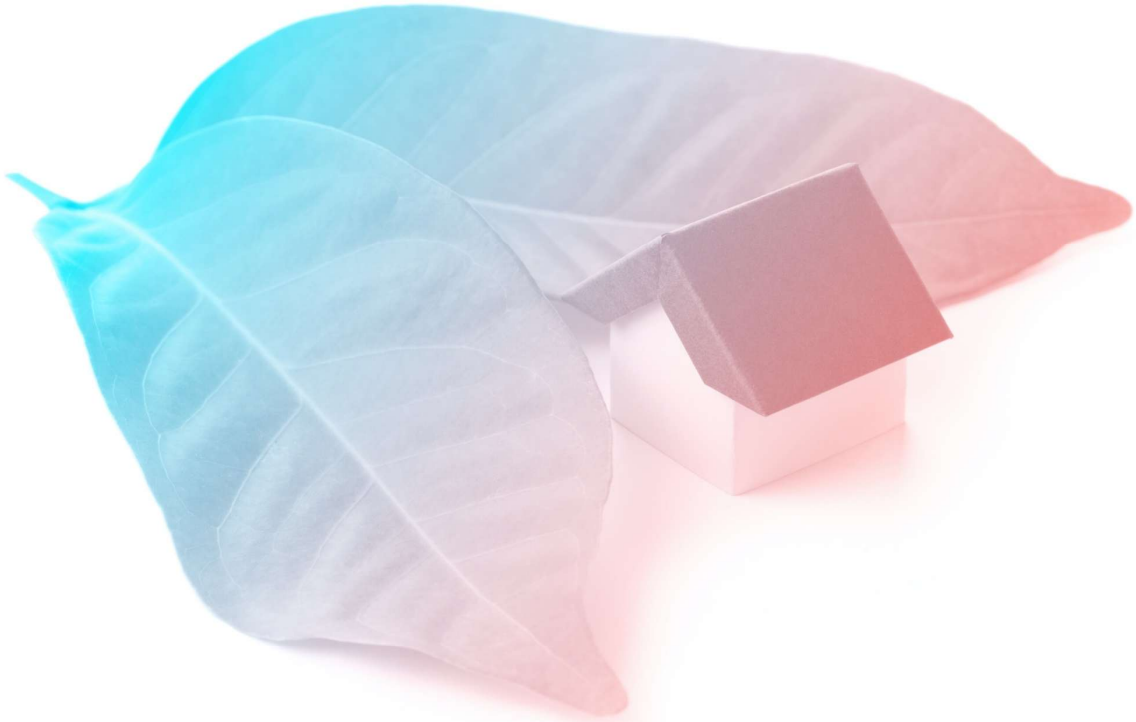
D7.2 Design evaluation through user validation in demonstration sites



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D7.2 Design evaluation through user validation in demonstration sites

Summary

The current Deliverable presents the second evaluation of the proposed MiniStor design of the user interaction, configuration, interfaces and features from representative subjects.
For this second version, the evaluation methodology has been extended from users in the pre-demonstration site to residential users in the demonstration sites of the project. The methodology involved surveys to collect responses concerning user satisfaction with the system, evaluation of the degree of accessibility of the controls, ease of use, etc. Survey respondents had access to the interface while answering questions. Information has been analysed and compared with responses to the first stage evaluating the degree of improvement achieved. During this process all data collected from users have been anonymized and treated under GDPR guidelines.
Results show that users at the pilot sites found their interaction with the user interface agreeable and the information clearly presented. Aspects for improvement are also mentioned.

Deliverable Number	Work Package
D7. 2	WP. 7
Lead Beneficiary	**Deliverable Author(S)**
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Type of deliverable	R	Report	X
Dissemination Level	CO	Confidential, only for members of the consortium (including the Commission)	
	PU	Public	X

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Introduction

This document is the second of two related deliverables of Task 7.1. The Design and Validation task follows the MiniStor development respectively at pre-demo site (M9) and at demo site (M65).

The scope of this second stage of task 7.1 is to implement and evaluate the design of MiniStor's user interaction, configuration, features and interfaces when deployed at the pilot sites and receive meaningful feedback from the pilot users. As a first step, we needed to identify the different user roles, the means of interaction with the system, the monitoring and control operations that will be supported for the different users and define the different scenarios of use. The outcome of this design process was evaluated by a wide range of residential users, which could potentially be future MiniStor customers with specific expectations about the product and the features that it offers. The main objectives of this task were:

- to identify the user needs and requirements concerning their interaction with MiniStor system.
- to perform the initial design of the user interfaces and features.
- to evaluate the design.

Results from this stage have been applied to T5.1 "Design of the MiniStor control and self-optimization platform (Smart Home energy management system)" and T5.3 "IoT-platform for user interaction with system for operation and performance (visualizations, alerts, actionable devices, user interface)". Results will also help refine the message being delivered to stakeholders in WP8.

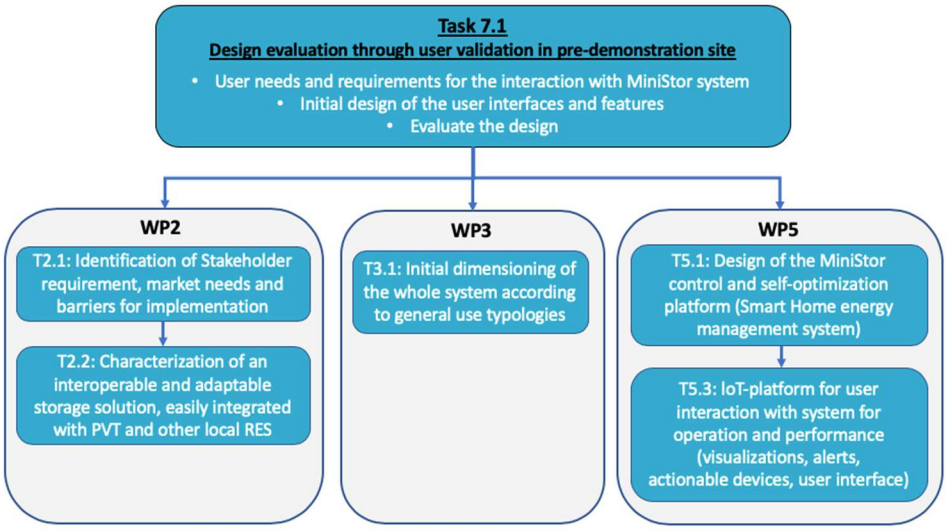


Figure 1 Task 7.1 connections

In the following chapters we present:

- the User Stories that have been identified are presented
- the Use Cases that have been identified are presented
- the evaluation of MiniStor design from the users is presented and discussed
- the outcomes of this stage of this task are given in the Conclusions

1. Methodology

1.1. User Requirements Methodology

The most commonly used way of modelling requirements is by the definition of Use Case scenarios. The Use Case approach has been very successful in previous years due to its impact on the whole development cycle, which assists in finding the application architecture and identify the different components of the system in the design phase. The use case is a procedure that describes how a person ("actor") is operating the system and includes a main sequence of actions ("success scenario"), as well as one or more alternative paths. Use cases can be written in unstructured text or in the form of Unified Modelling Language (UML) diagrams, while quite often they conform to a structured template containing:

- Title,
- Goal,
- Actor(s),
- Preconditions,
- Main Success Scenario,
- Alternatives,
- Extensions etc. [2].

Technical terminology is usually avoided so that the use case is clear to customers, end-users and non-technical readers.

Early in 2001, the Manifesto for Agile Software Development was created by 17 people who met to discuss the future of software development. The manifesto was a short document that described the team's conclusions on how to develop and manage software in better ways, from which the Twelve Principles of Agile Software have emerged. Some of the principles include "to satisfy the customer through early and continuous delivery of valuable software" and "welcome changing requirements, even late in development". Capturing requirements in the agile world is made through User Stories, which is the smallest unit of work in the agile framework. While Use Cases focus more on the behaviour of the system, User Stories focus on "who", "what" and "why". Each User Story can be considered a thread through one of the use cases and can be expressed in a single sentence, using simple language [1]. In the following figure, User Stories and Use Cases main characteristics and differences are presented in a nutshell.

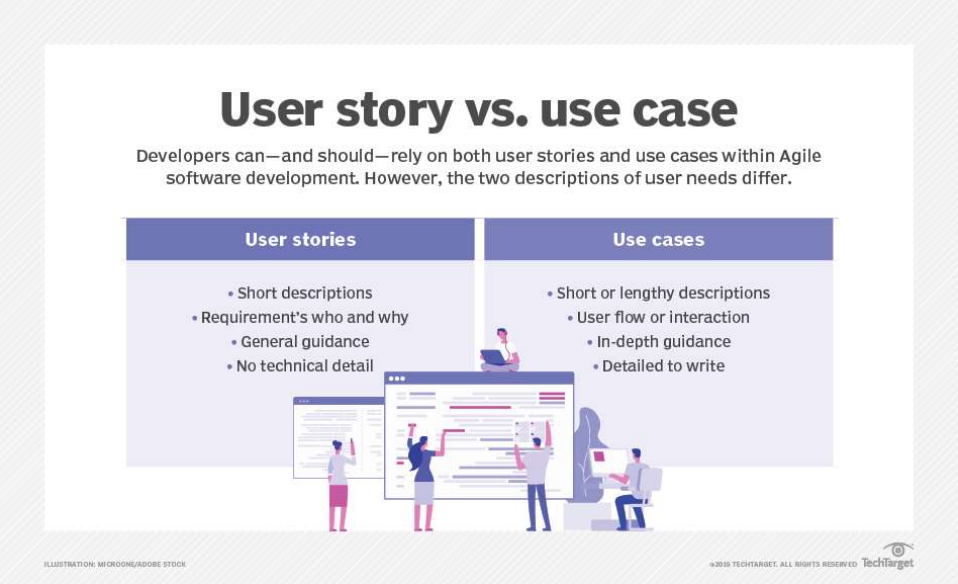


Figure 2 - User Story vs Use Case [3].

In Agile project management:

- User stories are short requirements or requests written from the perspective of an end user.
- Epics are larger bodies of work that can be broken down into a number of smaller tasks (called stories). A series of related and interdependent user stories makes up an epic.

User stories are usually expressed in a simple sentence, as follows:

"As a [type of user], I [want to], [so that]."

- "As a [type of user]": Who are we building this for?
- "Wants to": Their intent, goal — not the features they use. What is it they're actually trying to achieve?
- "So that": What's the reason?

Use Case models and User Stories are both very important techniques in the Requirement Gathering Process of software development [4]. When comparing Use Cases and User Stories it appears that User Stories are much simpler tasks than Use Cases, while there is a similarity between Epics and Use Case models. Users and Epics can be used to generate Use Case models.

The potential end-users of the MiniStor system have also been identified. The Actors/Users that we have identified for MiniStor User Interface are the following:

- the resident of the apartment/building
- the building manager
- the maintenance personnel
- the administrator
- the developer

Following the above steps the UI features have been identified from the user stories, while possible interactions and functionalities were identified through the use case scenarios that were formed taking into account also features already identified in tasks of WP 2, 3 and 6. The first drafts of the MiniStor UI were designed in graphical form with the intended colour schemes and they incorporated basic functionalities and features identified from the user stories and use cases (for example, visualization of tariffs and energy consumption).

In the next chapters, we present the user stories and use cases that have been identified based on the desired functionality for each Actor/User, while the mockup interfaces have been implemented as functional pages with focus on the actual end-user/customer, meaning the resident and/or the building manager.

1.2. User Evaluation Methodology

The methodology used in this task for the MiniStor design data collection, follows the approach of a remote interview with potential end-users interested to improve the building or dwelling energy flexibility by an innovative solution for the energy management and storage. A questionnaire was developed considering both the use cases/user stories methodology and the final IoT platform evaluation.
It was split into four main sections of questions:

- Background information
- MiniStor features and functionalities
- MiniStor IoT platform
- Business opportunity

The questionnaire was circulated in order to reach a large number of stakeholders as possible and collect a high level of information.
The process can be summarized in four main points:

a) Identification of questions for the design evaluation

After a brainstorming that involved project partners, a series of questions were formulated in order to know more about the characteristics of potential users, their preferences regarding thermal and electrical storage systems, and to provide a first evaluation of the interface design. The intent was to investigate expectations and needs. The majority of questions followed the close-end type in order to facilitate both answering and data collection. Others required an open type of question, such as describing any energy improvements made to the respondent's dwelling.
The first block of questions included a brief demographic description of the respondent (age and gender), time in years they have resided in the dwelling, and the number of occupants they live with. General knowledge was gauged with specific questions on energy storage and fluency in English. This last question was made in order to see if the respondents could easily participate this survey since it was conducted in English.
A further question asked participants to detail any energy improvement made to their dwelling, in order to understand which type of energy improvement is done more frequently.

In the second part of the questionnaire, participants have been asked to login to the MiniStor Platform, navigate within it and answer a series of questions about it in the questionnaire.

b) Circulation of the questionnaire among potential users

The questionnaire was published and distributed using Google Forms[1] platform. This ensured that it could reach the largest number possible of interested persons, and guarantee their anonymity. The first version of the questionnaire for the initial design was promoted among academic and professional networks via postings on social media (MiniStor's LinkedIn, Twitter page) and email distribution lists. Recipient of the social media and emails were asked to re-distribute among their contacts as well. The second version of the questionnaire was distributed among residential users in the pilot sites.

c) Analysis of responses

The results collected through the questionnaire are presented in the form of graphs (bar, pie) for better presentation of data, while open-ended responses were studied for trends or categories, such as classifying the type of improvements to be made to the interface or their motivation to install the system.

d) Derivation of conclusions

The analysis of responses gives meaningful results and allows for the validation of the initial design while feedback can lead to improvements and new features.

2. User Stories identification

For the residential pilot users, the same process as for the pre-pilot has been conducted, adjusted for the fine-tuning of the MiniStor Platform that was finally delivered to them. That is to say, in the following table the User Stories that we have identified for the MiniStor user interaction with the system are presented. As described in the methodology, User stories are usually expressed in a simple sentence, as follows: "As a [type of user], I [want to], [so that].". New User Stories can of course be added in this list as required, according to the feedback received from different stakeholders. The User Stories that are related are grouped in larger bodies of work, called Epics, which we have identified as the following:

- Administration
- Monitoring (Status, Data Analytics)
- Control

[1] https://en.wikipedia.org/wiki/Google_Forms

- Prediction
- Demand Response (DR) Events
- Alerts/Notifications
- Maintenance
- KPIs monitoring

For each type of user, we have tried to identify his/her needs and wants and express them in the form of User Stories. Most of the stories concern the roles of Resident and Building Manager, which are the main potential customers of the system.

Table 1 Identified MiniStor User Stories

	User Type	Epic	User Story
1.	Resident/Building Manager	Monitoring	As a user I want to view the indoor temperature of my apartment, so that I can decide when to turn on the heating.
2.	Resident/Building Manager	Monitoring	As a user I would like to see the energy consumption of the building, so that I can monitor its behaviour.
3.	Resident/Building Manager	Monitoring/Data Analytics	As a user I would like to see the monitoring data in the form of graphs so that it is easier to observe the state in a certain period.
4.	Resident/Building Manager	Monitoring/Data Analytics	As a user I would like to choose the period for which I would like to see the data.
5.	Resident/Building Manager	Monitoring	As a user I would like to see the stored energy amount in the MiniStor system, so that I'm fully aware of the system's condition
6.	Resident/Building Manager	Monitoring	As a user I would like to see if the battery is charging or giving energy to the building, so that I'm fully aware of the system's condition
7.	Resident/Building Manager	Monitoring	As a user I would like to see the status of my building's conditions in a summary, so that I can easily grasp the overall picture of its condition.
8.	Resident/Building Manager	Monitoring	As a user I want to know what portion of energy is covered by the MiniStor System and what portion is covered by the grid or by another fuel (for thermal).
9.	Resident/Building Manager	Monitoring	As a user I would like to see how much energy the system is importing/exporting to the grid as well as the daily imported/exported energy so that I can understand the electricity energy balance of the building.
10.	Resident/Building Manager	Monitoring	As a user I would like to see how much electrical and how much thermal energy is produced by the PVTs, so that I'm fully aware of the system's condition

11.	Resident/Building Manager	Prediction	As a user I want to be notified about the DER forecasts of the following day, so that I can schedule some of my loads.
12.	Resident/Building Manager	Prediction	As a user I want to know how close the actual production of the system was by comparing to the predicted consumption for that day.
13.	Building Manager	Prediction	As a user I would like to be able to view the prediction for both electricity and thermal energy production and consumption in real time compared to the actual values.
14.	Resident/Building Manager	KPIs monitoring	As a user, I want to view the energy savings for my building so that I can compare with energy use prior to MiniStor installation period.
15.	Resident/Building Manager	KPIs monitoring	As a user, I want to view the CO2 emissions of my building so that I can see how environmentally friendly it is.

3. User evaluation of MiniStor design – Results and Discussion

The evaluation of MiniStor design was performed in the form of a survey/questionnaire of 34 questions (29 questions some of which are followed by a complementary explanatory question), which was distributed among the pilot end-users (see Annex I). A total of 18 responses was received across all pilots, which considering the short duration of the testing and operation period, along with the fact that most of it took place during summertime, it is a fair number.

3.1. Background Information

As in the previous version of this deliverable, the first group of questions aims to identify background information of the respondents. The results do not show any significant deviation between the potential end-users initially contacted and the pilot end-users finally contacted, after the MiniStor system was installed in their premises. Any deviations between the two samples can be explained by the smaller second sample and the more targeted group, since those were the pilot end-users selected for the MiniStor system being installed at their premises. The first two questions concern demographic information (age and gender) and show that more men than women have answered the questionnaire, while most participants belong to the age groups 18-45 and 46-65. The respondents also show variability in the duration they have lived at their home and the number of occupants that live at their home. The respondents have also mostly a strong knowledge background on the fields of energy storage and building management, while the majority has fluency in English thus, they are able to properly understand and answer the questions.

The results for this first group of questions are given in the form of charts below, where on the left side the results for the latest survey are presented (demo site users) and on the right side the results from the previous one (general users).

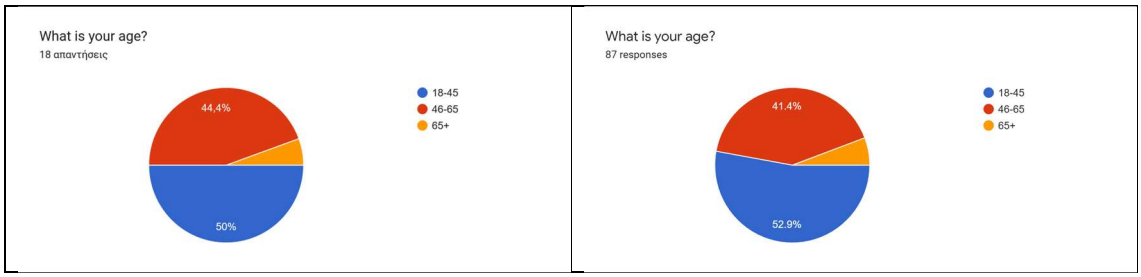


Figure 3. Questionnaire. Age results. Comparison. Pilot end-users (left), potential end-users from previous round (right)

Figure 4. Questionnaire. Gender results. Comparison. Pilot end-users (left), potential end-users from previous round (right)

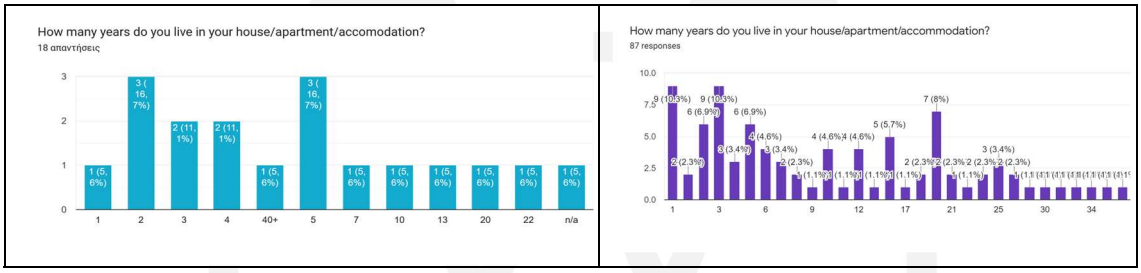


Figure 5. Questionnaire. Years of Occupancy. Comparison. Pilot end-users (left), potential end-users from previous round (right)

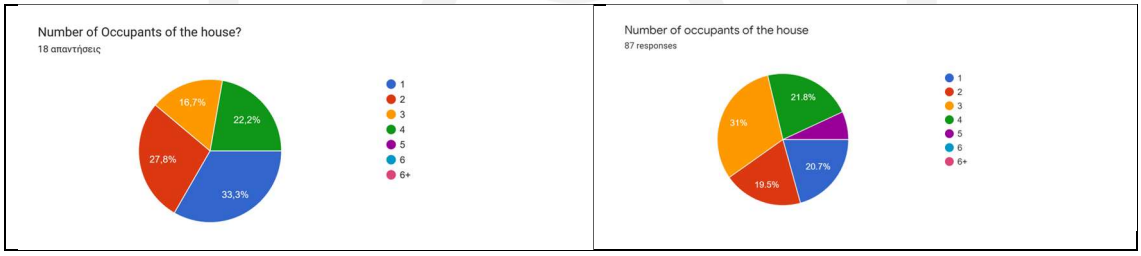


Figure 6. Questionnaire. Number of Occupants. Comparison. Pilot end-users (left), potential end-users from previous round (right)

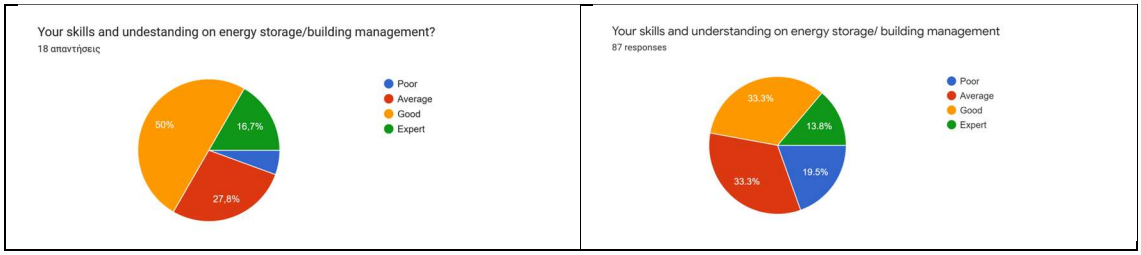


Figure 7. Questionnaire. Comprehension of Energy Storage and energy building management. Results. Comparison. Pilot end-users (left), potential end-users from previous round (right)

Figure 8. Questionnaire. Fluency in English results. Comparison. Pilot end-users (left), potential end-users from previous round (right)

3.2. MiniStor Features and Functionalities

This second group of questions aims to validate the features and functionalities of the MiniStor system's User interface, as they were identified through the User Stories and the Use Cases. The pilot end-users were given access to the MiniStor Platform itself and then were asked to evaluate their experience using the questionnaire. There is possibility to visualize live energy use and historical data display. It also identifies state of charge, energy exchanges (see Annex II).

The results indicate that the end-users were able to navigate smoothly and easily through the MiniStor platform itself and locate valuable information. More specifically, they were able to locate the amount of energy generated or consumed when using the MiniStor system. Almost three out of four were able to identify the energy exchanged with the grid outside of the MiniStor System, however nearly nine out of ten were able to comprehend the energy exchange among the various assets of the MiniStor System and the grid, the environmental impact via the CO_2 emissions reductions, along with the financial aspects of the operation on the MiniStor system. The prediction information seemed more challenging. However again, almost three out of four people were able to understand and navigate through the respective tab, whereas the MiniStor System, though easily located, was a bit overwhelming, judging also from the remarks made by the end-users. Evidently, the Home tab, presenting the MiniStor pilot was considered the most meaningful one from the three. The reason for this, is attributed to the fact that this tab represents the overview of the system and useful information for everyday end-users, whereas the other two, a more deep and technical information, related mostly to people with the technical knowledge in general and in particular of the MiniStor system. These are evident through the figures presented below, showing the results of the questionnaire shared with the end-users.

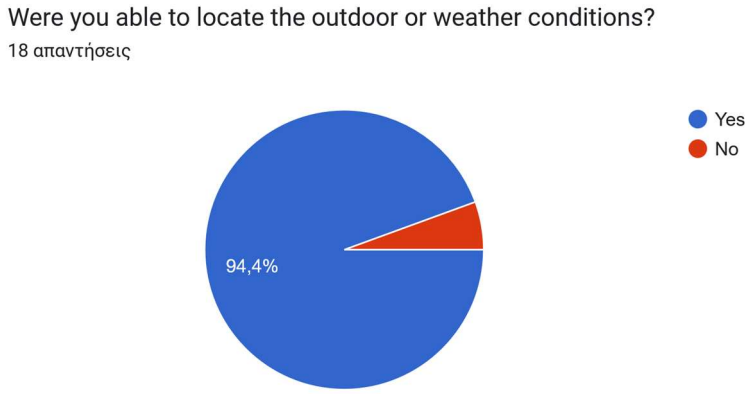


Figure 9. Questionnaire. Locate outdoor or weather conditions. Results.

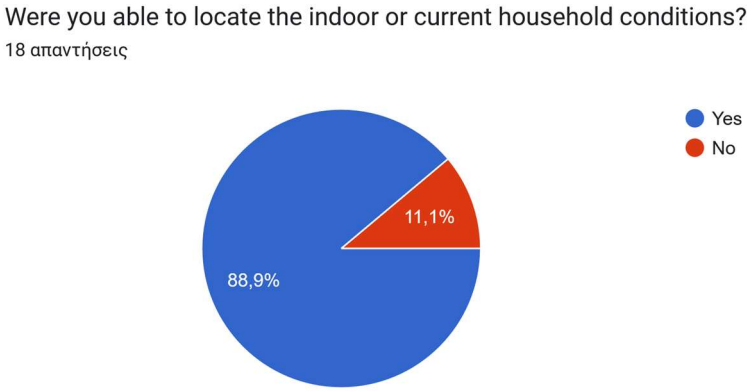


Figure 10. Questionnaire. Locate the indoor household conditions. Results.

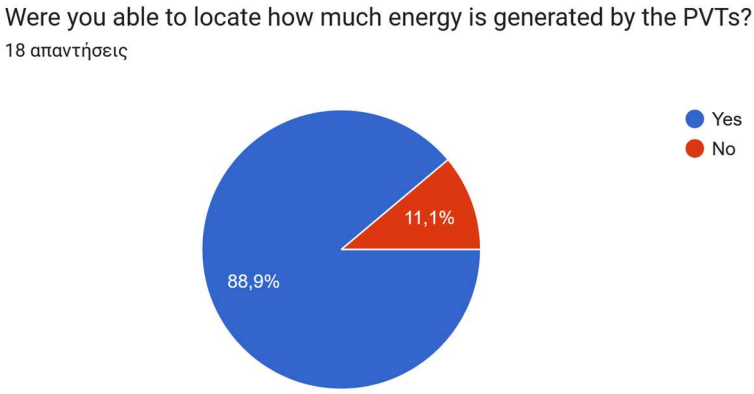


Figure 11. Questionnaire. Identify the amount of energy generated by the PVTs. Results.

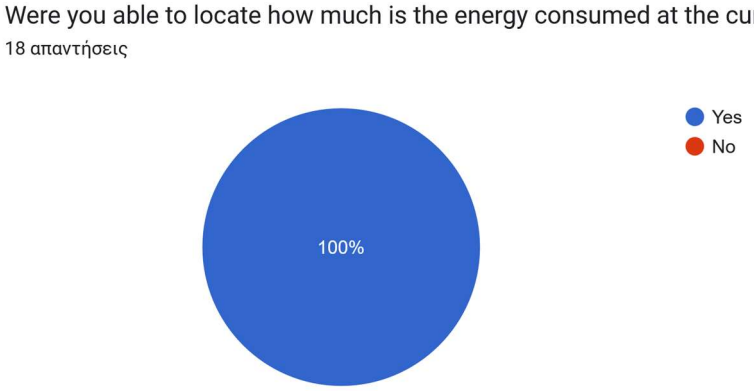


Figure 12. Questionnaire. Identify the amount of energy consumed by the facility. Results.

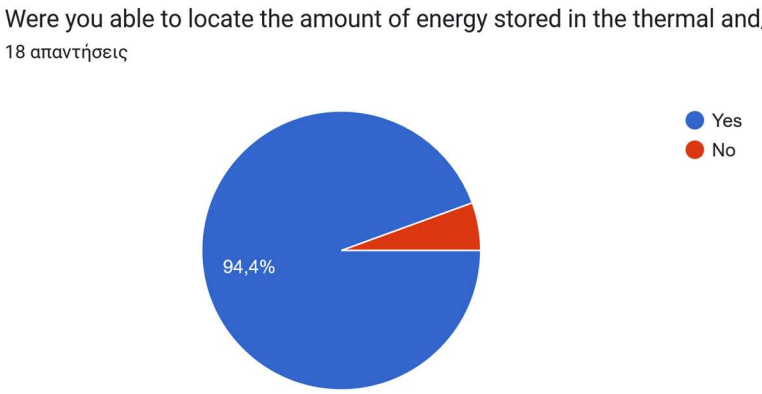


Figure 13. Questionnaire. Identify the amount of energy stored in the thermal and electrical battery systems. Results.

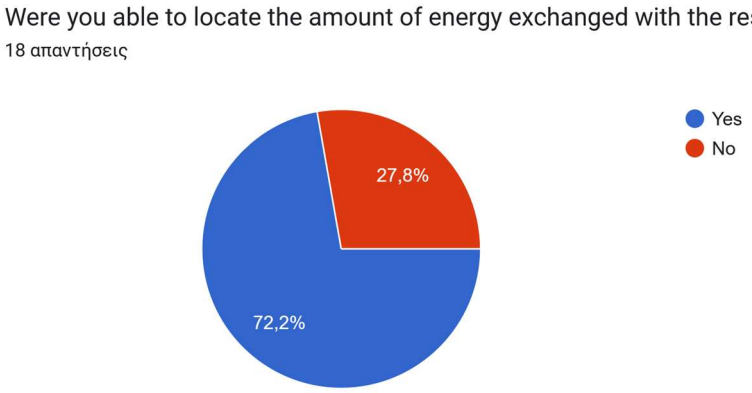


Figure 14. Questionnaire. Identify the energy exchanged with the rest of the utilities. Results.

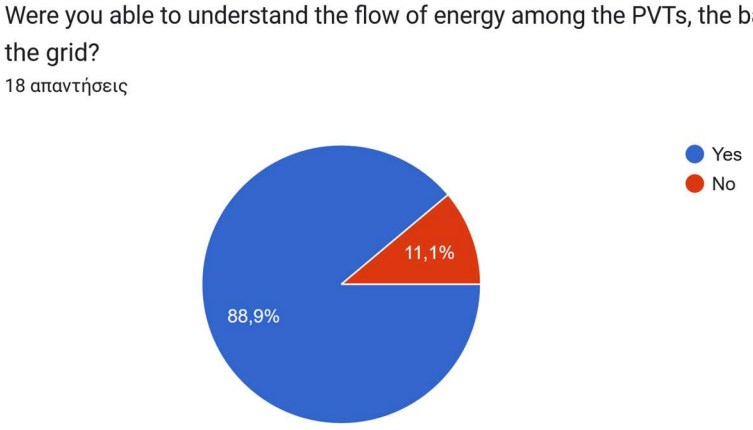


Figure 15. Questionnaire. Identify the energy flow among the PVTs, the battery systems, the facility and the utilities. Results.

Were you able to locate the amount of CO2 emission reduction achieved and the energy saved by the use of the MiniStor System?

18 απαντήσεις

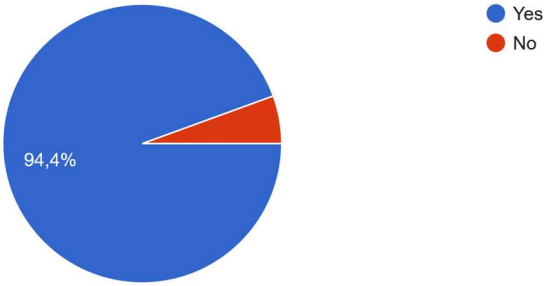


Figure 16. Questionnaire. Identify the amount of CO_2 emission reduction achieved through the utilization of the MiniStor System. Results.

Were you able to locate the days energy, electrical and thermal, and financial balances?

18 απαντήσεις

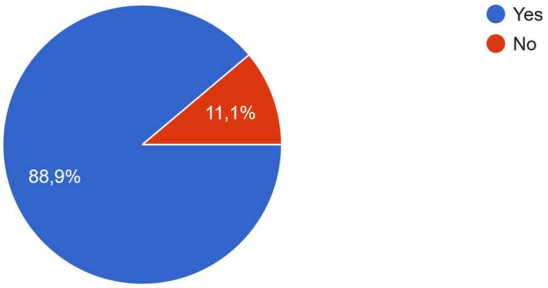


Figure 17. Questionnaire. Identify the energy and financial balances indicated. Results.

Were you able to locate the prediction tab?

18 απαντήσεις

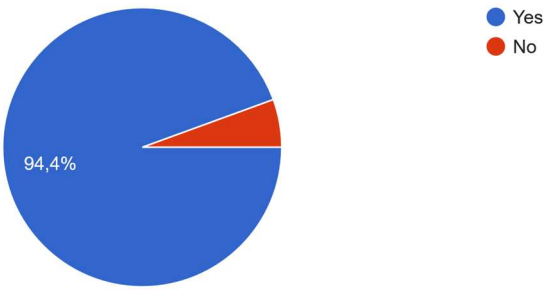


Figure 18. Questionnaire. Locate the prediction tab. Results.

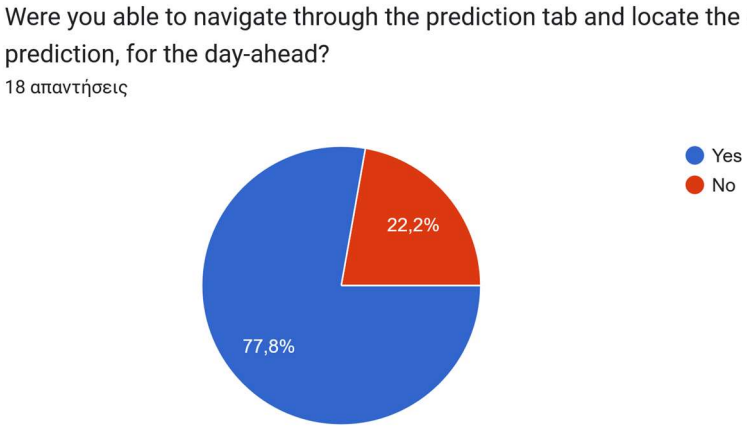


Figure 19. Questionnaire. Navigate through the prediction tab and locate the PV generation for the day-ahead timeslot. Results.

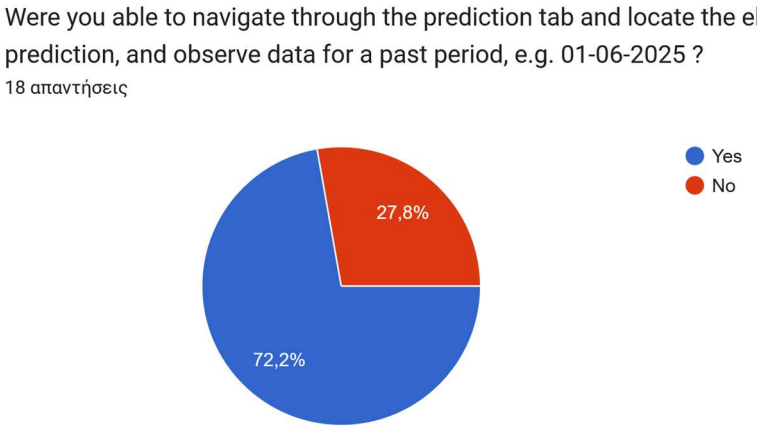


Figure 20. Questionnaire. Navigate through the prediction tab and monitor the home electrical consumption prediction for a required past timeslot. Results.

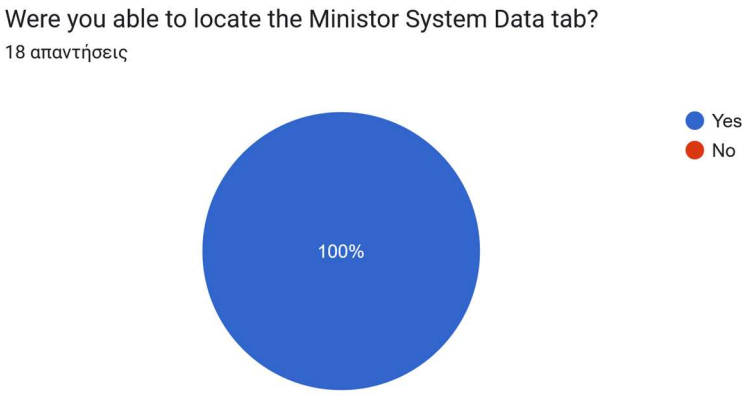


Figure 21. Questionnaire. Locate the MiniStor System Data tab. Results.

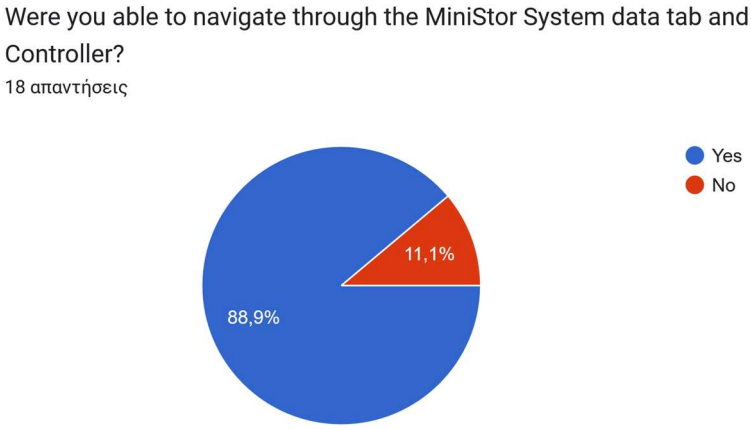


Figure 22. Questionnaire. Navigate through the MiniStor System Data tab and locate the graph showing data from the solar controller.

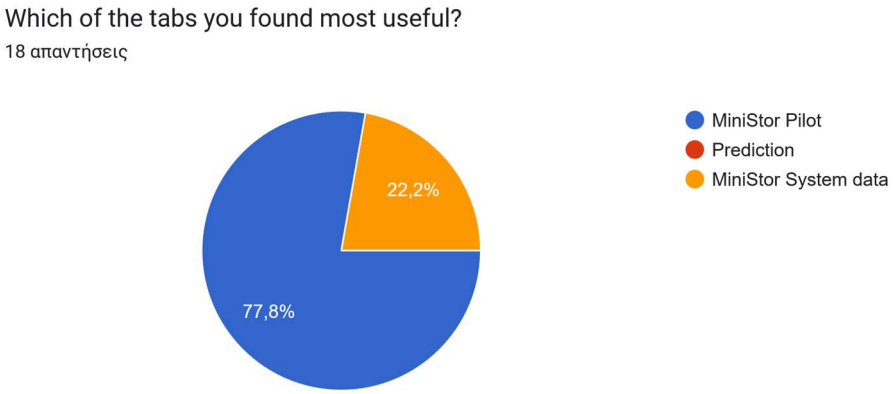


Figure 23. Questionnaire. Evaluation of the MiniStor platform tabs. Results.

3.3. MiniStor Interface evaluation

Regarding the interface evaluation the general outcome is mostly positive, with the end-users showing having a clear comprehension of the information presented through the MiniStor platform, the colour, text and buttons layouts. These are evident through the figures presented below, showing the results of the questionnaire shared with the end-users.

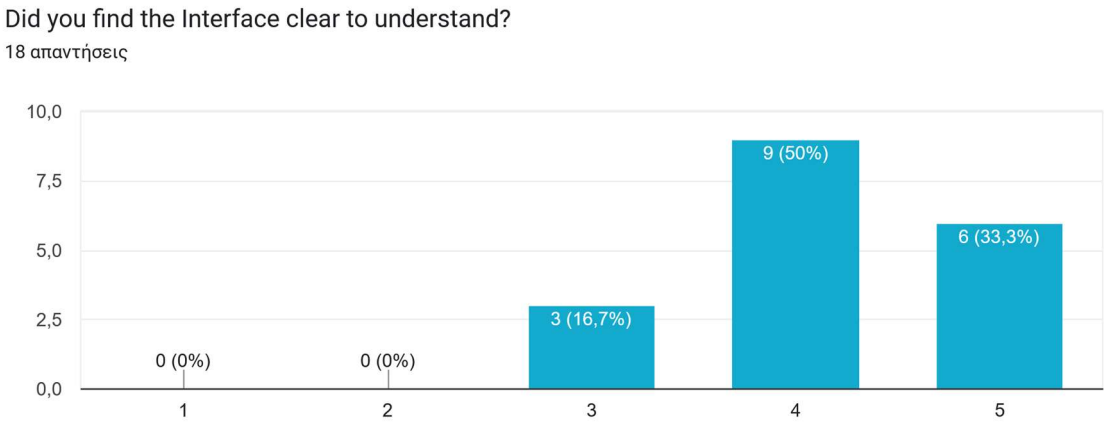


Figure 24. Questionnaire. Evaluate clarity of the MiniStor platform. Results.

Table 2. Questionnaire. Remarks on the MiniStor Platform Clarity Evaluation. Resutls.

Remarks given for the MiniStor Platform Clarity evaluation (as stated in the survey)
• The tabs along with their description and widgets. • Navigation and terminology used need further simplification. • Prediction tab is stuck in loading. • Careful application of colours, icons and arrow directions all help to interpret the numbers. • Visual and usable but some figures are too compact. • Have not good understanding of Computers and interphases. • Everything is really clear to understand and to locate. • Some of the data can only be found after scrolling all the way down in my browser. • Easy to navigate, but a bit complex. • The Interface was simple and easy to use.

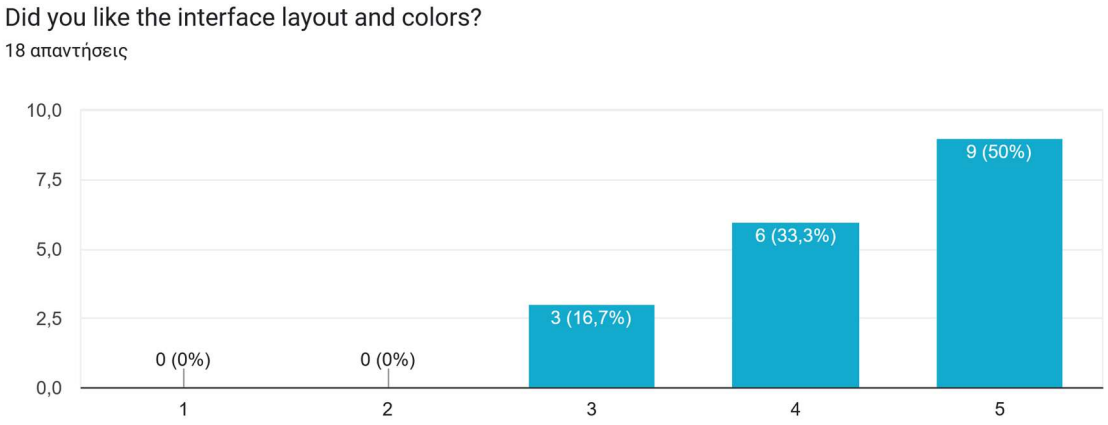


Figure 25. Questionnaire. Interface layout and colours evaluation of the MiniStor Platform. Results.

Table 3.Questionnaire. Remarks on the Interface layout and colours evaluation of the MiniStor Platform. Results.

Remarks on the Interface layout and colours evaluation of the MiniStor Platform (as stated in the survey)
• The tabs are neatly organized. Combining a lot of different colours may be overloading to the user, while keeping mainly evenly coloured, enhances focus. • I would like more colour and interactivity. • Graphs are a little bit fuzzy. • I like how I can see everything at the same time on the 'Pilot' tab without scrolling. • Easy to identify the elements. • Again, clear, simple and elegant. • Attractive colour layout and the information is presented at once. • Some colours of the numbers make them difficult to read. • Simple colours, not too confusing.

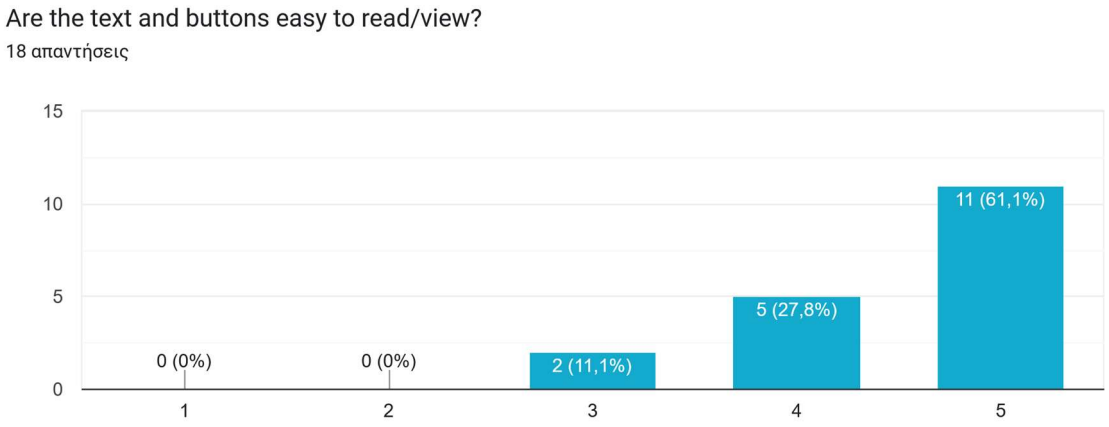


Figure 26. Questionnaire. Evaluation of MiniStor Platform on easiness to read/view. Results.

Table 4. Questionnaire. Remarks on Evaluation of Ministor Platform on easiness to read/view. Results.

Remarks on Evaluation of MiniStor Platform on easiness to read/view (as stated in the survey).
• Text colour and size along with the font colours makes them easily visible. • Some of the labels appear rather small, but scaling can be used in the browser without breaking the layout much. • Good fonts and spacing between text and images. Some text too gray in my browser. • Size, but it´s necessary to visualize a lot of information.

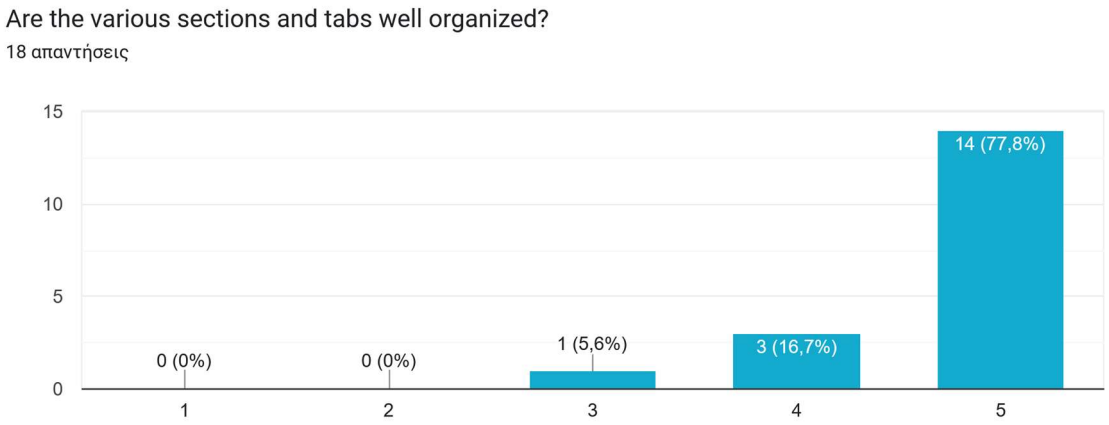


Figure 27. Questionnaire. Evaluation of the sections and tabs organized layout of the MiniStor Platform. Results.

Table 5. Questionnaire. Remarks on the Evaluation of the sections and tabs organized layout of the MiniStor Platform. Results.

Remarks on Evaluation of the sections and tabs organized layout of the MiniStor Platform (as stated in the survey)
• They are well organized. • I would prefer not to use scroll too much. • There is no cluttering of the information. • information is displayed from the overview to the details.

Table 6. Questionnaire. Summary of the evaluation. Identify merits and drawbacks of MiniStor Platform. Results.

What did you like the most/ the least? What would you change? (as stated in the survey)
• I mostly liked the whole idea of MiniStor principle of operation. The platform also helped me to understand key aspects of operation and how the energy is harvested, stored and used to cover the residence needs. • I like the MiniStor Pilot Tab more and the MiniStor System Data less because the information is presented a bit confusingly. • To me, some of the colours at the time-series plots appear too similar to each other, but I know this is hard with many variables. I like the feature though, where I can hide the lines by clicking on their name in the legend up top. Maybe an option would be helpful here to hide/show all of them with one click? • The prediction tab didn't show anything. • n/a • Interface, no changes. • Liked the most - The layout and real time information is attractively presented. Liked the least - having to navigate till the bottom of the screen to find some information. Might change that part for icons that expand when clicked. • Most: structure and data information. least: orange colours in numbers. proposal of changes: orange colour (text and numbers) in MiniStor Pilot. • MiniStor Pilot Tab---No changes recommended.

3.4. MiniStor Business Opportunity

The last group of questions focused mostly on the willingness of the respondents to install a storage system such as MiniStor in their building, in order to evaluate if anything has changed since the first round that is prior to installing the MiniStor System. The answers remained the same. In particular, the end-users have stated that they would be interested in installing such a system especially if this brings cost savings, is environmentally friendly, which seem to be MiniStor's strongest assets. However, a high initial cost of the installation would probably push them back from taking this decision.

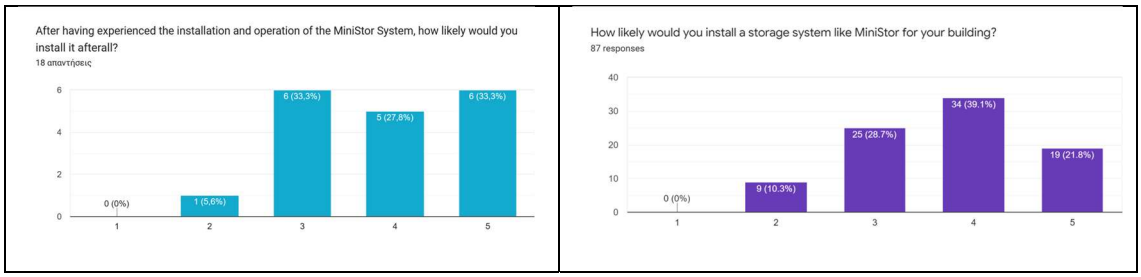


Figure 28. Questionnaire. Willingness of the pilot end-users to install and operate the MiniStor System. Results.

Table 7. Questionnaire. Explanations for the willingness of the pilot end-users to install and operate the MiniStor Platform. Results.

Explanations for the willingness of the pilot end-users to install and operate the MiniStor System (as stated in the survey)
• I would like to see a few years more of Ministor's operation in order to ensure that performance will not decline in an unexpected way. • Because it requires prerequisites and synergies that may not be satisfied in an individual case. • As a working prototype, there were some issues that made the system unavailable for some time • In the future, I hope it would be a great solution for singular houses. • It saves energy and the automation makes it easier to operate. • It´s a combination of technologies that still has potential for improvement. • Expensive.

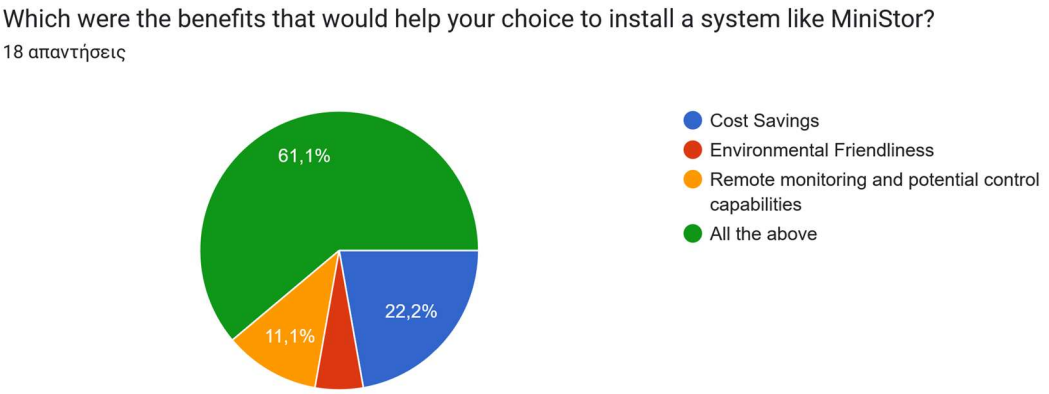


Figure 29. Questionnaire. Identify benefits of installing MiniStor. Pilot end-users. Results.

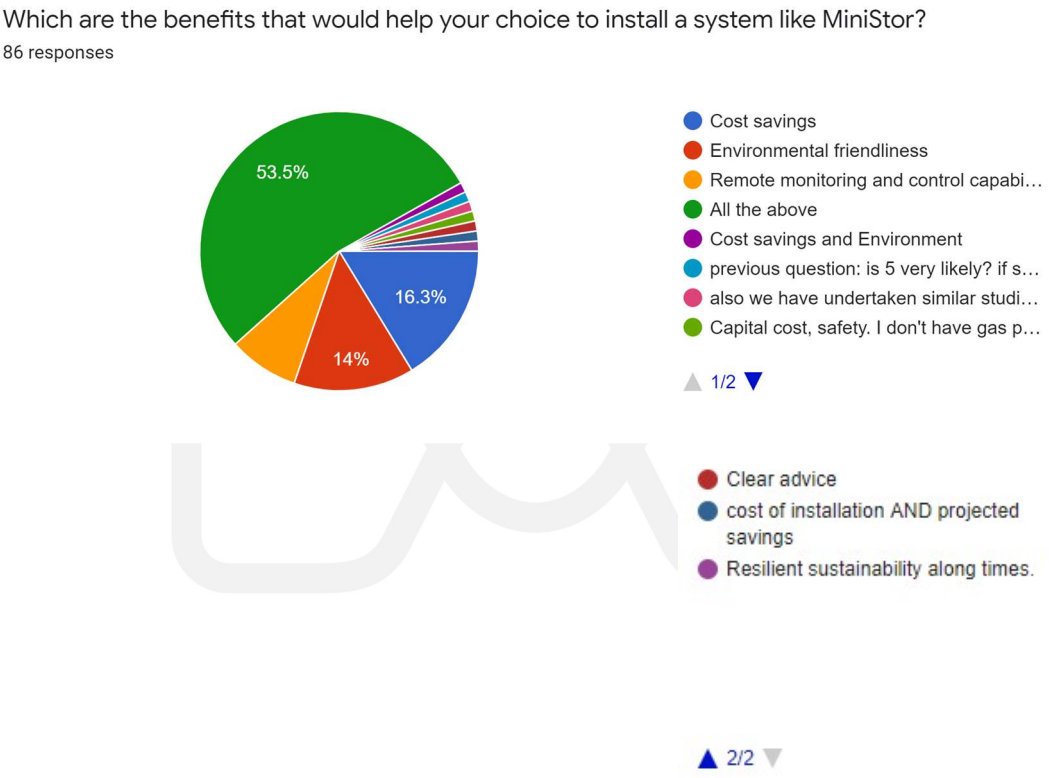


Figure 30. Questionnaire. Identify the benefits of installing MiniStor System. Previous survey. Potential end-users. Results.

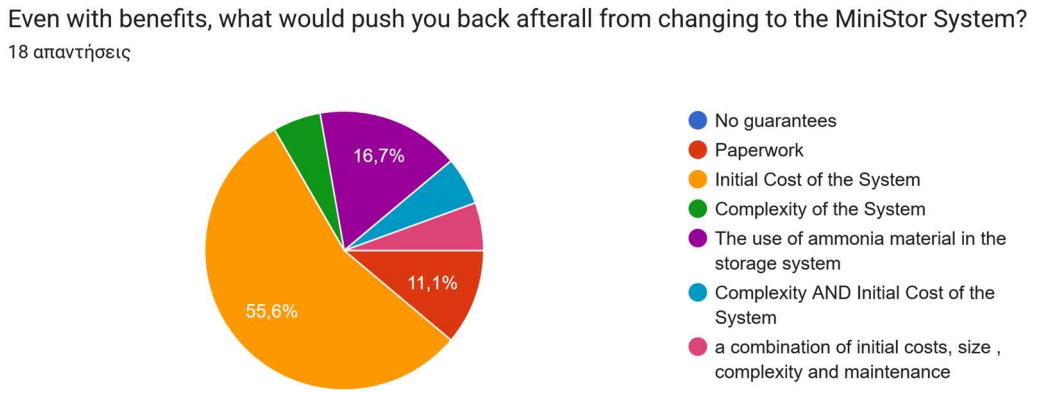


Figure 31. Questionnaire. Identify any drawbacks of installing MiniStor System. Pilot End-users. Results.

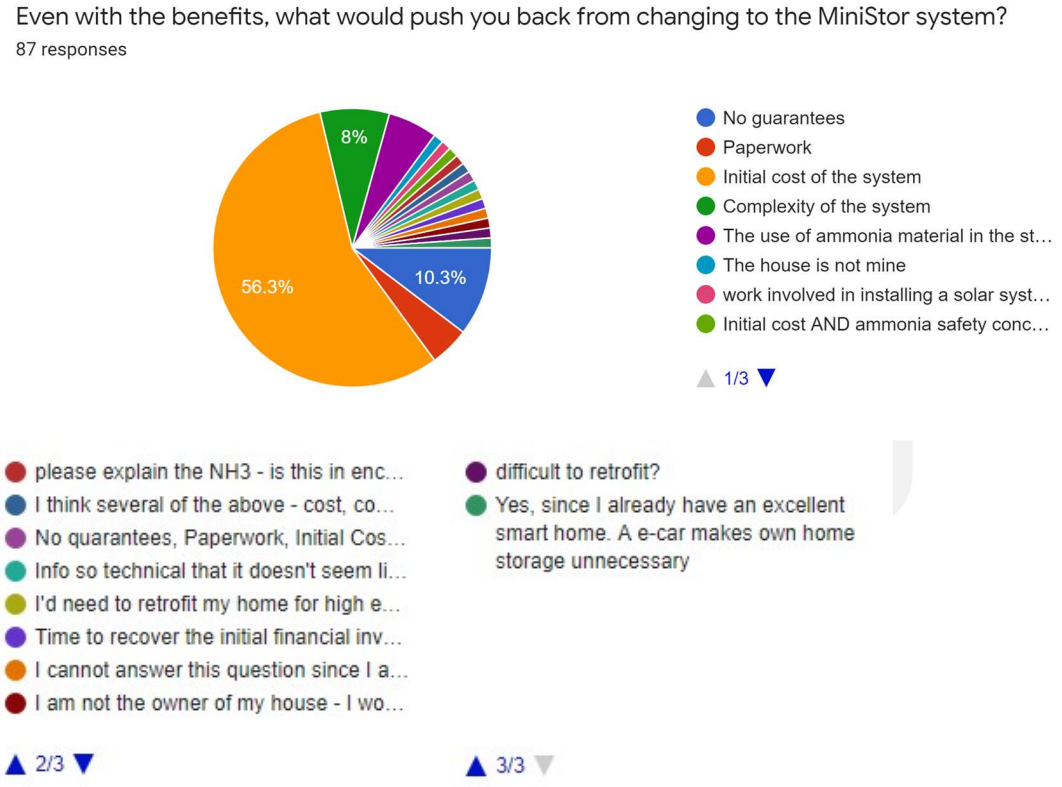


Figure 32. Questionnaire. Identify any drawbacks of installing MiniStor System. Previous survey Potential end-users. Results.

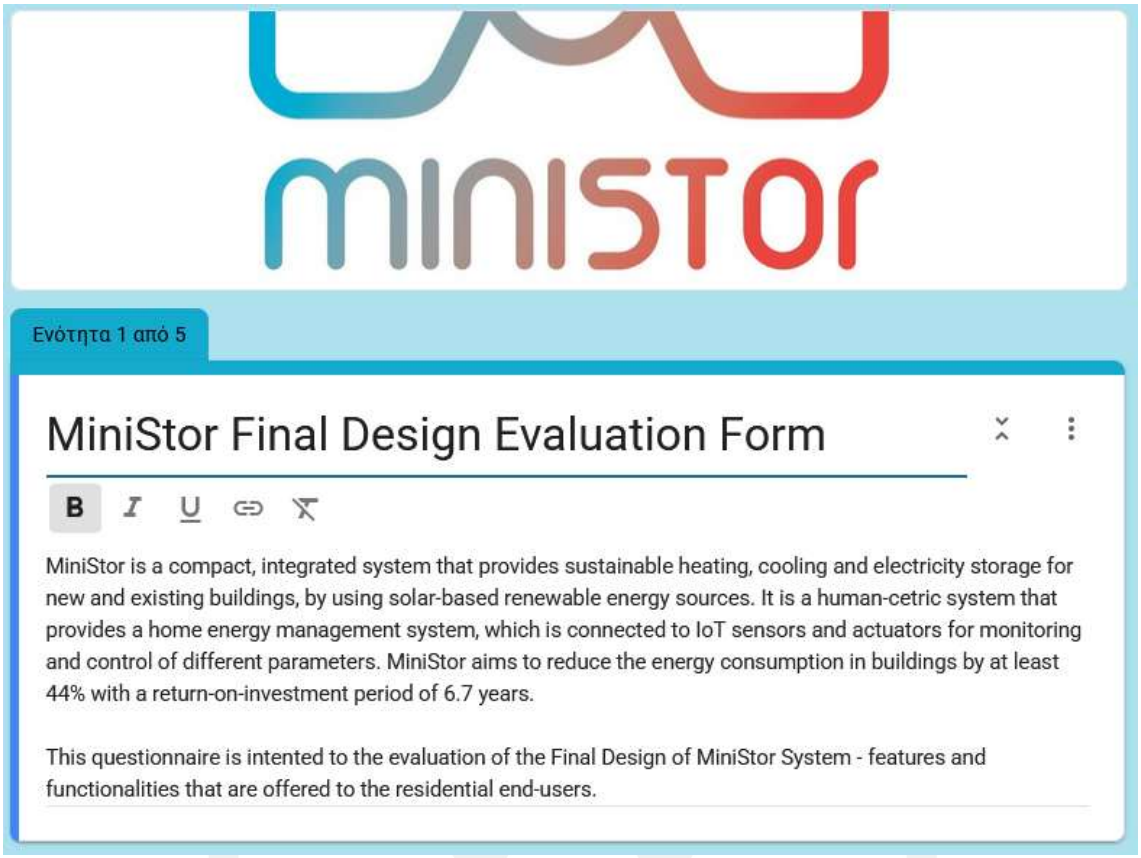
Conclusions

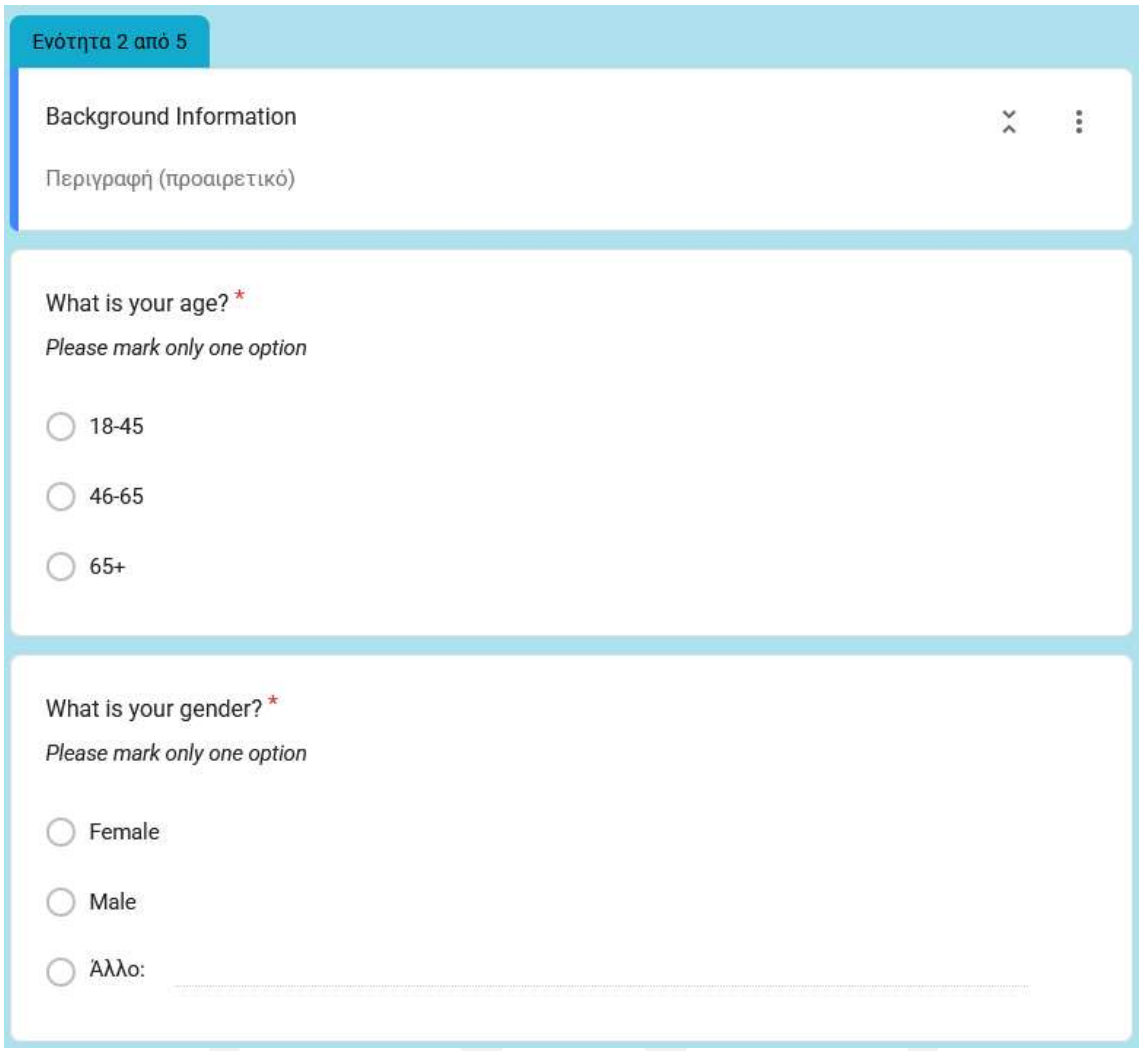
During the second phase of this task, the latest version of the MiniStor System Platform has been presented to the end-users in the pilot sites and in turn they were asked to evaluate it, via the utilization of an online questionnaire for helpful access to the end-users. The same methodology as described in the previous deliverable was utilized, with a more focused audience in this report.

The results show a general satisfaction of the overall experience with the user interface, although there is room for improvement. There was a clear understanding of the information presented via the MiniStor Platform and general understanding of the information, text, colours used and buttons layout. Additionally, the end-users were able to navigate with relative ease via the MiniStor Platform to retrieve the various pieces of information provided. Regarding the Business part of the MiniStor System, while end-users acknowledge the clear benefits of such an innovative system, they are hesitant about the high initial cost of its installation, as this would push them back from taking the decision of installing it.

Annex I

In this Annex the questionnaire circulated among the end-users is presented from an end-user point of view.





Ενότητα 2 από 5

Background Information

Περιγραφή (προαιρετικό)

What is your age? *

Please mark only one option

- 18-45
- 46-65
- 65+

What is your gender? *

Please mark only one option

- Female
- Male
- Άλλο:

How many years do you live in your house/apartment/accomodation? *

Κείμενο σύντομης απάντησης

Number of Occupants of the house? *

Please mark only one option

- 1
- 2
- 3
- 4
- 5
- 6
- 6+

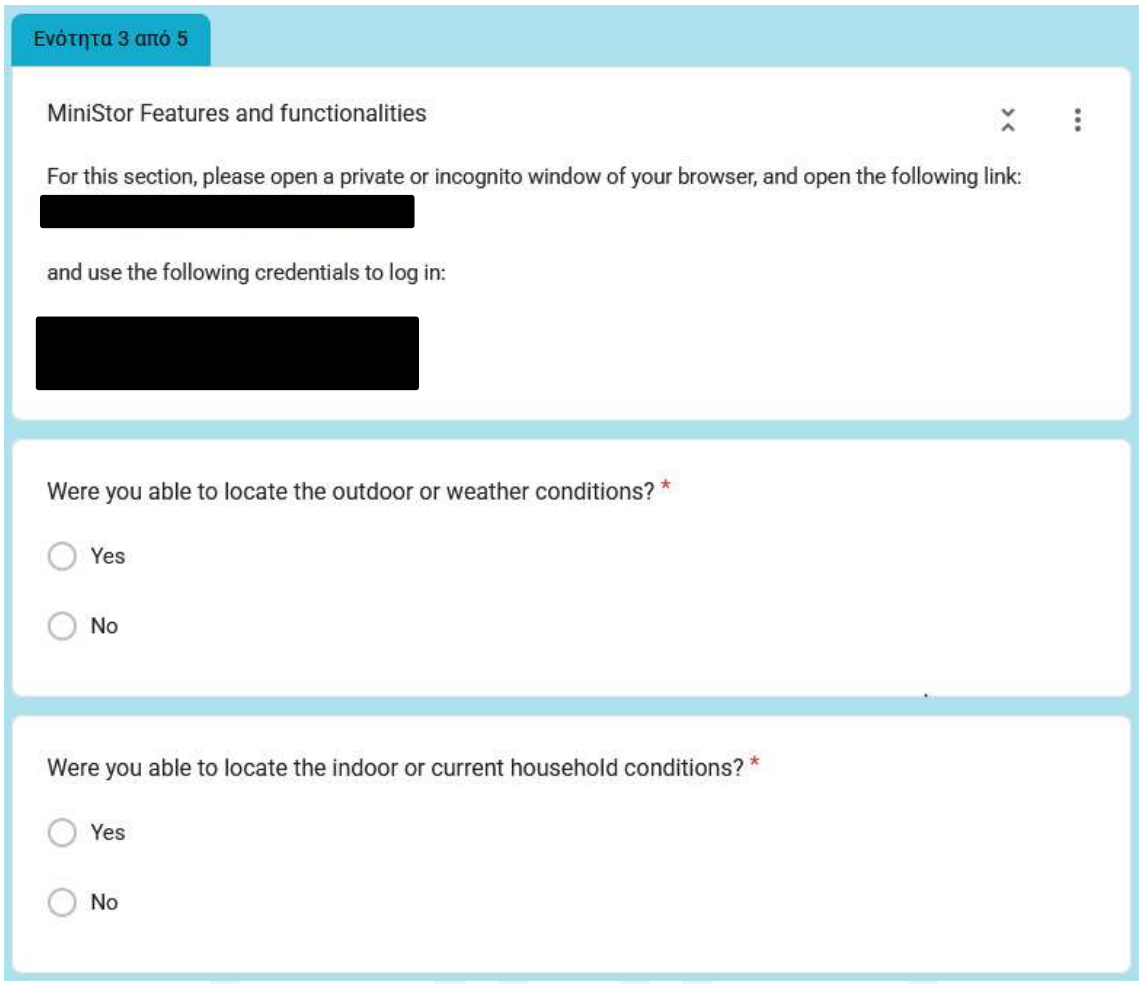
Your skills and undestanding on energy storage/building management? *

Please mark only one option

- Poor
- Average
- Good
- Expert

How fluent you are in English? *

- Beginner
- Intermediate
- Advanced



Ενότητα 3 από 5

MiniStor Features and functionalities

For this section, please open a private or incognito window of your browser, and open the following link:

[redacted]

and use the following credentials to log in:

[redacted]

Were you able to locate the outdoor or weather conditions? *

- Yes
- No

Were you able to locate the indoor or current household conditions? *

- Yes
- No

Were you able to locate the indoor or current household conditions? *

- Yes
- No

Were you able to locate how much energy is generated by the PVTs? *

- Yes
- No

Were you able to locate how much is the energy consumed at the current facility? *

- Yes
- No

Were you able to locate the amount of energy stored in the thermal and/or electric battery systems? *

- Yes
- No

Were you able to locate the amount of energy exchanged with the rest of the electricity grid? *

- ○ Yes
- ○ No

Were you able to understand the flow of energy among the PVTs, the battery systems, the home and the grid? *

- ○ Yes
- ○ No

Were you able to locate the amount of CO2 emission reduction achieved and the energy saved by the use of the MiniStor System? *

- ○ Yes
- ○ No

Were you able to locate the days energy, electrical and thermal, and financial balances? *

- ○ Yes
- ○ No

Were you able to locate the prediction tab? *

- Yes
- No

Were you able to navigate through the prediction tab and locate the electrical power generation prediction, for the day-ahead? *

- Yes
- No

Were you able to navigate through the prediction tab and locate the electrical power consumption prediction, and observe data for a past period, e.g. 01-06-2025 ? *

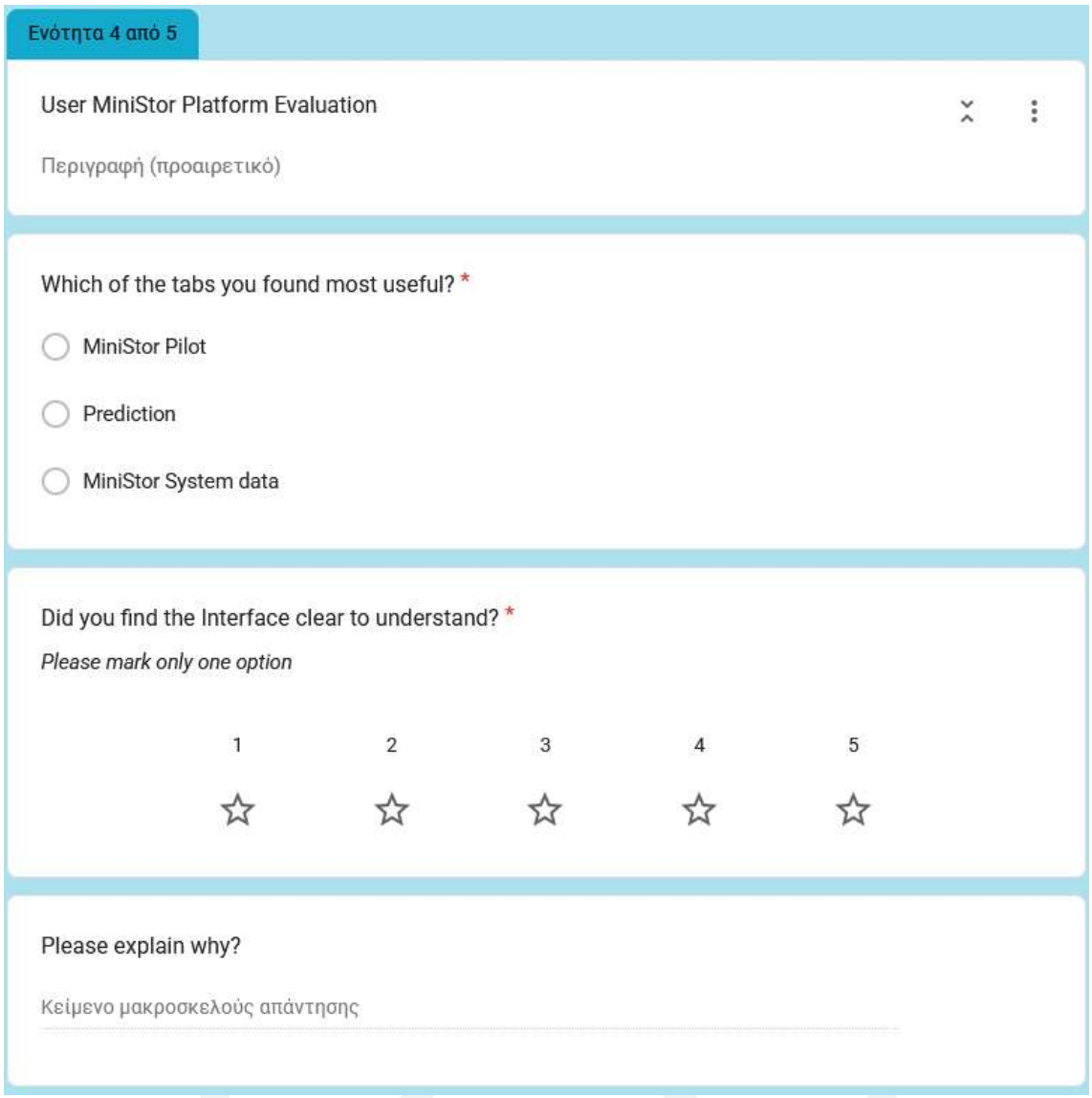
- Yes
- No

Were you able to locate the Ministor System Data tab? *

- Yes
- No

Were you able to navigate through the MiniStor System data tab and locate the graph of the Solar Controller? *

- Yes
- No


Ενότητα 4 από 5
User MiniStor Platform Evaluation
Περιγραφή (προαιρετικό)
Which of the tabs you found most useful? *
MiniStor Pilot
Prediction
MiniStor System data
Did you find the Interface clear to understand? *
Please mark only one option
1
2
3
4
5
Please explain why?
Κείμενο μακροσκελούς απάντησης

Did you like the interface layout and colors? *

Please mark only one option

1 2 3 4 5

☆ ☆ ☆ ☆ ☆

Please explain why?

Κείμενο μακροσκελούς απάντησης

Are the text and buttons easy to read/view? *

Please mark only one option

1 2 3 4 5

☆ ☆ ☆ ☆ ☆

Please explain why?

Κείμενο μακροσκελούς απάντησης

Are the various sections and tabs well organized? *

Please mark only one option

1 2 3 4 5

Please explain why?

Κείμενο μακροσκελούς απάντησης

What you liked the most/ the least? What would you change?

Κείμενο μακροσκελούς απάντησης

Ενότητα 5 από 5

Business opportunity end-user evaluation

Περιγραφή (προαιρετικό)

After having experienced the installation and operation of the MiniStor System, how likely would you install it afterall? *

1 2 3 4 5

Please explain why?

Κείμενο μακροσκελούς απάντησης

Which were the benefits that would help your choice to install a system like MiniStor? *

- ○ Cost Savings
- ○ Environmental Friendliness
- ○ Remote monitoring and potential control capabilities
- ○ All the above
- ○ Άλλο: .....

Even with benefits, what would push you back afterall from changing to the MiniStor System? *

- ○ No guarantees
- ○ Paperwork
- ○ Initial Cost of the System
- ○ Complexity of the System
- ○ The use of ammonia material in the storage system
- ○ Άλλο: .....

Annex II

This annex presents screenshots of the user interface that was evaluated. Contents were live and could be queried by users as they wished.

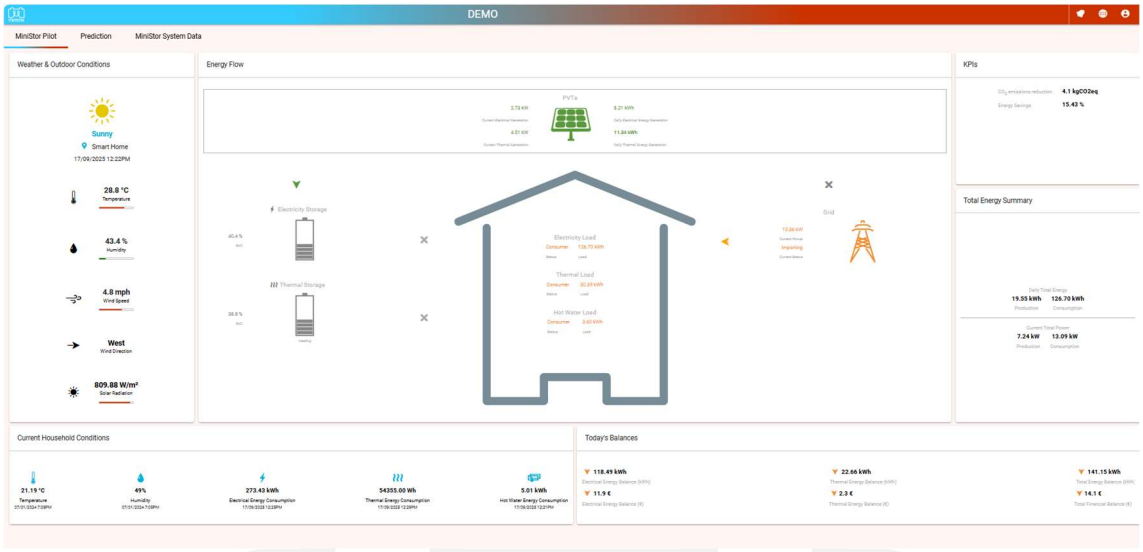


Figure ii-a: Home tab (MiniStor data overview)

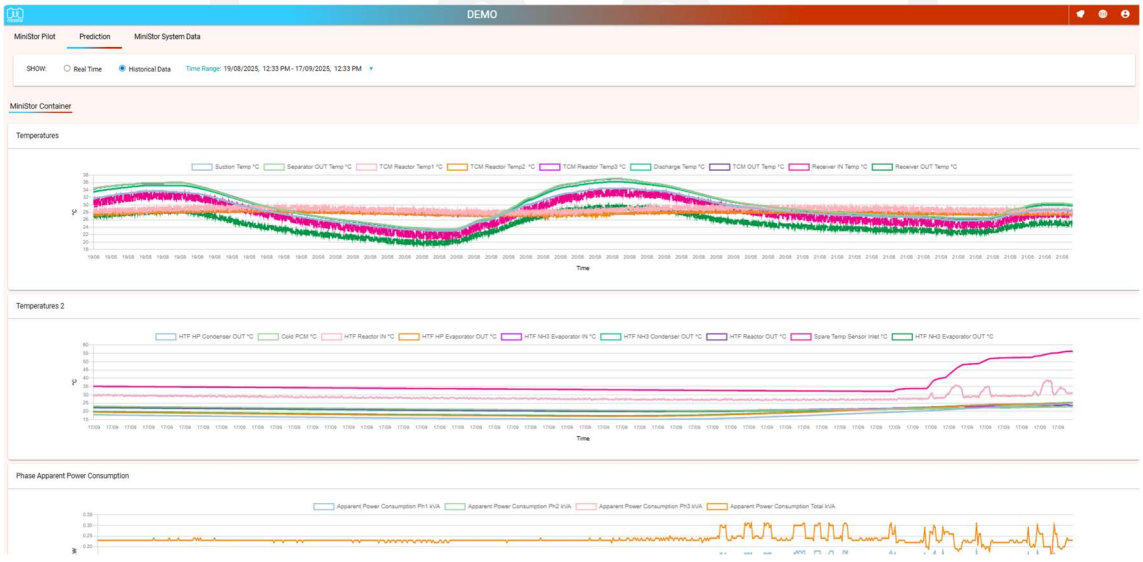


Figure ii-b: Prediction tab (Electrical energy prediction)

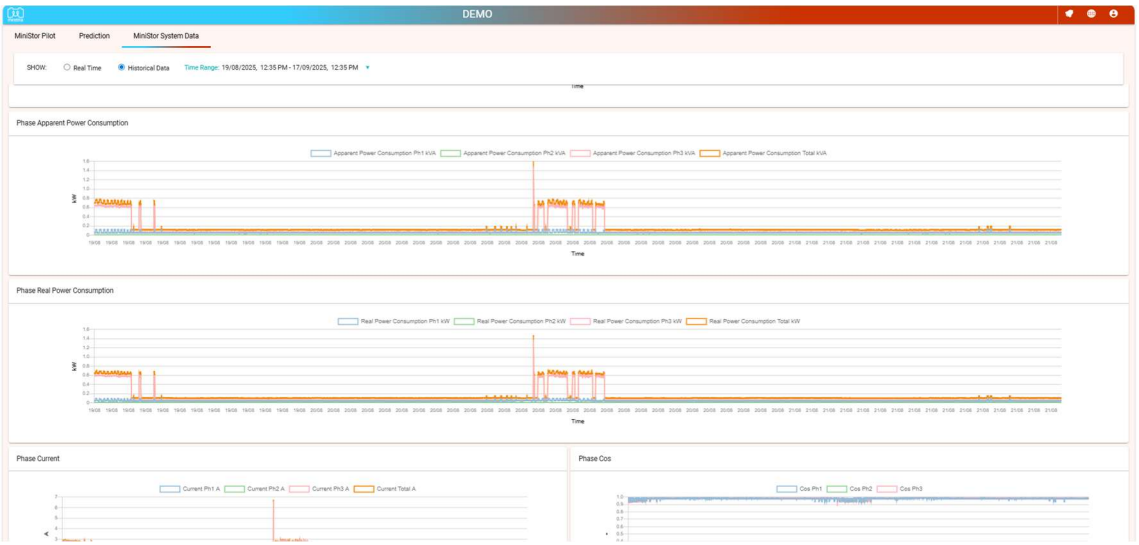


Figure ii-c: MiniStor system data tab (Display of different temperatures, states of charge and electrical energy stored/generated)

References

[1] JACOBSON, Ivar; SPENCE, Ian; KERR, Brian. Use-Case 2.0. Queue, 2016, 14.1: 94-123. https://dl.acm.org/doi/pdf/10.1145/2898442.2912151

[2] FORBRIG, Peter. Use Cases, User Stories and BizDevOps. In: REFSQ Workshops. 2018. https://pdfs.semanticscholar.org/5a92/a773017cea26b422121cdc58953eca7e082b.pdf

[3] https://searchsoftwarequality.techtarget.com/answer/What-is-the-difference-between-a-user-story-and-use-case-in-software-testing

[4] Madanayake, Ravi & Dias, Kapila & Kodikara, N.D.. (2017). User Stories vs UML Use Cases in Modular Transformation. International Journal of Scientific Engineering and Applied Science (IJSEAS) –Jan 2016. 3. 50-54. https://www.researchgate.net/publication/312293252_User_Stories_vs_UML_Use_Cases_in_Modular_Transformation