ODYSSEE-MURE Fit4-55 (2022-2025)

Monitoring the Energy Efficiency Pillar for Climate Neutrality

National Report – Cyprus

Theodoros Zachariadis (t.zachariadis@cyi.ac.cy)
Marios Karmellos (m.karmellos@cyi.ac.cy)
The Cyprus Institute

with contributions from
Constantinos Taliotis and Melina Moleskis, The Cyprus Institute

Nicosia, December 2024

Co-funded by the European Union

This project has received funding from the European Union's LIFE programme under grant agreement No. 101075902

Project title

Odyssee-MURE – Monitoring the Energy Efficiency Pillar for Climate Neutrality

Notes

Funding

This project has received funding from the European Union's LIFE programme under grant agreement No. 101075902

The sole responsibility for the content of this document lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither CINEA nor the European Commission are responsible for any use that may be made of the information contained therein."

Co-funded by the European Union

Contents

1. Introduction

This report provides information about the current trends and challenges of the energy system of Cyprus, with emphasis on the potential of energy efficiency policies and measures to contribute to the decarbonisation challenge of the Cypriot economy, as stipulated by the European Green Deal, the European Climate Law that was adopted in summer 2021, the accompanying proposals of the European Commission that were published in July 2021 ('Fit for 55' policy package), most of which were adopted in 2023-24, and the revised national Energy and Climate Plan that was undergoing consultation in November 2024.

The emphasis of the report is on the policy challenges rather than on a mere description of the current situation. Therefore, descriptive Sections 2 and 3 are brief: Section 2 provides an overview of the energy landscape in the country, and Section 3 is a summary of the most recent country profile prepared in the frame of the Odyssee-Mure project. The main part of the report focus on Sections 4 and 5. Firstly, Section 4 highlight the challenges and investment needs for implementing successfully the 'Energy Efficiency First' principle as outlined in the country's National Energy and Climate Plan. Then, Section 5 outlines the policies to tackle energy poverty and provides recommendations for improving the schemes providing grants to vulnerable households with the aid of insights from behavioural sciences.

2. Economic and Policy Context

2.1. Economic context

According to the latest census, the Republic of Cyprus had a population of 923,000 inhabitants in 2021. Its per capita Gross Domestic Product in 2023 was estimated at 35,800 Euros (adjusted for purchasing power), or 95% of the average EU per capita GDP. It accounts for about 0.2% of EU's GDP and 0.2% of the EU's greenhouse gas (GHG) emissions. After the pandemic, the country has enjoyed sustained economic growth at rates higher than the EU average. Its outlook up to 2030 is for a continuation of growth trends, with real GDP projected by the government to increase by 2.5% per year in the period 2024-2030.

2.2. Energy and climate policy background

In 2022, Cyprus had a consumption per capita of 1.8 toe, nearly 40% below the EU average. Electricity consumption per capita was 31% below the EU average. Still, Cyprus is among the EU Member States with the highest GHG emissions per capita and the highest GHG emission intensity (emissions per unit of GDP). Total GHG emissions have grown by 56% between 1990 and 2021, whereas they declined by 25% in the EU during the same period. This was due to a strong increase in national GDP during the last 30 years (over 140%), but also because of the lack of strong energy efficiency and decarbonisation policies.

Economic activities subject to the EU Emissions Trading system are three oil-fired power plants, a cement plant and a small number of brick and tile factories. Oil-fired generation contributed to 85% of the total generation mix in 2022 and the remainder was supplied by renewable energy sources (mainly wind and solar photovoltaics). Once the required gas infrastructure is made available, a large part of the island's thermal power generation capacity is expected to run on natural gas from mid-2026 onwards.

In the sectors that are not subject to the EU ETS and are covered by a national greenhouse gas reduction obligation through the EU Effort Sharing Regulation, emissions were almost stable between 2005 and 2021. The 2030 target for these sectors according to the Effort Sharing Regulation is to reduce their emissions by 32% compared to 2005. According to the latest policies included in the revised National Energy and Climate Plan of 2024, the projected emission reduction in 2030 is unlikely to exceed 26%.

Renewable energy sources accounted for about 19% of gross final energy consumption in 2022 and are projected to reach 33% by 2030, in line with the necessary contribution of the country to the EU-wide renewables target adopted in the recast Renewable Energy Directive EU/2023/2413. In terms of gross inland consumption, fossil fuels accounted for slightly below 90% in 2022; as all fossil fuels are currently imported, this high energy dependency demonstrates clearly that a fast penetration of renewables will yield large benefits in the country's fuel import costs and trade balance.

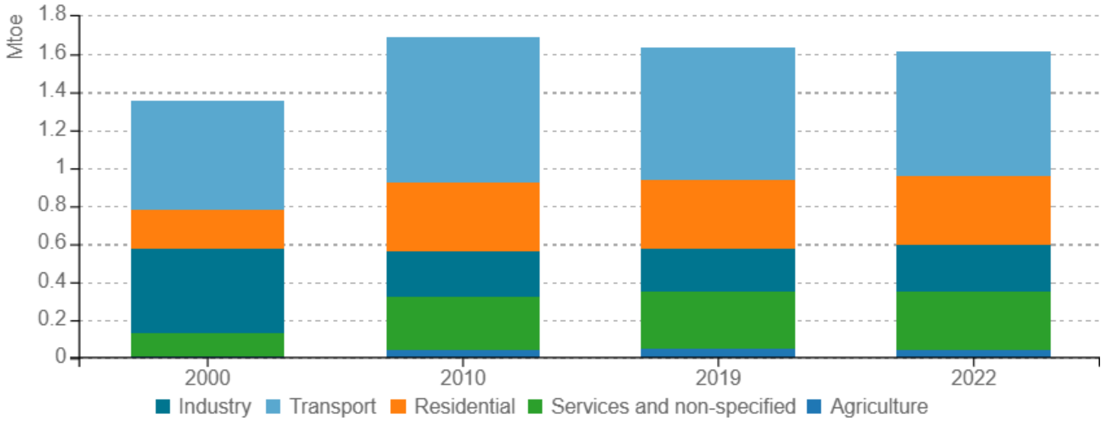
Energy cost for Cypriot households (as a percentage of their total expenditures) is close to the EU average for residential energy use, while it is higher than the EU average in transport fuel use due to the low share of public transport in passenger mobility. The share of the country's rural population at risk of poverty or social exclusion is slightly higher than in the EU, and so are energy poverty levels – based on the share of population unable to keep their homes adequately warm and the share of population with arrears on their utility bills.

3. Overall Energy Efficiency Progress and Policies[1]

3.1. Overview

Despite the temporary effects of the economic recession of years 2012-2015, energy consumption in Cyprus was 20% higher in 2022 than in 2000. Increases in energy demand of both transport and buildings (residential and services) have been responsible for this development, while the share of industry in energy consumption has dropped both because of the smaller share of industry in total economic activity in 2022, and thanks to energy efficiency improvements in major industrial plants.

Figure 3-1: Final energy consumption by sector (with climatic corrections)

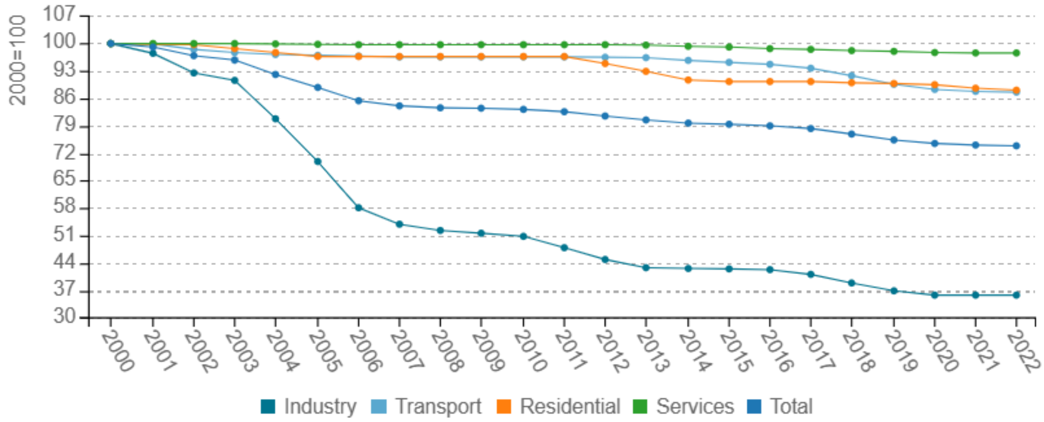


Source: ODYSSEE

Overall technical energy efficiency has improved by around 26% in Cyprus between 2000 and 2022. This has been driven by energy efficiency improvements in most sectors - buildings, industry and transport. Industry has shown the fastest increase in energy efficiency, mainly because the largest industrial energy consumer is by far the cement industry, which has undergone a major reconstruction and refurbishment of its plants. Services have demonstrated the slowest energy efficiency improvement, as well as transport until 2016. Over the last eight years (2014-2022) progress in the residential sector has remained stagnant too.

[1] See the full country profile, December 2024 update, at the Odyssee-Mure project website on https://www.odyssee-mure.eu/publications/efficiency-trends-policies-profiles/. Note that some of the energy statistics of year 2000 and some of the comments comparing energy performance of year 2000 with that of 2022 have to be treated with caution as Cyprus became an EU Member State in 2004, and earlier energy statistics may have not undergone rigorous quality check.

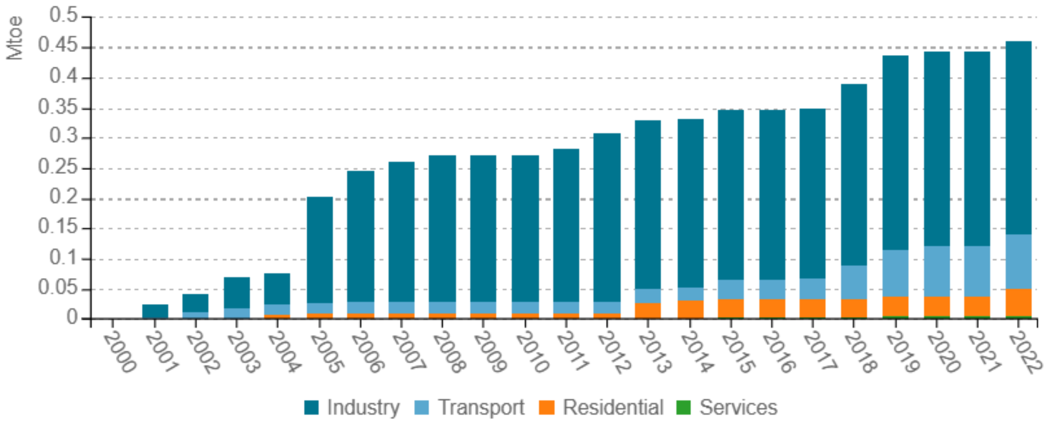
Figure 3-2: Technical Energy Efficiency Index



Source: ODYSSEE

The evolution of energy savings between 2000 and 2022 reflects the progress in technical energy efficiency shown above. Out of 0.46 Mtoe of total savings, 70% seem to have come from the industrial sector, and smaller savings form transport and the residential sector. However, pre-2004 sectoral energy statistics have to be treated with caution as Cyprus became an EU Member state in 2004, and earlier energy statistics may have not undergone rigorous quality check.

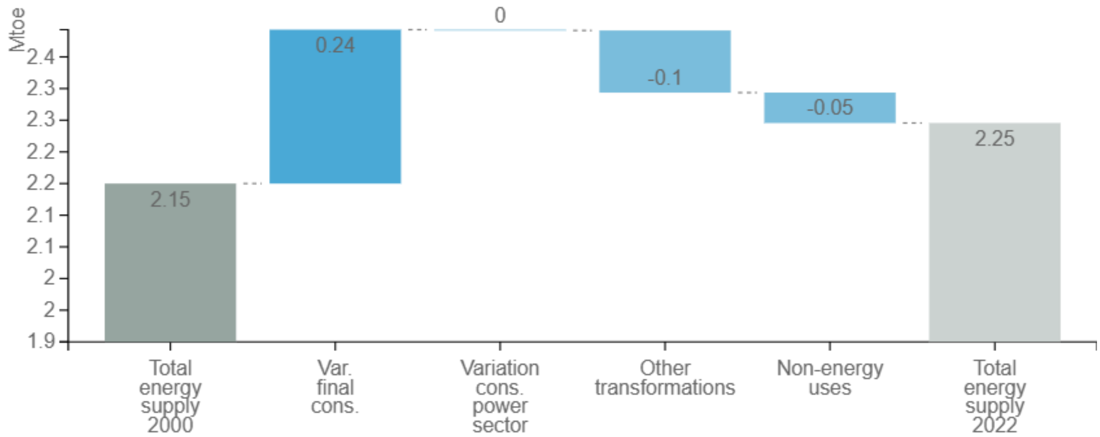
Figure 3-3: Energy savings by sector



Source: Odyssee

Total energy supply rose to 2.25 Mtoe in 2022 (about 5% higher than in 2000), driven mainly by the increase in final energy consumption and by the lack of substantial progress in efficiency of the power generation sector.

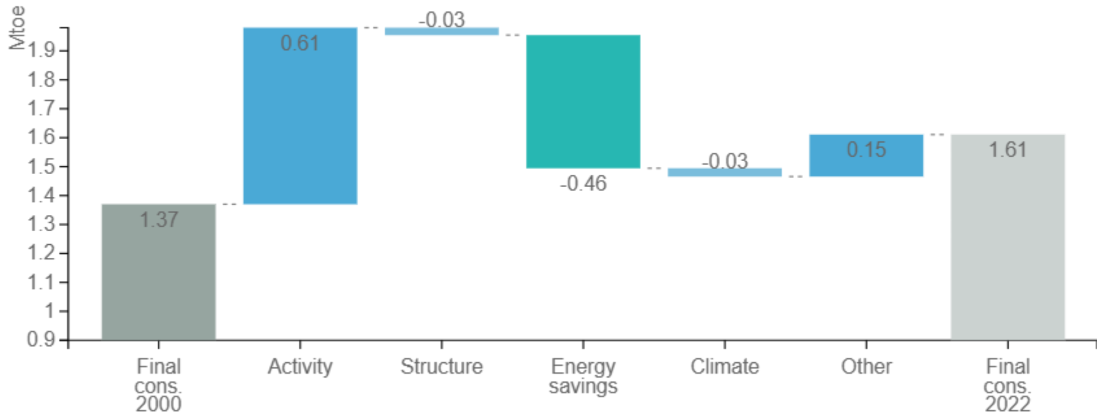
Figure 3-4: Main drivers of the total energy supply variation



Source: Odyssee

Final energy consumption grew by 17.5% between 2000 and 2022, as a result of broader economic growth in Cyprus during this period. In the absence of energy savings, however, this increase would have been triple as high (51%).

Figure 3-5: Main drivers of the final energy consumption variation



Source: Odyssee

Several cross-cutting energy efficiency measures have been adopted during the last years, mainly mandated by the European Union's policy framework and largely financed through EU resources (the Recovery and Resilience Facility and the European Structural and Investment Funds coming from the regular EU budget.

3.2. Buildings

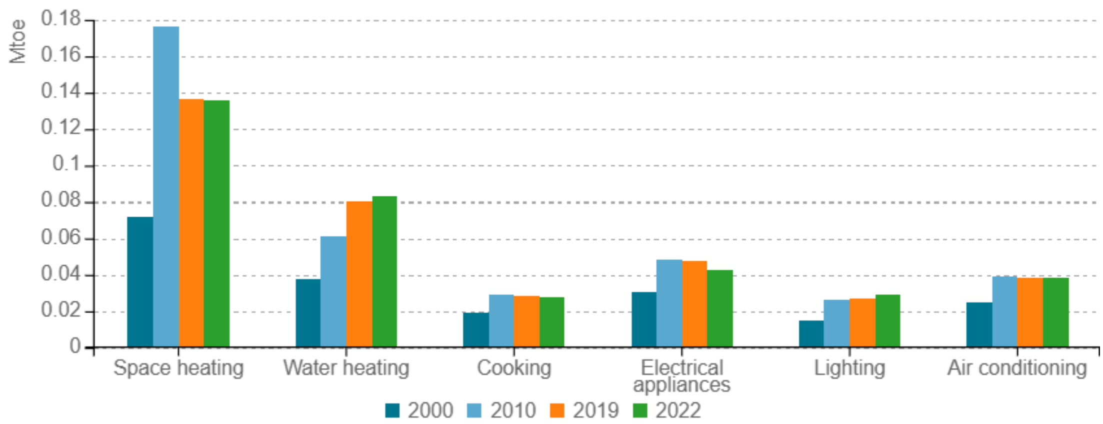
Reflecting economic growth and the increase in the number and size of residential and other buildings, energy consumption has increased since 2000 but has remained essentially stable since 2010 as growth in activity was counterbalanced by energy efficiency improvements.

Figure 3-6: Final energy consumption in buildings (with climatic corrections)

Source: Odyssee

The share of main end uses in residential energy consumption has not changed significantly in the last decade. Electrical appliances and water heating are responsible for the highest part of final energy consumption - however, the latter use is predominantly satisfied through solar water heaters.

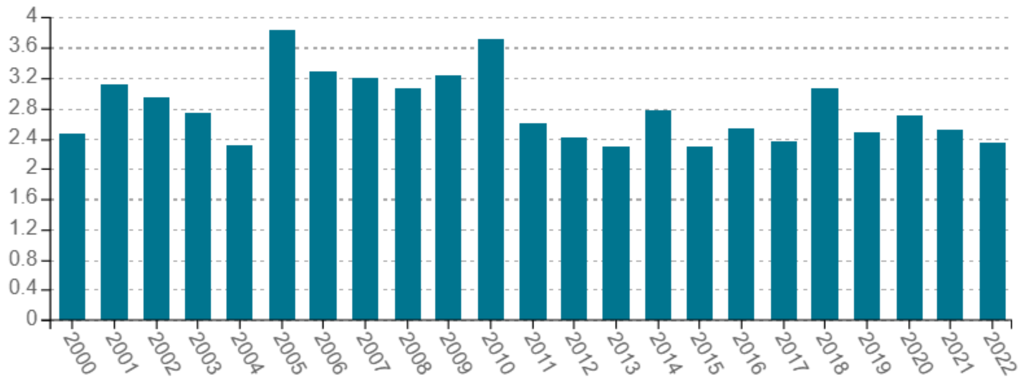
Figure 3-7: Energy consumption by end-use of households (with climatic corrections)



Source: Odyssee

Residential energy consumption of space heating per area unit has remained essentially constant in the last decade, at about 2.5 kg of oil equivalent per square metre on average.

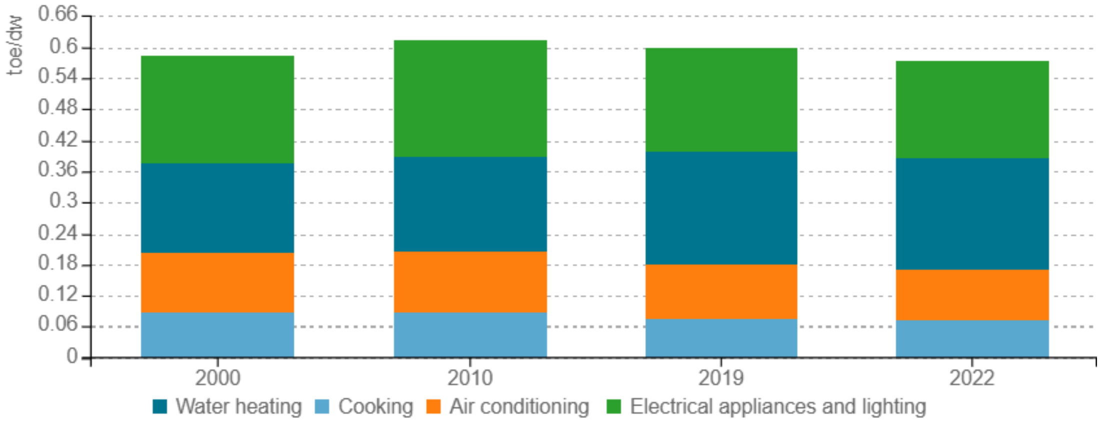
Figure 3-8: Energy consumption of household space heating per m2 (with climatic corrections)



Source: ODYSSEE

Residential energy consumption per dwelling in 2022 was almost the same with that in year 2000, which seems to be the composite effect of improved energy performance of new buildings and some energy renovations in existing buildings on the one hand, and greater size and comfort of more recent buildings on the other hand. The share of main end uses in energy consumption has not changed significantly. Electrical appliances and water heating are responsible for the highest part of final energy consumption - however, the latter use is predominantly satisfied through solar water heaters.

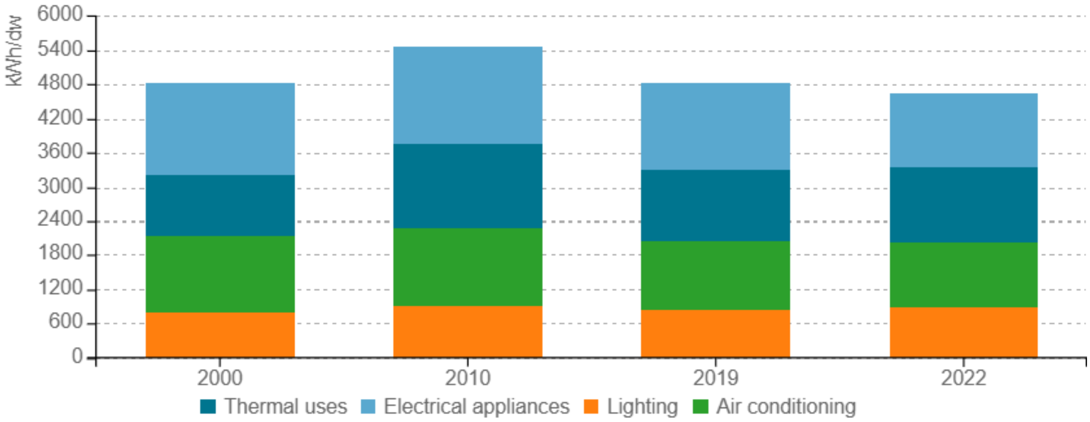
Figure 3-9: Energy consumption per dwelling by end-use (except space heating)



Source: ODYSSEE

Electricity consumption per dwelling has remained stable since 2000. Thermal uses account for a substantial fraction of electricity consumption because of the widespread use of heat pumps and other electric systems for space heating (e.g. storage heaters and electric stoves). Obviously, the consumption of air conditioners and electric appliances is also significant.

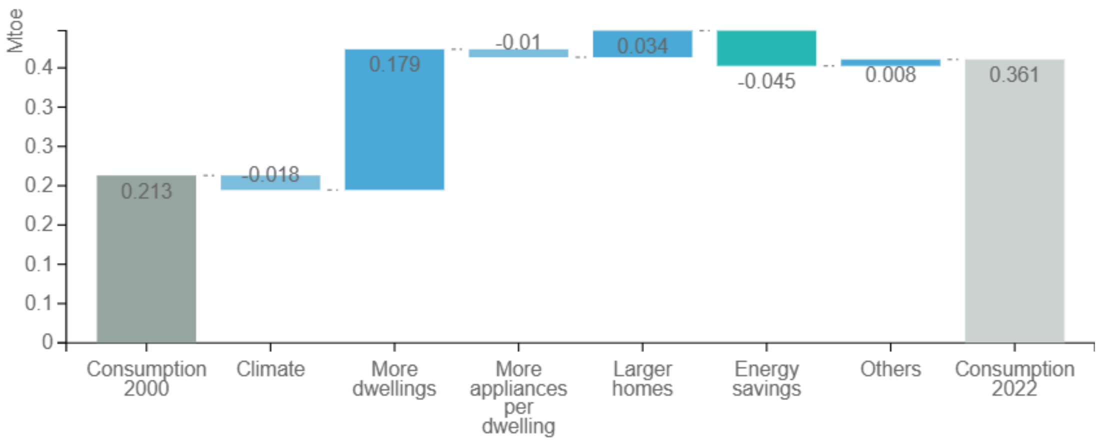
Figure 3-10: Electricity consumption per dwelling by end-use (with climatic corrections)



Source: Odyssee

The increase in the number and size of dwellings has been primarily responsible for the 69% rise in total residential energy consumption between 2000 and 2022. It has been only partly counterbalanced by energy efficiency improvements.

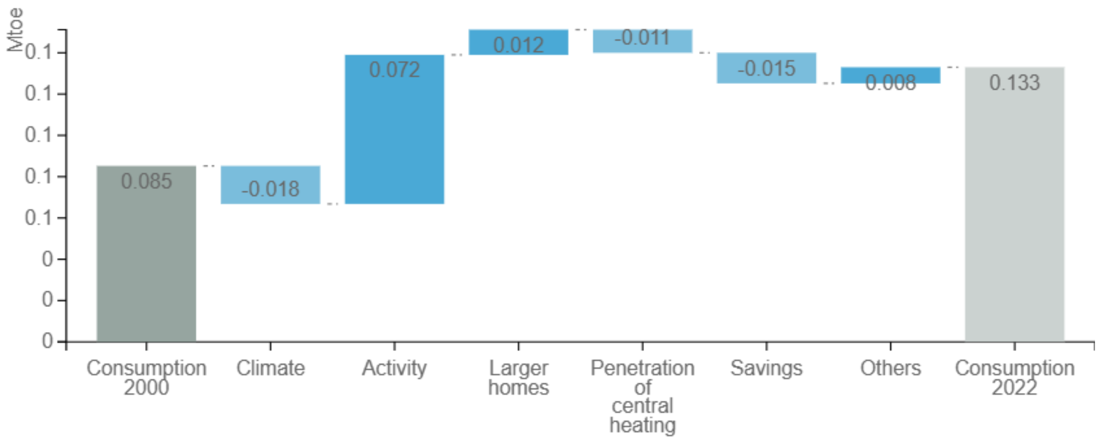
Figure 3-11: Main drivers of the energy consumption variation in households



Source: ODYSSEE

As with total residential energy consumption, the increase in the number and size of dwellings has been primarily responsible for the 56% rise in space heating consumption between 2000 and 2022. It has been only partly counterbalanced by energy efficiency improvements.

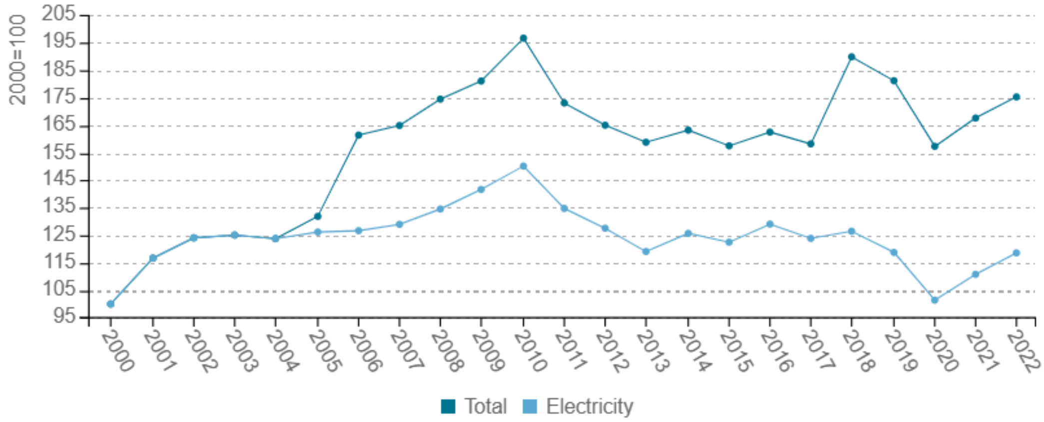
Figure 3-12: Main drivers of the space heating consumption variation of households



Source: Odyssee

Energy consumption per employee in the service sector of Cyprus has fluctuated over the last fifteen years, reflecting the mixed effects of the economic downturn of 2012-2015, the pandemic of 2020-2021, and gradual energy efficiency improvements. The sector relies on electricity by more than 80% to cover its energy needs.

Figure 3-13: Energy and electricity consumption per employee in services (with climatic corrections)

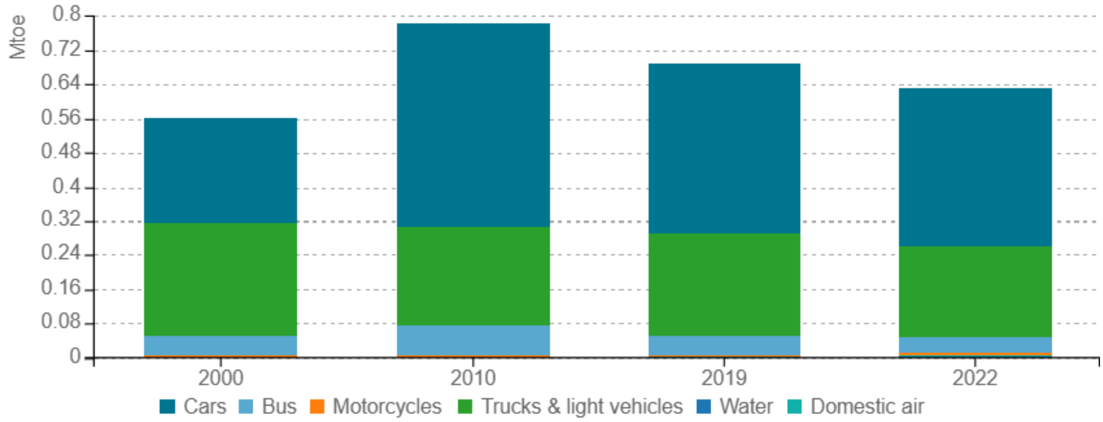


Source: ODYSSEE

3.3. Transport

Transport accounts for half of final energy consumption in Cyprus, and cars are responsible for more than half of transport's energy use. This is due to the very low use of public transport, despite recent investments in public buses which have not been adequate to induce a significant modal shift.

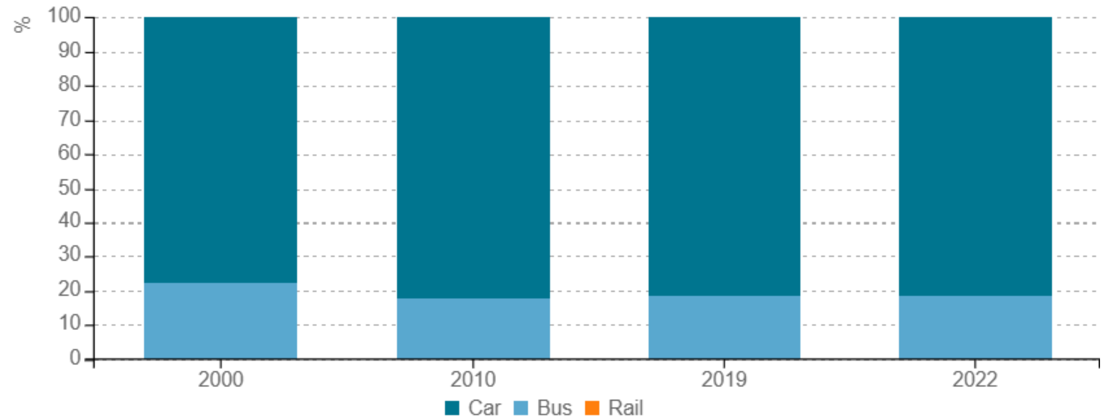
Figure 3-14: Transport energy consumption by mode



Source: ODYSSEE

Attempts to strengthen the public transport system, which consists of urban and interurban buses, have only had a small effect up to now. Therefore, the share of cars in total passenger traffic has remained very high in Cyprus; in fact, it has risen further between 2000 and 2022 to 81%.

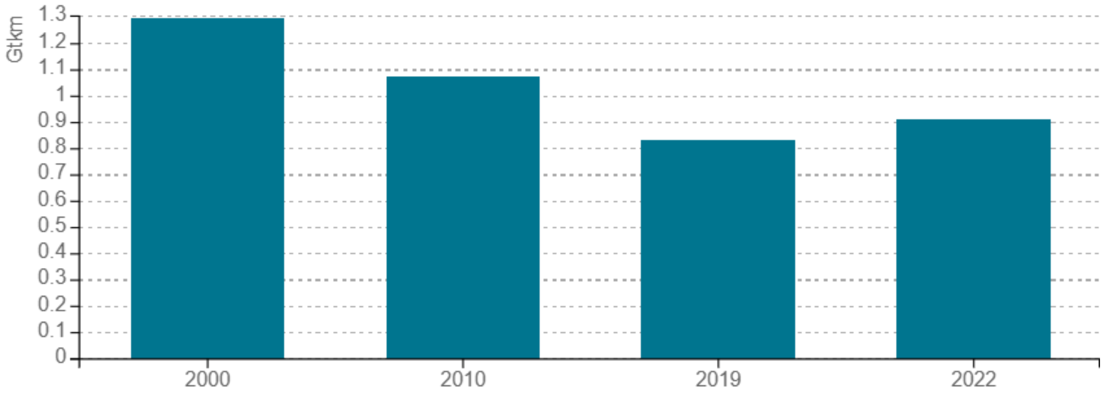
Figure 3-15: Modal split of inland passenger traffic



Source: ODYSSEE

Inland freight transport is conducted only with trucks.

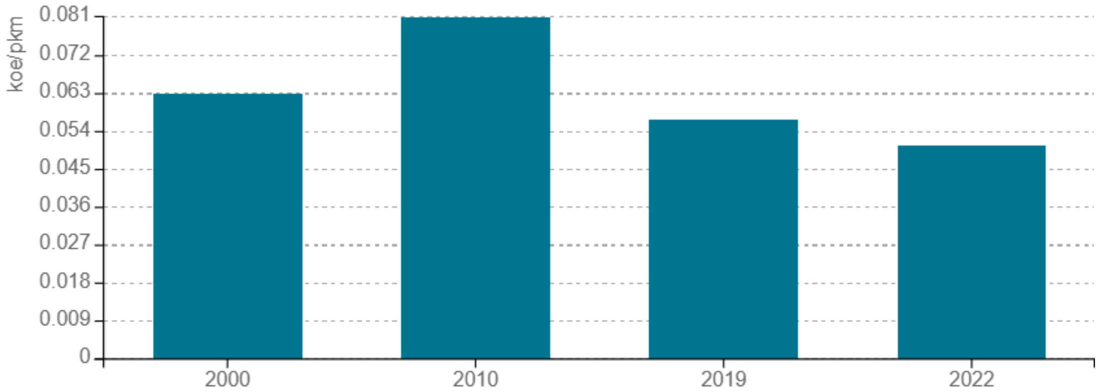
Figure 3-16: Inland freight traffic (only road in Cyprus)



Source: ODYSSEE

Energy intensity of passenger cars, expressed in energy consumption per passenger-kilometre, has gradually declined in the last decade as a result of improved fuel economy of modern cars.

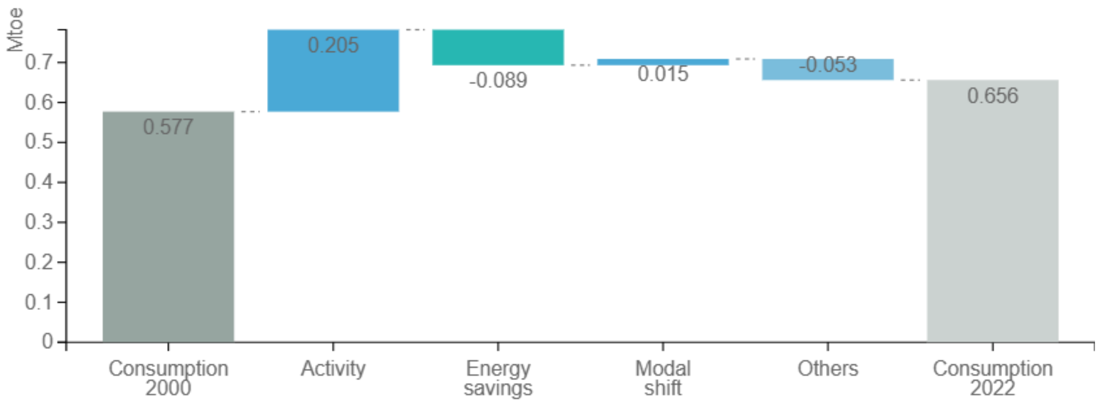
Figure 3-17: Energy consumption of cars per passenger-km



Source: ODYSSEE

Despite some energy efficiency improvements because of the gradual renewal of the stock of motor vehicles, increases in total passenger kilometres and tonne kilometres travelled have been stronger; therefore, total energy consumption of transport has risen by 14% between 2000 and 2022.

Figure 3-18: Main drivers of the energy consumption variation in transport



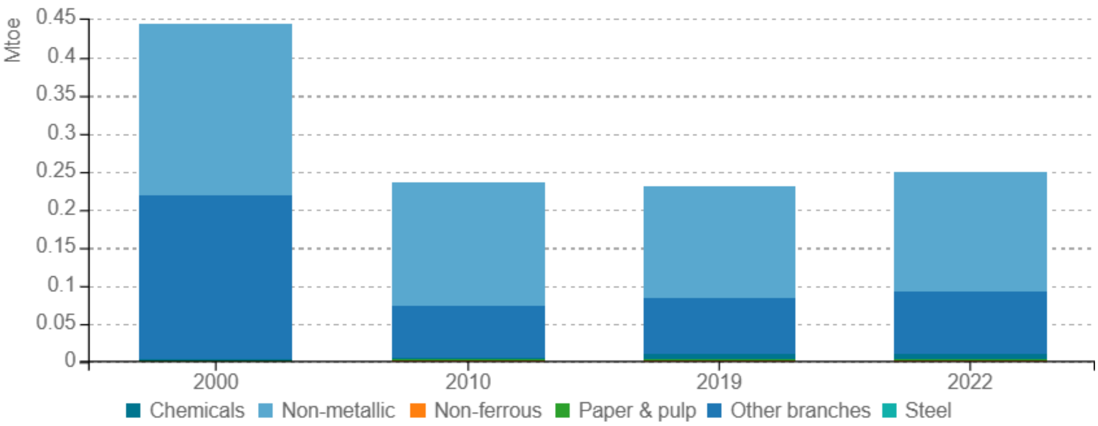
Source: ODYSSEE

Policies and measures to improve the energy efficiency of transport have focused on economic incentives (excise taxes on motor fuels and CO2-based annual circulation taxes of cars) as well as on the implementation of the 'Clean Vehicles Directive' for low-emission buses.

3.4. Industry

Final energy consumption of the industrial sector has dropped substantially over the last two decades because of the decline in industrial economic activity. The non-metallic minerals sector, dominated by the cement industry, is currently the only energy-intensive industrial activity and is responsible for more than half of industrial energy use.

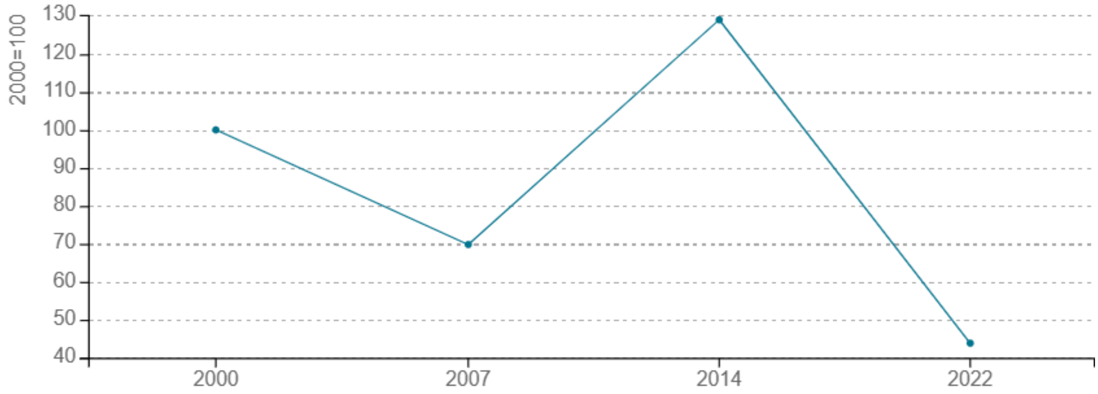
Figure 3-19: Final energy consumption of industry by branch



Source: ODYSSEE

Unit consumption of the cement industry - the only energy-intensive industry of Cyprus - has declined since 2000. A temporary increase after 2012 was an artefact of the decreasing denominator of this index (tonnes of cement production) because production of cement dropped substantially in 2013-2015 because of the decline of the Cypriot construction industry due to the economic downturn.

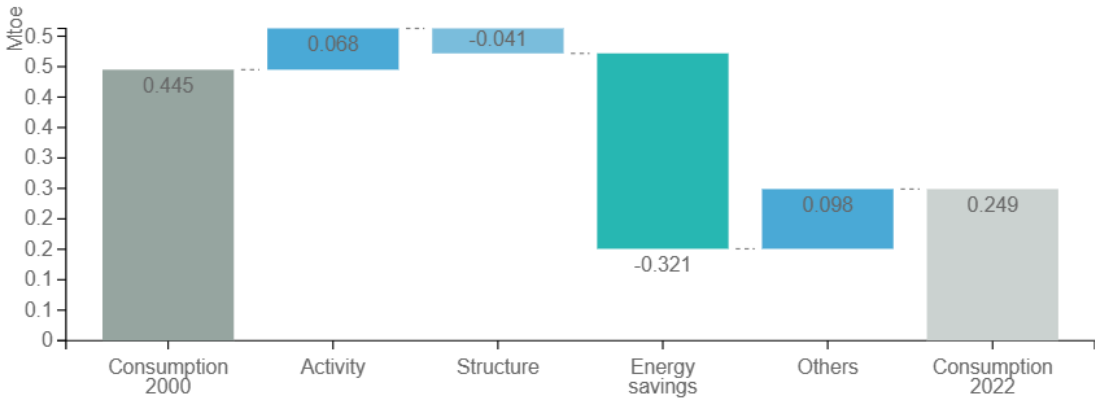
Figure 3-20: Unit consumption of cement (toe/t)



Source: ODYSSEE

Energy savings in the industrial sector, primarily in the cement industry, helped reduce final energy consumption by 44% between 2000 and 2022, despite a slight increase in industrial output after the pandemic. Small structural changes (i.e. a shift towards less energy intensive industrial activities) have also contributed to some energy savings.

Figure 3-21: Main drivers of the energy consumption variation in industry



Source: ODYSSEE

3.5. Comparison with other countries

The performance of Cyprus in comparison with other European countries can be viewed with the aid of the scoreboard on energy efficiency indicators and policies that has been developed in the frame of the ODYSSEE-MURE project.

This tool scores EU countries on different energy efficiency criteria: energy efficiency level; energy efficiency progress (i.e. energy efficiency trends)' energy efficiency policies; and a combination of these criteria. For each criterion each country is scored with a score between 0 and 1 based on a variety of indicators (extracted from the ODYSSEE Database) and of energy policies (extracted from the MURE Database). A more detailed description of the methodology is provided in the Odysee-Mure webpage on https://www.odyssee-mure.eu/php/scoreboard-combined/documents/european-energy-efficiency-scoreboard-methodology.pdf.

Figures 3-22 to 3-26 below present a sample of these indicators, and more specifically the "overall" energy efficiency indicators for industrial, transport, residential, and services energy efficiency, as well as the overall economy-wide energy efficiency scores. Individual scores according to the energy efficiency level, energy efficiency progress, and energy efficiency policies are also available in the online tool on the page mentioned above. In general, as shown in Figure 3-26, Cyprus ranks in the 12th position out of the 27 EU Member States as regards the composite energy efficiency performance. Its position is higher in the industrial and transport sectors, where it ranks 3rd and 7th respectively, whereas in the residential and tertiary buildings its performance is lower.

Figure 3-22: Overall industrial energy efficiency score of EU countries according to the Odyssee-Mure Scoreboard.

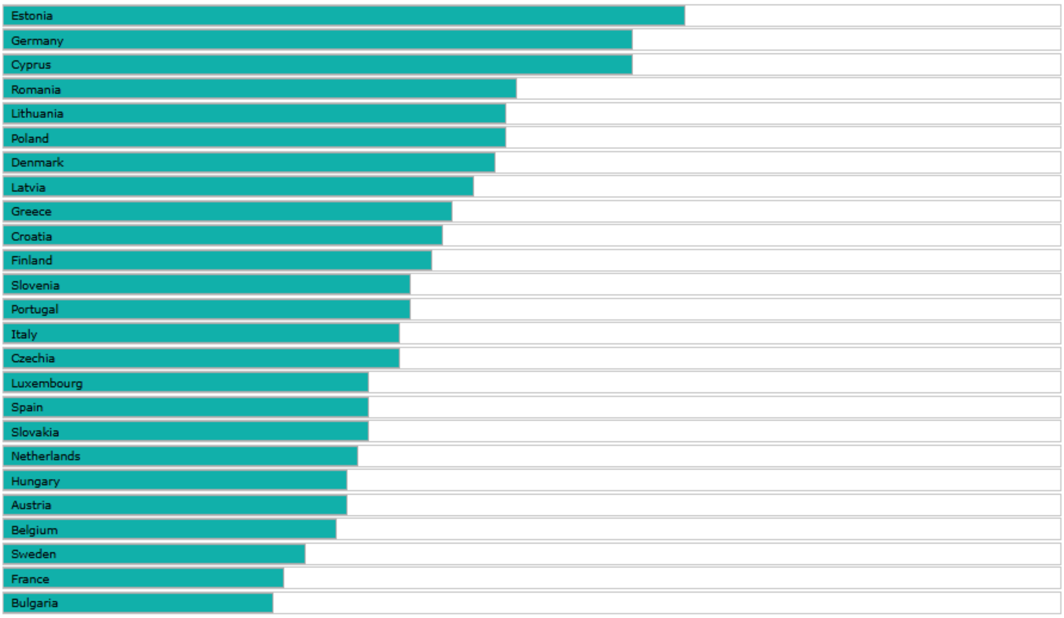


Figure 3-23: Overall transport energy efficiency score of EU countries according to the Odyssee-Mure Scoreboard.

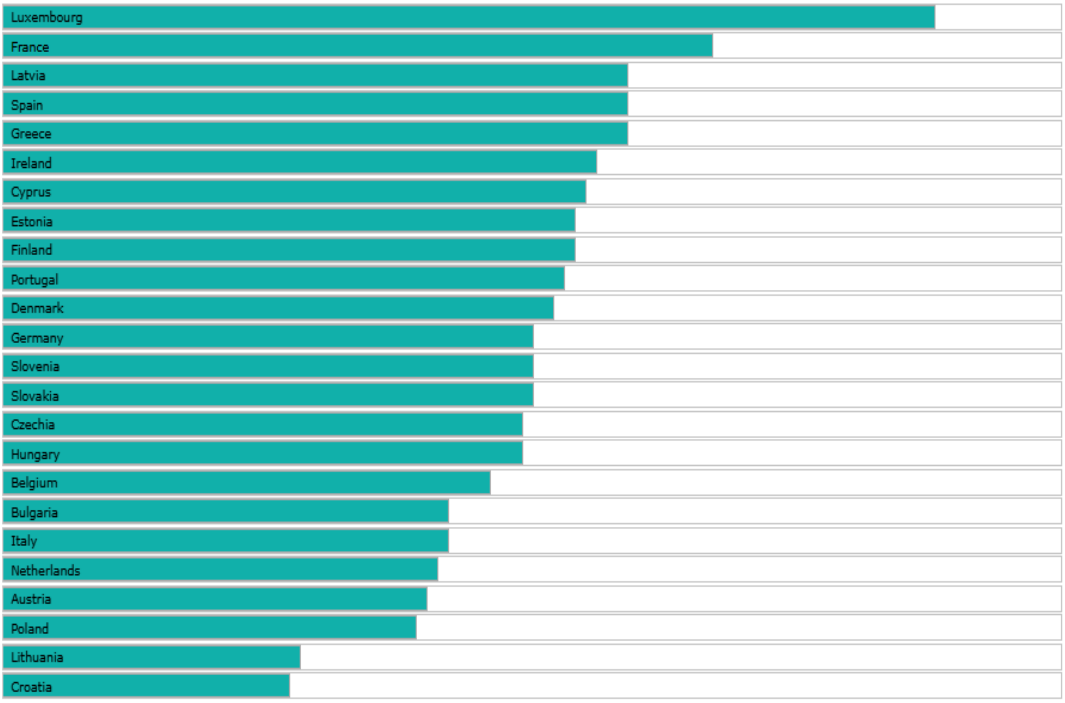


Figure 3-24: Overall residential energy efficiency score of EU countries according to the Odyssee-Mure Scoreboard.

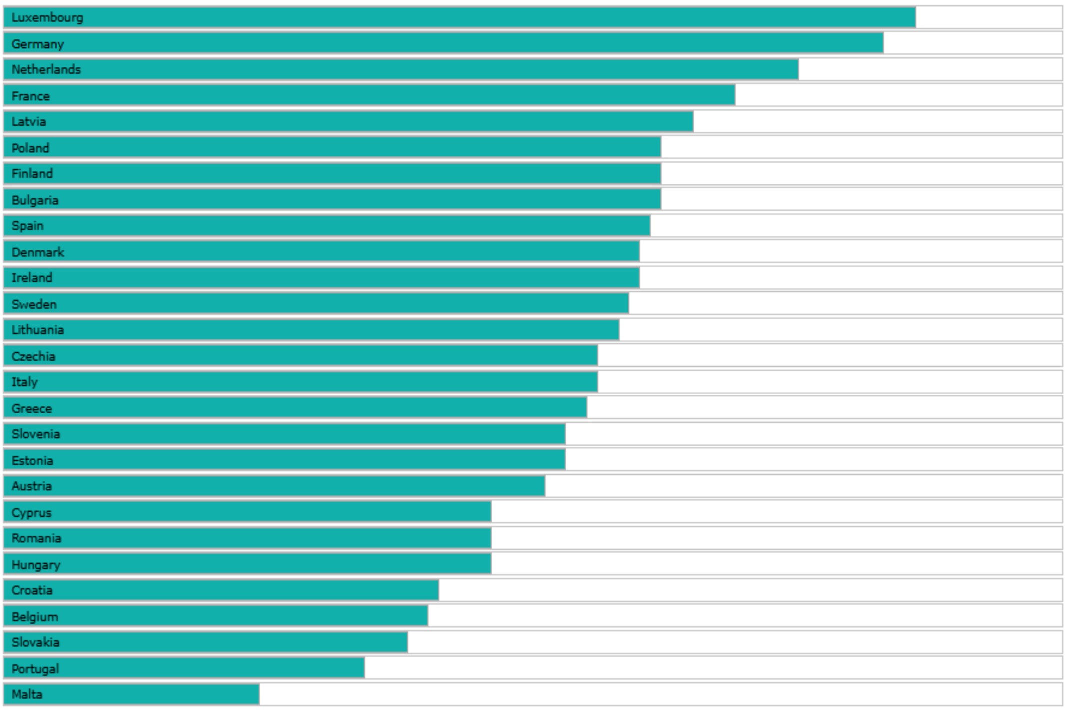


Figure 3-25: Overall services energy efficiency score of EU countries according to the Odyssee-Mure Scoreboard.

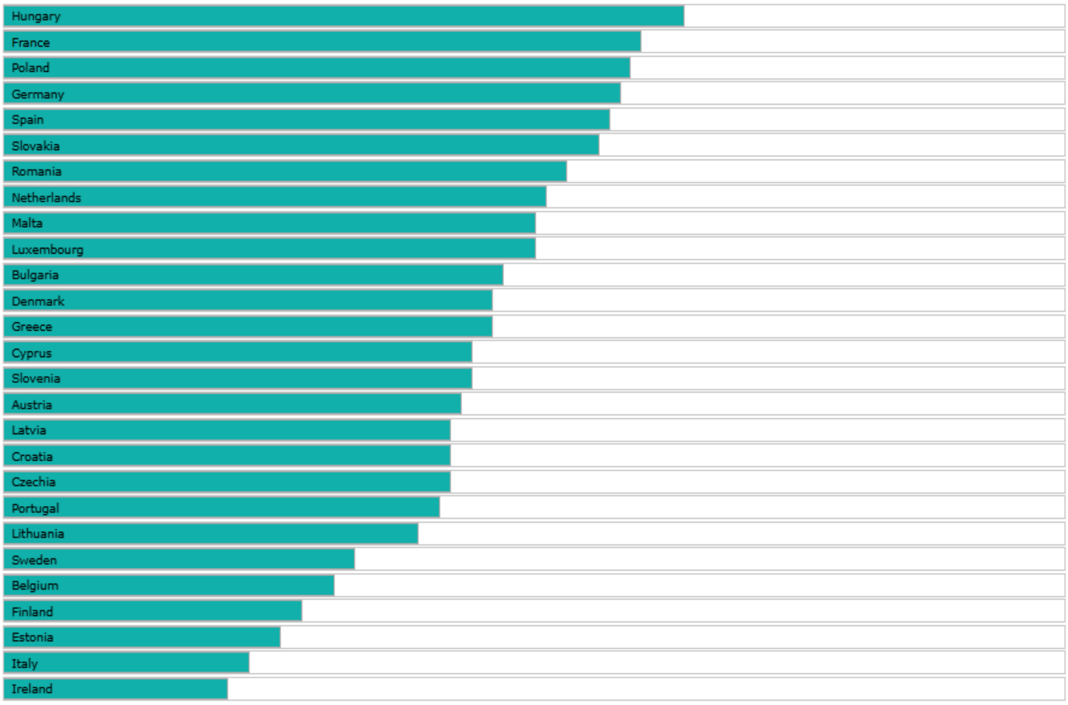
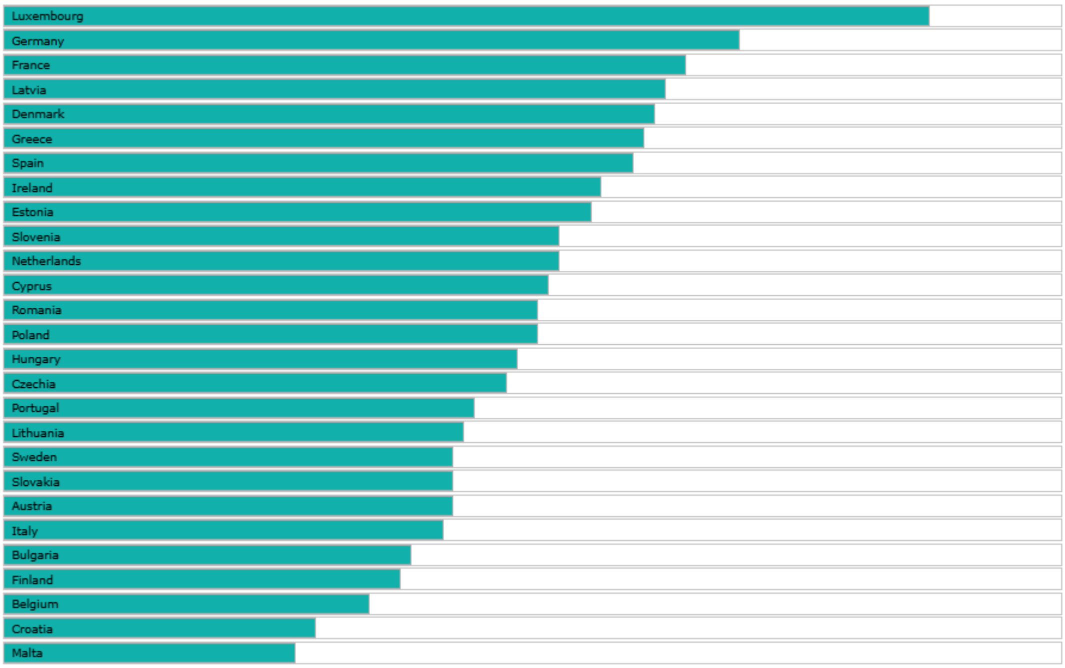


Figure 3-26: Overall economy-wide energy efficiency score of EU countries according to the Odyssee-Mure Scoreboard.



4. Are current investments adequate to ensure progress in energy efficiency in line with the 'Energy Efficiency First' Principle?

4.1. Background

In its recent report "*Towards EU climate neutrality*", the European Scientific Advisory Board on Climate Change noted that estimates of climate investment needs *"are based on a variety of sources with different scopes and levels of granularity. Currently, there is insufficient information available on the investments required to fund the transition towards climate neutrality. There is also a lack of available indicators to track progress at the sectoral level. This knowledge gap is mainly due to the lack of a harmonised methodology for identifying and estimating climate-related investment needs"*. Based on this finding, the Board recommended that "*The EU should strive for a more granular and accurate overview of required and actual investments in climate mitigation to monitor and assess progress.*"

In an attempt to address this policy gap, this section outlines the method followed to assess current investments and future investment needs in the scenarios of the revised NECP of Cyprus (WEM – With Exiting Measures – and WAM – With Additional Measures).

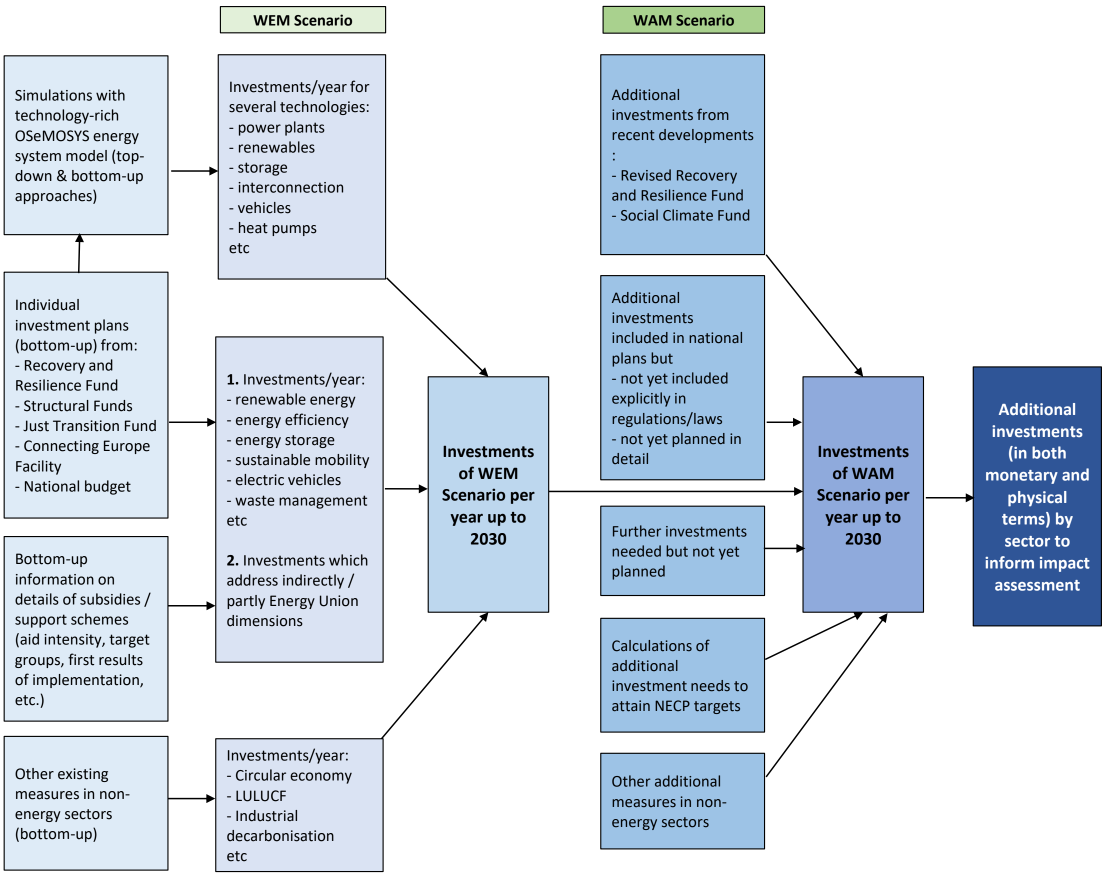
4.2. Methodology

This method is presented in more detail in the impact assessment (chapter 5) of the revised NECP of Cyprus that was published for public consultation in November 2024. It involves a combination of:

- Detailed bottom-up information of current and planned investments, associating them with the five different Energy Union dimensions and allocating them in relation to the two main emission abatement categories (sectors subject to the current Emissions Trading system – ETS – and the Effort sharing Regulation – ESR – respectively); and
- Top-down projections and cost-optimal simulations of our energy systems models, augmented by other assessments of non-energy-related GHG emissions.

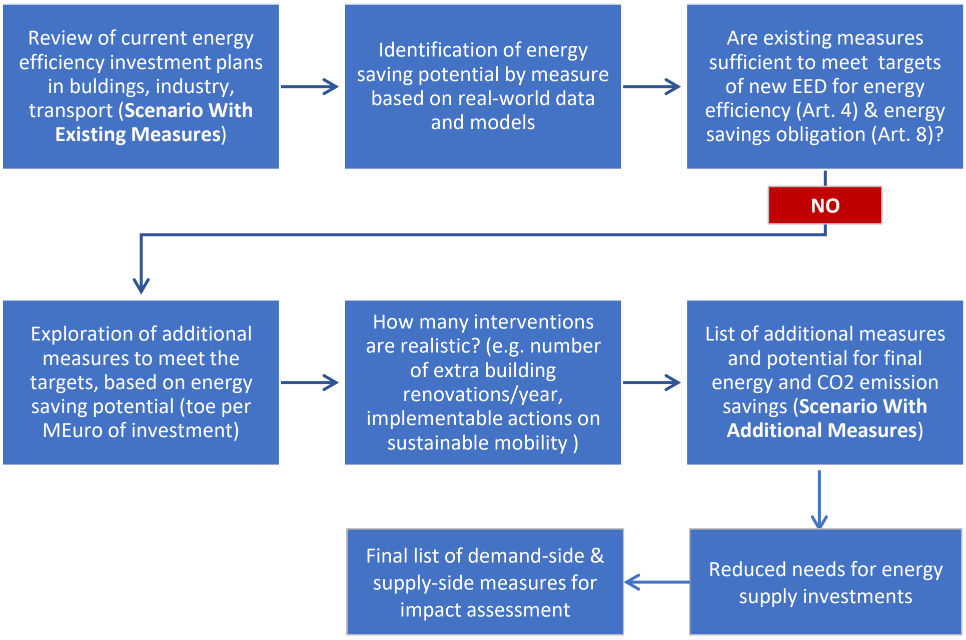
Figure 4-1 describes the steps followed in this procedure.

Figure 4-1: Outline of the methodology to assess investments and investment needs in the NECP scenarios



Especially with regard to energy efficiency, and the identification of additional investments that are necessary to realize the WAM scenario and comply with the final energy consumption target of Article 4 of the Energy Efficiency Directive, the procedure that we followed, in close collaboration with national energy authorities, is summarized in Figure 4-2.

Figure 4-2: Procedure to reach realistic energy efficiency measures in the revised NECP of Cyprus



4.3. Findings

(a) Checking the adequacy of existing measures

As a first step, we explored all investments that are already foreseen and officially approved in the National Recovery and Resilience Plan (RRP), the European Structural and Investment Funds (from the EU's regular budget, i.e. the Multi-Annual Financial Framework 2021-27), the approved Just Transition Plan, the funding secured from the Connecting Europe Facility on electricity interconnection, and sustainable mobility investments or expenditures foreseen in the national budget of the Ministry of Transport.

Since many of the investments in energy renovations provide funding both for energy saving interventions (e.g. roof insulation, installation of double-glazed windows, conversion of buildings to near-zero energy buildings etc.) and for the installation of solar PV panels in buildings, it is appropriate to distinguish the portion of the funds devoted to energy efficiency and that which goes to renewable energy investments. The allocation of the funds is different for each investment because it depends on the kind of interventions supported by each project. For example, building renovations supported by the RRP have different requirements from the corresponding renovations supported by the Structural Funds. The allocation of investment amounts between energy saving and renewable energy measures has been conducted on the basis of detailed information obtained by officers form the national Ministry of Energy.

The overall picture from this exercise was that over 4 billion Euros are already foreseen (and are accounted for in the revised Scenario with Existing Measures – WEM – of the NECP) for the low-carbon energy transition of Cyprus, but a very substantial portion will be devoted to the electricity interconnection of the country. Sustainable mobility and electric mobility will receive close to one quarter of the total funds, or about 1.1 billion Euros. Energy efficiency investments in buildings and industry, however, will receive comparatively lower amounts, just over 250 million Euros, up to 2030.

(b) Identifying additional measures

We therefore concluded that energy renovations must receive stronger support in the NECP's Scenario With Additional Measures – WAM. To assess the additional investments needed, we then followed a twin approach:

i) First, we collected information on the additional funds which are planned by governmental authorities for green actions, such as: additional investments proposed by the government of Cyprus to the European Commission for the REPowerEU chapter of the revised national Recovery and Resilience Plan; projects that have been included in the approved Just Transition Plan of the country, for which only a part of their budget has been already included to be financed by the Just Transition Fund; projects aiming to alleviating energy and transport poverty with the aid of the newly decided Social Climate Fund (SCF)[2], which is scheduled to start one year before the introduction of the new Emissions Trading System (ETS2), i.e. in 2026; announced plans for further investments for energy efficiency improvements in industry and restoration of waste disposal facilities; and additional sustainable mobility investments that have been provided by the Ministry of Transport as part of the WAM scenario.

ii) Especially for energy renovations in buildings, we found that the additional funds are insufficient to reach the energy savings foreseen in the WAM scenario of this NECP revision. Therefore, we conducted a specific analysis about the additional building renovations (and the accompanying funds) that are necessary to enable energy savings consistent with the WAM scenario. For this purpose, we obtained data from the Ministry of Energy on the number of renovation grants awarded up to now; the estimated final energy savings per renovation; and the aid intensity per category of renovation, depending on full or partial renovations, aid to regular or vulnerable households, etc.

Then we performed an assessment of the amount of renovations that need to be financially supported up to 2030. Our assessment showed that, apart from the funds planned in the revised RRP and the funds to be available from the SCF as mentioned above, additional public funds up to 300 million Euros will have to be provided up to 2030 for renovations of private dwellings as well as of buildings in the public sector and in private enterprises. Total investments mobilised can amount to over 500 million Euros. Such measures, in the form of direct public investments and support schemes to the private sector, will also involve installation of PV panels – but the main portion of these funds must be devoted to energy efficiency actions. Together with the investments from the RRP and the SCF, these funds correspond to about 3000 building renovations per year – in private dwellings, businesses, the public sector, and vulnerable households – for each year of the period 2024-2030. This requires a strong acceleration of today's renovation rates, which involve less than 2000 renovations per year.

In summary, the total additional investment needs to implement the WAM scenario shown were calculated at close to 780 million Euros of extra public funds, intended to mobilise total investments of up to 1.6 billion Euros by 2030. And total investments of the NECP, as shown

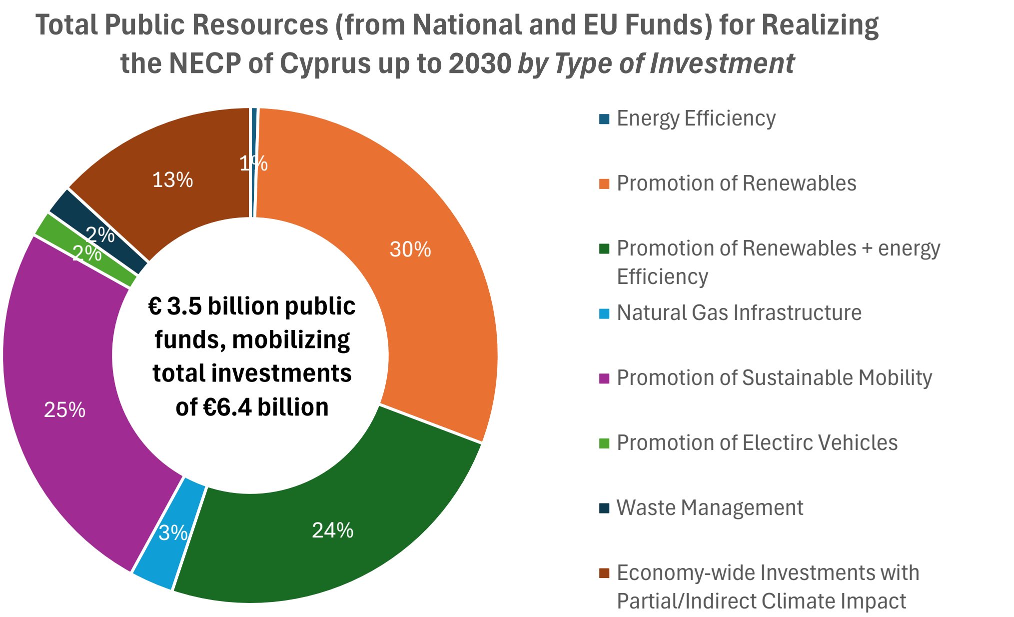
[2] See Regulation (EU) 2023/955.

in Table 4-1 and Figure 4-3, amount to 3.5 billion Euros of public investments and 6.4 billion Euros of total investments.

Table 4-1: Total investments in the NECP of Cyprus by type of intervention

(million Euros)	Public Funds	Total Funds
Energy Efficiency	18	36
Promotion of Renewables	1066	2701
Promotion of Renewables + energy Efficiency	858	1353
Natural Gas Infrastructure	101	272
Promotion of Sustainable Mobility	885	1135
Promotion of Electirc Vehicles	61	273
Waste Management	70	100
Economy-wide Investments with Partial/Indirect Climate Impact	465	500
Total	**3523**	**6370**

Figure 4-3: Allocation of total investments in the NECP of Cyprus



In short, policies related to EE1st in the updated NECP of Cyprus, which were selected under interaction between policy maker choices and model-based work, are the following:

- Cost-effective policies and measures that are related to energy efficiency have been included in the NECP's WAM scenario to an extent that has not been observed in the past. All these measures, at the time of their implementation, have a negative or near-zero total lifetime cost and are therefore cost-effective. Further energy efficiency measures risk being unrealistic to implement (e.g. an even stronger increase in the number of energy renovations of buildings up to 2030 would require extremely high financial and human resources to realise). This finding is based on two relevant studies mentioned in the NECP as well as analyses conducted by the authors in the determination of additional renovation measures as explained above. In any case, the measures foreseen in the NECP's WAM scenario seem to be sufficient for Cyprus to meet its target for reductions in final energy consumption required in Article 4 of the revised Energy Efficiency Directive (EU) 2023/1791.

- The WAM scenario foresees energy efficiency measures in transport (modal shift towards public transport and micromobility as well as electrification of cars) which involve significant investments that reach unprecedented levels for the standards of the Cypriot transport system. This indicates a strong consideration of EE1st.
- Further prioritising demand-side measures such as energy efficiency improvements would put Cyprus at risk of strong divergence from two main objectives of the 'Fit for 55' package which are related to energy supply: the renewable energy deployment targets and the reduction in emissions of ETS sectors – which in the case of Cyprus is predominantly fossil fuel based power generation that needs strong decarbonization.
- The WAM scenario includes the implementation of a green tax reform that involves carbon pricing in non-ETS sectors of the Cypriot economy, for implementation already from 2025 onwards. Such a reform serve as a bridge to the new ETS2 to be implemented from 2027 onwards on fuels used in road transport, heating and light industry, and can indeed stimulate further improvements in energy efficiency and substitution of fossil fuels by low- or zero-carbon energy forms. This reform is part of the national Recovery and Resilience Plan of Cyprus. In fact, carbon pricing is in line with the Commission's EE1st guidance which mentions that Member states are encouraged to "internalise to fullest possible extent the environmental and climate costs of energy alternatives".

At the same time, application of EE1st has helped avoid additional investments in energy supply. According to initial projections, Cyprus would need to add three additional thermal power plants burning natural gas by 2025 to meet the increasing demand for electricity, taking into account constraints in the deployment of renewables. Our model calculations, however, showed that the additional energy efficiency measures of the WAM scenario could render one of the three plants redundant until 2030, saving several millions of Euros of investment costs.

5. Special focus: Energy poverty policies

5.1. The EU Framework on Energy Poverty

The concept of energy poverty was first incorporated into EU law through the Directive on common rules for the internal electricity market (2009/72/EC). Since then, the EU has introduced several initiatives, including the launch of the Energy Poverty Observatory (2016) and the inclusion of energy as an essential service in the European Pillar of Social Rights (2017). The 2019 Clean Energy for All Europeans package further obligated member states to identify, monitor, and address energy poverty through National Energy and Climate Plans (NECPs). In 2020, the European Commission issued its first Recommendation, offering guidance on measuring energy poverty and promoting best practices, with dedicated EU funding for vulnerable groups. As energy prices surged in 2021, the Commission published a toolbox (EU/2021/660) outlining measures that can be taken at national level to support vulnerable consumers. In 2022, the Energy Poverty Advisory Hub (EPAH) was established to facilitate the exchange of best practices and enhance policy coordination across EU countries.

In 2023, the revised Energy Efficiency Directive (EU/2023/1791) and the Social Climate Fund Regulation (EU/2023/955) were published, highlighting the role of National Energy and Climate Plans (NECPs) and Social Climate Plans in alleviating energy poverty. As such, all EU countries were due to submit their update NECPs by June 2024 and will be expected to submit Social Climate Plans by June 2025 to access the Social Climate Fund. Against this backdrop, the revised Energy Performance of Buildings Directive (EU/2024/1275) came into force in May 2024, further suggesting EU countries to include specific plans for addressing energy poverty in their National Building Renovation Plans as well as including information-related actions, among others.

5.2 Current policies targeting energy poverty and the Social Climate Fund

Cyprus' challenge on energy poverty is significant, with 19% of population recorded as residing in vulnerable households. Against this background, the combination of ETS2 with the green taxation reform that the national government has committed to adopting causes broader concerns about the socio-economic impact of green policies on the poor, at a time when the cost of living has become an ever more important element of public debates. Unofficial information from energy authorities indicates that previous government efforts to support households in energy poverty resulted in less than half of the intended participants applying for funding. Thus, traditional policy approaches have failed to resolve this challenge to date.

As an EU member state, Cyprus is a beneficiary of the Social Climate Fund (SCF), the €65 billion fund reserve, to be formed from part of the proceeds from the auctioning of ETS2 allowances, that will support just transition over the period 2026-2032. Cyprus has been allocated €131 million for the whole period, which represents a maximum of 75% of the funds to be allocated for social purposes. Therefore, including the national contribution of Cyprus, the minimum amount of funds will be €175 million.

Though the adequacy of the funds available from the Social Climate Fund remains questionable as to their sufficiency to support all citizens prone to energy poverty, a key concern is also whether vulnerable households will indeed use the financial opportunities offered to them in order to modernize their energy-using residences and equipment in order to become resilient to future increases of energy costs. Previous experience – both from Cyprus and from many other countries – shows that the response of vulnerable households even to generous financial incentives to improve energy efficiency in their dwellings has been low.

According to the SCF Regulation (Article 8), the country can allocate up to 37.5% of the available funds as direct income support to vulnerable households and vulnerable transport users. The rest of the funds can be spent on supporting energy saving projects, energy renovation of buildings, promoting low or zero emission mobility, reducing greenhouse gas emissions and reducing the number of vulnerable households, small businesses and vulnerable transport users (Article 7).

The revised National Energy and Climate Plan of Cyprus already states that 19.3% of the cumulative amount of end-use energy savings for the period 2021 - 2030 should be achieved by implementing energy efficiency measures among people affected by energy poverty or otherwise vulnerable. As the next step, Cyprus is expected to submit its Social Climate Plan (SCP) by June 30, 2025, for approval by the European Commission, outlining its policies on: (1) green investments in energy efficiency-related building renovations (i.e., grant schemes) and (2) temporary direct income support, as well as the respective targets, total costs, effective monitoring and implementation plans and accurate data.

To mitigate energy poverty, Cyprus has introduced several measures, which are mentioned in the revised National Energy and Climate Plan of 2024:

- Social tariffs: Reducing VAT on electricity from 19% to 5% for vulnerable households for a specific period.
- Direct transfers: Making lump-sum payments to families who are struggling to pay their energy bills (amount based on income and household size).
- Financial aid for residents of remote areas: Support residents of remote / mountainous areas, inhabiting areas with an altitude of 600m or more.
- Electricity disconnection protection: Protection for all vulnerable consumers from electricity disconnection in critical times.
- Subsidy plan: Grants for replacing old electrical appliances with new, energy-efficient ones. 4,503 applications were received between December 2021 and June 2022.

5.3. The Policy Challenge

While such policies are relatively simple to implement and can contribute somewhat to the alleviation of energy poverty, they are suboptimal measures for various reasons. First, they only ease the severe circumstances of living in energy poverty and fall short of providing sustainable solutions. They also fall short of addressing the specific circumstances and barriers (i.e., structural and behavioural) experienced by vulnerable households. Moreover, they lower the main impetus for households to become energy efficient, and they tend to be more expensive for the government in the long term.

Policy-makers and academics attest to the difficulty of getting citizens to apply to social funding programs. In the case of Cyprus, unofficial information from energy authorities indicates that previous government efforts to support households in energy poverty resulted in less than half of the intended participants applying for funding.

Reusing the conventional approach is unlikely to work. On top of the usual challenges of poor outreach, ineffective communication and complex, bureaucratic processes that often hinder the uptake of grant schemes, policy-makers must also consider that vulnerable groups are likely to face additional obstacles. Prolonged financial stress can have a negative impact on people's cognitive capacity. Recent studies from behavioral science show that people's decision-making and problem-solving capacity deteriorates as they face poverty and income instability. The cognitive capacity it takes to constantly worry about budgeting, has been shown to bring about a range of harmful outcomes. These include forgetfulness, impulsive spending, anxiety, distraction and failure to plan ahead, all of which lead to worse long-term outcomes.

Of particular importance is the evidence that households in financial distress often lack the capacity for long-term planning, focusing instead on immediate concerns. This phenomenon is known as 'tunneling'. Forward thinking is necessary to invest in energy efficiency measures because it involves expending resources in the present – money and time – for a higher return in the future. The absence of forward thinking in the face of pressing needs means that decision-makers may opt out of investing in something now that will only benefit them much later. While this is a rational response to financial constraints and uncertainty, it can lead to long-term harm and underutilization of available grants.

To sum up the challenge, while low-income households and enterprises tend to have higher energy needs due to low energy performance of their dwellings, at the same time, it's harder for them to prioritize energy saving among their more immediate concerns. As a result, not many are likely to apply for the available grants. Therefore, policies targeting vulnerable households and businesses need to consider not only the financial constraints but also the behavioural factors that affect their judgment and decision-making.

To improve the future efficiency of energy poverty related policies, the potential benefit from applying behavioural insights seems large. All the measures that have been applied so far have been inherently based on the rational choice model of neoclassical economics, whereby households consistently make energy-related decisions that maximize expected benefits, under uncertainty, following an analytical comparison of costs and benefits associated with all the available options. However, this approach is lacking in that it fails to consider how people make decisions, and importantly, how people experiencing energy poverty make decisions. As such, it neither understands nor addresses the context and barriers (structural and behavioural) experienced by vulnerable households amidst energy poverty.

Instead, the application of behavioural science can help us understand why households do not always respond to the financial incentives the way policy-makers expect them to, even when the economic benefits are clear. To uncover these reasons, a recent study applies behavioural journey mapping to examine the process of applying to a Grant Scheme in Cyprus from the perspective of a vulnerable household. That study explains the reasons for low uptake of energy efficient technologies by vulnerable households and provides actionable recommendations to ensure that the limited resources of the SCF are used efficiently. The full study is available elsewhere[3]; the next section summarizes the recommendations stemming

[3] Moleskis M., Solomou P., Ikinci M. And Zachariadis T. (2024), Green Transition for Vulnerable Households? Insights From Behavioral Science on What Works (And What Doesn't). Revised paper submitted to *Frontiers in Sustainable Energy Policy*, November 2024.

from that analysis, which is very relevant for addressing households subject (or prone) to energy poverty.

5.4. Actionable Recommendations

- *Re-think channels of communication to increase awareness and consideration*. Cypriot policy-makers can increase awareness to the Grant Schemes targeted to vulnerable households, by utilizing communication channels that are more relevant and accessible to the targeted population. For example, word of mouth is a powerful communication channel since people are more likely to pay attention to people they already know and trust. To boost word of mouth, policy-makers can replace lectures and monologue-style presentations with discussion sessions within relatively small, newly created groups among the targeted population, to help reshape social norms and alleviate stigma. Moreover, what can also help increase the chances of the Scheme being considered is assigning civil servants who have already formed a relationship with vulnerable households (such as the welfare department) as messengers.

- *Re-think content of communication to increase consideration.* Cypriot policy-makers can grasp people's attention more effectively by tapping onto the power of social proof. This can happen, for example, by communicating examples of people who have already applied to Grant Schemes, carefully selecting those who bear similarities to the targeted population, such as the problems they face and village they live in. Use of positive social norms and in-group identity can also happen through the sharing of statistics and messages such as "*More and more of your fellow citizens in the municipality of Strovolos are applying*".

- *Re-think framing of communication to increase consideration.* To capture people's attention, policy-makers can try tapping into loss aversion by framing the cost of *not* participating in a Grant Scheme with clear examples of future savings. For example, '*If you live in a 100 sq.m. residence, every month you go without solar panels costs you X money*'. This is likely to be much more effective than its mirror message '*If you live in a 100 sq.m. residence, you can save X money every month with solar panels.*'. In some cases, the effect of loss aversion on the adoption of energy efficiency measures can even surpass the effect of social norms (Neumann et al., 2023). Further, the time period for portraying the loss (whether weekly, monthly, quarterly etc.) can also have an impact on consideration. For example, if weekly savings are a low number, it's better to communicate savings for a bigger time interval.

- *Re-think content of the Scheme to increase consideration and decision optimality.* Key aspects of the content are information overload, complexity and ambiguity which cause cognitive overload and lack of understanding. The antidote is often simplicity. This can involve separating information meant for the general (non-vulnerable) population, avoiding facts that are irrelevant from the applicants' point of view (such as EU regulations and national goals), eliminating complex terms and presenting information in the order that makes sense to the target audience. In addition, mitigating the effect of reward uncertainty by offering data on case studies and tangible estimates of the benefits can help people visualize the rewards. Finally, clear indications should be provided about companies-contractors that are willing to accept being repaid directly by the government funding at a later stage.

- *Re-think identity evoked to increase consideration and decision optimality.* In a tight-knit community such as Cyprus, identities and reputations matter a lot. To account for that, policy-makers should align the Scheme with identities that carry a positive association for the intended participants, such as “head of family", "working provider" or “energy-efficiency ready”, which are likely to elicit a more positive response compared to “vulnerable household”.

- *Re-think friction points to increase consideration, decision optimality and action.* Hassle factors exist throughout the process and not all can be eliminated, due to resource constraints. However, where possible, it’s worth making these seemingly minor changes that make it easier and less uncertain for an individual to apply. A practical, low-cost solution is a “passport page” that provides an executive summary, highlighting the fundamental aspects that should be considered by the intended recipients. Website links should lead to specific documents (instead of generic homepages), and information provided should be checked for its accuracy, clear labeling and language. Personalized help should be made easily accessible and available by manning the phonelines (or returning calls in a timely manner).

- *Re-think number of options provided to increase decision optimality.* Cypriot policy-makers can reduce choice overload by limiting the number of options people have. Ideally, if policy-makers can establish a predefined list of beneficiaries to the Scheme, then they can switch to automatic enrolments, making application for vulnerable households the default option. By streamlining this process, vulnerable households can be spared the burden of decision-making and excessive information-seeking.

- *Re-think additional help to increase awareness, consideration, decision optimality and action.* Additional help can take the form of proactively reaching out to at-risk populations, inquiring about their program enrolment status, and assisting them with the initial steps of the application process (e.g., by pre-filling or pre-populating some information). Proactive outreach can be instrumental in overcoming inertia and encouraging individuals to complete the rest of the application process. In addition, the establishment of financial intermediaries that can assist vulnerable households in accessing capital would be beneficial, considering banks’ reluctance to engage with this demographic. Finally, sending timely reminders can help people overcome procrastination and submit their application on time.

To conclude, insights from behavioural science can significantly help policy-makers in designing and implementing grant schemes and unconditional cash transfers backed by the limited resources offered by the Social Climate Fund or by other financial support schemes targeting energy poverty. These initiatives should effectively reach, engage, and persuade the intended recipients to apply for financial support. A successful implementation of measures addressing energy poverty can both increase social acceptance of green policies and encourage policymakers to provide additional funds to reinforce the benefits of the green transition to vulnerable population.

6. Summary and Conclusions

This country report has summarized energy efficiency trends of Cyprus in the last two decades and has outlined two important policy aspects arising from recent policy developments.

One policy related aspect (included in Section 4 of this report) had to do with investments to reach energy and climate goals of Cyprus in view of its EU-wide commitments. In this regard, we briefly presented a comprehensive methodology that can provide reasonably accurate estimates of the green investments that are necessary up to 2030; this is described in more detail in the revised NECP of Cyprus prepared during 2024. The method aligns with the call from the European Scientific Advisory Board on Climate change to prepare a granular and accurate overview of required and actual investments in climate change mitigation to monitor and assess progress of each EU member state towards its 2030 and 2050 goals. Such a method can help demonstrate to what extent national plans are aligned with the 'Energy Efficiency First' (EE1st) principle embedded in the latest Energy Efficiency Directive.

At the same time, one has to keep in mind that although EE1st can contribute both to meeting the new EED objectives and the broader energy and climate targets for year 2030, it may not always be compatible with the long-term goal to reach net zero emissions by 2050. The EED asks to opt for energy demand reduction measures if they are cost-effective compared to energy supply increases. However, there are cases where simple energy efficiency interventions may be more cost-effective, i.e. may save more energy units per thousand Euros of investment, but may lock the economy in a path that does not lead to zero emissions in 2050. For example, roof insulations may be more cost-effective than a full-fledged energy renovation of an older building; and replacement of oil-fired boilers with gas-fired boilers in industries using low- and medium-temperature processes may be more cost-effective than the replacement with heat pumps. However, the energy saving potential of the former solutions is comparatively low. Given that the lifetime of renovations and equipment can reach several decades, such investments are not consistent with a path to net zero emissions by 2050.

Another issue that has to be considered is the need to secure electricity supply on the way to climate neutrality, even if some measures improving energy security may not seem to be cost-effective. A zero-carbon economy will be almost fully electrified (with electricity coming from renewables and perhaps from some fossil fuel use coupled with carbon capture technologies); this means that EU-wide electricity consumption may more than double by 2050. This calls for extremely careful planning to secure uninterrupted and high-quality supply of electricity, which requires huge investments in digitizing, modernizing, and expanding the electricity grid. Some of these investments may not seem to be cost-effective but they are absolutely necessary to protect our energy systems against "tail risks", i.e. occurrences of low probability but severe impacts. In such cases, although EE1st should in no case be abandoned, it is clear that cost-effectiveness and cost-benefit analyses cannot be an absolute guide for public investment decisions, as explained in recent policy documents[4]. Such considerations call for careful planning that takes multiple criteria into account.

[4] See The New Economics of Innovation and Transition: Evaluating Opportunities and Risks. A Report by the Economics of Energy Innovation and System Transition (EEIST) Consortium, UK, 2022.

The second policy aspect – how to address energy poverty – was discussed in Section 5 of this report. Energy poverty is a significant concern for Europe. As the scale and pace of climate policy in the EU accelerates, the immediate and longer-term socio-economic effects are becoming more noticeable, especially amongst vulnerable groups. This report highlights findings from a more detailed analysis that draws on behavioural science to identify cognitive and structural barriers that may prevent vulnerable households from applying for or fully utilizing the available financial support for energy-saving investment (barriers that policy-makers tend to miss). While the recommendations are broadly applicable across the EU and can support the successful and efficient utilization of national and EU funds to tackle energy poverty (such as the Social Climate Fund to be launched in 2026), this report has focused on the case of Cyprus, where energy poverty is high and other energy poverty initiatives in the past faced significant challenges. We argue that, by addressing key barriers using behavioural insights, such as the complexity of application processes, can significantly enhance the efficacy of the schemes for vulnerable households, paving the way for a more equitable and green transition.

In summary, while Cyprus currently ranks at the middle of EU Member states as regards energy efficiency levels, trends and policies as shown in the Odyssee-Mure scoreboard presented in Section 3, achieving real progress towards the energy and climate targets 2030 and then towards climate neutrality in 2050 is full of challenges. These are related both to the amount of investments needed (since energy renovations of buildings and the shift to sustainable mobility must accelerate) and to the adequacy of the labour force in order to implement energy efficiency investments at the desired scale and speed. A realistic but ambitious energy efficiency strategy is necessary, in line with a more broadly coherent climate strategy. This strategy has indeed been laid out in the revised National Energy and Climate Plan. Now is the time of its implementation.