

REPORT ON COLLECTIVE PURCHASE CAMPAIGNS DEVELOPED IN CYPRUS, THE SUCCESSES AND THE LEARNINGS

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ABOUT CLEAR-X

Consumers Leading the EU's Energy Ambition Response, Expansion (CLEAR-X) is an ambitious extension of a tried-and-tested methodology, designed and developed to address consumers' needs thus **enabling consumers to lead the energy transition by investing in renewable energy sources (RES) and energy efficient (EE) technologies**.

The project cover some of the [countries](#) where financial, administrative/regulatory and technical barriers were most often perceived by the consumers during their journey to RES technologies.

These countries, Bulgaria, Cyprus, Lithuania, North Macedonia, Slovakia & Slovenia, were therefore selected for the potential impact of introducing collective purchase schemes, geographic diversity compared with similar past projects, and the presence of suitable consumer organisations.



There are four specific objectives:

- Reliable information on RES and EE technologies suitable for consumer's homes is available
- Consumers collectively invest in suitable RES technologies through trusted schemes
- Consumers receive relevant information and advice on RES and EE technologies
- Regulatory frameworks facilitate consumers' adoption of RES and EE technologies and relevant market offers

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CAMPAIGNS SPECIFICATION

CAMPAIGN #1:

Product	Heat Pump for heating and cooling (commonly called Air conditioners)
Campaign Calendar	Registration: 23 Jan to 31 April 2023 Offer: 6 Feb to 31 April 2023
Campaign Landing Page Link	https://www.klimatistika.cy

CAMPAIGN #2:

Product	Photovoltaics
Campaign Calendar	Registration: 26 April to 31 July 2023 Offer: 26 April to 31 July 2023
Campaign Landing Page Link	https://www.photovoltaika.cy

CCA organised two Collective Purchase Campaigns (CPC) with the aim of securing EE and RES investment at better prices and purchase conditions, quality installations for all consumers, who'd sign up to participate in the CPC.

CAMPAIGN 1: AIRCOS MARKET RESEARCH ANALYSIS

The Market Research Analysis for air conditioners in Cyprus encompassed several key activities:

- **Online Search and Shop Visits** to gather relevant information about the products and brands available in the market;
- **Communication with CCA Members** via emails and telephone conversations to gain insights into the broader air conditioner market in Cyprus;
- **Discussions with major sales companies and importers** of air conditioners to understand market dynamics, challenges, and trends.

These activities aimed to provide a comprehensive overview of the air conditioner market in Cyprus, considering factors such as consumer preferences, market trends, and challenges faced by industry players.

The current economic situation, particularly in the aftermath of the COVID-19 years, has impacted consumer purchasing power, making it challenging for many to afford the replacement of old air conditioners or the installation of new, highly efficient units.

Importers have highlighted difficulties in guaranteeing the import of a certain number of air conditioner models, citing concerns related to pricing and timely delivery. The use of a "just-in-time" policy by most importers and shops resulted in insufficient stock availability. Additionally, the high cost of electricity has contributed to consumer reluctance in using air conditioner units to regulate the temperature in their homes, whether for cooling or heating, depending on the season.



This economic landscape presents challenges and considerations for both consumers and industry players in the air conditioning market in Cyprus.

Main highlights

In Cyprus, the primary challenge is dealing with excessive heat, and air conditioners are extensively employed. The second option for cooling includes fans—portable, wall-mounted, or ceiling fans. Nevertheless, with temperatures frequently surpassing 40°C, fans prove to be less effective.

Therefore, the air conditioner market in Cyprus is highly developed, offering a diverse range of options. Consumers can purchase air conditioners from specialised electrical shops, DIY stores, online retailers, and even supermarkets. The market features a wide variety of air conditioners, ranging from affordable to high-end brands, with power levels tailored to different needs. The most commonly used power rating in Cyprus is 12,000 BTU, often installed in bedrooms. Customers have the option to buy air conditioners independently and find their own installer, or they can choose to purchase from an electrical store that provides installation services.

The Cyprus market, being relatively small, is characterised by consumers who are generally aware of suppliers with reputable standing. In the context of the CLEAR-X project, CCA capitalized on this by engaging with retailers known for their positive reputation to explore potential collaborations and agreements.

PRODUCT TEST RESULTS

The initial list of tested air conditioners is detailed in Appendix A, encompassing a broad selection of air conditioners available in the Cyprus market and subjected to testing by ICRT. The final selection of air conditioners offered by CCA to consumers as part of the campaign is outlined in Appendix B. The choices were made considering various parameters, as elucidated in Appendix B.

It is essential to note that the selection of air conditioners was based on results derived from products provided by other partners, ensuring a comprehensive and collaborative approach to the campaign.

NEGOTIATION

After compiling a list of air conditioner suppliers, shops, and installers in Cyprus, CCA sent emails to inform them about the CLEARX project and see whether they would be interested in submitting an offer for the CPC. Additionally, CCA engaged in one-on-one interviews with suppliers, shops, and installers to address specific queries and concerns related to the CPC.

A comprehensive document was prepared and disseminated to suppliers, shops, and installers, outlining crucial information for their participation in the collective market. The document included:

- details on why they should participate, bid, and become a provider in the collective market.
- insights into the estimated campaign and purchase timeline
- the timeframe for submitting tenders



- the basic conditions for participation.

Suppliers were requested to include in their binding offers information such as:

- device models they could offer
- minimum quantities for each model
- final consumer prices (including VAT)
- a detailed description of the basic installation, including services covered.

The document encouraged suggestions for enhancing the offer and attracting potential consumers.

The air conditioner models for the campaign were limited to power ratings of 9,000 and 12,000 BTUs, with the latter being the more popular choice in Cyprus.

CCA informed the interested parties that the press conference to announce the launch of the air conditioners CPC would take place on the 23rd of January 2023. They were requested to submit offers for:

- Two inverter air conditioner models with a power rating of 2.5 kW (9,000 BTU), and
- Two inverter air conditioner models with a power rating of 3.5 kW (12,000 BTU).

Only two offers were received from the following suppliers: HARRIS Electric House and CYPIN LTD, covering both the required models of 2.5 kW and 3.5 kW.

CCA had a discussion with CYPIN to explore the possibility of reducing their prices, as they were considerably higher than those offered by Harris Electric House. Keeping in mind that green loans in Cyprus are very limited, primarily available for purchasing cars, and even those loans have interest rates not significantly different from ordinary loans, the proposed price would have not been favourable for the success of the campaigns.

Unfortunately, CYPIN insisted on maintaining their initial prices. Consequently, CCA decided to proceed solely with Harris Electric House, as the offer from CYPIN was significantly higher for the same models.

The selected supplier, Harris Electric House, assured that they had sufficient quantity of each selected model in stock and offered a discount ranging from 15% to 20%. CCA proceeded to sign a contract with them, and offered consumers the following models:

- MITSUBISHI HEAVY INDUSTRIES, SRK25ZSW, total score test result 67%
- MITSUBISHI HEAVY INDUSTRIES, SRK35ZSW, total score test result 69%
- DAIKIN, FTXM25RV1B, total score test result 74%
- DAIKIN, FTXM35RV1B, total score test result 71%

CAMPAIGN CONTENT & PROMOTION

The employees of CCA were well-equipped to address any inquiries related to the CLEARX project, including details about the ad hoc website for CPC registration and other relevant matters. Additionally, these employees are actively involved in the CLEAR-X project team, ensuring comprehensive support and information dissemination.



CCA provided valuable information to CPC participants through four documents covering topics such as collective purchasing of air conditioners, testing of air conditioners (including a list of tested models), addressing unpleasant smells from air conditioners and how to remove them, and offering guidance on the care and maintenance of air conditioners.

CCA also maintained an active telephone line from 23 January to 31 July 2023, operating daily from 09:30 to 14:00h. This allowed CCA to engage in proactive communication with consumers during the collective purchase campaign, helping them not only in understanding consumer preferences and concerns but also allowed for a personalised approach to cater to their needs. Direct communication channels, such as a telephone line, played a crucial role in building trust and ensuring consumers felt supported throughout the purchasing process.

In addition to direct communication via phone lines, CCA used diverse media channels such as press conferences, TV and radio appearances, and social media advertising, to effectively communicate the campaign's benefits.

Before the campaign, CC drafted invitations to a press conference, which were disseminated to various media outlets in Cyprus, including TV, radio, newspapers, and websites. Moreover, CCA directly communicated with several journalists via personal phone calls, inviting them to attend the press conference. During the conference, CCA highlighted the advantages of the collective purchases campaign for air conditioners, introduced the website/platform, and provided an overview of the registration and purchase process.

Following the press conferences, CCA participated in numerous TV and radio appearances. Many of these engagements were interactive, allowing CCA's representatives to not only discuss the collective purchases campaign but also emphasize the advantages of using energy-efficient air conditioners.

Throughout our TV and radio appearances, CCA shared the association's phone number and email with consumers, encouraging them to reach out at any time for additional information. As a result, CCA received hundreds of phone calls and emails seeking further details about the campaigns.

In conclusion, CCA successfully generated consumer interest in the A/C campaign, leading to the registration of thousands on our platforms for the collective purchasing campaign.

CONCLUSION

The table below presents the goals and the results achieved.

	Goal	Achievement
Engagement	1,500	3,151
Sales/Installations	200	57
Average cost/installation	800€ ¹	1,158 €
Page Visits	-	21,000

¹ This average cost was determined based on national data available at the time of writing the project proposal in 2020.



Barriers

The main barriers identified for not achieving the targeted sales quantities, as indicated by consumer satisfaction feedback, include:

- **High Prices:** Approximately 78% of the 457 respondents felt that the prices of the selected air-conditioners were too high, making it challenging for low-income consumers to benefit from the offers.
- **Limited Availability of Recommended Models:** Consumers expressed concerns about the scarcity of recommended models, likely influenced by post-COVID market effects. This limitation in product variety affected consumers' choices.
- **Short Time Span for Purchase to Installation:** Consumers noted that the time span from purchasing air-conditioners to installation was too short. Suppliers were reportedly reluctant to commit to quick installations.
- **Lack of State Grants or Green Loans:** The absence of state grants, especially for vulnerable consumers, and the unavailability of green loans from banks contributed to the challenges in making these purchases, particularly for individuals with lower incomes.

In addition to the previously mentioned barriers, the timing of our campaign proved to be unfavourable. It coincided with the aftermath of the COVID-19 period, during which the economic situation of most consumers was not optimal. The market faced challenges with a shortage of available air conditioner models, and suppliers were hesitant to commit to the required quantities for the selected air conditioner models. These factors further contributed to the difficulties in achieving the desired campaign outcomes.

Lessons learnt

It became evident early in the campaign that the selected products were relatively expensive compared to some other models that, while less efficient, still fell within the list of the best 10 models. Unfortunately, these more budget-friendly models were not available in the required quantities, and suppliers were unable to guarantee their availability. Exploring the option of offering a mix of models without quantity guarantees from suppliers might have been a strategy to potentially achieve higher sales.

CCA gained valuable insights into organizing CPCs through their experience with the first campaign. Consumer interest was evident, and there's a readiness for future collective purchasing initiatives. CCA acknowledges the need for better preparation, market analysis, and timing assessment for the successful initiation of new CPCs. Moreover, while CCA committed many resources in increasing consumer awareness about EE technologies, it is clear that there is still work to do when talking about energy saving, which both benefit their pockets and the environment.



CAMPAIGN 2: PV PANELS

MARKET RESEARCH ANALYSIS

The Market Research Analysis for Photovoltaics in Cyprus involved various activities, including online research, visits to photovoltaic suppliers and installers, communication with CCA members through emails and phone conversations, and discussions with major sales companies and importers of photovoltaic panels and inverters.

Due to the tremendous increase in the electricity prices consumers turned to installation of photovoltaic systems. Reflecting the sudden demand of PV installations more and more installation companies appeared in the market. In the Cyprus market there are established PV installers which offer a variety of brand PV panels and inverters. The installers also offer a great range of PV power systems, from 3KWp to 10KWp.

Each installation company committed to handling the entire administrative process, encompassing the submission of requisite forms and applications (to entities such as the Electricity Authority of Cyprus and City Hall) for obtaining permission for PV installation. This included conducting a techno-economic analysis of the proposed investment, conducting a final check with the Electricity Authority of Cyprus to facilitate the system's connection to the network, and, if applicable, ensuring eligibility for the government grant by submitting all pertinent forms to the Ministry of Energy for grant payment.

Nevertheless, it is important to note that in the current economic climate characterized by the aftermath of the COVID-19 pandemic, many consumers lack the financial capacity to invest in photovoltaic systems, primarily due to the high cost associated with these installations. Importers face challenges in ensuring the availability of specific models of photovoltaic panels, including issues related to quantities, pricing, and timely delivery. The scarcity of stock is attributed to the prevalent just-in-time inventory management policy adopted by most importers and shops.

PRODUCT TEST RESULTS

The initial list of tested photovoltaic panels is detailed in Appendix C, encompassing panels available in the Cyprus market that underwent testing by ICRT. For the conclusive selection of photovoltaic panels presented to consumers and employed in the campaign, please refer to Appendix D. The choices were influenced by various parameters, as outlined in the same appendix.

It is important to note that the chosen photovoltaic panels were determined based on results obtained from products supplied by other partners and one from CCA.



NEGOTIATION

After compiling a list of air conditioner suppliers, shops, and installers in Cyprus, CCA sent emails to inform them about the CLEARX project and see whether they would be interested in submitting an offer for the CPC. Additionally, CCA engaged in one-on-one interviews with suppliers, shops, and installers to address specific queries and concerns related to the CPC.

A comprehensive document was prepared and disseminated to suppliers, shops, and installers, outlining crucial information for their participation in the collective market. The document included:

- Rationale for participating, bidding, and becoming a provider in the CPC;
- The estimated campaign and purchase timeline;
- The estimated timeframe for bidding by interested providers;
- Fundamental conditions for participation in the submission of tenders.

Providers were asked to indicate in the offer the following information:

- Photovoltaic panel models that they could offer for the CPC from the list of tested and rated devices (see Appendix C).
- Minimum quantity of each model in stock.
- Final price for each model, inclusive of VAT, applicable to the consumer, along with a comprehensive description of the basic installation.
- Indication or description of the service network.
- Any suggestions for enhancing the offer to attract potential consumers to make a purchase (which could influence the selection decision based on the offered price).

CCA communicated to the interested parties that the press conference, signalling the launch of the PV CPC, would take place on the 26th of April 2023, and they were requested to submit their offers for the models listed in Appendix C.

Only three offers were received from the following suppliers: Polart Energy, Eletoyia Photovoltaics, and Domenica Solar. Other suppliers and installers were unable to provide the recommended panels either because they were old models or were unable to order and receive them on time and in the required quantity.

Both **Polart Energy** and **Domenica Solar** offered only the Jinko Tiger Pro 455 Wp panels, while **Eletoyia Photovoltaics** offered Jinko Tiger Pro 455 Wp, JA Solar JAM72S20-460/MR, Q-Cells Hanwha Q, LUXOR ECO-P60/270W H, REC Twin Peak 2 280 TP and JA SOLAR JAM60S.

CCA decided to proceed with all three suppliers, Polart Energy, Domenica Solar, and Eletoyia Photovoltaics. They guaranteed having a sufficient quantity of each offered panel in stock and offered a discount ranging from 10% to 15%. CCA signed contracts with all three.



CAMPAIGN CONTENT & PROMOTION

As for the CPC on air conditioners, CCA employees were able to address inquiries regarding the CLEAR-X project, the dedicated registration website, and other relevant matters.

CCA promoted the campaign through a variety of channels, including call center, factsheets, TV and radio appearances, press conferences, social media and video production.

Indeed, CCA created four factsheets related to collective purchasing of Photovoltaics, explaining topics such as what photovoltaic energy is, how photovoltaic panels produce electricity, and maintenance of photovoltaic systems. These documents were made available on the platform for participants.

Similarly to the air conditioners CPC, CCA's telephone line operated from 26 April to 31 July 2023, every day from 09:30 to 14:00h. Throughout the campaign, the telephone line both received incoming calls and proactively reached out to consumers to assess their interest in purchasing the offered product and their intent to buy or not.

CCA initiated the campaign process by drafting an invitation to a press conference, which was then distributed to all media outlets in Cyprus, including TV, radio, newspapers, and websites. Furthermore, CCA personally contacted numerous journalists via phone calls, extending invitations for their participation in the press conferences.

At the press conference, CCA presented the benefits of the collective purchases campaign for photovoltaic systems, showcased the website/platform of the CPC, and elucidated the process of registration and purchase through presentations.

Following the press conference, CCA was invited to several TV and radio appearances, where interactive discussions allowed CCA's representatives to elaborate not only on the collective purchases campaign but also on the advantages of installing photovoltaic systems. Throughout these appearances, CCA shared with consumers the association's phone number and email, encouraging them to reach out for additional information. This outreach resulted in hundreds of phone calls and emails seeking more details about the campaigns.

Additionally, CCA promoted the campaign by disseminating a specially produced video for the CPC through various channels, including social media, TV, and radio.

This effort, together with the activities mentioned above, contributed to reaching the targeted number of engaged consumers registering on our CPC platform.

CONCLUSION

The table below presents the goals (KPIs) versus the results achieved.

	Goal	Achievement
Engagement	1,500	1,565
Sales/Installations	200	57



Average cost per installation	5,000€ ²	5,520€
Page Visits	-	20,468

Barriers

The **main barriers** for not achieving the target quantities of sales of PV panels during the CPC are the following, based on the Consumer Satisfaction survey results:

- **High prices** of the selected photovoltaic panels: Approximately 49% of 122 respondents found the prices to be excessively high, making it challenging for low-income consumers to benefit from the offers.
- **Shortage of available recommended models:** Post-Covid market effects contributed to a perceived scarcity of products and providers, impacting consumer choices.
- **Inadequate time for installation after purchase:** Consumers noted a short time span from purchasing photovoltaic systems to installation, with suppliers showing reluctance to commit within the specified timeframe.
- **Lack of green loans:** The absence of green loans, coupled with banks' refusal to provide loans to vulnerable consumers, posed additional challenges to the adoption of photovoltaic systems.

The insufficient availability of the required photovoltaic panels in the Cyprus market further complicated matters, as suppliers and installers were hesitant to commit to the necessary quantities for the selected photovoltaic models.

Moreover, to install PVs, several permits are required, including those from the Electricity Authority of Cyprus and the City Council. While permission from the City Council is typically expedited within one or two weeks, obtaining approval from the Electricity Authority often takes four to five months. Following the installation, consumers must endure additional waiting periods for the Electricity Authority to inspect and approve the installation before it can be connected to the grid. These delays proved frustrating for many consumers, leading some to reconsider proceeding with the installation via the CPC organised by CCA.

During a crucial phase of the campaign, the government **announced** a new initiative named 'Photovoltaics for All.' This scheme should offer consumers the chance to install a photovoltaic system without an initial capital investment. Participants should receive a grant of €1,000, and the remaining amount should be repaid through bimonthly instalments of €150 via the electricity bill once the photovoltaic system starts producing electricity for the premises. Unfortunately, consumers, including those registered for the CLEAR-X campaign, are still awaiting the actual opening of the scheme. This was an additional factor that ultimately impeded the results of the CCA campaign.

² This average cost was determined based on national data available at the time of writing the project proposal in 2020.



Lessons learnt

During and after the implementation of the CPC, CCA understood that consumers are still reluctant to invest in PV systems. Despite our efforts to inform them about the benefits of this technology, many are not yet convinced of the positive impact it can have on their finances and the environment.

Additionally, CCA noted that all three selected PV companies were not as proactive as anticipated in reaching out to registered consumers to proceed with the installation of PV systems. They displayed limited engagement after sending out the offers to interested consumers, and there wasn't enough effort in regularly contacting consumers to understand why they were not proceeding with the installation. CCA frequently encouraged the companies to actively contact interested consumers to inquire about their intentions, taking on the investigative role themselves as needed.



APPENDIX A: TESTED AIR CONDITIONERS

Κλημιστικά που ελέγχθηκαν εργαστηριακά και υπάρχουν στην Κύπρο			
Τύπος / model	Κατασκευαστής	Model	Βαθμολογία
IT14368-0088-51	Mitsubishi Electric	WSH-LN25I Onyx Black (MSZ-LN25VGB/MUZ-LN25VG)	4.366
IT14368-0088-52	Mitsubishi Electric	WSH-LN25I Pearl White (MSZ-LN25VGV/MUZ-LN25VG)	4.366
IT14368-0088-53	Mitsubishi Electric	WSH-LN25I Natural White (MSZ-LN25VGW/MUZ-LN25VG)	4.366
IT14368-0111-00	Mitsubishi Electric	MSZ-AP25VG / MUZ-AP25VG	4.036
IT14368-0111-50	Mitsubishi Electric	MSZ-AP25VGK / MUZ-AP25VG	4.036
IT14368-0192-00	Mitsubishi Heavy Industries	SRK35ZS-W (Premium) + SRC35ZS-W	3.960
IT14368-0205-00	Mitsubishi Heavy Industries	SRK25ZS-W (Premium) + SRC25ZS-W	3.846
IT14368-0112-00	Mitsubishi Electric	MSZ-AP35VG / MUZ-AP35VG	3.838
IT14368-0112-50	Mitsubishi Electric	MSZ-AP35VGK / MUZ-AP35VG	3.838
IT14368-0001-00	Mitsubishi Electric	MSZ-SF25VE / MUZ-SF25VE (MSZ-SF25VE)	3.812
IT14368-0145-00	Mitsubishi Electric	MSZ-HR35VF	3.636
IT14368-0118-00	LG	S09EQ.NSJ / S09EQ.UA3 (S09EQ.SSJ)	3.605
IT14368-0131-00	LG	PC09SQ.NSJ / PC09SQ.UA3 (PC09SQ.SSJ)	3.555
IT14368-0175-00	Panasonic	KIT-FZ25-WKE	3.510
IT14368-0229-00	Toshiba	RAS-13PKVPG-E / RAS-13PAVPGG-E (Daiseikai 9)	3.461
IT14368-0138-00	Mitsubishi Electric	MUZ-HR25VF - MSZ-HR25VF	3.458
IT14368-0211-00	Midea	MSAGBU-12HRFN8 -QRD1GW(GA)-HIWF/MOX230-12HFN8-QRD6GW (Xtreme Save)	3.440
IT14368-0136-00	LG	PC12SQ.NSJ / PC12SQ.UA3 (PC12SQ.SSJ)	3.420
IT14368-0116-00	LG	S12EQ.NSJ / S12EQ.UA3 (S12EQ.SSJ)	3.412
IT14368-0182-00	LG	S09ET NSJ/S09ET UA3 Standard	3.402
IT14368-0203-00	LG	AC12BH NSJ / AC12BH UA3 (ARTCOOL MIRROR)	3.391
IT14368-0174-00	Panasonic	KIT-FZ35-WKE	3.349
IT14368-0218-00	LG	S12ET NSJ/S12ET UA3 Standard	3.329
IT14368-0113-00	Samsung	AR09NXFPEWQNEU / AR09NXFPEWQXEU	3.323
IT14368-0151-00	Toshiba	RAS-B10J2KVG-E / RAS-10J2AVG-E (Seiya)	3.251
IT14368-0196-00	Haier	AS25S2SF2FA / 1U25S2SM1FA (Flair)	3.161
IT14368-0125-00	Midea	MSVPBU-12HRFN1-QRD0GW/MOB03-12HFN1-QRD0GW (VERTU PLUS 35)	3.160

APPENDIX B: FINAL SELECTION OF AIR CONDITIONERS

For consumers prioritizing energy efficiency when selecting air conditioners, understanding the Seasonal Energy Efficiency Ratios (SEER) for cooling and Seasonal Coefficient of Performance (SCOP) for heating can be valuable during the purchase decision.

Seasonal efficiency, a recent measure, provides a more comprehensive assessment of the actual energy efficiency of heating and cooling devices over an entire year. Higher SEER and SCOP values indicate lower energy consumption for cooling and heating, respectively.

The SEER rating is calculated by dividing the total BTUs (British Thermal Units) of heat removed from the air by the air conditioner's total energy consumption in watt-hours (Wh).

SCOP is a useful coefficient for evaluating reversible air conditioners, representing the ratio of energy produced to energy consumed, specifically in heating mode.

Traditionally, air conditioners were classified based on the Energy Efficiency Ratio (EER) for cooling and the Coefficient of Performance (COP) for heating. EER is obtained by dividing the machine's cooling efficiency in kilowatts (KW) by its power consumption in KW. COP is similarly calculated for heating efficiency. Higher EER and COP values indicate better machine quality.

- **Efficiency**, accounting for 65% of the total score, is evaluated by testing air conditioner performance at various outdoor temperatures during cooling and heating. SEER and SCOP indices, annual energy consumption, and time required to reach desired temperatures are measured.
- **Noise**, constituting 10% of the total score, is assessed by measuring the noise levels of both outdoor and indoor units during operation.
- **Flexibility**, accounting for 10% of the total score, examines features such as low power mode, fan-only operation, display of room temperature, and maximum distance between outdoor and indoor units.
- **Ease of use**, representing 10% of the total score, assesses the user-friendliness of changing settings and, if applicable, the usability of remote control applications.
- **Instructions for use**, contributing 5% to the total score, evaluate the completeness and clarity of accompanying user manuals, including information on recycling the device or its components.



	EER/COP	Ετήσια κατανάλωση ενέργειας ψύξη/θέρμανση SEER/SCOP	Απόδοση kWh	65%	5%	10%	10%	10%	Συνολικό αποτέλεσμα δοκιμής
2.5 kW Κλιματιστικά									
LG F09MT NSM/F09MT U24	5.1/5.3	9.4/5.1	93/1016	++	+	+	+	+	79
Toshiba RAS-10PKVPG-E/RAS-10PAVPG-E	5.5/4.2	10.6/5.2	83/807	++	+	o	+	o	77
Daikin FTXM25R2V1B/RXM25R5V1B	4.4/4.5	8.7/5.1	101/659	+	+	+	+	++	74
Mitsubishi Electric MSZ-AP25VG/MUZ-AP25VG	4.1/4.1	8.6/4.8	101/698	+	+	o	+	+	71
Mitsubishi Heavy Industries SRK25ZS-W/ SRC25ZS-W2	3.8/2.7	8.5/4.7	103/804	+	+	+	++	++	67
Panasonic CS-FZ25WKE/CU-FZ25WKE	3.1/2.5	6.2/4.2	141/663	+	o	+	+	o	60
3.5 kW Κλιματιστικά									
LG F12MT NSM/F12MT U24	3.8/5.4	9.1/5.1	135/1043	+	+	+	+	+	76
Daikin FTXM35R2V1B/RXM35R5V1B	4.2/4.0	8.7/5.1	137/686	+	+	+	+	++	71
Mitsubishi Heavy Industries SRK35ZS-W/ SRC35ZS-W2	3.1/4.2	8.4/4.7	146/863	+	+	+	+	++	69
Toshiba RAS-13PKVG-E/RAS-13PAVPG-E	4.3/3.2	9.5/5.1	129/435	+	+	o	o	+	68
Mitsubishi Electric MSZ-AP35VG/MUZ-AP35VG	2.8/3.6	8.6/4.7	142/862	+	+	o	+	+	67

++	ΠΟΛΥ ΚΑΛΑ (80-100)	+	ΚΑΛΑ (60-79)
o	ΜΕΣΗ ΤΙΜΗ (40-59)	-	ΕΛΑΤΤΩΜΑΤΙΚΑ (20-39)
		oo	ΜΗ ΙΚΑΝΟΠΟΙΗΤΙΚΑ (0-19)



APPENDIX C: LIST OF PV PANELS AND VOLTAGE CONVERTERS TESTED

Panels:

- JA Solar JAM72S20 445-470/MR
- Jinko Solar Tiger Pro 60HC 440-460 Watt
- Hyundai HIE-S350SG-BFR
- Q-Cells Hanwha Q.PEAK DUO ML G9.4 390 Wp
- RECSOLAR Half-cut monocristalino 320 Mono – 120 cells
- REC REC Twin Peak 2 280 TP
- LG NeoNR 400 Q1C-A6
- JA Solar JAM60S10-345/MR-BF
- Luxor ECO LINE P60/270W
- Amerisolar AS-6P30
- SHARP Mono half-cell NU-JD 445 Wp

Voltage converters:

- Kostal PIKO MP plus 3.0 – 2
- Fronius Primo 3.0-1 Light
- SMA Sunny Boy 3.0-1AV-41
- Fronius Primo GEN24 3.0 Plus
- Solaredge HD-Wave SE3000H-RW000BNN4
- Huawei SUN2000-3KTL-L1
- APSystems DS3 880W
- APSystems QS1 1400W
- Enphase microinverter IQ 7+ 290VA - IQ7PLUS-72-2-INT



APPENDIX D: PHOTOVOLTAIC PANEL TEST RESULTS 2022-2023

Through our engagement with the International Organization for Consumer Research and Testing (ICRT), we conducted extensive testing on diverse models of Photovoltaic panels, meticulously evaluating the quality of brands accessible in the Cypriot market. Focusing on crystalline PV panels exclusively, we subjected the selected brands in Cyprus to thorough examination in an independent laboratory in Spain. The comparison encompassed the results of various tested parameters across 10 models. The following parameters were meticulously scrutinized during the testing process:

- **Visual Inspection and Water Jet Test:** Conducted a comprehensive assessment of the frame's overall appearance, construction, and resistance to water penetration.
- **Determination of Maximum Efficiency:** Measured the maximum power under optimal laboratory conditions, including a standard temperature of 25 degrees Celsius, luminous flux of 1000 W/m², and controlled air flow to simulate peak operational conditions.
- **Performance of Photovoltaic Panels:** Evaluated performance under ideal laboratory conditions, maintaining a temperature of 25 degrees Celsius, optimal airflow for cooling, and a luminous flux of 1000 W/m². Efficiency calculations were based on the ratio of received light (W) to electricity generated (W).
- **Maximum Power (Wp) and Guarantee Percentage:** Assessed the total Watt-peak (Wp) and the percentage efficiency of the frame over the manufacturer's stated life, comparing actual performance to the initially declared maximum performance.
- **Maximum Permissible Mechanical Load:** Measured the load-bearing capacity in Pascals, focusing on the frame's resilience to mechanical stress from various weather conditions, including storms, hail, ice/snow, and falling debris.
- **Evaluation of Deviation in Initial and Final Maximum Power Tests:** Implemented two samples for each frame model, conducting both functional and unconstrained stress tests. Scores were assigned based on the outcomes, categorizing frames into intervals of average, above-average, and below-average performance.

	1	2	3	4	5	6	7	8	9	10
Manufacturer	JA Solar	Jinko Solar	Hyundai	Q-Cells	RECSOLAR	REC	LG	JA SOLAR	LUXOR	Amerisolar
Model name	JAM72S20-460/MR	Tiger Pro 60HC 440-460 Watt	HiE-S350SG-BFR	Hanwha Q.PEAK DUO ML G9.4 390 Wp	Half-cutmonocrystalino 320 Mono-120 cells	REC Twin Peak 2 280 TP	NeoNR 400 Q1C-A6	JAM60S10-345/MR-BF	ECO-P60/270W	AS-6P30
PARAMETERS UNDER TEST										
Visual inspection and resistance to water penetration	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,5
Calculation of the maximum power	4,911	4,216	5,121	4,329	5,298	4,289	4,978	4,222	4,329	5,169
Performance of photovoltaic panels	20,7	21,32	20,2	20,6	19,2	17	22,10	20,2	16,6	16,9
Max. Power (Wp) and % manufacturer's warranty	460 Wp 84,80%	460 Wp 84,8%	350 Wp 86,0%	390 Wp 86,00%	320 Wp 80,7%	280 Wp 82%	400 Wp 92,5%	345 Wp 80%	270 Wp 85%	275 Wp 83%
Max. permissible mechanical load (Pa)	5400	5400	5400	5400	5400	5400	5400	5400	5400	5400
Deviation in tests maximum efficiency	5.5	5,488	5,239	5,5	5,5	5,5	5,5	4,478	5,5	4,482
Overall assessment	5,279	5,057	4,483	4,274	4,263	4,146	4,066	4,053	3,499	3,275
Overall ranking	1	2	3	4	5	6	7	8	9	10