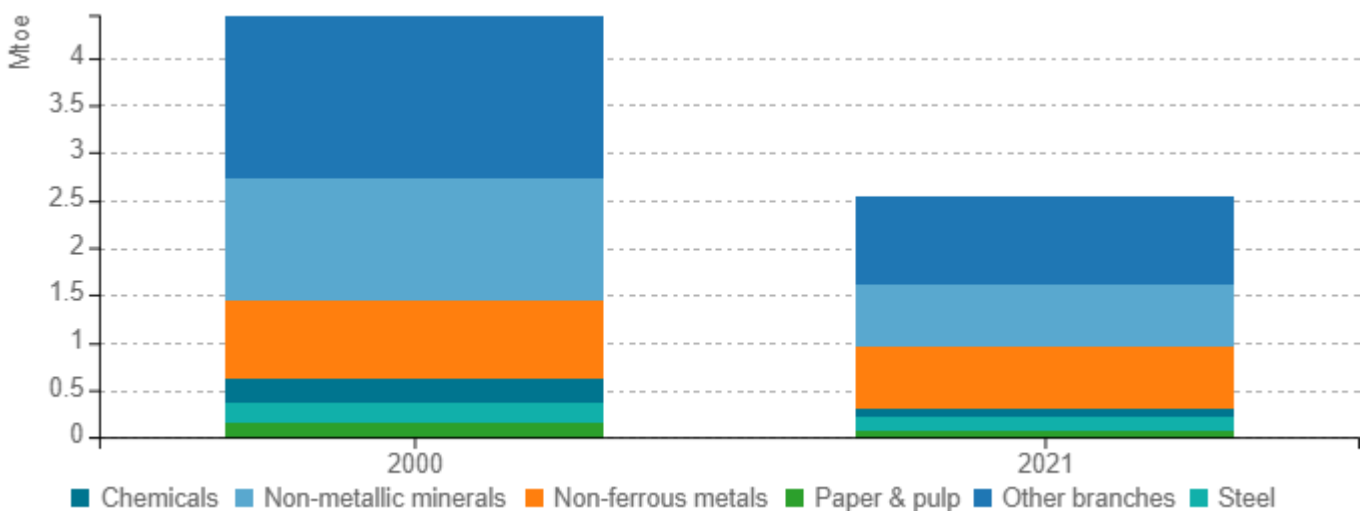
Measures	Description
Linking of vehicle taxation to energy efficiency and CO2 emissions	Regulation
Transport infrastructure projects	Energy efficiency improvement mechanism
"I Move Electric" programme	The programme "I Move Electric" supports the purchase of EVs in Greece.

Source: MURE

Industry

The overall industrial energy consumption decreased by 42% between 2000 and 2021. All sectors had a high decrease except non-ferrous metals and steel that showed a fall of almost 19% and 24% respectively. The industry was the main sector which sustained the effects of the economic recession in Greece.

Figure 11: Final energy consumption of industry by branch

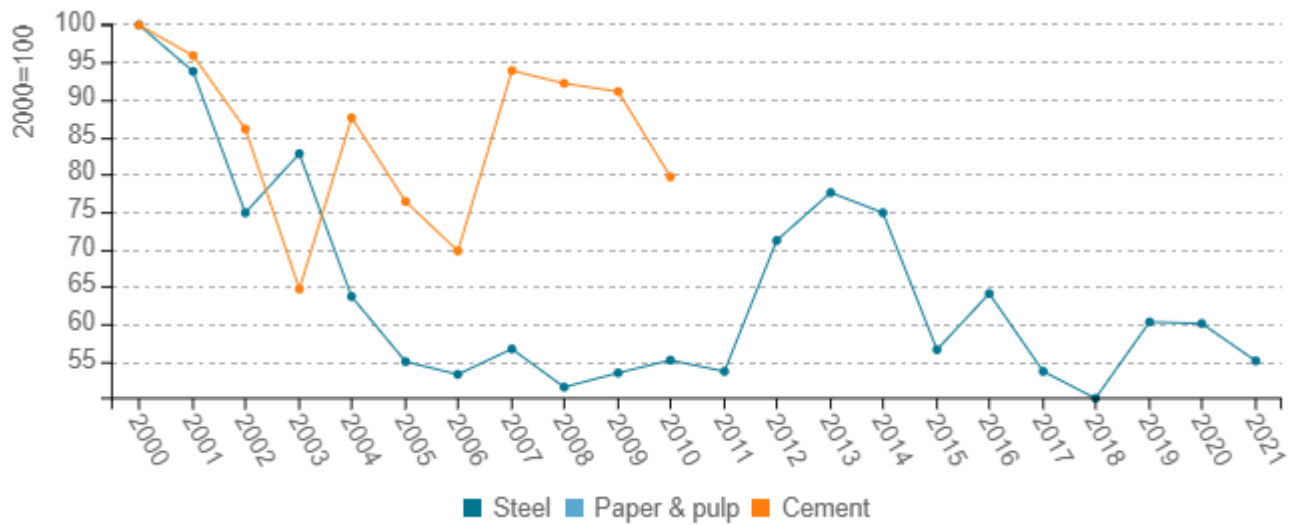


Source: ODYSSEE



Specific consumption of steel showed a strong decreasing trend in the period from 2000 to 2021. In 2021, unit consumption for steel was 45% lower than in 2000 (Figure 12). There are no available data for paper and pulp over 2000-2021 and for cement since 2010.

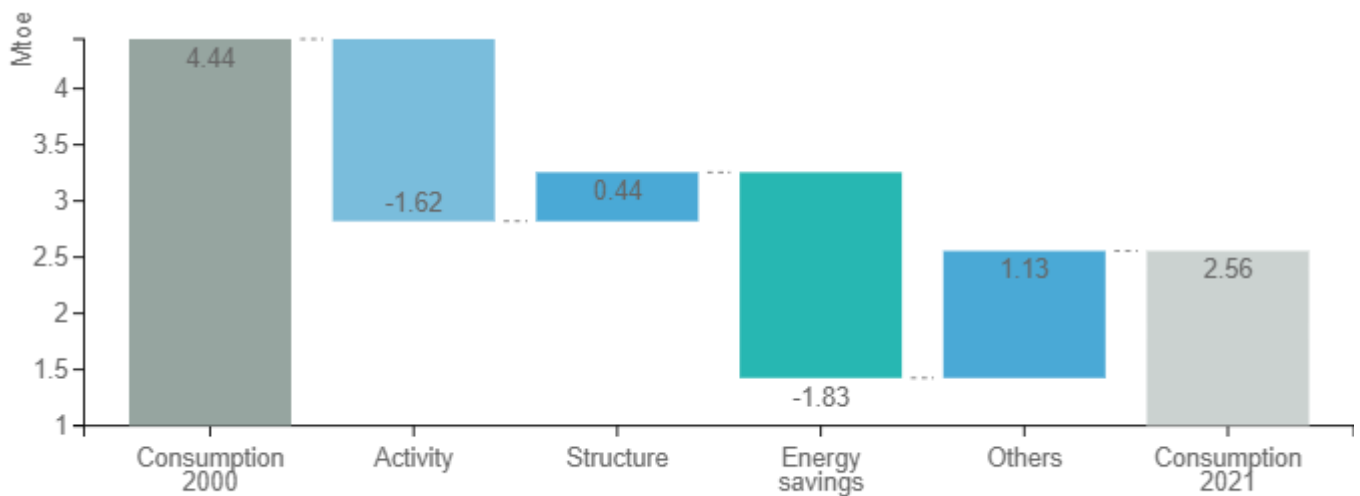
Figure 12: Unit consumption of energy-intensive products (toe/t)



Source: ODYSSEE

Greece's total final energy consumption for industry decreased by 42% from 2000 to 2021, mainly due to the energy savings (-1.83 Mtoe), resulting from the implementation of energy efficiency improvement measures as well as reduced activity (-1.62 Mtoe) and structural changes (0.44 Mtoe). "Others" (1.13 Mtoe) corresponded mainly to the "negative" savings due to inefficient operations in industry during the recession.

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



Source: ODYSSEE



Greece's National Energy and Climate Plan (NECP), published in December 2019, gives an overview of the measures implemented in the industrial sector. The grant of business loans with favourable terms under the project "Innovative Entrepreneurship, Supply Chain, Food, Drinks" as well as other Financial incentives, such as incentives for relocation of enterprises, led to the achievement of energy savings (Table 4).

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

Measures	Description
Innovative Entrepreneurship, Supply Chain, Food, Drinks	Business loans with favourable terms
Relocation of enterprises to industrial-business zones and business parks	Financial incentives
The "New Industrial Parks" programme	The aim of the programme is the creation of new and the expansion and upgrading of existing green infrastructure, which aims to reduce the environmental footprint of industrial parks and decarbonize the country's industrial activity.
The "Modern Manufacturing" programme	Energy efficiency programme for SMEs.

Source: MURE