

# European Commission

## Directorate-General for Structural Reform

### Support

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Support to the Renovation Wave in Cyprus: Policies to alleviate Energy Poverty

Deliverable 3 - Fighting Energy Poverty in Cyprus: new policy measures and methodologies.

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## 1. Introduction to Deliverable 3

This document is the Deliverable 3 to EY's engagement for the provision of "Support to the Renovation Wave in Cyprus: Policies to alleviate Energy Poverty".

The aim of this report is to: propose new and adjust existing policies and measures; propose measures of awareness and other informative and behavioural issues; and to propose a methodology for estimating energy savings resulting from the implementation of energy efficiency measures for vulnerable customers and energy poor.

### 1.1 Propose new definition and adjustment of existing measures through specific amendments to the relevant Cypriot legislative and regulatory framework, including new piece of legislation.

#### 1.1.1 Summary of current and proposed measures

This section proposes measures to address and alleviate Energy Poverty in Cyprus based on Deliverable 2 findings, best practices, and discussions with competent authorities in Cyprus. The measures are categorized in four Pillars which collectively aim to tackle the issue of energy poverty.

Cyprus has implemented a set of measures for vulnerable and energy poor customers. These measures were presented in detail in Deliverable 2 and are summarized below under the following categories:

- Special electricity tariff Code-08 (20% less than the normal electricity price) - R.A.A. (K.Δ.Π.) 307/2023.
- Financial incentives through increased subsidy to the households who are under energy poverty and to vulnerable customers through their inclusion in RES and Energy Conservation Fund subsidy schemes - R.A.A. (K.Δ.Π.) 310/2023
- Financial incentives through increased subsidy to the households who are under energy poverty and to vulnerable customers through their inclusion in the scheme for households' energy efficiency improvements - R.A.A. (K.Δ.Π.) 310/2023.
- Continuity of electricity supply during critical periods - (R.A.A. 3010/2023)<sup>1</sup>.
- Allowances/subsidies from the Welfare Benefit Administration Service of the Deputy Ministry of Social Welfare (ΥΔΕΠ/WBAS).
- Other Measures and policies (e.g., awareness campaigns, Digital One-Stop-Shop etc.).

The above measures seem to address various aspects of energy poverty including affordability, energy efficiency and awareness. However, a comprehensive strategy to alleviate energy poverty requires a governance framework for implementation and monitoring purposes, something that Cyprus lacks. With the above in mind, the measures for alleviating energy poverty in Cyprus can be categorized under the following four pillars:

- Social/Affordability measures (i.e., measures that provide immediate financial relief such as special, tariffs, income support, tax, and energy prices reductions);
- Structural measures (i.e., measures which address the root cause by reducing energy consumption and improving energy efficiency);

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<sup>1</sup> R.A.A. mentions: "Non-disconnection or reconnection of electricity during critical periods in households affected by energy poverty, as well as for vulnerable customers for whom uninterrupted electricity supply is necessary for health reasons..."

- Information and Behavioral measures (i.e., measures to raise awareness and promote energy efficient behavior); and
- Administrative and Governance Measures (i.e., measures that optimize the governmental services, simplify procedures, indicators monitoring, etc.,) which are not include any of the above measures but there are relative measures that affect energy poverty indirectly.

Table 1 – Summary of existing Social/Affordability, Structural, Information/Behavioural measures

<b>Social/Affordability</b>
a. Special electricity tariff Code 08 (20% less than normal – depending on consumption) – R.A.A. 307/2023
b. Continuity of Electricity Supply during critical periods - R.A.A. 3010/2023
c. Heating Financial support for people who live in mountainous and semi-mountainous areas
d. NEW - Reduction of the tax for heating diesel of 39 cents per litre from December 2023 to March 2024.
e. NEW - Subsidy 100% in the increase of the price of electricity for vulnerable consumers (November 2023 until end of February 2024).
<b>Structural Measures</b>
a. Subsidy Schemes with increased subsidy under the RES and EC fund - R.A.A.310/2023 <ul style="list-style-type: none"> <li>■ Installation of PV system with the method of Net Metering or Virtual Net Metering in households of vulnerable customers.</li> <li>■ Installation/replacement of thermal system for hot water in households.</li> <li>■ Replacement of energy intensive electrical appliances in households of vulnerable customers (CLOSED)</li> <li>■ Installation of roof thermal insulation (New Scheme issued in 2024)</li> </ul>
b. Subsidy Scheme with increased subsidy: <i>Save and Upgrade</i> - R.A.A.310/202 <ul style="list-style-type: none"> <li>■ Type A – roof insulation, wall insulation, replacement of window frame, installation of external movable shading.</li> <li>■ Type B – thermal system for hot water, purchase and installation of AC, Aerothermal/Geothermal pump, PV, Battery storage, Boiler.</li> <li>■ Type C – Services costs.</li> </ul>
<b>Information and Behavioral Measures</b>
a. Information Awareness Campaign from MECI
b. Information provision from third parties such as NGOs (e.g., CEA)
<b>Administrative and Governance Measures</b>
■ Governmental Information Storage – (KAII) – used to confirm whether subsidy scheme applicants fall into the relevant categories
■ One – Stop Shop (IN PROGRESS)

According to the European Commission (EC)<sup>2</sup>, **Social/Affordability measures** are very important and should be included in the policy mix. Although these measures are important as they can have immediate impact, they provide a **temporal** relief to energy poor and do not

<sup>2</sup> [Commission Recommendation \(EU\) 2023/2407 of 20 October 2023 on energy poverty \(europa.eu\)](https://european-council.europa.eu/media/en/press-summaries/default/2023/2407)

address the problem at its root. While helpful, these measures could act against the reduction in energy consumption and/or the investment in energy efficiency measures since part of the electricity cost is subsidized. Furthermore, if allocated disproportionately, Social/Affordability could pose a risk in the public funding available for more structural measures in the form of capital incentives for renovations. Therefore, such temporal relief measures should be applied cautiously.

**Structural Measures** on the other hand are deemed by the EC as priority measures as they address energy poverty at its root. These measures include energy efficiency renovations and access to renewable energy sources. Additionally, structural measures have long-lasting impacts and are aligned with the EU's objectives of a fair energy transition (paragraph 19)<sup>3</sup>.

The remaining two pillars **Information and Behavioural measures** and **Administrative and Governance measures** are complementary to Pillars one and two but are of equal importance. Perfectly designed social and structural measures will have limited impact without the proper information and awareness campaigns and without the proper governance and tools (e.g., monitoring, user friendly digital platforms etc.). In general, information and awareness measures should include relevant training and education to energy poor on energy efficiency tips and behavior, tools for support, information on available Government schemes etc. Additionally, education and training should be provided to social workers and to government staff which are usually in the front line of this problem.

The Table below presents an action plan to alleviate energy poverty in Cyprus. The aim of the action plan below is to capture the immediate next steps at a high level to ensure the Deliverable 2 and 3 recommendations are evaluated, prioritized and planned for implementation. Key actions are detailed in the tables at the end of each section below (1.1.2.1, 1.1.2.2, 1.1.2.3 and 1.1.2.4). Following the prioritization of recommendations, key actions for each the selected measures should be implemented.

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<sup>3</sup> [Commission Recommendation \(EU\) 2023/2407 of 20 October 2023 on energy poverty \(europa.eu\)](#)

Table 2: High-level action plan – main actions and key work steps

Actions for Implementing the Policies and Measures				
Main Actions   Key Work Steps	References	Description   Outcome	Key Stakeholders	Key Benefits
<b>1. Finalization of Recommendations on Energy Poverty Definition and Identification</b>	Reference to Documents	This is an initial action plan to alleviate Energy Poverty in Cyprus. It focuses on reviewing and finalizing the recommendations from Deliverables 2 and 3, capturing key stakeholders and benefits		
<b>1.1 Finalize Recommendations on Energy Poverty definition and identification</b> 1.1.1. Agree on qualitative Energy Poverty definition (Task 2.1.2.) and issue relevant Decree 1.1.2. Agree how Energy Poor can be identified using Government Information Storage (KAΠ) 1.1.3. Agree on quantitative Energy Poverty identification criteria (Task 2.2.1) and issue relevant Decree  <i>Note: The recommendations focus on defining, identifying and quantifying energy poverty .</i>	<b>Deliverable 2</b> Energy Poverty Estimation Indicators (Task 2.2.1.) Quantitative Energy Poverty Criteria (Task 2.2.1.) Qualitative Definition of Energy Poverty and Vulnerable Customers (Task 2.2.2.)	Approved Energy Poverty definition and identification criteria	1. <b>[Owner]</b> Energy Service - MECI 2. <b>[Key Stakeholders]</b> Deputy Ministry of Social Welfare, Cyprus Statistical Services	1. Updated energy poverty definition which reflects relevant EC Recommendations 2. Clear criteria for identifying and quantifying energy poor households in Cyprus

2. Finalization and prioritization of Recommended Measures	Reference to Documents	This is an initial action plan to alleviate Energy Poverty in Cyprus. It focuses on reviewing and finalizing the recommendations from Deliverables 2 and 3, capturing key stakeholders and benefits		
<p>2.1. Prioritization of recommended measures</p> <p>2.1.1. Evaluate and assess recommended measures across four pillars</p> <p>2.1.2. Prioritize recommended measures for each pillar</p> <p>2.1.3. Plan for the implementation of prioritized measures</p> <p>2.1.4. Plan for timely engagement with relevant stakeholders</p> <p>2.1.5. Develop an implementation strategy to implement prioritized measures and monitor their progress</p> <p>2.2. Re-assess measures not implemented and update strategy accordingly</p>	<p><b>Deliverable 3</b></p> <p>Recommendations on Policies and Measures (Task 3.1.1. and 3.1.2.)</p>	<p>Produce a comprehensive list of measures to alleviate energy poverty in Cyprus</p>	<p>1. <b>[Owner]</b> Energy Service - MECI</p> <p>2. <b>[Key Stakeholders]</b> Deputy Ministry of Social Welfare; Electricity Authority of Cyprus; Ministry of Finance; Ministry of Transport, Communication and Works; Cyprus Land Development Organization; Cyprus Statistical Services; ESCOs, Banks; Academic Institutions</p>	<p>1. Expand eligible categories to reflect newly defined energy poor</p> <p>2. Protect energy poor from increasing electricity costs</p> <p>3. Remove unnecessary costs and administrative processes</p> <p>4. Offer additional subsidies to energy poor</p> <p>5. Enable energy poor living in rented properties to reduce their energy expenses</p> <p>6. Create innovative mechanisms to support energy poor</p> <p>7. Multi-channel information provision</p> <p>8. Central and local support</p> <p>9. Establish Administrative and Governance measures to monitor energy poverty levels</p>

### 1.1.2 Gaps and Recommendations

The existing measures implemented in Cyprus along with best practices from various EU Member States were reviewed and presented in Deliverable 2. This analysis, combined with the identified demographics of energy poverty, lead to the identification of gaps and provided insights for developing targeted recommendations to improve overall effectiveness. This subsection presents a list of recommendations for each of the four pillars as well as additional points for consideration to alleviate energy poverty in Cyprus.

#### 1.1.2.1 Social/Affordability Measures

As mentioned above, Cyprus is already implementing several Social/Affordability measures which could be adjusted and complemented with additional ones to have greater impact. The implementation of such measures however should not act against the implementation of structural measures (i.e., act as anti-incentives) since they are the ones that can address the problem of high energy consumption at its root. In general, social measures should be available to support energy poor until they implement structural measures (e.g., installation of PVs or insulation). A staged phase-out of social measures should therefore be examined and communicated to give people time to plan structural measures accordingly. Social measures could be maintained and offered only to those that cannot implement structural measures, for example to the energy poor who live in rented properties.

#### Special Electricity Tariff (Code 08)

As mentioned in Deliverable 2, Cyprus already implements a Special Electricity Tariff (Code 08) which is 20% less than the normal tariff (depending on consumption). Table 3 below attempts to map the eligible categories against certain criteria, recognizing that such mapping cannot be absolute since the eligibility criteria for some categories are complex (e.g., eligibility criteria for Minimum Guaranteed Income beneficiaries are not just financial). As the table shows, the tariff is predominately linked to health conditions and less so on other criteria.

Table 3: Decree 307 – Special Tariff eligible categories

Criteria	Number of Categories
Income	2
Family Status	1
Health	14
Age, Health & Income	1
Total	18

Energy Poor households were defined as part of Deliverable 2 to include aspects such as energy expense and energy efficiency of their property in addition to income. Furthermore, analysis of the demographics of Energy Poor revealed that a large percentage of the energy poor are low-income people over 65 years old. Specifically, the analysis showed that 48% of households have at least one person above 65 and that 33% are occupied only by people over 65. In terms of number of people, 29% of energy poor (34,245 people) are over 65 years old. Additionally, analysis revealed that a small percentage of households (4%) are single parents. To ensure that all energy poor are therefore adequately supported, it is recommended that the people categories that are eligible for this tariff are expanded to include all households that are considered energy



poor according to the indicators and criteria in Deliverable 2. The implementation duration of this however should be considered together with the EU Directive 2019/944 Article 5 and the relevant derogation applicable to Cyprus (see Note below). Furthermore, the implementation of such measures **should not act as an anti-incentive to implementing structural measures**. As such social measures, including reduced tariffs, could be slowly phased out to encourage the implementation of structural measures.

Additionally, according to MECI, the actual number of applicants for the Special Electricity Tariff is considerably less than the number of those eligible (Guarantee Minimum Income receivers' number). Specifically, as of June 2023, the number of households that receive the special tariff was 17,665 as opposed to the 25,000-30,000 people that are eligible. Although it is not clear why this is, it could be because they might not be aware of the Scheme or because they might have missed the application deadline. As a first step it could be considered to introduce a system of automatic enrolment or at least automated reminders to enroll, an approach that is implemented in Portugal. The reasons for the low number however should be analyzed further.

Finally, MECI should assess whether the existing framework is still fit for purpose, especially since the number of domestic electricity suppliers will increase in the immediate future. Specifically, MECI should assess whether new suppliers will be able to offer this measure as well as consider whether an alternative to the percentage reduction (e.g., monetary benefit) could be introduced. For example, Greece offers monetary discount (4.5-7.5 Euro cents per kWh) to energy poor<sup>4</sup>. Similarly, England and Wales offer an annual electricity bill reduction of £150<sup>5</sup>. Additionally, the tariff could be reviewed regularly so that it is dynamic throughout the year to capture changes in the electricity prices.

**Note:** EU Directive 2019/944 Article 5 states that Member States shall take appropriate actions to ensure effective competition between suppliers and ensure the protection of energy poor and vulnerable household customers<sup>6</sup>. However, there is a possibility for Member States to derogate the above by applying public interventions in the price setting for the supply of electricity to energy poor or vulnerable household customers. **This derogation applies to Cyprus for this Special Electricity Tariff which is available for energy poor and vulnerable households until 2025.**

## Heating/Cooling Financial Support for all Energy Poor

Currently, people living in mountainous and semi-mountainous areas receive financial support (direct payments to their bank accounts) for heating and transportation purposes<sup>7</sup>. The criteria are not related to energy poverty or vulnerability, but rather they partly subsidize the anticipated increased costs related to additional heating requirements and longer transportation of the population living in these areas. Tables below show the financial support given for heating and transportation.

Table 4: Financial assistance for heating

Financial support	Altitude
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<sup>4</sup> <https://www.gov.gr/en/sdg/consumer-rights/connection-to-utilities/electricity/social-residential-tariff>

<sup>5</sup> <https://www.gov.uk/the-warm-home-discount-scheme>

<sup>6</sup> DIRECTIVE (EU) 2019/ 944 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - of 5 June 2019 - on common rules for the internal market for electricity and amending Directive 2012/ 27/ EU (europa.eu)

<sup>7</sup> 10.1 ΣΤΗΡΙΞΗ ΚΑΤΟΙΚΩΝ ΟΡΕΙΝΩΝ ΚΑΙ ΑΠΟΜΑΚΡΥΣΜΕΝΩΝ ΚΟΙΝΟΤΗΤΩΝ - Υπουργείο Εσωτερικών (moi.gov.cy)

€175	600m-800m
€225	801m-1000m
€260	>1001m
<b>Additional support:</b> €85 for each person >65 years of age, €165 for each person <65 years of age.	

Table 5: Financial support for transportation

Financial support	Description
€300	per year per non-retired working adult person, member of a household, residing in a Community/Area located at 40-59 km from the nearest urban center or in a Community/Area at a distance 30-39km and which at the same time is at an altitude greater than or equal to 700m
€500	per year per non-retired working adult person, member of a household, residing in a Community/Region located at 60-79 km from the nearest urban center.
€600	per year per non-retired working adult person, member of a household, residing in a Community/Region located at a distance greater than or equal to 80km. from the nearest urban center.
<b>Notes:</b> Adult - a person who has reached the age of 18 on the date of submission of the application. Employed person - a person who is working on the date of submission of the application. Non-retired person a person who has not reached the age of 65 on the date of submission of the application.	

The mechanism behind the financial support amounts should be investigated to understand how the values were calculated. Furthermore, the introduction of such support to energy poor could be explored or at least it should be explored whether and how it can work in conjunction with the Special Electricity Tariff as this measure offers direct financial support and not a discount on the electricity bill. Additionally, energy poor living in coastal and inland areas will tend to have more energy needs for cooling during the summer period. It is therefore suggested to consider providing such financial support for cooling, not just heating, to all energy poor according to their geographic location. Several EU MS however offer heating, and where applicable cooling, financial support to energy poor either in the form of direct payments or vouchers. The policy of heating and energy vouchers is applied in several countries such as the UK through the *Winter Fuel Payment*<sup>8</sup> and the *Cold Weather Payment*<sup>9</sup>, France with the *energy*

<sup>8</sup> [Winter Fuel Payment: Overview - GOV.UK \(www.gov.uk\)](http://www.gov.uk)

<sup>9</sup> [Cold Weather Payment: Overview - GOV.UK \(www.gov.uk\)](http://www.gov.uk)

*Voucher (Chèque Energie*<sup>10</sup> and Greece with the *myΘερμανσή* allowance<sup>11</sup>. A distinction and proportionality of the amount that each household receives can be discussed and analyzed further based on the energy poverty criteria.

### **Prohibition of disconnection for all Energy Poor during winter/summer period**

At the moment the Prohibition of Electricity Disconnection in Cyprus is applied to a small group of vulnerable customers mainly based on health-related criteria (R.A.A. 310/2023). According to 3.c. of the R.A.A., in addition to vulnerable customers for whom the continuation of electricity supply is necessary for health reasons, **continuity of electricity supply or re-connection of electricity during critical periods should be offered to households who are under energy poverty**. EU MS such as Spain, Portugal and France apply the prohibition of disconnection to all Energy Poor and Vulnerable Customers during the winter period. Specifically in France the disconnection for household consumers is banned annually for the period 1 November to 31 March<sup>12</sup>. According to MECI, there were 106 applications to join the scheme since 2015, with 12 being active today. MECI should investigate the low registration numbers and consider implementing such measure (i.e., avoid disconnection) to Energy Poor, not just vulnerable customers, during critical periods which in Cyprus could be both to avoid cold spells and heat waves.

### **VAT exemptions (or income tax credit) for expenditures related to energy efficiency measures.**

The latest subsidy scheme issued by the Cyprus Government in 2024 was designed so that it covers 100% of the PV cost for energy poor and up to 75% of the cost for roof insulation. Additionally, the energy poor and vulnerable customers are exempted from the VAT associated with such expenses. It is not clear from the information available that all Government funding schemes associated with energy efficiency measures have such exemption. Regardless, it is suggested to exempt energy poor households of VAT from all subsidized energy efficiency upgrades (PV, roof insulation, energy efficient appliances etc.).

### **Electricity price cap based on a typical household consumption.**

Energy poverty is directly related to energy consumption and therefore energy expense. Electricity prices have been on the rise for some time, something that has detrimental effect on low-income households and energy poverty. The introduction of an electricity price cap implemented across various countries such as France<sup>13</sup> and the UK<sup>14</sup> is a tool to control electricity costs in general, not just for the energy poor. A price cap is set by taking into account factors such as energy prices, electricity production costs, infrastructure investment, and market conditions and could be set only for a specific consumer group (e.g., households and small businesses). The aim is to protect the interests of consumer, promote competition and ensure secure and sustainable energy supply. The introduction of such measure and its regular review (e.g., every six months or every year) could be examined as it can help the energy poor deal with a cost that is essentially out of their control. This can apply to all electricity using customers, especially as the number of suppliers is likely to increase in the near future.

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<sup>10</sup> [Aide énergie -Le chèque énergie 2023 sera valable jusqu'au 31 mars 2024 | Service-Public.fr](#)

<sup>11</sup> [myΘέρμανση | ΑΑΔΕ \(aade.gr\)](#)

<sup>12</sup> [\\*SWD\\_2023\\_647\\_F1\\_OTHER\\_STAFF\\_WORKING\\_PAPER\\_EN\\_V5\\_P1\\_3016190.PDF \(europa.eu\)](#)

<sup>13</sup> [France to uphold electricity price caps until early 2025, finance minister says | Reuters](#)

<sup>14</sup> [Energy price cap | Ofgem](#)

Electricity price cap is a policy tool used to benefit all consumers, not just the energy poor and vulnerable. For the energy poor, the Special Electricity Tariff currently in place could be an alternative to this and could be reviewed regularly so that it is dynamic throughout the year to capture changes in the electricity prices.

### **Energy poor households do be excluded from additional costs linked with green electricity (Ταμείο ΑΠΕ και ΕΞΕ).**

Under the existing measures, the law N.33(I)/2003 requires the promotion and encourage the use of Renewable Energy Sources and the creation of a special Subsidy Fund which Cyprus has successfully implemented (RES and Energy Conservation Fund – Ταμείο ΑΠΕ και ΕΞΕ). This fund raises money from all electricity customers through their electricity bills by charging an additional €0.005 per kWh. This fund is used to partially subsidize RES and Energy Conservation measures, with the energy poor receiving increased subsidies compared to the wider population. The contribution of energy poor however potentially creates an unfair disparity in the sense that (a) the energy poor contribute to a fund which in its majority subsidizes energy efficiency upgrades for the wider population and (b) the energy poor which tend to consume more electricity due to the low energy efficiency of their properties, could end up paying more than the wider population living in high energy efficiency properties. Up until recently the contribution of the energy poor was half that of the wider population (i.e., €0.0025)<sup>15</sup>, however due to changes in the way this is being charged and paid by customers it became difficult to implement and as such it went back to its original amount. Although in monetary terms, the amount of money a typical household pays is low (e.g., average consumption of 6000kWh per annum results to an annual cost of €30), it would have been better if the contribution of the energy poor was less than the that of the wider population (reduced or was completely removed). The Government could therefore explore how this amount could be reduced or removed altogether, recognizing however that the administrative process of doing so could be burdensome. As an alternative, the Special Electricity Tariff could be slightly adjusted to account for the marginal costs incurred by the energy poor.

### **Relocation of the Energy Poor in new Social Housing**

The Cyprus Land Development Organization, which is under the jurisdiction of the Ministry of Interior, was established by the State as part of its social policy to facilitate low and moderately paid families to acquire their own housing. The organization announced in 2023 that it is planning to fund the phased development of multi-apartment buildings for vulnerable consumers<sup>16</sup>, with the first one being available in 2026. Although there seems to be an issue with some of the funding, the organization is confident that the plans will go ahead<sup>17</sup>. MECI could work closely with the organization to ensure that vulnerable customers that are also energy poor are considered for some of these houses, particularly those that are renting low energy efficient properties.

### **Green Tax**

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<sup>15</sup> [https://resecfund.org.cy/sites/default/files/2020-05/KDP\\_417-2019.pdf](https://resecfund.org.cy/sites/default/files/2020-05/KDP_417-2019.pdf)

<sup>16</sup> <https://www.philenews.com/kipros/koinonia/article/1384992/to-2026-i-proti-polikatikia-gia-evalotes-ikogenies/>

<sup>17</sup> <https://www.moi.gov.cy/moi/moi.nsf/All/8A951E1504CE8F77C2258A3C001B7DDE?OpenDocument>

It is anticipated that towards the end of 2024, green taxes will be implemented in Cyprus directly affecting energy poor. Per a recent study released by the University of Cyprus in charge of green tax reform, those taxes will be in the form of:

- Carbon tax on transport fossil fuels, expected at the region of €0.05 per litre from the end of 2024 onwards; and
- Water levy at initial rate at the region of €0.01 + VAT per cubic metre.

According to the study, there will be welfare loss in the form of additional expenditure per household number depending on income received as a result of green taxed under implementation. While the aim of green taxation is to be financially neutral, mitigation measures are proposed to counter the effect on vulnerable households. Monetary compensation, public transport, green vehicle subsidies are amongst the measures proposed for vulnerable for which MECI could top up in being further targeted (i.e., energy poor). MECI should work together with the Ministry of Finance, the ministry in charge of the green tax reform, and could propose extensions of some measures to take into account green taxes impacting energy poor households.

## Social/Affordability measures – Summary and Recommendations

As it was mentioned above, the implementation of Social/Affordability measures **should not act against the implementation of structural measures** (i.e., act as anti-incentives). In general, such measures should be available to support energy poor until they are able to implement structural measures (e.g., installation of PVs or insulation). **A staged phase-out of social measures could therefore be examined to give Government and customers adequate time to plan and seek financial support for structural measures.** Social measures could be maintained and offered only to those that cannot implement structural measures, for example to the energy poor that live in rented properties. Table below presents the proposed approach for each measure, along with KPIs and relevant comments.

Table 6: Social/Affordability measures

Social/Affordability Measures	KPI	Key Actions and Comments
<b>Strong Recommendation</b>		
Special Electricity Tariff (Code 08)	<ul style="list-style-type: none"> <li>- Number of customers registered per annum</li> <li>- Number of energy poor registered per annum (this may differ to above KPI)</li> </ul>	<ul style="list-style-type: none"> <li>- Expand the eligible categories to include newly defined energy poor</li> <li>- Investigate and understand the low registration numbers and explore a notification or auto-enrolment mechanism</li> <li>- Explore how this can be implemented across all electricity suppliers</li> <li>- Explore the introduction of monetary benefit as opposed</li> </ul>

		to the existing percentage reduction
Prohibition of disconnection for all Energy Poor	<ul style="list-style-type: none"> <li>- Number of customers registered per annum</li> <li>- Number of energy poor registered per annum (this may differ to above KPI)</li> <li>- Number of avoided disconnections recorded per annum</li> <li>- Number of avoided disconnections recorded per annum for energy poor</li> </ul>	<ul style="list-style-type: none"> <li>- Investigate and understand the low registration numbers</li> <li>- Protect all energy poor (as defined as part of this project) against disconnection during critical periods (winter and summer)</li> </ul>
VAT exemptions	<ul style="list-style-type: none"> <li>- Number of schemes exempted from VAT per annum</li> <li>- VAT funded by the Government (€) per annum</li> </ul>	- The latest Government subsidy scheme for PV and roof insulation exempts the energy poor and vulnerable customers from VAT. MECI should ensure that this is consistently applied to all future subsidy schemes for the energy poor.
<b>Recommendation</b>		
Heating/Cooling Financial Support	<ul style="list-style-type: none"> <li>- Number of financial supports issued per annum</li> <li>- Amount of money provided per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Consider how this heating financial support for people living above certain altitude levels could be replicated to Energy Poor and whether it can be merged with the Special Electricity Tariff</li> <li>- Consider introducing a cooling financial support for those living in inland or coastal areas where temperature is expected to be higher</li> <li>- Consider how the proportionality support can be replicated to other categories</li> </ul>
Relocation of the Energy Poor in new Social Housing	<ul style="list-style-type: none"> <li>- Number of energy poor (households) relocated per annum</li> <li>- Number of energy poor (people) relocated per annum</li> </ul>	- Work together with Cyprus Land Development Organization to ensure that some vulnerable and energy poor are considered for some of the new social houses,

		particularly those that are renting
<b>To be considered</b>		
Energy poor households to be excluded from green electricity fees	<ul style="list-style-type: none"> <li>- Number of households excluded per annum</li> <li>- Total fund contributions lost (€) per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Consider how the marginal cost incurred by energy poor can be reduced or eliminated either by removing such contribution or by compensating the estimated amount through other arrangements (e.g., Special Electricity Tariff)</li> </ul>
Electricity price cap	<ul style="list-style-type: none"> <li>- Number of times reviewed per annum</li> <li>- Estimated amount saved (€) per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Consider if this is something that can be applied for the benefit of the general population and by extension to the energy poor.</li> </ul>
Green taxes	N/A	<ul style="list-style-type: none"> <li>- Monitor implementation impact</li> <li>- Work together with Ministry of Finance to propose extensions on some of the proposed measures.</li> </ul>

### 1.1.2.2 Structural Measures

According to literature review and best practices analysis, the structural measures currently offered in Cyprus could be expanded and enhanced to improve the energy efficiency of owned and rented energy poor properties. Structural measures should also take into consideration split incentives and double split incentives. A split incentive arises where the landlord has no incentive of investing in energy efficiency measures for which the tenant would be the sole beneficiary (e.g. a situation where an energy poor is renting an apartment or a house from a landlord and the landlord has no incentive to improve the energy efficiency of the house since they will see no direct economic benefit) or where tenants/owners in a multi-apartment building are not able to improve the energy efficiency of their apartment since costs associated with the building's renovation works require consent from the remaining apartment owners (e.g. owners of top floor apartments require consent from the remaining owners to insulate the roof of their apartment if the roof is common etc.). A double split incentive occurs where both split incentives occur (e.g., residents who rent in multi-apartment buildings and therefore there is a split incentive between the tenant and the landlord as well as between the tenant/landlord and the remaining apartment owners).

#### **Subsidy Schemes for replacing high energy consuming electrical appliances.**

According to EC Recommendations such schemes are considered as structural measures and are a key for decreasing energy consumption and therefore energy costs. The EU further states that “an average European household saved on average EUR 198 user expenditure in 2020,



which expected to increase to EUR 312 per year per household in 2030, thanks to the improved efficiency of appliances placed on the EU market. In 2022, at the height of the energy prices, it was estimated that an average European household could save on their energy bill up to EUR 2,450 if equipped with the top-class appliances”<sup>18</sup>. A scheme of this sort was available for vulnerable customers in Cyprus in the recent years<sup>19</sup>, but it has been discontinued and it is unclear at this stage whether it will run again. The Government should re-introduce this scheme to include large appliances such as fridge/freezers, washing machines, heating and cooling units<sup>20</sup>. The replacement of old appliances with new could significantly contribute towards reducing the energy consumption and therefore energy costs. Such scheme however should be designed with the principles of circular economy in mind, to ensure that existing appliances have reached an adequate life duration (e.g., by manufacturing date as installation date would be impossible to verify) and that they are recovered for recycling. Furthermore, such scheme could address the issue of split incentive as the subsidy could go straight to the energy poor who will not only experience significantly less energy consumption but could also take the appliance with them to their next property, should for whatever reason decide to move. It is worth noting that in some instances during the previous schemes, some appliances were moved to non-vulnerable homes following their procurement. As such, better monitoring and safeguards should be put in place to prevent this from happening in the future.

### **Capital expenditure and subsidy coverage.**

Typically, the implementation of energy efficiency measures in Cyprus requires the household owner to fund the related capital expenditure and apply for any subsidy following their implementation to recover part of the costs. In some cases, particularly for large renovation works, this acts as a barrier as people cannot cover the full cost, before recovering some of the expenses through subsidies (see Deliverable 2 Task 2.1.3). For the energy poor, although the subsidy amount offered is more, and there are provisions that do not require them to cover the subsidy costs, the issue of covering the remaining amount (cost less the subsidy) is still present. The latest subsidy scheme for PV and roof insulation issued by MECI has introduced the concept of Participating Traders to streamline the application and installation process, eliminating the requirement for the vulnerable (and energy poor) to fund the upfront capital expenditure. Additionally, the subsidy available for the energy poor is designed to cover 100% of the costs related to PV installation, and 75% of the costs associated with roof insulation. The new subsidy scheme therefore addresses the issue of the upfront capital expenditure, but the issue of covering the remaining cost for roof insulation is still present.

To overcome both issues, it is recommended that subsidies cover the full 100% of the capital expenditure for energy efficiency upgrades in energy poor households, including roof insulation, as well as implement a mechanism that does not require energy poor to cover any of the associated costs. To help with the implementation of the latter, a list of pre-qualified installer/developers could be put together and vetted by MECI, to ensure an effective and efficient completion of the relevant works. Contractors (or Participating Traders) could be paid in stages, upon completion of various work milestones. Payments could be made directly to the contractors, or through vouchers issued to homeowners. The latter option could resemble the Green Homes Voucher Scheme<sup>21</sup> implemented in the U.K. in 2020 which provided grants in

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<sup>18</sup> [https://energy.ec.europa.eu/system/files/2023-10/SWD\\_2023\\_647\\_F1\\_OTHER\\_STAFF\\_WORKING\\_PAPER\\_EN\\_V5\\_P1\\_3016190.PDF](https://energy.ec.europa.eu/system/files/2023-10/SWD_2023_647_F1_OTHER_STAFF_WORKING_PAPER_EN_V5_P1_3016190.PDF)

<sup>19</sup> [https://resecfund.org.cy/el/ilektrikes\\_syskeyes\\_2021](https://resecfund.org.cy/el/ilektrikes_syskeyes_2021)

<sup>20</sup> At this stage it is safe to assume that LED lighting is an established technology that most houses use. This combined with the administrative burden of recording their replacement makes it inefficient.

<sup>21</sup> <https://www.gov.uk/guidance/apply-for-the-green-homes-grant-scheme>



the form of vouchers to homeowners and landlords to make energy efficiency improvements to homes.

According to MECI, the population, and especially the energy poor, are mostly interested in installing PVs only, whilst only a smaller number takes advantage of subsidies for other energy efficiency intervention. Although the installation of PVs reduces the electricity cost, it does not contribute towards the cumulative end-use energy savings obligation EU MS have (see Section 1.4). Increasing the roof insulation subsidy for the energy poor to 100% is expected to further promote the implementation of such measure. To further encourage the implementation of energy efficiency measures beyond PVs, MECI should consider subsidising PVs at 100% for the energy poor, only if they are accompanied by a fully subsidised roof insulation (or the implementation of other energy saving measures). This can be achieved either by amending existing schemes or by creating a completely new scheme for the energy poor only.

Taking into consideration that Government funding is limited, and that the Government may struggle to fully subsidise these interventions, where appropriate, alternatives such as Energy Performance Contracting, and on-bill schemes could be explored and considered as alternatives (see relevant sub-sections below).

### **Energy Performance Contracting**

Energy performance contracting is a strategic approach that could significantly address the energy needs and cost burdens of energy users, including the energy poor. This innovative financial instrument allows for the implementation of energy efficiency measures and renewable energy projects without the need for upfront capital investment. Under such contracting arrangements, an energy services company (ESCO) finances, designs, implements, and maintains energy efficiency interventions, and the client pays for these services through a portion of the energy savings realized over time<sup>22</sup>. For the energy poor, the successful implementation of this model is paramount as it offers an avenue to upgrade low efficiency infrastructure and reduce energy costs without imposing an immediate financial burden. Such model could be developed alongside and to complement Government funding and clear contractual agreements, performance metrics, and monitoring mechanisms could be used to ensure accountability and success. To ensure cost recovery by ESCOs, it is important to develop clear and comprehensive bilateral contracts (between beneficiary and ESCO) or even tripartite contracts where the beneficiary, ESCO and third parties (e.g., banks, the electricity supplier) get into a contract so that the ESCO costs are recovered directly through the electricity bills. Examples of third-party financing structures can be seen in Figures below. As an alternative, the Government can enter part of their subsidy allowance as a secure bond, essentially providing some sort of guarantee for ESCOs and banks. Additionally, MECI could explore whether energy intervention measures across a number of premises could be grouped together to include energy poor and non-energy poor to achieve economies of scale and lower the implementation risk.

Although there are several ESCOs currently registered in Cyprus<sup>23</sup>, they are not actively involved in the market. To enable their active participation, MECI could explore leading an initiative between the Government, ESCOs, and local banks, to facilitate the creation of collaboration framework. Initially, ESCOs could start working on large projects (e.g., Government buildings) which could serve as the bedrock of building trust and essential relationships, which could be then cascaded down to smaller projects such as domestic dwellings of the general public as well as the energy poor.

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<sup>22</sup> There are a number of registered ESCOs in Cyprus, the list of which is available on [MECI's website](#)

Figure 1: Third party financing with ESCO borrowing.

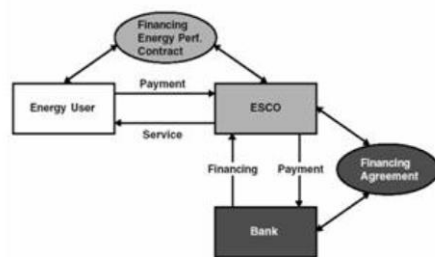
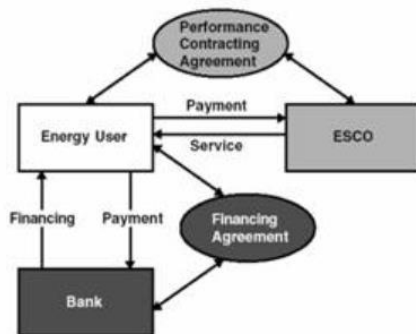


Figure 2: Third party financing with energy user/customer borrowing



### On-bill energy saving schemes

On-bill energy saving scheme refers to a system where energy efficiency upgrades or renewable energy installations are financed through a customer's utility bill. This innovative approach allows consumers to make improvements to their homes or businesses without upfront costs, paying for the upgrades over time through their monthly utility bills. By spreading the cost over an extended period, on-bill energy saving programs make it easier for individuals and businesses to invest in energy efficiency measures, ultimately reducing energy consumption, lowering utility bills, and contributing to a more sustainable future. Additionally, since payments are tied to the utility bill, the recovery of the investment cost is somewhat secured. A scheme of this sort was recently introduced in Cyprus for PV (PV for everyone), where households can cover the capital expenditure of a domestic PV up to a certain size, partly by utilising Government subsidy (slightly reduced compared to other schemes) and partly by paying back the initial investment (funded by Government funds) through their electricity bill for a fixed amount and period of time. The scheme was announced in January 2024, but it is anticipated that it will attract significant interest. It is recommended that a scheme for other measures (e.g., roof insulation, better windows etc.) is designed in the same way to allow for more energy efficiency measures to be implemented. The appropriate mechanisms should be put in place to guarantee the recovery of the financed investment. Additionally, the impact such scheme could have on Energy Performance Contracting should be assessed to ensure that the two options do not act against each other. One example of doing this, is by exploring which solution is better for energy poor and limiting one of the two to energy poor only.

### Subsidy scheme for combination of PV and battery storage.

The economic benefits of renewable energy sources such as domestic PVs are already well known, and the payback of such investment is typically very short. The increased penetration of small scale distributed and uncontrolled renewable energy sources however raises electricity system security and reliability concerns. Battery storage of various sizes are starting to act as solutions for these issues. Specifically, battery storage can solve local network constraint issues as well as wider system security and reliability issues. The benefits of designing a subsidy scheme that allows for the connection of battery storage alongside PVs for the energy poor could be twofold. It will allow the owner to maximise renewable energy generation and therefore minimise cost, particularly as net-billing schemes are replacing net-metering schemes which are considered to be less beneficial, and at the same time it would also enable them to participate in a future energy market through demand response. This could potentially put the energy poor in the forefront of the future energy market but most importantly give the energy poor the chance to earn additional income through their participation in the market. With the exception of one of the Government Subsidy Schemes (Energy Conservation and Subsidy Scheme) which includes battery storage as an option of a wider set of measures, the use of battery storage is not encouraged nor subsidised. Considering the inclusion of such scheme, especially as the electricity market in Cyprus evolves over the next few years, could potentially be of great benefit to the energy poor. Although the cost of battery storage is still relatively high, if planned correctly, a battery storage scheme could immediately alleviate some of the problems excess PV puts on the power networks and solve voltage and demand/supply issues, by shaving generation and peak demand curves.

### **Collective Purchasing Scheme to achieve economies of scale.**

In addition to the individual measures above, it would be good to consider cost savings achieved through economies of scale by grouping together a small number of households (e.g., 5-20) and appointing a single contractor to undertake the works. This seems to be a common strategy in several European countries such as the UK, Slovenia, Bulgaria and Lithuania. CLEAR-X, an EU funded project, promoted collective purchasing campaigns and included Cyprus. One of the aims of the project was to “*overcome the main barriers stopping consumers from investing in RES and EE technologies (e.g., high upfront investment costs, inconvenience, lack of trust, etc) by organising collective purchase schemes*”<sup>23</sup>. Therefore, the examination of incorporating and implementing such strategy whereby a group of households are collectively seeking quotes from contractors for the implementation of energy efficiency measures should be considered. This could be centrally coordinated via a process set-up at a local authority, province or national level.

### **Measures to address Split Incentives:**

#### **Energy Efficiency Schemes for rented properties.**

Cyprus’ Ministry of Interiors is in the process of introducing a “Renovate – Rent” scheme (Ανακαινίζω – Ενοικιάζω)<sup>24</sup> which subsidizes renovation costs incurred by owners to renovate properties that are not in use. The aim of this scheme is twofold, for old unused properties to enter the market and to create affordable housing for tenants. To ensure this, the Government support comes with rent price conditions whereby the rent price should be 30% less than the market rate for a period of four years (a market rate is set for different property sizes at different locations). The scheme does not exclude owners from seeking additional funding from MECI

<sup>23</sup> [Collective Actions - CLEAR-X](#)

<sup>24</sup> <https://www.moi.gov.cy/moi/moi.nsf/All/74A53A8B206A6AB4C2258A670032039C?OpenDocument>

for energy efficiency related upgrades, provided that they cover costs associated with works not covered by this scheme, but at the same time it does not mandate it. MECI should ensure that any Government funded renovation works under this scheme include minimum energy efficiency requirements, which would help improve the energy performance of Cyprus' ageing building stock.

In addition to this, Cyprus Government should consider designing a scheme that resembles this but does not limit it to unused properties, to encourage landlords to improve the energy efficiency of the properties they rent out, whilst maintaining an affordable rent price for their tenants for a similar duration (4 years). In addition to the energy efficiency gains, designing such scheme would address the split incentive issue between landlord and tenant, which tends to be a barrier for energy upgrades in rented properties. In line with EC recommendations, priority could be given to buildings with the worst energy performance.

In addition to the above, such scheme could be further enhanced by being complemented with Energy Performance Contracting (see above) which could allow the property owners to pay close to nothing whilst their tenants would benefit from reduced costs and better comfort levels.

### **Rights of multi-apartment building owners**

As it was mentioned above, split incentives between multi-apartment buildings act as a barrier to energy upgrades, and renovations in general, of buildings where some or most of the owners agree to undertake certain building related works, while other refuse to. The Immovable Property (Possession, Registration and Valuation) Law<sup>25</sup> currently has a provision which allows Management Committees of multi-apartment buildings to proceed with repairs and maintenance with the approval of 75% of the apartment owners. The Law however does not explicitly mention energy upgrades to be part of repairs or maintenance and therefore its application to such works may be ambiguous or subject to interpretation. Furthermore, the percentage requirement for proceeding with any works could be a barrier, especially as the number of apartments in a building increase. For example, for a building with 10 different apartment owners, there is a requirement for 8/10 owners to agree. This could act as a barrier to energy efficiency upgrades for multi-apartment buildings where a few owners are not giving their consent, also known as split incentive between multi-apartment building owners. Introducing a majority vote approach (i.e., 51% of owners) is something that could help towards addressing the split incentive issue, whilst ensuring that multi-apartment building owners will start getting advantage of Government subsidy schemes to undertake energy efficiency upgrades. This measure is something that is being proposed across different EU MS, and more recently in Greece<sup>26</sup>. It is therefore recommended for the Cyprus Government to consider implementing such legislative change but at the same time assess the impact such measure will have on apartment owners who have limited financial resources. One approach to address the latter to be for the Government to provide some financial support for owners who do not have the resources to do it, provided they meet certain financial criteria.

### **Set Minimum Energy Performance requirements for all properties, including those that are on the market for rent.**

In December of 2023, the EU Parliament and Council reached a provisional agreement whereby all new buildings should be zero-emission as of 2030 (for new buildings occupied or owned by the public sector the deadline is 2028) and MS will have to ensure an average primary energy

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<sup>25</sup> [https://www.cylaw.org/nomoi/enop/non-ind/0\\_224/index.html](https://www.cylaw.org/nomoi/enop/non-ind/0_224/index.html)

<sup>26</sup> [Πιο ευέλικτα τα «κοινόχρηστα» φωτοβολταϊκά • Τέλος στην 100% συναίνεση στις πολυκατοικίες • B2Green](#)

reduction of at least 16% by 2030 and between 20-22% by 2035<sup>27</sup>, and an objective to transform the residential building stock into zero-emission stock by 2050. With regards to the residential buildings in particular, MS can choose the tools with which they can achieve the required improvement such as minimum energy performance standards, technical assistance and financial support measures, and they need to establish a national trajectory for the progressive renovation of their building stock in line with 2030, 2040 and 2050 targets.

MECI should therefore consider whether the introduction of a specific minimum energy performance class will be required by a certain date, to ensure Cyprus' ageing building stock improves its energy performance. This could be done for all properties, owned and rented, and MECI could consider offering additional financial support to vulnerable and energy poor. The UK for example requires landlords who let out properties with poor Energy Performance (Classes F-G) to improve them to a minimum EPC rating E. If they cannot source sufficient external funding, they are required to make a financial contribution of up to £3,500<sup>28</sup> including VAT. According to the SWD of the EU Guidance on Energy Poverty, an alternative way is to link taxes with EPC rating, essentially incentivizing homeowners and landlords to prioritize energy efficiency upgrades, targeting those who are most financially capable of undertaking them<sup>29</sup>.

### Better implementation of Energy Performance Certificates, EPC

Although it is a Legal requirement for properties to have an EPC when they are on the market for sale or rent, only a very small percentage of existing properties do. As such, it is very important to implement mechanisms to encourage the issuing of EPCs and/or penalising those that do not comply with the Law. Doing so will ensure that adequate information regarding the energy performance of buildings that are on the market for sale or rent is available to potential owners/tenants, including the energy poor. Measures could include a dedicated/independent auditor and control body, fines for non-compliances.

For energy poor house owners, it is suggested that the cost associated with the issuance of an EPC, which in turn identifies energy efficiency measures, could be subsidised by MECI. The issuance of the EPC should be accompanied with an explanation of the available energy efficiency options, and the best ways to increase energy savings.

## Structural Measures – Summary and Recommendations

Structural measures are key for tackling the problem of energy efficiency for the energy poor at its root. This can be achieved through a combination of increased incentives, better coordination, national and local Government ownership and responsibility, as well as mandatory legislative requirements.

Table 7: Structural measures

Social/Affordability Measures	KPI	Key Actions and Comments
<b>Strong Recommendation</b>		

<sup>27</sup> [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698901/EPRS\\_BRI\(2022\)698901\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698901/EPRS_BRI(2022)698901_EN.pdf)

<sup>28</sup> <https://www.gov.uk/guidance/domestic-private-rented-property-minimum-energy-efficiency-standard-landlord-guidance>

<sup>29</sup> [https://energy.ec.europa.eu/system/files/2023-10/SWD\\_2023\\_647\\_F1\\_OTHER\\_STAFF\\_WORKING\\_PAPER\\_EN\\_V5\\_P1\\_3016190.PDF](https://energy.ec.europa.eu/system/files/2023-10/SWD_2023_647_F1_OTHER_STAFF_WORKING_PAPER_EN_V5_P1_3016190.PDF)

Subsidy schemes for replacing high energy consuming appliances	<ul style="list-style-type: none"> <li>- Number of appliances replaced per annum</li> <li>- Amount of money spent (€) per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Re-running the subsidy scheme for replacing high energy consuming appliances for energy poor</li> <li>- Introduce better monitoring and safeguards to ensure appliances are not moved to non-energy poor households</li> <li>- Incorporate circular economy principles in the scheme to ensure existing appliances have reached an adequate life duration and that they are recovered for recycling</li> </ul>
Capital expenditure and subsidy coverage	<ul style="list-style-type: none"> <li>- Number of applications per annum</li> <li>- Amount of money spent (€) per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Introduce subsidies that cover 100% of capital expenditure for all energy efficiency upgrades for the energy poor</li> <li>- Continue the implementation of mechanisms that enable energy poor to seek funding without having to pay for any of the works and recover the money later (e.g., Participating Traders)</li> <li>- Introduce a pre-qualified list of installers/developers with whom MECI will have an arrangement for staged payments</li> <li>- Consider introducing a voucher scheme for homeowners to apply and get voucher for specific work packages. Voucher can be given to specific pre-qualified vendors.</li> <li>- Providing 100% subsidy for PVs only if they are associated with roof insulation or other energy saving interventions</li> <li>- Consider designing a new scheme just for the energy poor</li> </ul>

Energy Performance Contracting	<ul style="list-style-type: none"> <li>- Number of houses supported</li> <li>- Amount of money (€) spent via Energy Performance Contracting</li> </ul>	<ul style="list-style-type: none"> <li>- Lead on initiatives to stimulate market interest and facilitate discussions between stakeholders. Start with large government projects to establish a framework and relationships.</li> <li>- Develop comprehensive contracts that safeguard cost recovery</li> <li>- Explore ways to encourage ESCO and bank participation</li> <li>- Explore a centrally coordinated grouping of houses to achieve economies of scale and lower implementation risk</li> </ul>
On-bill energy saving schemes	<ul style="list-style-type: none"> <li>- Number of houses supported</li> <li>- Amount of money (€) given</li> </ul>	<ul style="list-style-type: none"> <li>- Develop comprehensive contracts that ensure cost recovery</li> <li>- Create schemes that allow the implementation of energy efficiency measures beyond PVs</li> <li>- Balance on-bill offerings with Energy Performance Contracting offerings to ensure they do not contradict each other</li> </ul>
Better implementation of EPC	<ul style="list-style-type: none"> <li>- Number of EPCs issued per annum</li> <li>- Number of penalties issued per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Implement mechanisms to encourage the issuing of EPCs and penalize non-compliances</li> <li>- Create a dedicated team (internal or external) for monitoring</li> <li>- Fund the issuance of EPC for energy poor</li> </ul>
<b>Recommendation</b>		
Energy efficiency schemes for rented properties	<ul style="list-style-type: none"> <li>- Number of houses supported per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Design a scheme that resembles other Government schemes to encourage landlords to improve the energy efficiency of the properties they rent out, whilst maintaining an affordable rent</li> </ul>

		<p>price for their tenants for a fixed duration</p> <ul style="list-style-type: none"> <li>- Ensure that Government funded renovation works under this scheme includes minimum energy performance requirements</li> </ul>
Rights of multi-apartment building owners	<ul style="list-style-type: none"> <li>- Number of legislations changed</li> </ul>	<ul style="list-style-type: none"> <li>- Amendment the existing legislation regarding multi-apartment buildings to explicitly mention energy efficiency upgrades</li> <li>- Lower the approval threshold from 75% to 51% to address split incentives</li> </ul>
<b>To be considered</b>		
Subsidy scheme for combination of PV and battery storage	<ul style="list-style-type: none"> <li>- Number of houses installed PV with battery storage</li> <li>- Capacity of battery storage installed</li> <li>- Amount of money spent (€) per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Consider the inclusion of such scheme in the future as it could support the local electricity system operator</li> </ul>
Collective purchasing scheme to achieve economies of scale	<ul style="list-style-type: none"> <li>- Number of houses participated</li> <li>- Amount of money saved (€) per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Examine the implementation of a centrally coordinated approach whereby a group of households are collectively seeking quotes from contractors for the implementation of energy efficiency measures in bulk</li> </ul>
Set Minimum Energy Performance requirements for all properties, including those that are on the market for rent.	<ul style="list-style-type: none"> <li>- Legislation amendments made</li> <li>- Number of rented properties renovated per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Consider the introduction of minimum EPC classes for all domestic properties by certain dates</li> <li>- Consider offering financial support to energy poor/vulnerable house owners or landlords renting to energy poor/vulnerable</li> </ul>



### 1.1.2.3 Information and Behavioural Measures

In general, there are limited measures related to raising awareness and providing information on energy poverty as well as on the energy efficiency schemes. Where available, campaigns seem to be generic and not targeted to different segments of the population and it is not clear whether they were designed to target specific audience (e.g., energy poor), nor whether their impact is monitored. Furthermore, there seems to be no communication channels with the energy poor (e.g., call centre, user friendly websites etc.). The Government campaign aside, the Cyprus Energy Agency, an NGO which is the Energy Poverty Advisory Hub's (EPAH) expert body in Cyprus, seems to be actively involved by running webinars and publishing information on energy efficiency and energy savings.

During the several meetings conducted by the Project Team, including meetings with the Deputy Ministry of Social, Welfare and the CEA, it became apparent that many vulnerable customers and energy poor households are not aware of different Government measures and relevant schemes. This is also evident in the announcement of the Deputy Ministry which highlighted that only a few beneficiaries expressed an interest for the reduced tariff, compared to the total numbers of those eligible<sup>30</sup>. Additionally, it became apparent that MECI does not have a dedicated communications department, nor a detailed communication strategy. It is therefore recommended for MECI to adequately resource such department, either internally or by appointing an external consultant.

According to article 22 on information and awareness of the Directive (EU) 2023/1791 “*Member States shall include a range of instruments and policies*”, among others:

- *publicly supported energy consumption assessments and targeted advisory services and support for household consumers, in particular people affected by energy poverty, vulnerable customers and, where applicable, people living in social housing.*
- *training activities.*
- *engagement strategies.*

A set of comprehensive information and behaviour measures would include aspects such as: **targeted informational campaigns** for different groups across different communication channels; **targeted education programs** for the energy poor and vulnerable customers, identified through the various channels mentioned in Section 1.3 below, on energy usage and efficiency topics as well as available options such as subsidies, Energy Performance Contracting and on-bill schemes; **training programs** for front-line works such as social works, medical staff, municipality workers etc. who are in direct and regular contact with vulnerable and poor (including energy poor) people to provide advice on measures they can take to protect themselves against energy costs, including Government subsidy schemes and energy audits.

### Information and Behavioural Measures – Summary and Recommendations

A comprehensive multi-channel communication strategy to raise awareness and provide relevant information is paramount for the successful alleviation of energy poverty. Table below summarises at a high level the various measures and relevant KPIs. Section 1.3. below presents a detailed and structured approach for measures of awareness and other informative and behavioural issues to address energy efficiency and energy poverty. A dedicated

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<sup>30</sup> <https://news.rik.cy/article/2023/7/20/elakhistoi-dikaikoukhou-tes-diatimeses-08-tes-aek-edexan-endiapheron-1028513/>

communications strategy team (internal or external) is required to ensure the efficient implementation of such measures and initiatives.

Table 8: Information and behavioural measures

Information and Behavioural Measures	KPI
Targeted informational campaigns for different groups through different communication channels	<ul style="list-style-type: none"> <li>- Number of campaigns run per annum</li> <li>- Number of communication channels used</li> <li>- Number of people reached per campaign</li> </ul>
Education programs for vulnerable customers and energy poor.	<ul style="list-style-type: none"> <li>- Number of education programs run per annum</li> <li>- Number of people participated per program</li> </ul>
Trainings programs for front-line workers	<ul style="list-style-type: none"> <li>- Number of trainings run per annum</li> <li>- Number of workers participated per training program</li> </ul>

#### 1.1.2.4 Administration and Governance Measures

The final pillar is that of **Administration/Governance measures** which focuses primarily on supporting the successful implementation of the other three pillars and the monitoring of energy poverty in general. This purpose of this pillar is to provide the energy poor with various tools to help them with energy related matters, as well as allow the Cyprus Government to govern energy poverty related matters and adjust its approach accordingly to ensure the end goal of reducing energy poverty is achieved. This is something that Cyprus seems to be lacking now and as such it is of paramount importance.

##### National Energy Poverty Observatory

A National Energy Poverty Observatory, NEPO, is something that the EU Commission asks EU MS to consider establishing in order to bring together key actors involved and develop a cross-sectorial understanding of energy poverty situation at all levels. This multidisciplinary governance tool can provide a platform for all stakeholders to participate in the national and local debate by providing key insights into the problem of energy poverty. National Energy Poverty Observatories can be found across different EU MS such as France<sup>31</sup>, Italy<sup>32</sup>, the UK

<sup>31</sup> [ONPE | Observatoire National de la précarité énergétique](#)

<sup>32</sup> [ABOUT US – OIPE \(oipeosservatorio.it\)](#)

and Greece<sup>33</sup> which are responsible for managing and monitoring all information, data and indicators of Energy Poverty and Vulnerable Customers. NEPOs tend to publish regular reports on the current state of energy poverty as well as research and develop methodologies and produce analysis on data, policy matters, measures and their impacts, future trends, new tools, innovative ways to address energy poverty etc., Such bodies can increase coordination and efficiency and reduce bureaucracy in addressing the issue.

It is therefore recommended for Cyprus to establish a National Energy Poverty Observatory that brings together various stakeholders. It is envisaged that this cross-departmental observatory will be made up of different Government bodies such as the relevant departments of the Ministry of Energy, Commerce and Industry (MECI), the Deputy Ministry of Social Welfare (DMSW), the Ministry of Finance (MoF), the Ministry of Transport, Communication and Works (MTCW), the Cyprus Land Development Organization, CLDO, the Cyprus Statistical Service (CyStat) as well as non-Governmental bodies such as the Cyprus Energy Agency (CEA) and potentially academic institutions such as the Cyprus Institute (CyI). For its successful operation, it is recommended that this NEOP is chaired by either MECI, responsible for energy poverty, or DMSW, responsible for poverty and social welfare in general.

### **Digital One Stop Shop**

Long, bureaucratic and complex processes tend to be a problem when it comes interacting with Government bodies to seek information and support. Several steps have been made and a lot of the Government bodies in Cyprus have digitalised their processes and publish relevant information on their websites in an attempt to make it easier for the general public interact with them. Having said this, this is a somewhat decentralised attempt, and it may be confusing to the public, especially if what they are after cuts across various Ministries and Government departments. This combined the limited information on energy poverty matters, it makes the matter even more dreadful. EY Cyprus has recently completed a DG REFORM project on the provision of “Technical support for setting up one stop shops to facilitate building renovation and renewable energy sources project permitting in Cyprus” (project SC2022/003) which amongst other, aims to provide technical, administrative and financial advice to all consumers interested in building renovations, including the energy poor. The Digital One-Stop-Shop is currently under development, and when complete it should act as a digital gateway to everything related to energy efficiency renovation. The Digital One-Stop Shop will also provide the building owner with a Building Renovation Passport, a road map for staged implementation of measures over a period of time, that collectively would lead to major renovation and significant energy savings.

### **Establishment Local Energy Hubs or Neighbourhood Energy Officers**

Local Energy Hubs are like community power centres working to support the general public on energy related matters. They do so by helping neighbourhoods where people may struggle with high energy costs by providing training and relevant information on energy efficiency and renewable energy and help families save money on energy bills. The establishment of Local Energy Hubs could be implemented at an administrative district level (i.e., Nicosia, Larnaca, Limassol, Paphos and Famagusta). Their role would be to act as an interim between central Government (or the NEPO) and coordinate with Local Authorities which are closer to the citizens. This is something that is observed in other EU MS whereby central Government

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<sup>33</sup> [Υποστηρικτικά Εργαλεία Ενεργειακής Απόδοσης \(cres.gr\)](https://www.cres.gr/)

(MECI in the case of Cyprus) allocates certain budget to them to support on energy poverty matters.

In addition to the above, MECI could coordinate and utilise Local Authority employees which tend to be closer to citizens, and provide them with the appropriate training and tools, to reach individuals across Cyprus with the necessary information and support. Following discussions between the Project Team, MECI with DMSW, it became apparent that DMSW has recently started a project whereby it embeds Social Workers (referred to as Neighbourhood Social Workers) in communities, clusters of communities and Local Authorities, which aim to come closer to the citizens and support them in social matters<sup>34</sup>. This project is implemented with co-financing from the European Union and could be utilised by MECI to disseminate information to those in need, but at the same time seek information from those in need. These Social Workers are trained to help people by visiting their houses and could be trained to perform energy assessments on properties they visit as well as advice on energy related matters and support citizens take advantage of Government subsidy schemes. In addition to the above, DMSW has a number of local offices and service points across Cyprus with the sole purpose of supporting citizens in need on social matters<sup>35 36</sup>. These workers are equipped with the necessary technology (e.g., tablets) and could therefore support citizens with various tasks, including online applications.

It is therefore recommended for MECI to explore working closely and coordinating with DMSW, to take advantage of the latter's mechanism, and offer additional advice and support to citizens.

### **Call centre**

Call centers represent a strategic approach to address the challenges faced by individuals or communities experiencing energy poverty. Although in recent years there are other several ways for communication (e.g., online via chat-boxes), some people are still dependent on traditional ways (e.g. elderly). By establishing dedicated call centers, or telephone numbers, Government bodies can provide a centralized and accessible point of contact for those seeking assistance with energy-related issues. These call centers can offer a range of services, including guidance on energy-saving measures, information on available financial assistance programs, and personalized advice on optimizing energy consumption. Additionally, call center representatives can play a crucial role in disseminating information about government initiatives, subsidy programs, and energy-efficient technologies. The aim is not only to provide immediate support but also to empower individuals and households with the knowledge and resources needed to navigate and overcome the complexities of energy poverty. Through effective communication and tailored solutions, call centers contribute to fostering energy resilience and improving the overall well-being of those facing challenges related to energy accessibility and affordability.

Such a call center could be offered by the Ministry of Energy, Commerce and Industry or by Deputy Ministry of Social Welfare by channeling calls to dedicated number and upskilling their existing call center operators.

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<sup>34</sup> [Neighborhood Social Workers announcement](#)

<sup>35</sup> [https://www.wbas.dmsw.gov.cy/dmsw/ydep.nsf/contact4\\_el/contact4\\_el?OpenDocument](https://www.wbas.dmsw.gov.cy/dmsw/ydep.nsf/contact4_el/contact4_el?OpenDocument)

<sup>36</sup> [http://www.dmsw.gov.cy/dmsw/sws.nsf/contact\\_el/contact\\_el?opendocument](http://www.dmsw.gov.cy/dmsw/sws.nsf/contact_el/contact_el?opendocument)

## Administration and Governance Measures – Summary and Recommendations

The successful implementation of all measures heavily depends and relies on strong governance and administration frameworks. Such frameworks will monitor progress with regards to energy poverty and adjust actions accordingly.

Table 9: Administrative and Governance Measures

Administrative and Governance Measures	KPI	Key Actions and Comments
<b>Strong Recommendation</b>		
National Energy Poverty Observatory	<ul style="list-style-type: none"> <li>- Number of stakeholders in NEPO</li> <li>- Number of meetings per annum</li> <li>- Number of actions implemented per annum</li> <li>- Number of reports issued per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Establish a NEPO with representatives from various departments and institutions</li> </ul>
Digital One Stop-Shop	<ul style="list-style-type: none"> <li>- Number of customers visited per annum</li> <li>- Number of completed applications per annum</li> <li>- Number of energy poor completed applications per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Promote Digital One Stop-Shop and ensure it addresses energy poverty and is regularly updated</li> </ul>
Establishment of Local Energy Hubs or Neighborhood Energy Officers	<ul style="list-style-type: none"> <li>- Number of Energy Hubs established</li> <li>- Number of Neighbourhood Energy Officers employed</li> <li>- Number of households supported per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Coordinate with DMSW to utilize the workers they have deployed</li> </ul>
<b>Recommendation</b>		
Call centers	<ul style="list-style-type: none"> <li>- Number of calls logged per annum</li> <li>- Number of people helped per annum</li> </ul>	<ul style="list-style-type: none"> <li>- Establish dedicated call centers to provide support and be inclusive to all people</li> </ul>

## **1.2 Propose new or adjustment of existing incentives to improve energy efficiency of homeowner and/or used by energy poor households.**

The proposed or adjustment of existing incentives to improve energy efficiency of homeowner and or/used by energy poor households was captured under Section 1.1., specifically under Pillar 2 and Structural Measures.

## **1.3 Propose measures of awareness and other informative and behavioural issues**

The objective of this section is to propose measures for raising awareness amongst the population living in Cyprus on the efficient and smart use of energy, and thereby successfully reach out to groups impacted by energy poverty. The proposed measures are to make meaningful impact on the wider Cypriot population and will seek to more specifically target individuals and households that are or may in the future be impacted the most by energy poverty, by increasing their awareness on energy usage and through pragmatic attitudinal and behavioral recommendations.

The steps of the methodology followed for the establishments of the proposed Communication Strategy are the following:

- Identification of demographic groups impacted by energy poverty in Cyprus;
- Identification of the significant information required by groups impacted by energy-poverty;
- Recommendations on the elements and approaches for the Cyprus Energy-saving Communications Strategy; and
- Mapping of communication and influence channels.

Several initiatives have already been launched in Cyprus, which aimed to raising awareness on energy efficiency amongst the country's residents. This was done centrally by the Ministry of Energy Industry and Commerce, MECI, and independently by the Cyprus Energy Agency (CEA) which is the Energy Poverty Advisory Hub's (EPAH) expert body in Cyprus. To date, CEA has:

- Organized a national information webinar (also available on demand), informing Local Authorities in Cyprus about the actions of EPAH and discussing the implementation of actions to address energy poverty
- Published general information on energy Efficiency such as an energy saving web tool and information on ways to save energy
- Published on their website information on energy saving, including behavioral Recommendations

These initiatives and actions have been important contributions, however, to address the specific needs the individuals, families, and households impacted by energy poverty, there is a need for more targeted initiatives and a robust communication strategy, to be centrally led by the Ministry of Energy Commerce and Industry (MECI). Such a campaign requires a thoughtful and strategic three-phase approach.



### 1.3.1 Pre-launch Campaign Phase

The pre-launch phase would include a clear **setting of objectives** the campaign would seek to achieve within its **execution timeline**, considering in advance the **availability of resources**, and the **target audience identified**. For example, the campaign's goals may be to raise awareness, encourage behavior change, advocate for policy reforms, or mobilize resources. Each of these goals differ greatly therefore identifying them early on will help guide the campaign's messaging and actions.

The next key step of a campaign would be the identification and **mapping of stakeholders**. Stakeholders could be the local communities, NGOs, government agencies, and businesses that can contribute either actively or as actors that relay the campaign's message, achieving a ripple effect across reaching secondary target groups who can then reach the primary target groups. Building partnerships with the stakeholders identify can amplify the impact of a campaign and also bring forward diverse perspectives, which can help reach the campaign's target audience.

The robustness of the campaign would then heavily rely on the **development of a compelling messaging** and an **engaging content** that highlights the impact of energy poverty and emphasizes the importance of addressing the issue. This must be relatable, solution-oriented, and should motivate people to take action. It could include videos, infographics, articles, case studies, and success stories that illustrate the consequences of energy poverty, potential solutions, and behavioral changes that can improve one's situation. People are expecting for **answers and solutions** that should directly resonate from a communications campaign; solutions that are tangible, bite-size, easy to understand and to implement. These solutions may come in different forms and programs such as training sessions and workshops for front-line staff and/or target group members, resources allocated to one-stop shop solutions, post-card informative flyers etc., and are to be disseminated through a **selection of communication channels** that will effectively reach the target audience. This could include social media, community outreach programs, traditional media, educational workshops, and collaborations with relevant organizations.

### 1.3.2 Campaign Phase

This phase of the communications campaign would include the **launch of the campaign across selected channels**, where the primary stakeholders would need to ensure that that messaging is consistent across all platforms and that all communication channels are used to their full potential. The **monitoring and evaluation** of the campaign would need to start in tandem to the launch, tracking the performance of the campaign's actions in real-time where possible, using analytics and tools that measure key performance indicators (KPIs) such as reach, target audience engagement, conversion rates, and ROI. Having real-time understanding of the campaign's performance, would allow for adjustments and continuous optimization (e.g., if certain channels are more effective than others, resources must be reallocated etc.). It would also establish ongoing feedback for audience reactions, allowing for **active engagement with the campaign's audience** by responding to comments, addressing concerns, and fostering a sense of community around the campaign.

**Building a sense of community** around the campaign can encourage individuals and organizations to share their experiences, insights, and success stories related to addressing energy poverty. This can create a platform for ongoing dialogue and collaboration, that will last beyond the campaign's defined timeframe. To increase and sustain the campaign's engagement there must be positive reinforcement to **celebrate the campaign's successes**, highlighting the achievements of the campaign, recognizing the efforts of individuals, communities, and organizations that have contributed to alleviating energy poverty.

### 1.3.3 Campaign end phase

Once the campaign concludes, a thorough **evaluation** must be conducted. This would include the analysis of data collected during the campaign and comparing it against the campaign's initial objectives. The preparation of a comprehensive report that outlines what worked well and areas for improvement can be a useful insight tool for the completed campaign and for future ones.

By following these phases, a comprehensive communications campaign that raises awareness, engages stakeholders, and contributes to meaningful solutions for addressing energy poverty can be initiated.

### 1.3.4 Identification of Demographic groups impacted by Energy Poverty

The way energy poverty is impacting different demographic groups, or populations, may differ from country to country influenced by multiple layers of factors such as:

- Income, energy prices, energy efficiency of housing/dwellings etc.;
- Individual energy requirements determined by a person's behaviors, age, marital status, gender, time spent at home, health, etc.;
- Weather extremities depending on each country's specific climate.; and
- Home location (urban, rural, coastal, densely populated area etc.)

'Energy poverty' for the impacted populations, individuals, and households, is associated with struggling to afford the cost of energy bills, or it may limit the household's energy consumption to an extent that impacts the individuals' quality of life i.e., refraining from using cooling, heating, cooking and other appliances. The most prominent groups impacted by energy poverty, in Cyprus, are:

- **Elderly Population:** Older individuals above the age of 65, especially those depending on benefits, state pension, etc. are vulnerable to energy poverty due to increased heating or cooling needs, in tandem to longer hours spent at home. Older individuals are also more likely to suffer from certain medical conditions that require specific temperature settings or the use of electricity-dependent medical devices, contributing to higher energy usage, and thereby higher energy bills.
- **Single-Parent Families:** Having only one income to meet the needs of a household, single-parent households can often face more financial challenges than two-parent households. Energy costs can put a significant strain on single parents' budget, covering everything from heating and cooling the home to cooking and using appliances. Energy expenses can therefore constitute a larger proportion of their budget, making them particularly vulnerable to energy poverty.
- **Large Families:** Larger households may have higher energy needs. Larger families may need larger homes, which can be more expensive to heat and cool than smaller homes, particularly if the home is older and less energy-efficient and require higher usage of home appliances for the daily routines. Usually, while energy needs and costs increase with family size, income may not necessarily keep pace.
- **Unemployed:** People who are unemployed, underemployed, have unstable employment, or are seasonal workers, for a sustained period of time may find it difficult to cover or contribute to the energy costs of their household due to their limited at times income.



- **People with Health Issues:** Individuals with health conditions may require more energy for heating and cooling, making it harder for them to afford energy bills, particularly as they are often less likely to be working, more likely to be spending time at home and indoors, and more likely to be dependent on state benefits. People with certain long-term health conditions and disabilities, may also continuously dependent on electrically powered medical devices and hence consume more energy, leading to higher energy bills. These individuals and their families are more likely to be impacted by energy poverty.
- **Rural Residents:** Individuals and families living in rural areas may face challenges due to older, less energy-efficient housing, and limited access to modern energy infrastructure. Rural housing may not have been designed with modern energy efficiency standards, leading to higher energy usage for heating and cooling. This could be attributed to factors such as inadequate insulation, outdated heating systems, or inefficient appliances. Rural residents living in mountainous areas are also more likely to be exposed to colder weather, requiring more heating during the winter months, even though during the hotter months of the year, they may require less cooling than those living in the other areas of the country.
- **People Renting Accommodation:** People renting often have little control over the energy efficiency of their homes. The responsibility for ensuring a home is properly insulated, is equipped with energy-efficient appliances, or uses renewable energy typically falls on the landlord. However, landlords are not incentivized or may not prioritize investing in such upgrades, especially since in most cases they are not the ones paying the energy bills.
- **People in Low-Energy Efficiency Housing:** Individuals living in poorly insulated or inefficient housing are more likely to experience energy poverty, as they may need more energy to maintain comfortable living conditions.
- **Socially Vulnerable Groups:** Certain social groups, such as asylum seekers, refugees, migrants, and other marginalized communities, may be more susceptible to energy poverty due to economic and social disparities. Refugees and migrants may be placed and/or concentrated in temporary or poor-quality housing, lacking basic insulation or modern heating and cooling systems. They may also need to expend a high proportion of their money on meeting their energy needs, accentuating energy poverty in these groups. This is a very diverse population, whose size may not be accurately captured by demographic data as many may regularly change accommodation, have an unregulated status, and opt not to be captured by the population census.

The above demographic groups can serve as the primary groups of awareness raising initiatives and Communications Strategies. The exact numbers of people belonging in each group must however be treated with caution as there may be occasions where people may be “silently” belonging into such group without “declaring it” or being “official registered”.

What must also be considered when understanding the specific needs of each group impacted by energy poverty is the “intersectionality” of individuals belonging to more than one of these groups; in relation to energy-poverty this may be the case for most of the groups. For example, an individual may be unemployed, however simultaneously be suffering from a long-term health condition, is a single-parent, belongs to a migrant community, and renting an accommodation of low-energy efficiency.

## Key Findings of demographic data analysis

For this task, demographic the data on the numbers of individuals and households (HH) impacted by energy poverty from the Cyprus Statistical Service (2019 Census) and analyzed. The analysis enabled the mapping of how many individuals/households in Cyprus belong in the demographic groups impacted by energy poverty. Certain groups, such as the socially vulnerable and those with chronic healthcare issues are not captured by the demographic data, however this should not underestimate the number of households and individuals that belong in these categories. Annex 1 presents the detailed data analysis conducted as part of this deliverable, and below are some core considerations:

- 15.1% of the households (52,290 households) in Cyprus are impacted by energy poverty.
- 33% of the households impacted are occupied only by elderly people (>65 years of age)
- 4% of the households impacted are occupied by single-parent families, with c.75% of those households being single-mother households.
- Large families constitute 8% of the energy poor households.
- 14% of the individuals living in energy-poor households are children, a total of c.17,000 children.
- 25% of the households impacted are one-adult households, 14% are two-adult households, while 31% are two-adult households with at least one of the two adults being older than 65.
- 56% of the individuals impacted by energy poverty are female.
- 26% of the households impacted have at least one individual who is not a Cypriot citizen.
- 56% of the households impacted are residing in the mountainous areas of island, and 22% in semi-mountainous areas<sup>37</sup>
- 40% of those living in households impacted by energy-poverty have outright ownership of the accommodation, while 37% of those in households impacted are provided the household for free.

### 1.3.5 Useful information for Energy Poor groups

People impacted by energy poverty may benefit from various and different pieces of information to help them manage their energy consumption more efficiently and improve their overall well-being. It is important before launching any communications initiative or campaign to conduct an 'Information Needs Assessment' for each of the groups identified in the previous section, to identify:

- i. What information would each group find useful;
- ii. How they would best understand the information they will receive, i.e., written form, images/animation, radio/tv spots, word of mouth etc.
- iii. The key channels/influencers to be used to relay the information.

An indicative list of topics the groups impacted by energy poverty may find particularly useful has been compiled below:

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<sup>37</sup> According to CyStat, location extrapolation should be taken with caution since it tends not to be fully representative of the actual situation.

- **Energy Conservation Tips:** These would include very simple and practical tips on how minor changes to daily habits and behavior can reduce one's energy consumption, such as turning off lights and appliances when not in use, using energy-efficient appliances, sealing drafts in windows and doors, wearing layers before turning on heating appliances on, setting the thermostat of their heating/cooling systems 1-2 degrees lower/higher etc.
- **Energy Solutions:** This would include information on low-cost energy solutions such as affordable and accessible energy-efficient products or solutions, like energy-saving light bulbs, programmable thermostats, or low-flow faucets etc. as well as energy efficiency building upgrades.
- **Weatherization Techniques:** These would include tips on how to weatherize homes to retain heat in the winter and cool air in the summer, including using weather stripping, insulating attics and walls, and using window coverings effectively.
- **Energy-Efficient Cooking Methods:** This would include guidance on cooking in ways that use less energy, such as using lids on pots, matching pot size to burner size, and using microwave ovens or slow cookers when appropriate.
- **Understanding Energy Bills:** This would include simple, succinct information on how to read and understand energy bills, including explanations of different charges and ways to identify areas where energy usage can be reduced. This would be particularly important once the smart meters are installed.
- **Financial Management:** This would provide people with simple personalized or generic budgeting advice to help manage energy costs more effectively, including tips on prioritizing expenses, seeking financial counseling services or, when the market allows it, look for alternative energy supplier.
- **Community Resources:** These would raise awareness of community resources, such as local charities, non-profits, or community centers that may offer support on programs for energy assistance. Community resources would need to take into consideration the needs of each target group when offering support, such as the literacy and the digital literacy of the group/individuals supported.
- **Government Assistance Programs:** This would promote local or national government programs that provide financial assistance for low-income households to cover energy bills or improve home energy efficiency. The promotion and implementation of such programs should take place through various channels that will consider the ability of impacted groups/individuals to apply/access such programs, as above, such as their literacy and digital literacy levels.

Providing accessible and practical information on these topics can empower individuals impacted by energy poverty to make informed decisions, reduce energy expenses, and improve their overall living conditions. Awareness raising initiatives and Communications campaigns must also consider the accessibility challenges the groups may face (e.g., lack of digital skills), and shape their communications strategies accordingly.

### 1.3.6 Elements of effective communication strategies

When developing and leading communication initiatives and campaigns, the accessibility of each target group must be considered to ensure that the message is audience-specific and that it can resonate with the receiver. Table below demonstrates a set of communication rules to consider when conveying a message effectively in a communications campaign.

Table 10: Communication Rules to convey a message effectively.

Rule	Description
<b>1. Simplicity</b>	Simple messages, in the language the audience understands, will be more impactful. Technical language can make the audience feel overwhelmed in which case they will not engage with the campaign.
<b>2. Succinct</b>	The time the audience may have to spend on understanding the message conveyed is limited. Long and imprecise narratives can derail the audience. Phrase the message with precision, including only a limited number of words.
<b>3. Credibility</b>	Confusing messages can cause doubts about the accuracy of the message, activating a defensive response in the audience. People consider genuine information easier, therefore avoiding contradictions will gain the credibility of the receivers and facilitate communication.
<b>4. Coherence</b>	Even if there are several topics to relay to the audience, people's attention is limited, and the working memory will filter most of the information. The fewer the elements the higher the probability of the audience being able to recall them.
<b>5. Culturally Tailored</b>	Crafting messages that resonate with the cultural backgrounds, realities and values of the target groups enhances the effectiveness of communication. This may involve using culturally relevant imagery, language, and examples to make the information more relatable.
<b>5. Memorable words</b>	The brain has an aesthetic sense which is attracted by elements such as symmetry and rhythm. In terms of speech, using rhymes or sets of words with similar endings can make a message more memorable.
<b>6. Personalized Communication</b>	Tailoring messages to the specific needs and circumstances of individuals or households helps create a sense of relevance. Personalized communication can address the unique challenges faced by different demographic groups.
<b>7. Novelty</b>	The brain is trained to detect and get motivated by 'surprise/shocking' elements. Surprising the audience with unknown, useful, and punchy information or data can help them make sense of the message and increase the probability of recalling it.
<b>8. Positive messages</b>	People tend to prefer cheerful messages and happy endings, therefore connecting the message with emotions and transmitting hope will help the audience to accept the message and remember it better as this can trigger a sense of self-interest.
<b>9. Use of visuals</b>	The brain works by building networks which are quicker to be triggered by mental images. It may be significantly easier for the audience to remember and recall such memories created by images rather than written information.
<b>10. Use of questions</b>	Questioning the audience can encourage them to feel included and increase their engagement with the message. In turn, the mental effort they will put in processing the answer will make them get connected to the topic, facilitating their ability to later recall the information/message.
<b>11. Context</b>	The emotional brain needs to make sense of information it receives in order to get motivated and engage with it. For this reason, the audience must recognize immediately the importance for them of the specific message, and how it is related to their needs and interests.
<b>12. Clear Calls to Action</b>	Clearly outlining specific actions that individuals can take to improve their energy efficiency, along with information on how to access support programs, helps translate awareness into tangible steps.

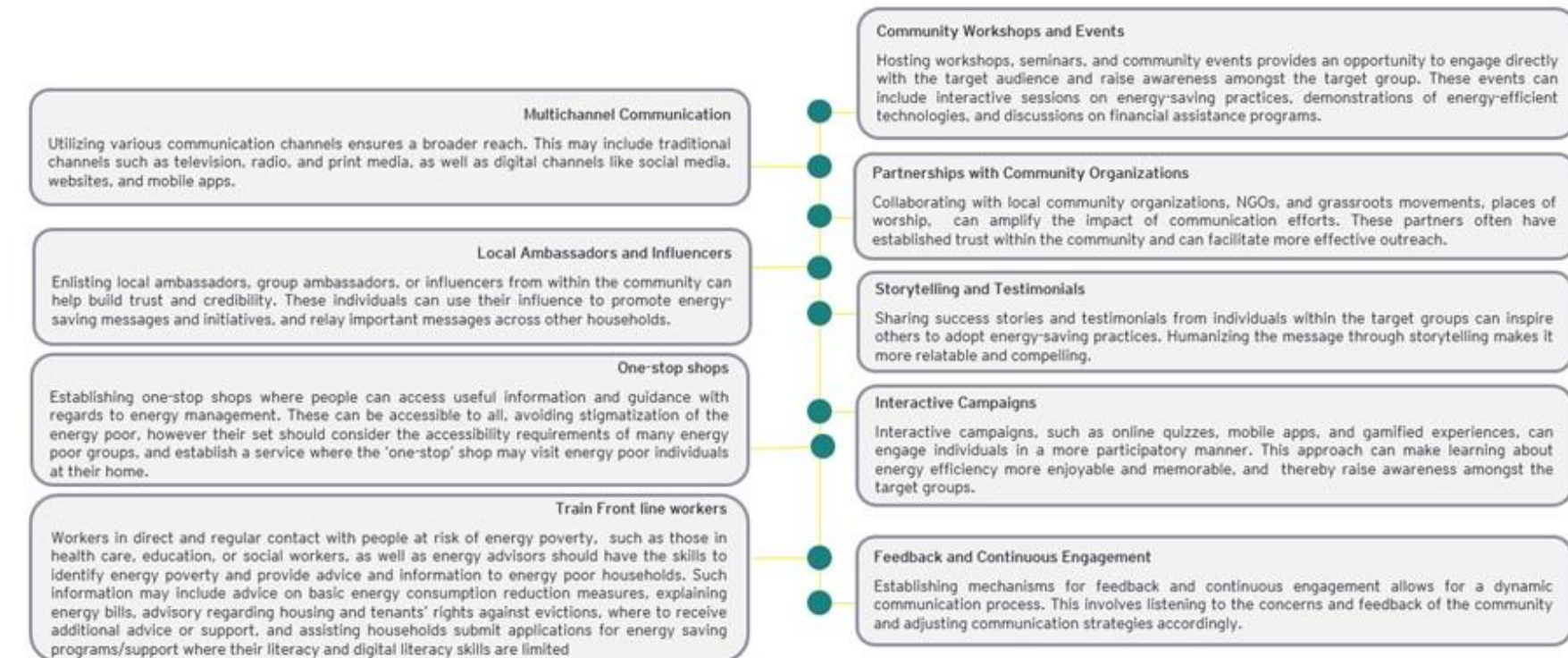
### 1.3.7 Impactful channels to communication strategies

As discussed earlier in this section, it is important to identify the most impactful channels through which a campaign's message will be delivered to primary target groups, namely the

nine groups identified in section 2 of this report, or secondary target groups. Secondary target groups could be those communities, groups or individuals that are not impacted by energy poverty themselves but are closely related and have contact with primary target groups. A communications campaign may also reach secondary groups, such as carers or family members of the target groups, when it is difficult to reach the target groups (i.e., people with health problems, the elderly). A ‘ripple’ effect could be achieved, whereby the message is transferred from secondary groups, and eventually reaches the target. A communications campaign should not rely on them purely but utilize secondary groups as a complementary method.

Figure 3 below lists our recommendations for impactful communication channels, which when used in combination can ensure the message resonates with a significant number of the primary target population.

Figure 3: Impactful Communication Campaign Channels



Annex 2. Presents a detailed table where all communication channels have been mapped across ‘influence groups’, such as local communities, NGOs, worship groups, government authorities etc., which have been identified as the key groups to relay the message of an energy poverty campaign and reach the nine target groups. To help assess each influence group’s outreach and impact on the target groups, vis-à-vis the cost associated with each influence group’s role, two separate matrices have been created as examples of what should be established during the pre-launch phase of a communications campaign. The matrices are presented in Figure 4 and

Figure 5 below.

Figure 4: Matrix presenting outreach versus impact of each influence group.

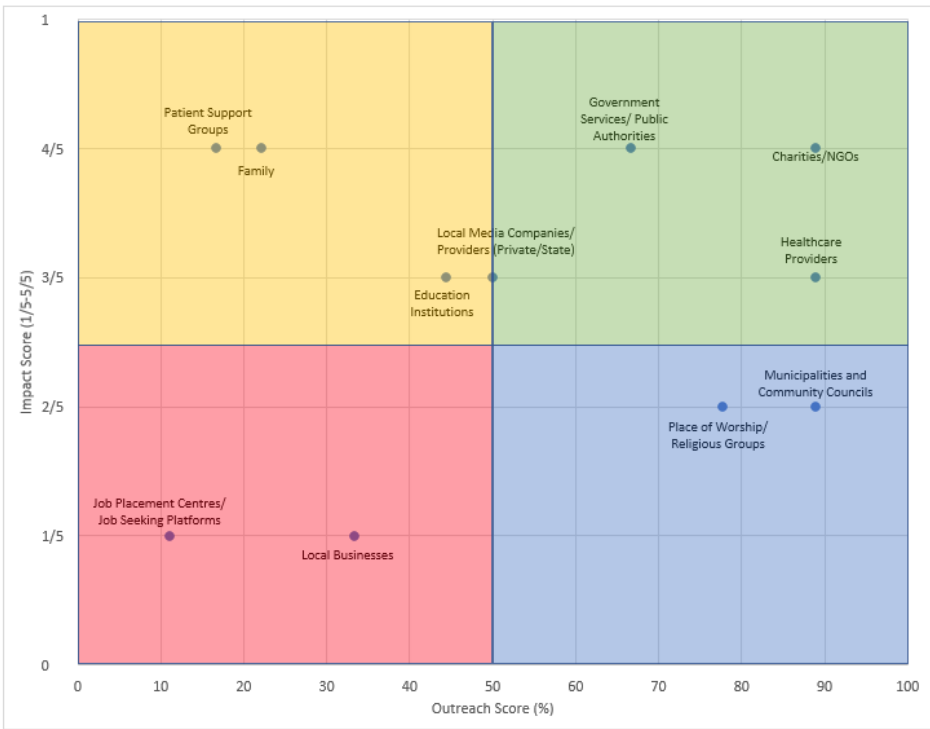
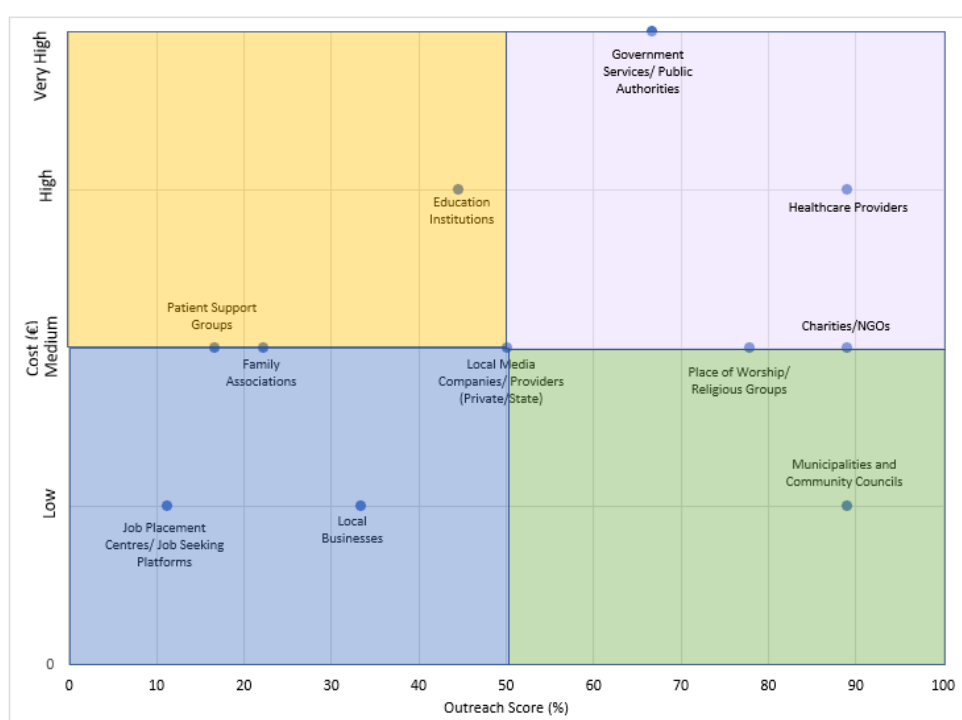




Figure 5: Matrix presenting outreach versus estimated cost of each influence group.



The information presented in the matrices above should be considered in relation to the detailed information presented in Annex 2 and 3 of this report. Annex 3. Serves as a tool for future stakeholders to be involved in the development of a communications campaign, whereby an exercise will need to be carried out to optimize resource allocation, and decisions may need to be made on selecting the influence groups and the reach out channels to be employed in the campaign. A brief justification on the allocation of the estimated cost tag, has also been given in Annex 3.

This deliverable has sought to set the guiding principles for the future communications campaign on energy poverty, as it establishes the steps to be followed when developing communications initiatives, and the key matters to be considered by the stakeholders that are to take ownership of such campaigns.

The key to creating a successful communications campaign on energy poverty involves a strategic approach to raise awareness, engage stakeholders, and drive positive change. Such an approach, as described in this report, would carefully understand its audience and their needs, set pragmatic objectives, establish a compelling message, and would utilize networks of stakeholders as influence groups to amplify and relay the message across the people impacted by energy poverty.

The sustainability and long-term impact of a communications campaign on energy poverty relies on the employment of a combination of channels of communication, the fostering of ongoing relationships with stakeholders and impacted groups, and most importantly on maintaining the momentum beyond the initial launch phase.

## 1.4 Propose a methodology for estimating the energy saving resulting from the implementation of energy efficiency measures for vulnerable customers, using standardized occupancy and thermal comfort conditions or other parameters.

As discussed in Section 1.1., improving the energy efficiency of energy poor households is the most impactful way to address the issue of energy poverty at its root since by doing so it will reduce energy consumption and energy expenses, whilst maintaining adequate comfort living conditions. The aim of this task is to develop a methodology that estimates the energy savings resulting from the implementation of energy efficiency measures in energy poor houses. Additionally, EU MS are obligated to achieve a share of their cumulative end-use energy savings target by implementing energy efficiency measures to consumers affected by energy poverty. Specifically, according to Directive 2023/1791, this share shall at least be equal to the proportion of households in energy poverty. According to Cyprus' Draft Update National Energy and Climate Plan, the total cumulative end-use energy saving target for Cyprus until 2030 is 349.04 ktoe and therefore 52.71 ktoe (i.e., 15.1%, which is the proportion of energy poor households; see Task 2.2.1 of Deliverable 2) must be achieved **by implementing energy efficiency measures in energy poor and vulnerable** households. These measures however must be measures that conserve final energy consumption and as such PVs cannot be counted.

The purpose of this task is therefore twofold: **(a)** to estimate the cumulative end-use energy savings achieved in ktoe from the implementation of energy efficiency measures in energy poor and vulnerable households, taking into consideration the Government's target as this is mandated by the EU Directive 2023/1791; and **(b)** to estimate the number of houses that will need to be upgraded along with an estimation of the budget that will be required for implementing these measures. In addition to the abovementioned target, the combination of measures to be implemented must consider aspects such as the total cost and the ability and availability of the labour workforce to deliver these measures, without losing sight of the end goal, which is to reduce the number of energy poor households in Cyprus (15.1% of households equates to 50,290 households; see Task 2.2.1 of Deliverable 2).

The energy performance of buildings depends on factors such as the technical characteristics of the building envelope (i.e., materials it is made from), the technical characteristics of equipment (e.g., heating and cooling system), the presence of renewable energy sources, occupancy level, climate conditions etc. In general, Cyprus has an old building stock, the majority of which was developed prior to the introduction of minimum performance requirements in 2007. Cyprus' building stock is represented by 18 different buildings, which were derived as part of other Government funded projects based on available data from the Cyprus Statistical Service and in the technical reports "Long-term strategy for mobilizing investments for renovating Cyprus national building stock" by JRC and "An energy efficiency strategy for Cyprus up to 2020, 2030 and 2050" of GIZ, which were completed in 2017. These reports were prepared within the technical assistance framework provided by the European Commission at the Ministry of Energy, Commerce and Industry (MECI). The 18 representative buildings, which were also used to calculate cost-optimal levels of minimum building energy performance requirements<sup>38</sup>, consist of three detached buildings, three multi-apartment buildings, three offices, three hotels, three schools and three hospitals, where each building category has two existing buildings and one new building. The buildings are of various sizes and have different construction dates, and their purpose is to represent the energy performance

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<sup>38</sup> Report (in Greek) with title "Calculation of the cost-optimal levels of the minimum energy performance requirements for buildings in accordance with article 5 of Directive 2010/31/EU on the energy performance of buildings" 31/7/2013.

of the wider building stock. Each building has specific technical characteristics which represent buildings' characteristics of similar age.

The methodology for estimating the energy savings resulting from the implementation of energy efficiency measures consists of the following steps: **1. Identify the representative buildings:** identify the buildings that better reflect the buildings energy poor live in; **2. Model the energy performance of representative buildings:** understand the existing energy performance of the representative buildings (Energy Performance Class and Energy Consumption) as well as the energy performance following various energy efficiency upgrades; **3. Estimate the cost of each energy efficiency upgrade:** estimate the cost for each energy performance upgrade; **4. Estimate the number of buildings required to meet the set target and the total cost:** estimate the number of buildings that will need to be upgraded to meet the cumulative end-use energy savings target and the total cost for implementing a set of measures to meet the cumulative end-use energy savings target. Each step of the approach is explained below. This task is complemented with an MS Excel Tool, "Tool for Estimating Energy Savings", found in Annex 4, which presents the calculations as well as acts as a tool for testing different scenarios of Step 4.

**Note:** Annex 4 has two separate MS Excel Tools. **Annex 4a** is the tool as described in this section. **Annex 4b is an adapted version of the same tool** that uplifts energy savings achieved by 25% from individual measures, and 50% for NZEB measures. Additionally, reduces the cost of PV and roof insulation, as well as the costs associated with NZEB upgrades. Both amendments were made following discussions with MECI and by analyzing information presented by MECI on typical savings and costs captured during the various subsidy scheme implementations. The increased savings reflect that the majority of existing buildings have a lower EPC class than the one modelled (i.e., are E, F and G), and as such greater energy savings are anticipated. Additionally, costs reflect true costs gathered and analyzed from the applications to the subsidy schemes. For example, the analysis showed that the average cost for roof insulation was €55/m<sup>2</sup> as opposed to the €95/m<sup>2</sup> originally modelled.

### 1. Identify the representative buildings

For the purposes of this project task, a total of four buildings were selected, two detached buildings and two multi-apartment buildings, based on their age and the fact that they were built prior to the introduction of minimum energy performance requirements. These building types reflect reasonably well the buildings energy poor live in based on the analysis presented in Deliverable 2 Task 2.2.1. As shown in Figure 6 and Figure 7, the majority of energy poor live in houses built between 1970-1990 and in detached or semi-detached, while a smaller number live in houses built in other years and live in apartment buildings.

Figure 6: Construction dates of energy poor houses

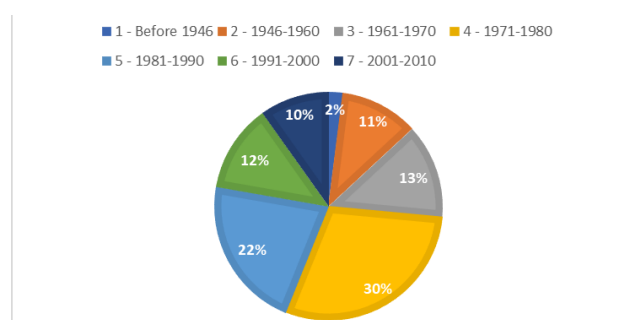
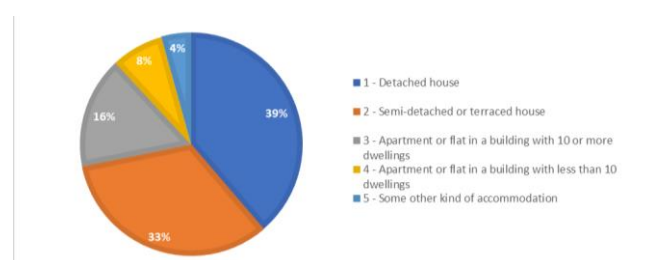


Figure 7: Building types of energy poor houses



The four buildings that were selected for this task are shown in Table 11 and their technical characteristics can be found in Annex 5 (extracts from the original report are in Greek).

Table 11: Buildings representing energy poor houses

No	Building type	Climate Zone	Surface Area (m <sup>2</sup> )	Construction Year	Existing/New
1	Detached 1	1	105	1980	Existing
2	Detached 2	2	172	2003	Existing
3	Multi-apartment 1	2	1,309	1999	Existing
4	Multi-apartment 2	1	2,192	2006	Existing

## 2. Model the energy performance of representative buildings

The “as is” energy performance of the representative buildings as well as their energy performance following various energy efficiency upgrades was modeled as part of another Government Project on behalf of MECI and the final report<sup>39</sup> was shared with the Project Team. The report presented the energy savings achieved through various individual and combined energy efficiency upgrades. Following discussions with MECI a list of measures was selected as reasonable to consider under this task. These are shown below for each building type.

- i. Detached Buildings: Roof insulation only, Roof insulation and PV;
- ii. Multi-apartment buildings: Roof insulation only, Roof insulation and small PV, Roof insulation and large PV and AC Systems, Roof insulation and AC Systems; and
- iii. Detached and Multi-apartment buildings: combination of measures achieving the minimum energy performance required by the local Legislation (EPC A for large scale renovations).

**Note:** PVs achieve primary energy savings and as such they do not contribute towards the cumulative end-use energy saving target. The upgrade options in the tool which PV were purely added to estimate the costs associated with them.

The report presented energy consumption (primary and final) and performance class for some of the above scenarios. MECI modelled the remaining scenarios and provided the relevant information to the Project Team separately. The results of all scenarios can be found in Annex 6. The results were also transferred to the MS Excel Tool found in Annex 4 which was used for the following steps.

<sup>39</sup> Report (in Greek) with title “Calculation of the cost-optimal levels of the minimum energy performance requirements for buildings in accordance with article 5 of Directive 2010/31/EU on the energy performance of buildings” 31/7/2013.

As shown in the Table 12 (extract from Annex 5), the existing energy performance class of the four abovementioned building types is D. Following the implementation of the measures in points (i) and (ii) above, their energy class improved to C, B or B+ (depending on the modelled scenario). The implementation of measures under point (iii) above resulted to an energy class A (as per the legislation) – not shown in the same table.

While the Project Team recognized that Cyprus has properties with an energy performance class lower than D, it was not possible to model such buildings since there were no representative buildings of lower energy performance class. As such, Annex 4b adapts Annex 4a and uplifts the energy savings achieved to reflect these scenarios. Regardless, in all cases the intention is for energy poor houses to get to an energy performance class of at least C following upgrades. As shown in Table 12, this can be achieved by implementing at least one of the measures mentioned above (e.g., roof insulation).

Table 12: Energy performance of representative buildings (existing and new)

Building	Existing	Roof Insulation U <sub>v</sub> =0.4 [W/ m <sup>2</sup> K]	Including PV (Single crystal, South, Angle 30°)		Including AC Systems (split units SEER=7 & SCOP=4)
	Final Energy Consumption [kWh/m <sup>2</sup> ]	Energy Performance	Area m <sup>2</sup> ( kW @ 200 W/m <sup>2</sup> )	Energy Performance	Energy Performance
Detached 1	D	C	→ Without PV →		→ Without AC System →
			20m <sup>2</sup> (~4kW)	B+	
		→ Without roof insulation →	20m <sup>2</sup> (~4kW)	B	
Detached 2	D	C	→ Without PV →		→ Without AC System →
			20m <sup>2</sup> (~4kW)	B	
		→ Without roof insulation →	20m <sup>2</sup> (~4kW)	C	
Multi-apartment building 1	D	C	→ Without PV →		→ Without AC System →
			50m <sup>2</sup> (~10kW)	C	
			120m <sup>2</sup> (~24kW)	C	
			120m <sup>2</sup> (~24kW)	C	A
			→ Without PV →		B+
		→ Without roof insulation →	120m <sup>2</sup> (~24kW)	D	→ Without AC System →
Multi-apartment building 2	D	C (incl. floor)	→ Without PV →		→ Without AC System →
			50m <sup>2</sup> (~10kW)	C	
			200m <sup>2</sup> (~40kW)	C	
			200m <sup>2</sup> (~40kW)	C	A
			→ Without PV →		B+
		→ Without roof insulation →	200m <sup>2</sup> (~40kW)	C	→ Without AC System →

Table 13: Energy savings and cost for each building type and measure (Annex 4a)

Building Type	Measures	Final Energy Saving per building (kWh)	Final Energy Saving per building (toe)	Final Energy Saving per building (ktoe)	Cost
Detached 1	Roof Insulation	3,284.40	0.28	0.0003	€ 4,988
	PV	-	-	-	€ 5,600
	Roof Insulation & PV	3,284.40	0.28	0.0003	€ 10,588
Detached 2	Roof Insulation	6,126.64	0.53	0.0005	€ 8,170
	PV	-	-	-	€ 5,600
	Roof Insulation & PV	6,126.64	0.53	0.0005	€ 13,770
Multi-apartment 1	Roof Insulation	43,079.19	3.70	0.0037	€ 41,452
	Roof Insulation & Small PV	43,079.19	3.70	0.0037	€ 55,452
	Roof Insulation & Large PV	43,079.19	3.70	0.0037	€ 75,052
	Roof Insulation, Large PV & AC Systems	105,492.31	9.07	0.0091	€ 120,052
	Roof Insulation & AC Systems	105,492.31	9.07	0.0091	€ 86,452
	PV	-	-	-	€ 33,600
Multi-apartment 2	Roof Insulation	50,416.00	4.34	0.0043	€ 104,120
	Roof Insulation & Small PV	50,416.00	4.34	0.0043	€ 118,120
	Roof Insulation & Large PV	50,416.00	4.34	0.0043	€ 160,120
	Roof Insulation, Large PV & AC Systems	161,681.92	13.90	0.0139	€ 226,120
	Roof Insulation & AC Systems	161,681.92	13.90	0.0139	€ 170,120
	PV	-	-	-	€ 56,000



Table 14: Energy savings and cost for each building type and measure (Annex 4b)

Building Type	Measures	Final Energy Saving per building (kWh)	Final Energy Saving per building (toe)	Final Energy Saving per building (ktoe)	Cost
Detached 1	Roof Insulation	4,105.50	0.35	0.0004	€ 2,888
	PV	-	-	-	€ 5,200
	Roof Insulation & PV	5,131.88	0.44	0.0004	€ 8,088
Detached 2	Roof Insulation	7,658.30	0.66	0.0007	€ 4,730
	PV	-	-	-	€ 5,200
	Roof Insulation & PV	9,572.87	0.82	0.0008	€ 9,930
Multi-apartment 1	Roof Insulation	53,848.99	4.63	0.0046	€ 23,998
	Roof Insulation & Small PV	67,311.23	5.79	0.0058	€ 36,998
	Roof Insulation & Large PV	67,311.23	5.79	0.0058	€ 55,198
	Roof Insulation, Large PV & AC Systems	131,865.39	11.34	0.0113	€ 100,198
	Roof Insulation & AC Systems	131,865.39	11.34	0.0113	€ 68,998
	PV	-	-	-	€ 31,200
Multi-apartment 2	Roof Insulation	63,020.00	5.42	0.0054	€ 60,280
	Roof Insulation & Small PV	78,775.00	6.77	0.0068	€ 73,280
	Roof Insulation & Large PV	78,775.00	6.77	0.0068	€ 112,280
	Roof Insulation, Large PV & AC Systems	202,102.40	17.38	0.0174	€ 178,280
	Roof Insulation & AC Systems	202,102.40	17.38	0.0174	€ 126,280
	PV	-	-	-	€ 52,000

### 3. Estimate the cost of each energy efficiency upgrade

The upgrade cost for each building and for each scenario mentioned in Step (i) and (ii) was calculated using the costs presented in the same report, shown in Table 15, along with a set of assumptions for each building type, see Table 16. For the scenarios mentioned in (iii) above, the upgrade costs were presented in the report and they were therefore extracted.

Table 15: Energy upgrade unit costs

System	Cost	Cost (Annex 4a)	Cost (Annex 4b)
<b>PV</b>	1400 €/kW	€1400	€1300
<b>Roof insulation</b>	80 €/m <sup>2</sup> + 2.5 €/(cm*m <sup>2</sup> )	€95	€55
<b>Floor insulation</b>	80 €/m <sup>2</sup> + 2.5 €/(cm*m <sup>2</sup> )	€95	€55
<b>Split units</b>	750 €/unit	€750	€750

Table 16: Energy upgrade assumptions

Building Type	Assumptions
<b>Detached 1</b>	- Assumed half of its surface area makes up the roof - 6cm of insulation
<b>Detached 2</b>	- Assumed half of its surface area makes up the roof - 6cm of insulation
<b>Multi-apartment 1</b>	- Assumed one third of its surface area makes up the roof (the building has 3 floors) - Assumed it has 60 split-units (5 units per apartment, 4 apartments per floor, 3 floors) - 6cm of insulation
<b>Multi-apartment 2</b>	- Assumed one fourth of its surface area makes up the roof and one fourth of its area makes up the floor (4 floors) - Assumed 88 split-units (5 units per 3 bed apartment and 2 units per 1 bed apartment, 4x 3 bed apartments & 1x 1 bed apartment per floor, 4 floors) - 6cm of insulation

### 4. Estimate the number of buildings required to meet the set target and the total cost

As it was mentioned above, Cyprus must achieve a cumulative end-use energy savings target of 52.71 ktoe until 2030 by implementing energy efficiency measures in energy poor households. A cumulative target means that the savings achieved in year 1 can be counted for years 1+1, 1+2 1+n until 2030, provided that their lifetime in years is greater or equal to the number of years between the year the measure was implemented and 2030 (e.g., measure has a lifetime of 10 years, and the measure was implemented in 2025). According to Annex V of K.Δ.Π. 203/2023<sup>40</sup>, the lifetime of the measures investigated for this task have lifetime that is adequate for the purpose of this activity.

To estimate the number of buildings required to meet the set target, the final energy savings achieved by each measure in kWh must be calculated, before they are converted to ktoe.

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<sup>40</sup> <https://www.energy.gov.cy/assets/modules/wnp/articles/202304/192/editor/kdp2032023.pdf>

Table 13 and Table 14 above shows the energy savings achieved by each measure, first in kWh and then in toe and ktoe (1 kWh is 0.000085985 toe). The same table also shows the cost of each measure, calculated as per Step 3 above.

The MS Excel Tool (Annex 4a and 4b) uses the information presented above and offers the option: **(a) Steady Annual Upgrade** - calculates the cumulative energy savings achieved along with the relevant cost for each measure and building type assuming that the same number of buildings are being upgraded each year, commencing in 2025 and lasting until 2030; and **(b) Dynamic Annual Upgrade** - calculates the energy savings achieved along with the relevant cost for each measure and building type for different number of buildings upgraded each year. Table 17 shows the scenario of upgrading Building Type Detached 1 with roof insulation using the Annex 4a methodology. According to the calculation, this upgrade leads to 0.0003 ktoe of savings. As such, commencing in 2025, 8887 buildings will have to be upgraded annually (53323 in total) to achieve a cumulative end-use energy saving of 52.71 ktoe. This will achieve new end-use energy savings of 2.51 each year, which cumulatively add up to the set target, see Table 18. The total cost for these upgrades is estimated to be circa €266m.

Table 17: Building type Detached 1 - roof insulation (Annex 4a)

Detached 1 - Roof Insulation		Annex 4a
Final Energy Saving per building (ktoe)		0.0003
Measure target (%)		100%
Measure target (ktoe)		52.71
Measure Cost		€ 4,988
No of Detached Houses per year		8887
Total no of houses 2025-2030		53323
Total Measures Cost		€ 265,949,679

Table 18: Cumulative end-use energy savings for roof insulation and PV (steady annual upgrade)

Cumulative end-use energy savings (ktoe)						
2025	2026	2027	2028	2029	2030	Sum
2.51	2.51	2.51	2.51	2.51	2.51	15.06
	2.51	2.51	2.51	2.51	2.51	12.55
		2.51	2.51	2.51	2.51	10.04
			2.51	2.51	2.51	7.53
				2.51	2.51	5.02
					2.51	2.51
						52.71

As mentioned above, the tool provides a **Steady Annual Upgrade** option which calculates the cumulative energy savings achieved along with the relevant cost for each measure and building type, assuming that the same number of buildings are being upgraded each year. This can be done by allocating a percentage of the total target that must be achieved to each measure and building type. Figure 8 below shows an example where 50% of the target is achieved by upgrading Detached Buildings of Type 1 with Roof

Insulation, 25% of the target is achieved by upgrading Detached Buildings of Type 2 with Roof Insulation and the remaining 25% of the target is achieved by installing roof insulation in Multi-Apartment Buildings of Type 1. The figure below shows the number of buildings that will need to be upgraded every year to achieve this target, commencing in 2025, using Annex 4a and Annex 4b.

Figure 8: Steady Annual Upgrade of selected measures (Top figure: Annex 4a, Bottom figure: Annex 4b)

Building Type	Measure	% of Target	ktoe	Number of Buildings per year	Total number of buildings 2025-2030	Cost	Total Per Building Type
Detached Building Type 1	Roof Insulation	50%	26.35	4,444	26,662	€ 132,974,840	€ 132,974,840
	PV		0.00	0	0	€ 0	
Detached Building Type 2	Roof Insulation & PV		0.00	0	0	€ 0	€ 58,386,482
	Roof Insulation	25%	13.18	1,191	7,146	€ 58,386,482	
Multi-apartment Buildings Type 1	Roof Insulation & PV		0.00	0	0	€ 0	€ 42,129,575
	Roof Insulation	25%	13.18	169	1,016	€ 42,129,575	
	Roof Insulation & Small PV		0.00	0	0	€ 0	
	Roof Insulation & Large PV		0.00	0	0	€ 0	
	Roof Insulation, Large PV & AC Systems		0.00	0	0	€ 0	
	Roof Insulation & AC Systems		0.00	0	0	€ 0	
Multi-apartment Building Type 2	Large PV		0.00	0	0	€ 0	€ 0
	Roof Insulation		0.00	0	0	€ 0	
	Roof Insulation & Small PV		0.00	0	0	€ 0	
	Roof Insulation & Large PV		0.00	0	0	€ 0	
	Roof Insulation, Large PV & AC Systems		0.00	0	0	€ 0	
	Roof Insulation & AC Systems		0.00	0	0	€ 0	
Target OK			52.71			€ 233,490,897	

Building Type	Measure	% of Target	ktoe	Number of Buildings per year	Total number of buildings 2025-2030	Cost	Total Per Building Type
Detached Building Type 1	Roof Insulation	50%	26.35	3,555	21,329	€ 61,588,347	€ 61,588,347
	PV		0.00	0	0	€ 0	
Detached Building Type 2	Roof Insulation & PV		0.00	0	0	€ 0	€ 27,042,160
	Roof Insulation	25%	13.18	953	5,717	€ 27,042,160	
Multi-apartment Buildings Type 1	Roof Insulation & PV		0.00	0	0	€ 0	€ 19,512,645
	Roof Insulation	25%	13.18	136	813	€ 19,512,645	
	Roof Insulation & Small PV		0.00	0	0	€ 0	
	Roof Insulation & Large PV		0.00	0	0	€ 0	
	Roof Insulation, Large PV & AC Systems		0.00	0	0	€ 0	
	Roof Insulation & AC Systems		0.00	0	0	€ 0	
Multi-apartment Building Type 2	Large PV		0.00	0	0	€ 0	€ 0
	Roof Insulation		0.00	0	0	€ 0	
	Roof Insulation & Small PV		0.00	0	0	€ 0	
	Roof Insulation & Large PV		0.00	0	0	€ 0	
	Roof Insulation, Large PV & AC Systems		0.00	0	0	€ 0	
	Roof Insulation & AC Systems		0.00	0	0	€ 0	
Target OK			52.71			€ 108,143,152	

For comparison purposes, to achieve the target purely by upgrading Detached Buildings of Type 1 to meet the minimum energy performance requirements (i.e., Nearly Zero Energy Buildings, NZEB), the total cost would be higher, however there would be a requirement to upgrade a significantly smaller number of buildings (2,818 buildings per year). Figure 9.

Figure 9: Steady Annual Upgrade to NZEB (Top figure: Annex 4a, Bottom figure: Annex 4b)

Combination of measures to meet Minimum Energy Performance Requirements						
Building Type	Measure	% of Target	ktoe	Number of Buildings per year	Total number of buildings 2025-2030	Cost
Detached Building Type 1	Combination of measures	100%	52.71	2818	16908	€ 710,954,633
Detached Building Type 2	Combination of measures		0.00	0	0	€ 0
Multi-apartment Buildings Type 1	Combination of measures		0.00	0	0	€ 0
Multi-apartment Building Type 2	Combination of measures		0.00	0	0	€ 0
Target OK			52.71			€ 710,954,633

Combination of measures to meet Minimum Energy Performance Requirements						
Building Type	Measure	% of Target	ktoe	Number of Buildings per year	Total number of buildings 2025-2030	Cost
Detached Building Type 1	Combination of measures (NZEB)	100%	52.71	1,879	11,272	€ 402,874,292
Detached Building Type 2	Combination of measures (NZEB)		0.00	0	0	€ 0
Multi-apartment Buildings Type 1	Combination of measures (NZEB)		0.00	0	0	€ 0
Multi-apartment Building Type 2	Combination of measures (NZEB)		0.00	0	0	€ 0
Target OK			52.71			€ 402,874,292

Additionally, the tool provides a **Dynamic Annual Upgrade** option which calculates the cumulative energy savings achieved along with the relevant cost for each measure and building type for different number of buildings upgraded each year for the period between 2025 and 2030. This option allows for different building upgrades volumes each year by taking as input the number of buildings that will be upgraded in each year.

As previously mentioned, the building upgrade implementation strategy should consider aspects such as cost and total number of houses upgraded, as well as the ability of the local labour market to deliver the required upgrade volumes.

## 1.5 Annexes to Deliverable 3

### 1.5.1 Annex 1 – Detailed Analysis of Demographic Data

Elderly (>65 years)		
	Number of People	Percentage
EP HHs that have at least one person >65 years	24.220	48%
Total EP HHs	50.290	
EP HHs that are occupied only by elderly people (>65 years)	16.411	33%
Total EP HHs	50.290	
EP people >65years	34.245	29%
Total EP people	116.324	

Single Parent HHs		
	Number of People	Percentage
EP single parent HHs	2.037	4%
Total EP HHs	50.290	
EP Single mother HHs	1.593	3%
Total EP HHs	50.290	

Women		
	Number of People	Percentage
Number EP people that are female	65.372	56%
Total EP people	116.324	
Number of EP adults (>=14 years) that are female	56.890	57%
Total EP people >=14 years	99.490	

<b>Large families</b>		
<b>Number of people in each EP HH</b>	<b>Number of EP HHs with that number of people</b>	<b>Percentage</b>
1	12.469	24,8%
2	24.006	47,7%
3	4.954	9,9%
4	4.802	9,5%
5	2.963	5,9%
6	820	1,6%
7	164	0,3%
8	110	0,2%
10	-	0,0%
12	-	0,0%
	50.290	

<b>Children (&lt;14 years)</b>		
<b>Number of children in each EP HH</b>	<b>Number of EP HHs with that number of children</b>	<b>Percentage</b>
0	40.839	81%
1	4.774	9%
2	2.387	5%
3	1.929	4%
4	331	1%
5	-	0%
6	29	0%
	50.290	
<b>Number of children that are EP</b>	16.835	14%
<b>Total EP people</b>	116.324	

<b>Citizenship (only people &gt;=16 have citizenship)</b>		
	<b>Number of People</b>	<b>Percentage</b>
<b>Number of EP HHs that everybody (&gt;=16) is CY</b>	33.354	66%
<b>Number of EP HHs that nobody (&gt;=16) is CY</b>	8.563	17%
<b>Number of EP HHs of mixed ethnicities (both CY and other)</b>	8.374	17%
	50.290	
	<b>Number of EP people</b>	<b>Percentage</b>
<b>Citizenships (hid citizenships with 0 EP people)</b>		
Cyprus	71.796	74%



Bulgaria	859	1%
Greece	<b>3.757</b>	<b>4%</b>
Hungary	50	0%
Italy	139	0%
Latvia	32	0%
North Africa	236	0%
Near and Middle East	<b>4.114</b>	<b>4%</b>
Other Africa	130	0%
Other Asia	<b>7.844</b>	<b>8%</b>
Other European countries	1.111	1%
Poland	227	0%
Romania	<b>4.382</b>	<b>5%</b>
Republic of Serbia	150	0%
United Kingdom	1.320	1%
West Africa	456	0%
Total EP people (>=16)	96.603	

Household type		
Household type	EP HHs of this type	Percentage
5 = "1 person (total)"	<b>12.469</b>	<b>25%</b>
6 = "2 adults, both < 65 years"	<b>6.955</b>	<b>14%</b>
7 = "2 adults, at least one 65+ years"	<b>15.754</b>	<b>31%</b>
8 = "Other no dependent children"	2.091	4%
9 = "Single person, at least 1 dependent child"	2.037	4%
10 = "2 adults, 1 dependent child"	2.626	5%
11 = "2 adults, 2 dependent children"	3.371	7%
12 = "2 adults, 3+ dependent children"	2.952	6%
13 = "Other households with dependent children"	2.036	4%
	<b>50.290</b>	

Climate zones		
Climate zone	EP HHs in this zone	Percentage
1 - Coastal	8.755	17%
2 - Inland	2.050	4%
3 - Semi-mountainous	<b>11.097</b>	<b>22%</b>
4 - Mountainous	<b>28.389</b>	<b>56%</b>
	<b>50.290</b>	

<b>Tenure status</b>		
<b>Tenure status</b>	<b>EP HHs in this zone</b>	<b>Percentage</b>
1 - Outright owner	20.194	40%
2 - Owner paying mortgage	1.763	4%
3 - Tenant or subtenant paying rent at prevailing or market rate	9.147	18%
4 - Accommodation is rented at a reduced rate	830	2%
5 - Accommodation is provided free	18.356	37%
	50.290	

### **1.5.2 Annex 2 – Communication Campaign Influence Groups and Channels**

*Provided as a separate document - MS Excel*

### **1.5.3 Annex 3 – Analysis of Impact, Outreach and Cost for all Influence Groups**

*Provided as a separate document - MS Excel*

### **1.5.4 Annex 4 – Tool for Estimating Energy Savings**

*Provided as two separate documents - MS Excel*

*Annex 4a - Tool for estimating Energy Savings*

*Annex 4b - Tool for estimating Energy Savings (adapted to increase energy savings achieved through the implementation of different energy efficiency measures and reduce some of the costs, following discussions and feedback from MECI).*

## 1.5.5 Annex 5 – Technical Characteristics of the selected representative buildings

### Detached Building Type 1

**Πίνακας Π1. 1** Στοιχειώδη δεδομένα σχετικά με την ενεργειακή απόδοση του κτηρίου «Κατοικία 1»

		Ποσότητα	Μονάδα
Υπολογισμός	Μέθοδος και εργαλείο	Εφαρμογή ECO Engine	
	Συντελεστές μετατροπής πρωτογενούς ενέργειας	Καύσιμο	Πρωτογενής ενέργειας (kWh/kWh)
		Φυσικό αέριο	1.1
		Υγραέριο	1.1
		Βιοαέριο	1.1
		Αργό πετρέλαιο	1.1
		Ανθρακας	1.1
		Ανθρακίτης	1.1
		Καύσιμο χωρίς καπνό	1.2
		Συσκευές διπλών καυσίμων (ορυκτό + ξύλο)	1.1
		Βιομάζα	0.1
		Ηλεκτρισμός από το δίκτυο	2.7
		Ηλεκτρική ενέργεια που εκποτίστηκε από το δίκτυο	2.7
		Θερμότητα από απόβλητα	0.05
		Θερμότητα περιοχής	1
		Κηροζίνη	1.1
Κλιματικές Συνθήκες	Τόπος	Ζώνη 1	
	Βαθμομέρες θέρμανσης	711	HDD
	Βαθμομέρες ψύξης	1587	CDD
	Πηγή της σειράς κλιματικών δεδομένων	Ιστοσελίδα: Degree Days.net	
	Περιγραφή περιβάλλοντα χώρου	Αστική περιοχή	
Γεωμετρία Κτηρίου	Μήκος × Πλάτος × Ύψος	8.50*7.375*6.00	m × m × m
	Πλήθος ορόφων	2	...
	S/V (εμβαδόν κελύφους/όγκος κτηρίου)	0.53	m <sup>2</sup> /m <sup>3</sup>
	Λόγος εμβαδού παραθύρων προς το συνολικό εμβαδόν του κελύφους	Νότια όψη	26.5 %
		Ανατολική όψη	9.7 %
		Βόρεια όψη	17.6 %
		Δυτική όψη	0 %
	Προσανατολισμός	0 (Η πρόσοψη είναι Νο-τια)	-
Εσωτερικά κέρδη	Χρήση κτηρίου	Μονοκατοικία	
	Μέσο θερμικό κέρδος από τους ενοίκους	5	W/m <sup>2</sup>
	Ειδική ηλεκτρική ισχύς συστήματος φωτισμού	7	W/m <sup>2</sup>
	Ειδική ηλεκτρική ισχύς ηλεκτρικού εξοπλισμού	5	W/m <sup>2</sup>
Δομικά στοιχεία	Μεσοσταθμική τιμή θερμοπερατότητας U των τοίχων	1.39	W/m <sup>2</sup> K
	Μεσοσταθμική τιμή θερμοπερατότητας U της στέγης	3.39	W/m <sup>2</sup> K
	Μεσοσταθμική τιμή θερμοπερατότητας U του υπογείου	---	W/m <sup>2</sup> K

	Μεσοσταθμική τιμή θερμοπερατότητας U των παραθύρων		5.80	W/m <sup>2</sup> K
	Θερμογέφυρες	Συνολικό μήκος	-	m
		Μέση γραμμική θερμική μετάδοση θερμογεφυρών	Τοίχος-στέγη=0.6 Τοίχος-δάπεδο επί του εδάφους=1.15 Τοίχος-τοίχος (γωνία)=0.25 Ανώφλι παραθύρου και πόρτας=1.27 Κατώφλι παραθύρου=1.27 Παραστατός παραθύρου ή πόρτας=1.27	W/mK
	Θερμοχωρητικότητα ανά μονάδα επιφανείας	Εξωτερικών τοίχων	120	kJ/m <sup>2</sup> K
		Εσωτερικών τοίχων	95	kJ/m <sup>2</sup> K
		Πλακών	231	kJ/m <sup>2</sup> K
	Τύπος συστημάτων σκίασης		Εξωτερική σκίαση από παντζούρια	
	Μέση τιμή συντελεστή ηλιακού θερμικού κέρδους g	Υαλοπινάκων	0.85	Ισοσέλιδα: AGC yourglass
		Υαλοπινάκων + σκίασης	0.425	...
	Ρυθμός διείσδυσης εξωτερικού αέρα (εναλλαγές αέρα ανά ώρα)		4	1/h
	Σύστημα αερισμού	Εναλλαγές αέρα ανά ώρα	Φυσικός αερισμός	1/h
		Βαθμοί απόδοσης κατά την ανάκτηση θερμότητας	---	%
	Βαθμοί απόδοσης συστήματος θέρμανσης	Ενεργειακή Απόδοση	80	%
	Βαθμοί απόδοσης συστήματος ψύξης	Ενεργειακή Απόδοση	260	%
	Βαθμοί απόδοσης συστήματος ZNX	Ενεργειακή Απόδοση	80	%
Σημεία ρύθμισης και προγράμματα λειτουργίας στο κτήριο	Σημείο ρύθμισης θερμοκρασίας	Χειμερινή	18 (εκτός από το μπάνιο 21)	
		Θερινή	25 (εκτός από το μπάνιο 27)	
	Σημείο ρύθμισης υγρασίας	Χειμερινή	---	
		Θερινή	---	
	Προγράμματα λειτουργίας και διατάξεις ρύθμισης	Πληρότητας	Παράρτημα 2	
		Φωτισμού	Παράρτημα 2	
		Συσκευών	Παράρτημα 2	
		Αερισμού	Παράρτημα 2	
Ενεργειακή ζήτηση/κατανάλωση κτηρίου	Συμβολή σε (θερμική) ενέργεια των σημαντικότερων εφαρμοζόμενων παθητικών στρατηγικών	1)	-	kWh/a
		2)	-	kWh/a
		3)	-	kWh/a
	Συνολικά		317	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για θέρμανση		41.87	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για ψύξη		75.63	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για ZNX		8.48	kWh/m <sup>2</sup> /year

	Ενεργειακή ζήτηση για λοιπές χρήσεις (ύγρανση, α-φύγρανση)			kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για αερισμό		0	kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για εσωτερικό φωτισμό		16.99	kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για λοιπές χρήσεις (συσκευές, εξωτερικό φωτισμό, εφεδρικά συστήματα κ.λπ.)		1.77	kWh/m <sup>2</sup> /year
Παραγωγή ενέργειας στον τόπο του κτηρίου	Θερμική ενέργεια από ΑΠΕ (π.χ. ηλιακοί συλλέκτες)		7	kWh/m <sup>2</sup> /year
	Παραγωγή ηλεκτρικής ενέργειας στο κτήριο και κατανάλωσή της επιτόπου		0	kWh/m <sup>2</sup> /year
	Παραγωγή ηλεκτρικής ενέργειας στο κτήριο και εξαγωγή της στην αγορά		0	kWh/m <sup>2</sup> /year
Κατανάλωση ενέργειας	Παρεχόμενη ενέργεια	Ηλεκτρική	94.39	kWh/m <sup>2</sup> /year
		Ορυκτά καύσιμα	50.35	kWh/m <sup>2</sup> /year
		Λοιπές μορφές (βιομάζα, τηλεθέρμανση/τηλεψύξη κ.λπ.)	0	kWh/m <sup>2</sup> /year
	Πρωτογενής ενέργεια		310.23	kWh/m <sup>2</sup> /year

Πίνακας Π1. 2 Στοιχεία Κατοικίας 1

Για υφιστάμενα κτήρια	Γεωμετρία κτηρίου	Ποσοστό του εμβαδού των παραθύρων ως προς το εμβαδό του κελύφους του κτηρίου και των παραθύρων χωρίς πρόσβαση στον ήλιο	Εμβαδόν δαπέδου σε η' όριος χρησιμοποιείται στον οικοδομικό κανονισμό	Περιγραφή του κτηρίου	Περιγραφή της μέσης τεχνολογίας κτηρίου	Μέση ενεργειακή απόδοση kWh/m <sup>2</sup> , a (πριν από την επένδυση)*	Απαιτήσεις σε επίπεδο κατασκευαστικού στοιχείου (τυπική τιμή)
Κατοικία 1	Μήκος>Πλάτος>Ύψος = 8.50*7.375*6.00m <sup>3</sup> Πληθός ορόφων: 2 S/V (εμβαδόν κελύφους/ όγκος κτηρίου)= 0.53m <sup>2</sup> /m <sup>3</sup> Νότια όψη~26.5% Ανατολική όψη~9.7% Βόρεια όψη~17.6% Δυτική όψη~0% (εφαπτομένη με διπλανή κατοικία)	Επαραθύρων~13.1m <sup>2</sup> Εκελύφους~199.90m <sup>2</sup> 6.5%	105	Η κατοικία κατασκευάστηκε το 1980. Αποτελείται από 2 επίπεδα, το ισόγειο και τον όροφο. Στο ισόγειο υπάρχουν οι κοινόχρηστοι χώροι και στον όροφο οι ιδιωτικοί χώροι. Είναι μονοκατοικία 3 υπνοδωματίων. Βρίσκεται στη ζώνη 1. Η εξωτερική ταχυοπαλία αποτελείται από 20cm τοιχίο. Τα υποστρώματα και οι δοκοί αποτελούνται από οπλισμένο σκυρόδεμα 20cm. Το παρθούρο είναι από πλαίσιο αλουμινίου με μονό τζάμι και με εξωτερική σκίαση από παντζούρια.	Εξωτερικός τοίχος: U(W/m <sup>2</sup> K)=1.39 Εσωτερικός τοίχος: U(W/m <sup>2</sup> K)=1.79 Εξωτερική δοκός/υποστρώμα: U(W/m <sup>2</sup> K)=3.26 Εσωτερική δοκός/υποστρώμα: U(W/m <sup>2</sup> K)=2.52 Οροφή: U(W/m <sup>2</sup> K)=3.17 Εσωτερικό ταβάνι: U(W/m <sup>2</sup> K)=2.70 Ενδιάμεσο πάτωμα: U(W/m <sup>2</sup> K)=2.70 Εκτεθειμένο πάτωμα: U(W/m <sup>2</sup> K)=1.96 Δάπεδο επί του εδάφους: U(W/m <sup>2</sup> K)=0.309 Παρθούρο: U (W/m <sup>2</sup> K)= 2.96 Τ-ηλιακό=0.79 L-ηλιακό=0.82 Συστήματα HVAC: Αυτοτελής (κλιματιστική) μονάδα διαίρεμένου τύπου Πηγή Θερμότητας: Λέβητας Τύπος Καυσίμου: Πετρέλαιο Σύστημα Θέρμανσης: Εποχιακή Ενεργειακή Απόδοση= 0.85 Σύστημα Ψύξης: Εποχιακή Ενεργειακή Απόδοση= 3.2 Σύστημα Ζεστού Νερού Χρήσης: ΧΘΖΝ Λέβητας Πηγή Ηλεκτρικής Ενέργειας: Ηλιακό Σύστημα	274	Κατηγορία ενεργειακής απόδοσης στο ΠΕΑ μετά την ανακαίνιση μεγάλης κλίμακας: 1ση ή καλύτερη από Α. Μέγιστος μέσος συντελεστής θερμοπερατότητας τοίχων και στοιχείων της φέρουσας κατασκευής που συνιστούν μέρος του κελύφους = 0.4W/m <sup>2</sup> K. Μέγιστος μέσος συντελεστής θερμοπερατότητας οριζόντιων δομικών στοιχείων και οροφών που συνιστούν μέρος του κελύφους = 0.4W/m <sup>2</sup> K. Μέγιστος μέσος συντελεστής θερμοπερατότητας κουφωμάτων που συνιστούν μέρος του κελύφους του κτηρίου = 2.25W/m <sup>2</sup> K. Μέγιστος μέσος συντελεστής σκίασης σε κουφώματα που συνιστούν μέρος του κελύφους = 0.63.

## Detached Building Type 2

**Πίνακας Π2. 1** Στοιχειώδη δεδομένα σχετικά με την ενεργειακή απόδοση

του κτηρίου «Κατοικία 2»

			Ποσότητα	Μονάδα
Υπολογισμός	Μέθοδος και εργαλείο	Εφαρμογή ECO Engine		
	Συντελεστές μετατροπής πρωτογενούς ενέργειας	Καύσιμο	Πρωτογενής ενέργειας (kWh/kWh)	
		Φυσικό αέριο	1.1	
		Υγραέριο	1.1	
		Βιογκάζι	1.1	
		Αργό πετρέλαιο	1.1	
		Ανθράκας	1.1	
		Ανθρακίτης	1.1	
		Καύσιμο χωρίς καπνό	1.2	
		Συσκευές διτλών καυσίμων (ορυκτό + ξύλο)	1.1	
		Βιομάζα	0.1	
		Ηλεκτρισμός από το δίκτυο	2.7	
		Ηλεκτρική ενέργεια που εκτοπίστηκε από το δίκτυο	2.7	
		Θερμότητα από απόβλητα	0.05	
		Θερμότητα περιοχής	1	
		Κηροζίνη	1.1	
Κλιματικές Συνθήκες	Τόπος		Ζώνη 2	
	Βαθμοήμερες θέρμανσης		880	HDD
	Βαθμοήμερες ψύξης		2020	CDD
	Πηγή της σειράς κλιματικών δεδομένων		Ιστοσελίδα: Degree Days.net	
	Περιγραφή περιβάλλοντα χώρου		Αστική περιοχή	
Γεωμετρία Κτηρίου	Μήκος × Πλάτος × Ύψος		12.60*13.40*6.60	m × m × m

	Πλήθος ορόφων		2	...
	S/V (εμβαδόν κελύφους/όγκος κτηρίου)		0.31	m²/m³
	Λόγος εμβαδού παραθύρων προς το συνολικό εμβαδόν του κελύφους	Νότια όψη	17	%
		Ανατολική όψη	15	%
		Βόρεια όψη	32	%
		Δυτική όψη	22	%
Προσανατολισμός		Η πρόσοψη είναι Βόρεια	-	
Εσωτερικά κέρδη	Χρήση κτηρίου		Μονοκατοικία	
	Μέσο θερμικό κέρδος από τους ενοίκους		12	W/m²
	Ειδική ηλεκτρική ισχύς συστήματος φωτισμού		7	W/m²
	Ειδική ηλεκτρική ισχύς ηλεκτρικού εξοπλισμού		5	W/m²
Δομικά στοιχεία	Μεσοσταθμική τιμή θερμοπερατότητας U των τοίχων		1.39	W/m²K
	Μεσοσταθμική τιμή θερμοπερατότητας U της στέγης		3.39	W/m²K
	Μεσοσταθμική τιμή θερμοπερατότητας U του υπογείου		---	W/m²K
	Μεσοσταθμική τιμή θερμοπερατότητας U των παραθύρων		2.46	W/m²K
	Θερμογέφυρες	Συνολικό μήκος	-	m
		Μέση γραμμική θερμική μετάδοση θερμογεφυρών	Τοίχος-στέγη=0.6 Τοίχος-δάπεδο επί του εδάφους=1.15 Τοίχος-τοίχος (γωνία)=0.25 Ανώφλι παραθύρου και πόρτας=1.27 Κατώφλι παραθύρου=1.27 Παραστατός παραθύρου ή πόρτας=1.27	W/mK
	Θερμοχωρητικότητα ανά μονάδα επιφάνειας	Εξωτερικών τοίχων	120	kJ/m²K
		Εσωτερικών τοίχων	95	kJ/m²K
		Πλακών	231	kJ/m²K



	Τύπος συστημάτων σκίασης		---	
	Μέση τιμή συντελεστή ηλιακού θερμικού κέρδους g	Υαλοπινάκων	0.76	Ιστοσελίδα: AGC yourglass
		Υαλοπινάκων + σκίασης	0.425	...
	Ρυθμός διείσδυσης εξωτερικού αέρα (εναλλαγές αέρα ανά ώρα)		4	1/h
	Σύστημα αερισμού	Εναλλαγές αέρα ανά ώρα	Φυσικός αερισμός	1/h
		Βαθμοί απόδοσης κατά την ανάκτηση θερμότητας	---	%
	Βαθμοί απόδοσης συστήματος θέρμανσης	Ενεργειακή Απόδοση	80	%
	Βαθμοί απόδοσης συστήματος ψύξης	Ενεργειακή Απόδοση	260	%
	Βαθμοί απόδοσης συστήματος ΖΝΧ	Ενεργειακή Απόδοση	80	%
Σημεία ρύθμισης και προγράμματα λειτουργίας στο κτήριο	Σημείο ρύθμισης θερμοκρασίας	Χειμερινή	18 (εκτός από το μπάνιο 21)	
		Θερινή	25 (εκτός από το μπάνιο 27)	
	Σημείο ρύθμισης υγρασίας	Χειμερινή	---	
		Θερινή	---	
	Προγράμματα λειτουργίας και διατάξεις ρύθμισης	Πληρότητας	Παράρτημα 2	
		Φωτισμού	Παράρτημα 2	
		Συσκευών	Παράρτημα 2	
		Αερισμού	Παράρτημα 2	
		Συστήματος θέρμανσης	Παράρτημα 2	
		Συστήματος ψύξης	Παράρτημα 2	
Ενεργειακή ζήτηση/κατανάλωση κτηρίου	Συμβολή σε (θερμική) ενέργεια των σημαντικότερων εφαρμοζόμενων παθητικών στρατηγικών	1)	-	kWh/a
		2)	-	kWh/a
		3)	-	kWh/a
	Συνολικά		368	kWh/m <sup>2</sup> /year

	Ενεργειακή ζήτηση για θέρμανση		43.30	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για ψύξη		93.32	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για ΖΝΧ		10.29	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για λοιπές χρήσεις (ύγρανση, αφύγρανση)			kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για αερισμό		0	kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για εσωτερικό φωτισμό		17.87	kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για λοιπές χρήσεις (συσκευές, εξωτερικό φωτισμό, εφεδρικά συστήματα κ.λπ.)		0.98	kWh/m <sup>2</sup> /year
Παραγωγή ενέργειας στον τόπο του κτηρίου	Θερμική ενέργεια από ΑΠΕ (π.χ. ηλιακοί συλλέκτες)		6	kWh/m <sup>2</sup> /year
	Παραγωγή ηλεκτρικής ενέργειας στο κτήριο και κατανάλωσή της επιτόπου		0	kWh/m <sup>2</sup> /year
	Παραγωγή ηλεκτρικής ενέργειας στο κτήριο και εξαγωγή της στην αγορά		0	kWh/m <sup>2</sup> /year
Κατανάλωση ενέργειας	Παρεχόμενη ενέργεια	Ηλεκτρική	112.17	kWh/m <sup>2</sup> /year
		Ορυκτά καύσιμα	53.59	kWh/m <sup>2</sup> /year
		Λοιπές μορφές (βιομάζα, τηλεθέρμανση/τηλεψύξη κ.λπ.)	0	kWh/m <sup>2</sup> /year
	Πρωτογενής ενέργεια		362	kWh/m <sup>2</sup> /year

Πίνακας Π2. 2 Στοιχεία Κατοικίας 2

Για υφιστάμενα κτήρια	Γεωμετρία κτηρίου	Ποσοστό του εμβαδού των παραθύρων ως προς το εμβαδό του κελύφους του κτηρίου και των παραθύρων χωρίς πρόσβαση στον ήλιο	Εμβαδόν δαπέδου σε m <sup>2</sup> όπως χρησιμοποιείται στον οικοδομικό κανονισμό*	Περιγραφή του κτηρίου	Περιγραφή της μέσης τεχνολογίας κτηρίου	Μέση ενεργειακή απόδοση kWh/m <sup>2</sup> , a (πριν από την επένδυση)*	Απαιτήσεις σε επίπεδο κατασκευαστικού στοιχείου (τυπική τιμή)
Κατοικία 2	Μήκος×Πλάτος×Ύψος= 12,60×13,40×6,60m <sup>3</sup> Πλήθος ορόφων: 2 S/V (εμβαδόν κελύφους/όγκος κτηρίου)= 0,32 m <sup>2</sup> /m <sup>3</sup> Νότια όψη=17% Ανατολική όψη=15% Βόρεια όψη=32% Δυτική όψη=22%	Επαραθύρων=75,2m <sup>2</sup> Εκελύφους=341,21m <sup>2</sup> 22%	172	Η κατοικία κατασκευάστηκε το 2003. Αποτελείται από 2 επίπεδα, το ισόγειο και τον όροφο. Στο ισόγειο υπάρχουν οι κοινόχρηστοι χώροι και στον όροφο οι ιδιωτικοί χώροι. Είναι μονοκατοικία 3 υπονομιωμάτων. Βρίσκεται στη Ζώνη 2. Η εξωτερική ταχοποιία αποτελείται από 20cm τοίχους. Τα υποστυλώματα και οι δοκοί αποτελούνται από οπλισμένο σκυρόδεμα 20cm. Το παρόνθρο είναι από πλαίσιο αλουμινίου με διπλό τζάμι.	Εξωτερικός τοίχος: U=1.39 W/m <sup>2</sup> K Εσωτερικός τοίχος: U=1.786 W/m <sup>2</sup> K Εξωτερική δοκός/υποστυλώμα: U=3.33W/m <sup>2</sup> K Εσωτερική δοκός/υποστυλώμα: U=2.56W/m <sup>2</sup> K Οροφή: U=3.39 W/m <sup>2</sup> K Εσωτερικό ταβάνι: U=2.62 W/m <sup>2</sup> K Ενδιάμεσο πάτωμα: U=3.20 W/m <sup>2</sup> K Εκτεθειμένο δάπεδο: U=2.49 W/m <sup>2</sup> K Δάπεδο επί του εδάφους: U=0.837 W/m <sup>2</sup> K Παράθυρο :U=2.46 W/m <sup>2</sup> K Τ-ηλιακό=0.76 / L-ηλιακό=0.80 Συστήματα HVAC 1: Κεντρική θέρμανση νερού με θερμαντικά σώματα Πηγή Θερμότητας: Λέβητας Τύπος Καυσίμου: Πετρέλαιο Σύστημα Θέρμανσης: Ενεργειακή Απόδοση=80% Συστήματα HVAC 2 Αυτοεξής (κλιματιστική) μονάδα διαιρεμένου τύπου Πηγή Θερμότητας: Λέβητας Τύπος Καυσίμου: Πετρέλαιο Σύστημα Θέρμανσης: Ενεργειακή Απόδοση=80% Σύστημα Ψύξης: Ενεργειακή Απόδοση=260% Σύστημα ΖΝΧ: ΧΘΖΝ Λέβητας Πηγή Ηλεκτρικής Ενέργειας: Ηλιακό Σύστημα	266	Κατηγορία ενεργειακής απόδοσης στο ΠΕΑ μετά την ανακαίνιση μεγάλης κλίμακας: Ιση ή καλύτερη από Α. Μέγιστος μέσος συντελεστής θερμοπερατότητας τοίχων και στοιχείων της φέρουσας κατασκευής που συνιστούν μέρος του κελύφους = 0.4W/m <sup>2</sup> K. Μέγιστος μέσος συντελεστής θερμοπερατότητας οριζόντιων δομικών στοιχείων και οροφών που συνιστούν μέρος του κελύφους = 0.4W/m <sup>2</sup> K. Μέγιστος μέσος συντελεστής θερμοπερατότητας κατασκευών που συνιστούν μέρος του κελύφους του κτηρίου = 2.25W/m <sup>2</sup> K. Μέγιστος μέσος συντελεστής σκίασης σε κουφώματα που συνιστούν μέρος του κελύφους = 0.63.

## Multi-Apartment Building Type 1

### Π4.3 Κτήριο αναφοράς για υφιστάμενα κτήρια

**Πίνακας Π4. 1** Στοιχειώδη δεδομένα σχετικά με την ενεργειακή απόδοση

του κτηρίου «Πολυκατοικία 1»

			Ποσότητα	Μονάδα
Υπολογισμός	Μέθοδος και εργαλείο	Εφαρμογή ECO Engine		
	Συντελεστές μετατροπής πρωτογενούς ενέργειας	Καύσιμο	Πρωτογενής ενέργειας (kWh/kWh)	
		Φυσικό αέριο	1.1	
		Υγραέριο	1.1	
		Βιοαέρι	1.1	
		Αργό πετρέλαιο	1.1	
		Άνθρακας	1.1	
		Ανθρακίτης	1.1	
		Καύσιμο χωρίς καπνό	1.2	
		Συσκευές διπλών καυσίμων (ορυκτό + ξύλο)	1.1	
		Βιομάζα	0.1	
		Ηλεκτρισμός από το δίκτυο	2.7	
		Ηλεκτρική ενέργεια που εκτοπίστηκε από το δίκτυο	2.7	
		Θερμότητα από απόβλητα	0.05	
		Θερμότητα περιοχής	1	
		Κηροζίνη	1.1	
Κλιματικές Συνθήκες	Τόπος		Ζώνη 2	
	Βαθμονήμερες θέρμανσης		880	HDD
	Βαθμονήμερες ψύξης		2020	CDD
	Πηγή της σειράς κλιματικών δεδομένων		Ιστοσελίδα: Degree Days.net	
	Περιγραφή περιβάλλοντα χώρου		Αστική περιοχή	
Γεωμετρία Κτηρίου	Μήκος × Πλάτος × Ύψος		22 *26.30*11.90	m × m × m
	Πλήθος ορόφων		πιλοτή + 3 ορόφοι	...
	S/V (εμβαδόν κελύφους/όγκος κτηρίου)		0.29	m <sup>2</sup> /m <sup>3</sup>
	Λόγος εμβαδού παραθύρων προς το συνολικό εμβαδόν του κελύφους	Νότια όψη	39	%
		Ανατολική όψη	24	%
		Βόρεια όψη	16	%
		Δυτική όψη	26	%
	Προσανατολισμός		(Η πρόσοψη είναι Δυτική)	-
Εσωτερικά κέρδη	Χρήση κτηρίου		Πολυκατοικία	
	Μέσο θερμικό κέρδος από τους ενοίκους		5	W/m <sup>2</sup>
	Ειδική ηλεκτρική ισχύς συστήματος φωτισμού		7	W/m <sup>2</sup>
	Ειδική ηλεκτρική ισχύς ηλεκτρικού εξοπλισμού		5	W/m <sup>2</sup>

Δομικά στοιχεία	Μεσοσταθμική τιμή θερμοπερατότητας U των τοίχων		1.39	W/m <sup>2</sup> K
	Μεσοσταθμική τιμή θερμοπερατότητας U της στέγης		3.39	W/m <sup>2</sup> K
	Μεσοσταθμική τιμή θερμοπερατότητας U του υπογείου		---	W/m <sup>2</sup> K
	Μεσοσταθμική τιμή θερμοπερατότητας U των παραθύρων		5.80	W/m <sup>2</sup> K
	Θερμογέφυρες	Συνολικό μήκος	-	m
		Μέση γραμμική θερμική μεταδόση θερμογεφυρών	Τοίχος-στέγη=0.6 Τοίχος-δάπεδο επί του εδάφους=1.15 Τοίχος-τοίχος (γωνία)=0.25 Ανώφλι παραθύρου και πόρτας=1.27 Κατώφλι παραθύρου=1.27 Παραστατός παραθύρου ή πόρτας=1.27	
	Θερμοχωρητικότητα ανά μονάδα επιφάνειας	Εξωτερικών τοίχων	120	kJ/m <sup>2</sup> K
		Εσωτερικών τοίχων	95	kJ/m <sup>2</sup> K
		Πλακών	231	kJ/m <sup>2</sup> K
	Τύπος συστημάτων σκίασης		Εξωτερική σκίαση από παντζούρια	
	Μέση τιμή συντελεστή ηλιακού θερμικού κέρδους g	Υαλοπινάκων	0.85	Ιστοσελίδα: AGC your-glass
		Υαλοπινάκων + σκίασης	0.425	---
	Ρυθμός διείσδυσης εξωτερικού αέρα (εναλλαγές αέρα ανά ώρα)		4	1/h
	Σύστημα αερισμού	Εναλλαγές αέρα ανά ώρα	Φυσικός αερισμός	1/h
		Βαθμοί απόδοσης κατά την ανάκτηση θερμότητας	---	%
	Βαθμοί απόδοσης συστήματος θέρμανσης	Ενεργειακή Απόδοση	190	%
	Βαθμοί απόδοσης συστήματος ψύξης	Ενεργειακή Απόδοση	260	%
	Βαθμοί απόδοσης συστήματος ZNX	Ενεργειακή Απόδοση	100	%
Σημεία ρύθμισης και προγράμματα λειτουργίας στο κτήριο	Σημείο ρύθμισης θερμοκρασίας	Χειμερινή	18 (εκτός από το μπάνιο 21)	
		Θερινή	25 (εκτός από το μπάνιο 27)	
	Σημείο ρύθμισης υγρασίας	Χειμερινή	---	
		Θερινή	---	
	Προγράμματα λειτουργίας και διατάξεις ρύθμισης	Πληρότητας	Παράρτημα 2	
		Φωτισμού	Παράρτημα 2	
		Συσκευών	Παράρτημα 2	
		Αερισμού	Παράρτημα 2	
		Συστήματος θέρμανσης	Παράρτημα 2	
		Συστήματος ψύξης	Παράρτημα 2	

Ενεργειακή ζήτηση/κατανάλωση κτηρίου	Συμβολή σε (θερμική) ενέργεια των σημαντικότερων εφαρμοζόμενων παθητικών στρατηγικών	1)	-	kWh/a
		2)	-	kWh/a
		3)	-	kWh/a
	Συνολικά		90	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για θέρμανση		1.28	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για ψύξη		11.78	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για ΖΝΧ		3.51	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για λοιπές χρήσεις (ύγρανση, αφύγρανση)		-	kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για αερισμό		0	kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για εσωτερικό φωτισμό		17.42	kWh/m <sup>2</sup> /year
Παραγωγή ενέργειας στον τόπο του κτηρίου	Ενεργειακή κατανάλωση για λοιπές χρήσεις (συσκευές, εξωτερικό φωτισμό, εφεδρικά συστήματα κ.λπ.)		-	kWh/m <sup>2</sup> /year
	Θερμική ενέργεια από ΑΠΕ (π.χ. ηλιακοί συλλέκτες)		8	kWh/m <sup>2</sup> /year
	Παραγωγή ηλεκτρικής ενέργειας στο κτήριο και κατανάλωση της επιτόπου		-	kWh/m <sup>2</sup> /year
Κατανάλωση ενέργειας	Παραγωγή ηλεκτρικής ενέργειας στο κτήριο και εξαγωγή της στην αγορά		-	kWh/m <sup>2</sup> /year
	Παρεχόμενη ενέργεια	Ηλεκτρική	32.8	kWh/m <sup>2</sup> /year
		Ορυκτά καύσιμα	1.18	kWh/m <sup>2</sup> /year
		Λοιπές μορφές (βιομάζα, τηλεθέρμανση/τηλεψύξη κ.λπ.)	-	kWh/m <sup>2</sup> /year
	Πρωτογενής ενέργεια		98	kWh/m <sup>2</sup> /year

Πίνακας Π4. 2 Στοιχεία Πολυκατοικίας 1

Για υφιστάμενα κτήρια	Γεωμετρία κτηρίου	Ποσοστό του εμβαδού των παραθύρων ως προς το εμβαδό του κελύφους του κτηρίου και των παραθύρων χωρίς πρόσβαση στον ήλιο	Εμβαδόν δαπέδου σε m <sup>2</sup> όπως χρησιμοποιείται στον οικοδομικό κανονισμό	Περιγραφή του κτηρίου	Περιγραφή της μέσης τεχνολογίας κτηρίου	Μέση ενεργειακή απόδοση kWh/m <sup>2</sup> , a (πριν από την επένδυση)*	Απαιτήσεις σε επίπεδο κατασκευαστικού στοιχείου (τυπική τιμή)
Πολυκατοικία 1	Μήκος*Πλάτος*Ύψος= 22*26.30*11.90m <sup>3</sup> Πληθος ορόφων: 3 S/V (εμβαδόν κελύφους/όγκος κτηρίου)= 0.29 m <sup>2</sup> /m <sup>3</sup> Νότια όψη~39% Ανατολική όψη~24% Βόρεια όψη~16% Δυτική όψη~26%	Επαραθύρων~166m <sup>2</sup> Εκελύφους~2,019m <sup>2</sup> 8%	1,309	Η πολυκατοικία κατασκευάστηκε το 1999. Αποτελείται από την πύλη και 3 ορόφους. Στην πύλη έχει διαμορφωθεί ειδικά ένας χώρος ο οποίος θα χρησιμοποιείται ως κατάστημα. Ο κάθε ορόφος έχει 4 διαμερίσματα των 3 υπνοδωματίων. Βρίσκεται στη Ζώνη 2. Η εξωτερική τοιχοποιία αποτελείται από 20cm τούβλο. Τα υποστυλώματα και οι δοκοί αποτελούνται από οπλισμένο σκυρόδεμα 20cm. Το παρόν κτήριο είναι από πλαίσιο αλουμινίου με μονό τζάμι και με εξωτερική σκίαση από παντζούρια.	Εξωτερικός τοίχος: U~1.39 W/m <sup>2</sup> K Εσωτερικός τοίχος: U~1.786 W/m <sup>2</sup> K Εξωτερική δοκός/Υποστυλώματα: U~3.33W/m <sup>2</sup> K Εσωτερική δοκός-υποστυλώματα:U~2.56W/m <sup>2</sup> K Οροφή: U~3.39 W/m <sup>2</sup> K Εσωτερικό ταβάνι: U~2.62 W/m <sup>2</sup> K Ενδοδακτύσιο πάτωμα: U~3.20 W/m <sup>2</sup> K Εκτεθειμένο δάπεδο (επαφή με εξωτερικό): U~2.49W/m <sup>2</sup> K Εκτεθειμένο δάπεδο (επαφή με μη θερμαινόμενο χώρο): U~1.88W/m <sup>2</sup> Δάπεδο επί του εδάφους: U~0.89 W/m <sup>2</sup> K Παράθυρο: U~5.80 W/m <sup>2</sup> K T-ηλιακό~0.85 / L-ηλιακό~0.90 Συστήματα HVAC 1: Αυτοτελής (κλιματιστική) μονάδα διαμεριμένου τύπου Πηγή Θερμότητας: Αντλία θερμότητας: πηγή αέρα Τύπος Καυσίμου: Ηλεκτρισμός δικτύου Σύστημα Θέρμανσης: Ενεργειακή Απόδοση~190% Σύστημα Ψύξης: Ενεργειακή Απόδοση~260% Συστήματα HVAC 2: Αυτοτελής (κλιματιστική) μονάδα διαμεριμένου τύπου Πηγή Θερμότητας: Λέβητας Τύπος Καυσίμου: Πετρέλαιο Σύστημα Θέρμανσης: Ενεργειακή Απόδοση ~90% Σύστημα Ψύξης: Ενεργειακή Απόδοση~320% Σύστημα ΖΝΧ: Ηλεκτρικό element	184	Κατηγορία ενεργειακής απόδοσης στο ΠΕΑ μετά την ανακαίνιση μεγάλης κλίμακας: Ιση ή καλύτερη από Α. Μέγιστος μέσος συντελεστής θερμοπερατότητας τοίχων και στοιχείων της φέρουσας κατασκευής που συνιστούν μέρος του κελύφους = 0.4W/m <sup>2</sup> K. Μέγιστος μέσος συντελεστής θερμοπερατότητας οριζόντιων δομικών στοιχείων και οροφών που συνιστούν μέρος του κελύφους = 0.4W/m <sup>2</sup> K. Μέγιστος μέσος συντελεστής θερμοπερατότητας κουφωμάτων που συνιστούν μέρος του κελύφους του κτηρίου = 2.25W/m <sup>2</sup> K (εξαιρούνται οι πρόθηκες κατασκευών). Μέγιστος μέσος συντελεστής σκίασης σε κουφώματα που συνιστούν μέρος του κελύφους = 0.63.

## Multi-Apartment Building Type 2

### Π5.3 Κτήριο αναφοράς για υφιστάμενα κτήρια

**Πίνακας Π5. 1** Στοιχειώδη δεδομένα σχετικά με την ενεργειακή απόδοση

του κτηρίου «Πολυκατοικία 2»

			Ποσότητα	Μονάδα
Υπολογισμός	Μέθοδος και εργαλείο	Εφαρμογή ECO Engine		
	Συντελεστές μετατροπής πρωτογενούς ενέργειας	Καύσιμο	Πρωτογενής ενέργειας (kWh/kWh)	
		Φυσικό αέριο	1.1	
		Υγραέριο	1.1	
		Βιογκάζι	1.1	
		Αργό πετρέλαιο	1.1	
		Ανθρακας	1.1	
		Ανθρακίτης	1.1	
		Καύσιμο χωρίς καπνό	1.2	
		Συσκευές διπλών καυσίμων (ορυκτό + ξύλο)	1.1	
		Βιομάζα	0.1	
		Ηλεκτρισμός από το δίκτυο	2.7	
		Ηλεκτρική ενέργεια που εκτοπίστηκε από το δίκτυο	2.7	
		Θερμότητα από απόβλητα	0.05	
		Θερμότητα περιοχής	1	
		Κηροζίνη	1.1	
Κλιματικές Συνθήκες	Τύπος		Ζώνη 1	
	Βαθμονήμερες θέρμανσης		711	HDD
	Βαθμονήμερες ψύξης		1587	CDD
	Πηγή της σειράς κλιματικών δεδομένων		Ιστοσελίδα: Degree Days.net	
	Περιγραφή περιβάλλοντα χώρου		Αστική περιοχή	
Γεωμετρία Κτηρίου	Μήκος × Πλάτος × Ύψος		35.70*17.50*15.80	m × m × m
	Πλήθος ορόφων		πilotή + 4 ορόφοι	...
	S/V (εμβαδόν κελύφους/όγκος κτηρίου)		0.30	m <sup>2</sup> /m <sup>3</sup>
	Λόγος εμβαδού παραθύρων προς το συνολικό εμβαδόν του κελύφους	Νότια όψη	13	%
		Ανατολική όψη	24	%
		Βόρεια όψη	16	%
		Δυτική όψη	23	%
	Προσανατολισμός		Η πρόσοψη είναι Δυτική	
Εσωτερικά κέρδη	Χρήση κτηρίου		Διαμερίσματα	
	Μέσο θερμικό κέρδος από τους ενοίκους		12	W/m <sup>2</sup>

	Ειδική ηλεκτρική ισχύς συστήματος φωτισμού	7	W/m <sup>2</sup>
	Ειδική ηλεκτρική ισχύς ηλεκτρικού εξοπλισμού	5	W/m <sup>2</sup>
Δομικά στοιχεία	Μεσοσταθμική τιμή θερμοπερατότητας U των τοίχων	1.39	W/m <sup>2</sup> K
	Μεσοσταθμική τιμή θερμοπερατότητας U της στέγης	3.39	W/m <sup>2</sup> K
	Μεσοσταθμική τιμή θερμοπερατότητας U του υπογείου	---	W/m <sup>2</sup> K
	Μεσοσταθμική τιμή θερμοπερατότητας U των παραθύρων	2.46	W/m <sup>2</sup> K
	Θερμογέφυρες	Συνολικό μήκος	-
		Μέση γραμμική θερμική μετάδοση θερμογεφυρών	W/mK
	Θερμοχωρητικότητα ανά μονάδα επιφάνειας	Εξωτερικών τοίχων	120
		Εσωτερικών τοίχων	95
		Πλακών	231
	Τύπος συστημάτων σκίασης		---
	Μέση τιμή συντελεστή ηλιακού θερμικού κέρδους g	Υαλοπινάκων	0.76
		Υαλοπινάκων + σκίασης	0.425
	Ρυθμός διείσδυσης εξωτερικού αέρα (εναλλαγές αέρα ανά ώρα)		4
	Σύστημα αερισμού	Εναλλαγές αέρα ανά ώρα	Φυσικός αερισμός
		Βαθμοί απόδοσης κατά την ανάκτηση θερμότητας	---
	Βαθμοί απόδοσης συστήματος θέρμανσης	Ενεργειακή Απόδοση	80
	Βαθμοί απόδοσης συστήματος ψύξης	Ενεργειακή Απόδοση	250
	Βαθμοί απόδοσης συστήματος ZNX	Ενεργειακή Απόδοση	90
Σημεία ρύθμισης και προγράμματα λειτουργίας στο κτήριο	Σημείο ρύθμισης θερμοκρασίας	Χειμερινή	18 (εκτός από το μπάνιο 21)
		Θερινή	25 (εκτός από το μπάνιο 27)
	Σημείο ρύθμισης υγρασίας	Χειμερινή	---
		Θερινή	---
	Προγράμματα λειτουργίας και διατάξεις ρύθμισης	Πληρότητας	Παράρτημα 2
		Φωτισμού	Παράρτημα 2



		Συσκευών	Παράρτημα 2	
		Αερισμού	Παράρτημα 2	
		Συστήματος θέρμανσης	Παράρτημα 2	
		Συστήματος ψύξης	Παράρτημα 2	
Ενεργειακή ζήτηση/κατανάλωση κτηρίου	Συμβολή σε (θερμική) ενέργεια των σημαντικότερων εφαρμοζόμενων παθητικών στρατηγικών	1)	-	kWh/a
		2)	-	kWh/a
		3)	-	kWh/a
	Συνολικά		126	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για θέρμανση		3.31	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για ψύξη		22.91	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για ZNX		4.14	kWh/m <sup>2</sup> /year
	Ενεργειακή ζήτηση για λοιπές χρήσεις (ύγρανση, αφύγρανση)		-	kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για αερισμό		2.17	kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για εσωτερικό φωτισμό		18.48	kWh/m <sup>2</sup> /year
	Ενεργειακή κατανάλωση για λοιπές χρήσεις (συσκευές, εξωτερικό φωτισμό, εφεδρικά συστήματα κ.λπ.)		-	kWh/m <sup>2</sup> /year
Παραγωγή ενέργειας στον τόπο του κτηρίου	Θερμική ενέργεια από ΑΠΕ (π.χ. ηλιακοί συλλέκτες)		8	kWh/m <sup>2</sup> /year
	Παραγωγή ηλεκτρικής ενέργειας στο κτήριο και κατανάλωση της επιτόπου		-	kWh/m <sup>2</sup> /year
	Παραγωγή ηλεκτρικής ενέργειας στο κτήριο και εξαγωγή της στην αγορά		-	kWh/m <sup>2</sup> /year
Κατανάλωση ενέργειας	Παρεχόμενη ενέργεια	Ηλεκτρική	51.59	kWh/m <sup>2</sup> /year
		Ορυκτά καύσιμα	28.27	kWh/m <sup>2</sup> /year
		Λοιπές μορφές (βιομάζα, τηλεθέρμανση/τηλεψύξη κ.λπ.)	-	kWh/m <sup>2</sup> /year
	Πρωτογενής ενέργεια		134	kWh/m <sup>2</sup> /year



## **1.5.6 Annex 6 – Individual Measures Modelling**

*Provided as a separate document - MS Word*