Coordination and support action

Call H2020-LC-SC3-EC-2-2020: Mitigating household energy poverty

Deliverable 4.1

Combined Evaluation of Impacts report (First summer)

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Abstract:	This document describes the overall evaluation strategy that VIL will follow during WP4 for the evaluation of the activities' impact after each summer. It will feed D4.1

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	Combined evaluation of impacts report (first summer) & D4.2 *Combined evaluation of impacts report (final).*
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Document Description

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Abstract

The COOLTORISE project has a dedicated work package (WP4) for the evaluation of the activities, to examine the general and potentially long-term societal impact of the project activities. The evaluation processes and tools include surveys and questionnaires, providing information about the participants' experience from the COOLTORISE workshops that took place under WP3. At this point, the results of the evaluation of the first summer will guide the partners regarding the needed changes to optimise their strategy for the second summer (2023). The results of the second summer will be presented in D4.2, to be delivered in August 2024. This process will provide evidence and feed the final policy recommendations of the project.

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1. Introduction

COOLTORISE is a Coordination and Support Action project which is intended to reduce summer energy poverty incidence among European households. The project develops in four EU member states located in South and South-East Europe (Bulgaria, Greece, Italy, and Spain) and it has the goal to improve the indoor thermal habitability conditions and to reduce the energy needs during the hot season, which will, in turn, decrease the exposure to heat and heat-related health risks.

Eurostat data shows that in 2018 about 19% of the population was unable to adequately maintain cool their house during the summer period and that 7.3% of the population was unable to adequately heat their homes in the winter. Among the main reasons are low-income, high-energy bills and low housing efficiency.

The situation becomes even more complex if we consider the rise in temperatures: the last five years have been defined as the hottest ever; not to mention 2019: the year in which temperatures reached the highest peaks. It is evident that the climate is changing, and this will affect our well-being. Rising temperatures will mostly affect the most vulnerable groups in society, who will continue to be more exposed to heat-related mortality, such as heat stress or disease.

Therefore, the characteristics of the buildings become more and more important: it is widely demonstrated that in old buildings, without insulation, or in apartments with bedrooms at the top, higher temperatures can be reached faster and therefore tenants can have more problems during the heat waves. Closely related to this issue is the access of tenants to an efficient cooling system: not all households, due to low income, have access to air conditioning systems.

Within this context, COOLTORISE aims to raise awareness on summer energy poverty as well as to pilot some soft measures to reduce the impact of the heat waves in low efficient households and deliver tools and information both to householders and to stakeholders to best mitigate summer energy poverty.

1.1. Scope of the deliverable

The D4.1 presents the evaluation and impact assessment strategy of the COOLTORISE project, along with the results of the activities that took place during the first summer (2022). The aim is to display on the one hand the overall evaluation process and the tools used, and on the other hand, the results achieved in terms of energy savings, reduction of GhG emissions, and the socio-economic impact and benefits produced for the involved stakeholders until the first half of the project's duration. This deliverable

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is the first out of the two that will be produced by the end of the project containing the evaluation results of COOLTORISE.

The evaluation & impact assessment methodology is an active, ongoing process, an object of assessment itself, that can also be updated in order to be optimised for the second summer. The evaluation and impact assessment strategy is built on the rationale of evaluating the success of COOLTORISE in meeting the expected impact standards. All evaluation activities belong to WP4: Evaluation of actions.

This deliverable is part of WP4, and more specifically T4.4: Combined evaluation of impacts, aiming at evaluating the combined impacts of all COOLTORISE actions that will take place during the project's lifetime. This task reflects the results from the WP4, extracting information mainly from WP3 and the COOLTORISE workshops on energy culture, energy bills, cooling toolkits, and outdoor activities.

1.2. Intended audience

This document constitutes the manual of the evaluation strategy that has been designed by the project, along with the results of the first summer. It is a practical tool for the project's evaluation managers and the project partners to efficiently monitor the project activities and present to third parties the progress and results of the COOLTORISE workshops. They can also identify the needs and re-adjust the evaluation strategy, following an agile process.

In addition, the document can be used as a guide and practical tool for "Horizon2020" – "Horizon Europe" evaluation and impact assessment managers of on-going and future projects, who will be willing to explore COOLTORISE strategy and capitalise on it, as well as a guide/control point for the reviewers of the European Commission. Last, the current deliverable report can be used by any possible future replicator of the COOLTORISE evaluation and impact assessment approach.

1.3. Document structure

The deliverable is structured into the following 7 sections: The **introduction** that describes the scope of the document, and the target audience, the **evaluation strategy of COOLTORISE**, presenting the evaluation approach and the tools that were used during the evaluation process, the **activities' results** from the first summer, the **evaluation results** based on the methodological approach and the KPIs, the **conclusion**, the **reference list**, and the **annex**.

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2. The Evaluation strategy of COOLTORISE

2.1. The WP4 structure and the correlation with WP3

The COOLTORISE evaluation strategy is described in the **WP4: Evaluation of the impact**, which is divided into four tasks:

Table 1 WP4 – Tasks

Task no.	Task title
T4.1	*Impact of workshops and personal interviews*
T4.2	*Impact of indoor kits and outdoor interventions*
T4.3	*Impact of summer heat warning alarms*
T4.4	*Combined evaluation of impacts*

This WP evaluates the impact of all actions conducted in COOLTORISE, while ensuring that the expected impact indicators are met. It also reports the lessons learnt during these actions and suggestions for improvement. During the project's lifespan, two deliverables will be issued, based on T4.4:

- D4.1: Combined evaluation of impacts report (first summer) – M18
- D4.2: Combined evaluation of impacts report (final) – M36

In a nutshell, these tasks evaluate the impact of the workshops and interviews with the consumers (T4.1), the indoor installable kits and the outdoor interventions (T4.2), and the heat warning alarms (T4.3). Each one of the tasks corresponds to the respective activities in the tasks of **WP3: Action: Launching tailored solutions**, which is divided into seven tasks.

Table 1 WP3 – Tasks

Task no.	Task title
T3.1	*Engagement and follow up of consumers*
T3.2	*Summer energy culture workshops*
T3.3	*Energy workshops and interviews*
T3.4	*Coolkids workshops*
T3.5	*Indoor installable*
T3.6	*Outdoor interventions*
T3.7	*Summer heat warning alarms*

More specifically, T4.1 evaluates T3.1-T3.4, T4.2 evaluates T3.5 and T3.6, and T4.3 evaluates T3.7. Task 4.4 is responsible for the combined evaluation of the actions' impact, taking into consideration the previous tasks. In addition, the expected impact as described in Section 2.1, WP2, T5.2, and T5.3 support the evaluation and impact assessment. T4.4 includes all the evaluation activities and produces unified assessment results for the COOLTORISE impact, that is reflected in D4.1 and D4.2. The connections among the tasks can be seen below:

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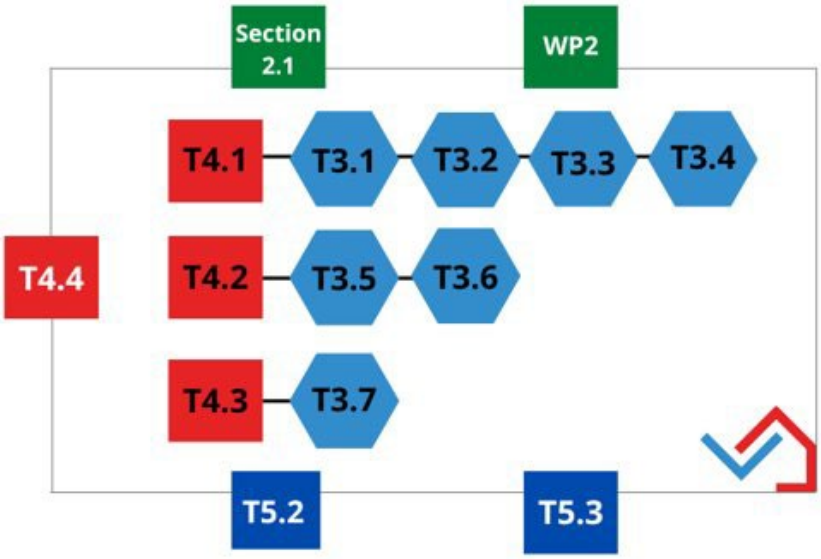

Figure 1 Overview of task connections and evaluation flow

In the next chapter, the methodology and tools of the evaluation strategy are presented.

2.2. The Bottom-up approach: Completion – Engagement – Effectiveness

The evaluation strategy of COOLTORISE follows a **bottom-up approach**. First, it evaluates the activities separately and then combines the results to extract unified conclusions and propose policies and solutions. The impact of the actions is measured through a threefold evaluation: the level of **completion** of the actions, the degree of **engagement** among households, and the **effectiveness** of the actions. The tasks of WP4 have iteration phases during the project: first, to evaluate the actions conducted during the first summer and to report suggestions for improvement; second, to evaluate the actions conducted during the second summer and to put together all the impacts derived from the project for a final evaluation. Also, the second iteration will generate knowledge and suggestions that will feed the policy recommendations of the project.

In this chapter, the evaluation criteria and tools per WP task are presented.

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2.2.1. Impact of workshops on energy culture and energy bills (T4.1)

As already mentioned, T4.1 corresponds to tasks T3.1, T3.2, T3.3, and T3.4, and it evaluates the impact of the workshops and interviews in WP3 on the consumers. The evaluation process includes both quantitative and qualitative criteria. First, the total number of workshops, home visits, and interviews provides the **total number of participants that completed the action.** Then, the pre/post questionnaires will be used to collect baseline data, related to the characteristics of the households, their energy consumption, their energy habits, and their expenses.

Pre-activity (*ex ante*) and post-activity (*ex post*) questionnaires were distributed to the participants to measure the actions' effectiveness. Ex ante questionnaires include questions regarding the behavioural change of the responders, the adoption of passive strategies and solutions, and their personal impressions of new skills, energy bill reduction, and self confidence in energy knowledge and management. Ex ante questionnaires are estimated to be answered by around 70% of the total participant households. The answers, in combination with the energy bills, when obtained, and the initial characterisation of the household, will complete the full picture of the household situation. Ex post questionnaires are estimated to be answered by at least 30% of the participants (approx. 250 households). There will be regular follow-ups for this particular group to monitor the progress and success of the activities.

All in all, the questionnaires provide useful insight into behavioural change, strategies, new skills, and new knowledge, mapping the effectiveness of the workshops.

2.2.2. Impact of indoor kits and outdoor interventions (T4.2)

T4.2 corresponds to T3.5 and T3.6. To measure the **completion** of the indoor kit tasks, the indicator is the total number of **kits distributed**. For the outdoor interventions, the corresponding indicator is the total number of said **interventions**. For the **engagement** the kits' indicators include the number of **kits installed and used during the summer** and the number of participants that would **buy and install them by themselves**. For the outdoor interventions, engagement will be counted based on the **number of participants in the interventions**.

In both cases, the participants will evaluate their **satisfaction regarding the improvement of indoor comfort** after the actions, and their **impressions regarding energy consumption reduction**. This information will be complementary to their real consumption, based on their **energy bill**. This information will be a measuring factor of the **effectiveness** of the actions.

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2.2.3. Impact of summer heat warning alarms (T4.3)

The summer heat warning alarms, under T3.7, aim to help households be prepared for an upcoming heatwave. The purpose of T4.3 is to evaluate if, during the two summers, the households were **informed about all the upcoming heatwaves** in advance. This is the **effectiveness** indicator of the task. The **number of communication channels created** (via applications, SMS, emails, etc.), will measure the degree of **completion** of the action. The **number of subscribers** to these alarms and the number of public institutions will be used to measure the **engagement** produced by this action. Since in most of the locations of the project there are already established channels informing the citizens of extreme weather conditions, the improvement of the existing tools will be examined.

2.2.4. Combined evaluation of impacts (T4.4)

T4.4 is in line with the expected impacts of the project, in section *2.1 Expected impacts*. The purpose of this task is to combine all the evaluation activities from tasks 4.1-4.3, and generate the two deliverables, D4.1, and D4.2. This task includes four criteria to measure the combined impact of the activities:

[1] The total number of engaged consumers: This number will be extracted from the aggregated number of households actively participating in the workshops and interviews in WP3. This activity is related to the impact *2.1.1 Involvement of at least 5,000 consumers per million Euro of EU funding.*

[2] The primary energy savings and reduction of GHG emissions: This criterion evaluates the savings in energy consumption as a consequence of the workshops and interviews in T4.1 and the indoor kits and outdoor interventions in T4.2. To confirm the energy savings, the energy use baseline is compared to the reduction on energy consumption after the activities. This activity is related to the impacts *2.1.2 Primary energy savings triggered by the project,* and *2.1.3 Reduction of greenhouse gases emissions (in tCO2- eq/year) triggered by the project*.

[3] The total number of professionals participating in the trainings: This criterion, is related to the SEPAs. The purpose is to attract volunteers from the professional field of engineering, urban sustainability, environmental studies etc, to work together with the rest of the interested volunteers. During their training, both target groups acquire useful knowledge to use either in their professional careers or in their personal life. The total number of trained SEPAs reflects the success of engaging citizens and raising awareness around summer energy poverty. The coordinators of each group of SEPAs evaluated their team. This activity is related to impact *2.1.4 Professionals participating*

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in trainings and with increased skills on energy issues. The results of this evaluation are displayed in the D2.3 Energy agents report (I Summer).

[4] Stakeholders reached through media and events: This criterion is related to the effectiveness of the dissemination activities in T5.2 and T5.3. Reaching a significant amount of people will facilitate the project's success. The target groups include the energy consumers and the key actors, such as local authorities, associations, private sector companies, and civil society. Multiple activities will provide input. In this vein, the workshops in WP3 are a major activity, along with the conferences for the key stakeholders. In terms of communication channels, mailing campaigns, information points, the COOLTORISE website, and social media accounts are in place.

The KPIs for assessing the success of the actions, are related to the expected events, interventions, and households that will participate throughout the project. The numbers are presented in the tables below:

Table 2 Number of expected events/interventions per activity

Action	Spain (Mad)	Spain (BCN)	Greece	Italy	Bulgaria
Workshops on summer energy culture and summer energy bills	25	21	32	35	53
Coolkids workshops	9	7	10	12	17
Indoor installable kits workshops	2	2	2	2	2
Outdoor interventions	3	3	4	4	6
Summer heat warning alarm campaigns	2	2	2	2	2

Table 3 Number of households participating in activities

Action	Spain (Mad)	Spain (BCN)	Greece	Italy	Bulgaria
Summer energy culture and summer energy bills workshops	375	315	480	520	800
Coolkids workshops	110	100	120	170	200
Indoor installable kits	45	40	60	65	100
Outdoor interventions	45	40	60	65	100
Summer heat warning alarms	450	400	600	650	1000

To sum up, the measuring factors for T4.4 are the **total number of engaged consumers**, the **primary energy savings and reduction of GHG emissions,** the **total**

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number of SEPAs and the coordinator SEPAs that evaluated their teams (WP2), and the **stakeholders reached through media and events** (T5.2-T5.3).

2.2.5. Summary of evaluation KPIs

The table below contains all the KPIs regarding the evaluation based on the information presented above.

Table 4 KPIs of T4.1-T4.3

	T4.1	T4.2	T4.3
Completion	Total num. of participants participating in the workshops/activities	- Kits distributed - Num. of interventions	Num. of channels created
Engagement	Total num. of people participating in the pre/post questionnaires	- Installed/used kits & intention to buy similar products - Num. of participants in the interventions	Num. of subscribers
Effectiveness	Behavioural change, strategies, new skills/knowledge (based on the questionnaires)	- Satisfaction with the increase in indoor comfort - Impressions regarding energy consumption reduction - Energy bill reduction	On time alarm for the upcoming heatwave

Table 5 KPIs of T4.4

T4.4
Total number of engaged consumers
Primary energy savings and reduction of GHG emissions
Total number of SEPAs (volunteers & coordinators)
Stakeholders reached through media and events

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2.3. From evaluation to impact

Bearing in mind the information and the KPIs mentioned above, it is important to unpack the rest of the methodological framework. The evaluation of the COOLTORISE starts from a bottom-up approach, evaluating first the activities separately, then the combination of activities, and finally the impact on participants' life and the policies that can be generated by the evaluation results. This approach is based on the triptych of completion, engagement, and effectiveness. These three criteria work horizontally, as transversal indices during the evaluation. The measuring factors of these criteria were mentioned in section 2.2.

The results of the evaluation generate four different types of impact: **Social, Economic, Environmental, and political**. Each of these categories has different sub-categories of impact, and each sub-category is confirmed by its own KPIs and variables, while it also exists in its own impact level. The impact levels are three: Micro, Meso, Macro. The micro level refers to the individuals that were involved in the activities either as SEPAs, or participating households. The meso level refers to the municipalities and local organisations executing the activities, that can eventually adopt local-level policies against summer energy poverty. The macro level refers to the national and EU policymakers that can uptake the project results and more specifically the policy recommendations and structure of macro-level policies.

The strategy overview is presented in the figure below:

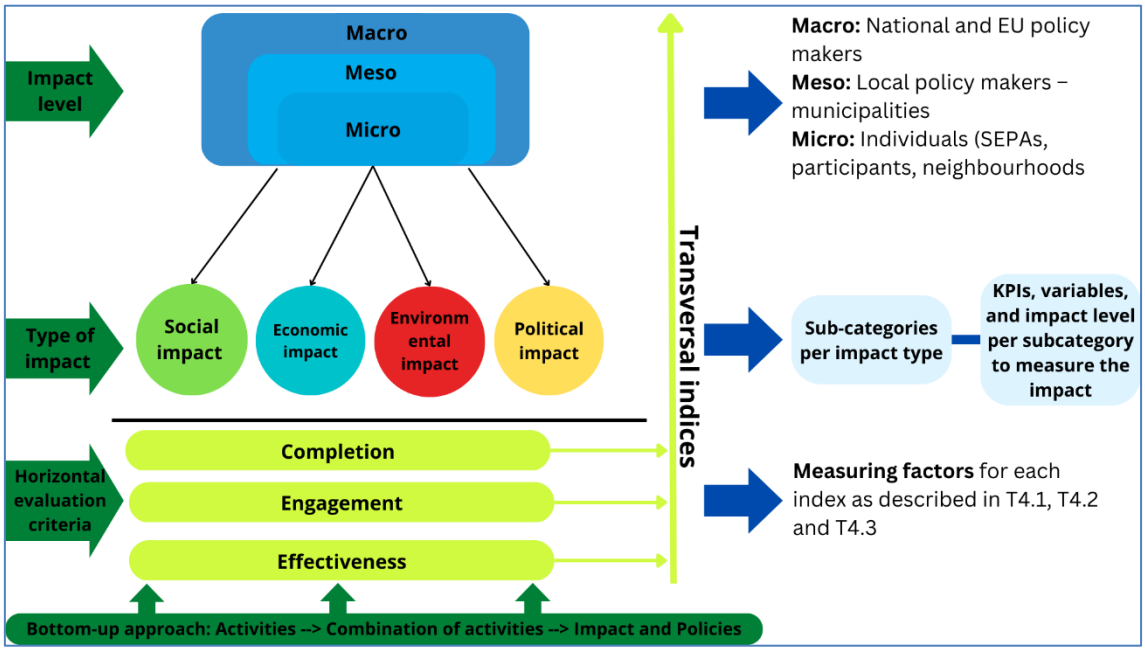

Figure 2 From evaluation to impact strategy

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2.3.1. Impact categories and sub-categories

As mentioned above, each of the 4 impact types, social, economic, environmental, and political, have their own sub-categories. These subcategories include community building, behavioural change, new knowledge, the economic empowerment of the households, the sustainable consumption of energy by both the project partners and the participants, and the empowerment of the local governance, among others. In detail, the sub-categories of impact per type are presented in the table below:

Table 6 Impact subcategories per type

Social	Economic	Environmental	Political
Community building & empowerment – outdoor interventions	Participant's economic empowerment	Sustainable energy consumption by the partners & the participants	Awareness about energy culture policies
Family empowerment – kids inclusive/gender equality/unrepresented groups	Economic value of shared resource use	Reduce household energy consumption & GHG emissions	Energy policy making at the local level/empowerment of local government
Behavioural change toward more efficient daily habits	Exploitation of social public tools		
Impact on social capital (users' skills)			
Improve dwellings' thermal comfort			
Building confidence, well-being, and energy literacy			

2.3.2. Impact analysis per sub-category

After the sub-categories of impact were established, an analysis of how they can be confirmed is needed. This analysis states the measured indicator (KPI), and the impact level. The indicators can be the number of participants, or the use of the tools given during the activities, and the impact level corresponds to the micro-meso-macro level approach. Below, each subcategory has a dedicated table providing this information.

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Social Impact sub-categories

The social impact of the project can be considered the most prominent one. Also, it is of great importance for the European Union as well, to combat summer energy poverty. Behavioural change towards energy efficiency can save money on energy bills, improve living conditions, and increase the quality of life. In addition, green actions can have a positive social impact on energy-poor households by reducing the environmental impacts of energy production. Renewable energy sources, such as solar, wind, and hydropower, are becoming increasingly cost-effective and widespread across the EU, and have helped to reduce the environmental footprint of energy production.

Finally, the EU has implemented a number of initiatives aiming at helping energy-poor households reduce their energy consumption and costs. These include the European Commission's "Energy Efficiency Directive" (European Commission, 2018), which requires all EU countries to set energy efficiency targets and to provide energy-saving advice to households. The EU's "Energy Poverty Advisory Hub" (EPAH, 2020) also seeks to identify and assess the causes and impacts of energy poverty, and to develop appropriate policy responses.

In this "climate", the COOLTORISE project can have a significant social impact, as it is presented in the tables below:

Table 7 Social sub-category 1

Dimension	Indicator (KPIs)	Impact level
Community building & empowerment – outdoor interventions	Number of Households participating in the outdoor interventions	Micro
	Number of citizens participating in the design & execution of the interventions	Micro

Table 8 Social sub-category 2

Dimension	Indicator (KPIs)	Impact level
Family empowerment – kids inclusive/gender equality/unrepresented groups	Number of Households participating with children	Micro
	Number of single-parent	Micro

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	households participating	
	Number of elderlies participating in the activities	Micro

Table 9 Social sub-category 3

Dimension	Indicator (KPIs)	Impact level
Behavioural change toward more efficient daily habits	Number of households changing their habits after participating in the COOLTORISE workshops	Micro
	Number of SEPAs changing their habits after receiving the COOLTORISE training	Micro

Table 10 Social sub-category 4

Dimension	Indicator (KPIs)	Impact level
Impact on social capital (users' skills)	Number of SEPAs receiving the training	Micro
	Number of participants using the tools from the cool kits to save and monitor their energy	Micro
	Number of people that will use the COOLTORISE knowledge in their professional career.	Micro

Table 11 Social sub-category 5

Dimension	Indicator (KPIs)	Impact level
Improve dwellings' thermal comfort	Number of participants that stated the workshop helped them find affordable ways to keep their dwellings cooler.	Micro
	Number of participants using the tools from the cool kits to improve their thermal comfort	Micro

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Table 12 Social sub-category 6

Dimension	Indicator (KPIs)	Impact level
Building confidence, well-being, and energy literacy	Number of participants that stated that the thermal comfort of their house has been improved	Micro
	Number of participants stated that they better understand their energy bills	Micro
	Number of participants that stated that they believe they use energy more efficiently	Micro

Economic impact sub-categories

The European Union has been actively promoting green actions to reduce energy poverty in its member states. These actions have had both direct and indirect economic impacts on energy-poor households. Directly, green actions have helped reduce energy costs for energy-poor households. In particular, energy efficiency improvements have helped to reduce household energy bills by reducing energy consumption. This has enabled energy-poor households to spend less on energy, freeing up more money for other household expenses. This has helped to reduce poverty and boost local economies (EEA, 2013).

The COOLTORISE project puts great effort to enhance and expand the positive economic impact of green actions and the specific ways to achieve this, are presented below:

Table 13 Economic sub-category 1

Dimension	Indicator (KPIs)	Impact level
Participant's economic empowerment	Number of participants that stated that they better understand their energy spending	Micro
	Number of participants stated that they believe they spend less energy	Micro
	Number of participants that stated that they found more affordable ways to keep their dwellings cool during summer	Micro

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Table 14 Economic sub-category 2

Dimension	Indicator (KPIs)	Impact level
Economic value of shared resource use	Number of people (SEPAs, participants, consortium members) receiving material that was created during the project.	Micro
	Number of municipalities having access to the COOLTORISE material gratis	Meso
	Number of policy makers in national/EU level having access to the COOLTORISE material gratis	Macro

Table 15 Economic sub-category 3

Dimension	Indicator (KPIs)	Impact level
Exploitation of social public tools	Number of municipal services participating in the activities	Meso
	Number of municipal staff involved in the activities	Meso
	Number of activities that took place with the support of the local governance	Meso

Environmental sub-categories

One of the most vital issues right now in climate change, is the GHG emissions. The EU has established a number of policies and measures to reduce GHG emissions. These include a commitment to reduce GHG emissions by at least 40 % by 2030 compared to 1990 levels and the adoption of an Energy Union Strategy to increase the share of renewables in the EU energy mix and reduce energy consumption. The EU has also adopted a number of specific legislative measures, such as the Emissions Trading System (ETS) and the Effort Sharing Decision (ESD), which set binding targets for reducing GHG emissions from sectors not covered by the ETS. In addition, the EU has committed to making its economy more resource efficient and decarbonising its energy system. This includes the development of an EU-wide energy efficiency target and a Renewable Energy Directive, which sets binding targets for the share of energy from renewable sources. Finally, the EU has also launched a number of initiatives to support the development of low-carbon technologies, such as the European Clean

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Energy Transition, which aims to increase the uptake of renewable energy sources and energy efficiency measures (EEA, 2022).

COOLTORISE has identified the importance of this cause and the related impact on this matter is presented below:

Table 16 Environmental sub-category 1

Dimension	Indicator (KPIs)	Impact level
Sustainable energy consumption by the partners & the participants	Number of partners within the consortium adopting new habits and be impacted by the project	Micro
	Number of households adopting new habits and be impacted by the workshops	Micro

Table 17 Environmental sub-category 2

Dimension	Indicator (KPIs)	Impact level
Reduce household energy consumption & GHG emissions	Number of households stating that they feel they consume less energy after the workshops	Micro
	Number of households that they do not intent to install an air-conditioning device in the proximate future (projection)	Micro
	Number of households using alternative cooling methods (cooling kits & other tools)	Micro

Political impact

Local authorities have a clear role in the transition towards a more sustainable future, as it expressed in the Sustainable Development Goals (SDG) [33] published by the United Nations as well as in the European H2020 framework by the European Commission. To enhance this concept, the European Commission launched the Covenant of Mayors, an initiative that supports local and regional authorities to create and submit their plans to implement sustainable and “green” actions to reach certain climate goals (SECAP, 2016, SEAP, 2018). More recently, according to the legal concepts of Citizen Energy Community and Renewable Energy Community defined in

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EMD and REDII, municipalities can be members of energy communities and take part in the local energy systems along with citizens and other stakeholders. This is a very fruitful environment to strengthen mostly but not solely the local political impact of COOLTORISE.

Table 18 Political sub-category 1

Dimension	Indicator (KPIs)	Impact level
Awareness about energy culture policies	Number of COOLTORISE communication activities attended by policy makers.	Meso/Macro
	Number of engaged policymakers at every stage of the project, as audience, co-organisers or/and with access to the material	Meso/Macro

Table 19 Political sub-category 2

Dimension	Indicator (KPIs)	Impact level
Energy policy making at the local level/empowerment of local government	Number of municipalities that participated in the COOLTORISE activities and had access to the training and workshop material	Meso
	Number of municipal staff participated and/or trained during the project	Meso

At the end of the project, the consortium will provide specific numbers for the abovementioned impact-oriented KPIs to showcase the overall impact of the COOLTORISE project. These results will be reflected in D4.2 which will be submitted in M36.

2.3.3. The impact value chain

The impact of the COOLTORISE activities follows a process starting from the inputs. As inputs, the project has the technical expertise of the consortium, the theoretical framework, and the equipment used. Then, through the activities, the project produced the SEPA training, the workshops for the energy-poor households, and finally diffused the knowledge and information that was generated by these activities. The

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outputs were the people trained as SEPAs, the people engaged in the workshops, the knowledge material, and the community empowerment of the communities. The outcomes included the raise of energy literacy, the indoor comfort of the households that participated in the workshops, reduced energy consumption, and an overall improved quality of life. This process led to three different impacts of the COOLTORISE project: The behavioural change for both the SEPAs and the workshop participants, the reduced energy poverty mainly for the workshop participants, and finally the new policies at the local level that can be implemented by the municipalities and organisations that have been coordinating the activities during the first summer. The table below shows the progress from input to impact:

Table 20 From input to impact

Inputs	Activities	Outputs	Outcomes	Impacts
Equipment	Training (SEPAs)	People trained	Energy literacy	Behavioural change
Technical Expertise	Workshops	People engaged	Indoor comfort	Reduce energy poverty
Theoretical framework	Diffusion of knowledge and information about the project	Knowledge material	Less energy consumption	New policies at a local level
		Community empowerment	Improved quality of life	

2.4. Evaluation tools

The evaluation of the COOLTORISE activities, took place using a variety of tools. First of all, the whole cycle of evaluation was supported by literature to confirm that the tools and practices are solid and representative. Starting from the level of completion, the source of information was the reporting excels from the workshops and the participants lists to confirm the number of people attending the workshops. This material was created by the pilot partners and then distributed to the SEPAs. During the workshop, the SEPA volunteers completed the information and then handed it to the SEPA coordinators for review and confirmation. Finally, the COOLTORISE partners received the completed reports.

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The tools proving the engagement but also the effectiveness of the workshops, were the pre- and post- questionnaires that were distributed during the activities. Both questionnaires were prepared by the pilot partners. The pre-questionnaires' purpose was to set the baseline and the initial knowledge of the participants about summer energy poverty, and energy efficiency, and also provide some information about their demographics. This pre-questionnaire was distributed to the SEPAs along with the reporting documents and they were distributed at the beginning of the workshops. For the follow-up questionnaires, the SEPAs contacted via phone the participants that had agreed to be contacted some months after the workshop, to evaluate the knowledge they gained during the COOLTORISE workshops. The post-questionnaires were effectiveness-oriented and intended to imprint the behavioural change, the new skills and knowledge, and the satisfaction of the participants. The answering format contained multiple-choice, Likert scale, Yes/No, and open answers.

The pre-questionnaire consisted of 22 questions. It started with some information about the heating and cooling facilities, and the alternative practices the households use to keep the dwellings either warm or cool. Then the responder had to provide some information about the dwelling's state and energy consumption. The questionnaire continued with some demographics and at the end there were seven questions that could prove the state of the household's behaviour, that could be the baseline for the behavioural change to be proven after the post-questionnaires.

The questions that were mainly used from the pre-questionnaires were the following:

1. Is your dwelling equipped with heating facilities? (multiple choice)

2. Can your household afford to keep its home adequately warm? (Yes/No)

4. Is your dwelling equipped with air conditioning? (Yes/No)

5. Do you use in your dwelling any other equipment for cooling? (multiple choice – more than one option)

6. Can your household afford to keep its home adequately cool? (Yes/No)

7. Do you use any of the following alternatives at home to keep cool? (multiple choice – more than one option)

9. In the past twelve months, has the household been in arrears, i.e. has been unable to pay the utility bills (heating, electricity, gas, water, etc.) of the main dwelling on time due to financial difficulties? (multiple choice)

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14. How many people live in your household? In which age groups they belong? (multiple choice – more than one option)

17. I feel that my energy consumption is normal for my type of household (Likert scale)

18. I know where to seek for energy savings advice (Likert scale)

19. I feel that I am not paying too much with my current energy bills (Likert scale)

20. I feel confident on how to save energy (Likert scale)

21. I feel confident to help others saving on their energy bill (Likert scale)

22. I am aware of how different energy tariffs can be used to lower my energy bill (Likert scale)

The post-questionnaire consisted of 24 questions. It started with questions about how and if the workshops helped them learn new and alternative ways towards energy saving, and energy efficiency, as well as if the workshops helped them better understand their energy bills and improve the thermal comfort of the dwelling. These questions, in comparison with the pre-questionnaire questions, reflect the behavioural change of the participants. Then, dedicated questions followed about the installable kit workshops, the outdoor interventions, and the heat warning alarms. The questionnaire had also 2 questions about the personal estimation of the responders on the energy saving they achieved, and it concluded with some demographics.

The questions that were used from the post-questionnaires were the following:

1. Please choose the types of intervention you have participated in (multiple choice – more than one option)

3. After participating in the energy culture workshops, I know how to combine the air conditioner with alternative systems (fans, evaporative coolers, etc.) to save energy (Likert scale)

4. After participating in the energy culture workshops, I am aware of alternative systems to keep my dwelling cool, and now installing an air conditioner is not a priority (Likert scale)

5. I feel that this activity has improved the thermal comfort of my dwelling (Likert scale)

6. Do you use any of the following alternatives provided by the workshops at home to keep it cool? (multiple choice – more than one option)

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8. Overall, this activity has helped me cope with my energy bills (Likert scale)

9. I feel that I understand better my energy bills and consumption (Likert scale)

10. Overall, has your participation in the COOLTORISE workshops helped you reduce your energy consumption (multiple choice)

10b. If possible, please provide a percentage of this reduction (personal estimation) (open question)

11. I am aware of how different energy tariffs can be used to lower my energy bill (Likert scale)

12. Which "cooling tools" were included in your kit? (multiple choice – more than one option)

13. Did you use the kits? (multiple choice)

14. Would you buy any of the kit items by yourself to use in your home or recommend it to a person close to you? (Yes/No)

14b. If yes, please specify the item (Open question)

15. What kind of outdoor activities did you participate in? (multiple choice – more than one option)

15b. If other, please specify (open question)

16. Do you feel that these activities have/will help(ed) reduce the overall temperature of the neighbourhood creating more "cool" places? (multiple choice)

17. Do you consider these outdoor interventions might be useful for any of the following? Please select as many as you consider (multiple choice – more than one option)

19. Do you intend to install air conditioning equipment in the short term (coming year)?

20. Would you install air conditioning equipment in the mid-term (coming 5 years)?

Both questionnaires have been included as Annexes, in case more details on their structure are needed.

The pre-questionnaires were printed and distributed to the participants during the workshops. The SEPAs helped them complete them by reading out loud and explaining

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the questions and then gathering them. Then they used either the EU Survey link that was created to gather the data, or they used the Moodle platform. In both cases they were exported in Excel format. The post-questionnaires were communicated via a phone interview, where the SEPAs contacted the households that agreed to participate in the evaluation and completed the questionnaires again using the EU Survey link that was created. The ViLabs team was the one with access to the results of the EU Survey linked as the responsible partner for the evaluation of the activities. However, all the questionnaires were anonymised by the pilot partners so no one else can identify the participants' personal information like names and contact details, with the responses. The pilot partners had full access only to the results of their own pilot and received anonymised results from the other pilot sites. The anonymisation codes were decided by each pilot so they defer from one to another.

On average, 45.2% of the participants in all pilot sites completed the pre-questionnaires. The target was to have a completed questionnaire by 65%-70% of the participants. However, this was proven particularly challenging, and the percentages vary from 26% to 65%. The lowest, 26% was reached in the Greek pilot case. The biggest share of participants were elderly people, and they found the questionnaire difficult to complete. In the pilot site of Barcelona, they reached 38%, in Italy 44%, in Bulgaria 53% and finally Madrid had the highest percentage of pre-questionnaires with 65%.

In the case of post-questionnaires, the target was to have at least 30% of the participants that had already answered the pre-questionnaires. On average, about 39% of post-questionnaires was achieved. The highest percentage was reached by Greece, with 60% of the pre-questionnaire responders participating in the post-questionnaires. Madrid reached 44%, Italy reached 37%, Bulgaria reached 36% and Barcelona reached 22%.

Another evaluation criterion was the number of SEPAs that conducted the activities. This information was provided by the WP2 reports and the partner responsible for the SEPA training. To conclude, the last tool used for the evaluation of the success of the COOLTORISE activities was the reports of some communication actions under WP5, that enhanced the diffusion strategy of the project, in order to reach people beyond the workshops. This information was gathered by the communication manager of the project and was handed to the evaluation managers for the purpose of this deliverable.

The next chapter presents the results of the first summer, and the analysis of these results, based on the evaluation KPIs of COOLTORISE.

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3. Activities' results: The first summer in numbers

In this third chapter, the results from each pilot will be presented. The pilots include 2 pilot sites in Bulgaria, Peshtera and Pazardzhik, one pilot site in Greece, one in Italy, and two in Spain, Barcelona, and Madrid. The chapter will be divided per pilot and per activity type. The activities include the summer energy culture workshops, the energy bill workshops, the indoor installable kits, the outdoor interventions, and the heating alarm channels.

Before going through the cases, it is essential to mention that not all types of workshops happened in all pilot cases. The energy crisis and the high prices of energy bills shifted the focus to the workshops on energy culture and energy bills. In addition, most of the pilot sites already have some type of heat wave alarms, so the partners decided to organise more elaborated culture and bills related workshops for this first summer and focus on the other workshops during the second summer. Also, only one pilot partner, Madrid, held the outdoor interventions and created the heatwave alarm channels. In terms of the responsibilities the consortium has towards the work plan of COOLTORISE, the KPIs are set to be met at the end of the project and there are no specific KPIs per summer. The project partners will make sure that they will achieve the KPIs by the end of the second summer (2023). At this point, it presented more impactful to adapt to the needs of the households.

3.1. Bulgaria

3.1.1. Pazardzhik

Demographics

Based on the activity reports from the Pazardzhik pilot site, the total number of people that attended the activities were 187. Also, 103 people responded to the pre-questionnaires, and 40 to the post-questionnaires. Regarding the demographics of the participants, they are mainly families. 34% of the households have children younger than 14 years old, while 24% of them have children between 14 and 18 years old. The elderlies, above 65 years old, cover 30% of the sample.

Heating and cooling facilities

In the pre-questionnaires, only one person stated that their household didn't have some sort of heating facilities, while on the contrary, 67% of the responders didn't have air-conditioning. Also, 71% of the responders stated that they were not able to

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keep their dwellings adequately hot during winter, while 65% couldn't keep them adequately cool. Focusing on the issue of cooling, most of the responders, 31%, use fans instead of air-conditioning, they shower more during summer (24.3%), and reduce the time they spend at home during heat waves (16.5%). However, fortunately most of the participants, 70%, didn't face any issues with paying their bills in the last 12 months.

Setting the baseline

The main purposes of the pre-questionnaires were to set the baseline for the households. In this questionnaire, more than half of the participants (57.3%) stated that they feel their energy consumption is not normal for their type of household. Also, 60.2%, didn't know where to seek energy saving advice, with 68% believing they pay too much for their energy bills. In the questions "*I feel confident on how to save energy*", and "*I feel confident in helping others save on their energy bills*" 52.43% responded *disagree/strongly disagre*e, although 22.33% responded *agree* which means there was a part of the audience that was familiar with energy-saving techniques. Lastly, on the question "*I am aware of how different energy saving tariffs can be used to lower my energy bills*", the responses were mixed. 22.33% responded *agree*, 25.24% responded *disagree*, and 39.81% responded *not agree nor disagree.* These results are the starting point of COOLTORISE for the Pazardzhik pilot site.

After the workshops

After the workshops, the participants had some time to try implementing the practices and overall knowledge they gained. Then the pilot partners contacted some of them, to participate in the post-questionnaires and evaluate the knowledge they acquired.

Energy culture and energy bills

Starting from the energy culture and energy bills workshops, from those who had an air-condition in their dwelling, 60% stated that after participating in the energy culture workshops, they learned new ways to combine the air conditioner with alternative systems to save energy. From those who didn't have an air-condition installed, all stated that during the workshops they learned alternative systems to keep their dwelling cool, and now installing an air conditioner is not a priority. The most famous alternatives were the use of plants, natural ventilation, and the use of shades during the day. As a result, more than half of the responders (52.5%) stated that they managed to improve the thermal comfort in their dwelling, while 70% stated that they are now aware of how different tariffs can be used to lower energy bills.

The post-questionnaires contained also questions about the reduction of the energy bills and the workshops' impact on coping with these bills. However, due to the energy

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crisis and the rise of energy prices, these questions were difficult to be answered, since even if we succeeded in lowering energy consumption, this didn't reflect on the cost of the bills. However, 32% of the responders stated that the workshops helped them cope with their bills, while 42.5% stated that they feel that after the workshops they better understand their energy consumption. In addition, 80% declared that they feel like the workshops helped them reduce their energy consumption either above their expectations or sufficiently. Then they gave a personal estimation of this reduction, in which most of the participants placed this reduction between 5% to 10% (57.5%). Another interesting indicator was the pair of questions on whether households intended to install air-conditioning in the prospect of 1 or 5 years. In the case of Pazardzhik, 37.5% of the responders were negative about installing air-conditioning in the next year, while 20% were unsure. In the second question about 5 years ahead, 25% of the households were still negative, while 17.5% were unsure and 12.5% stated that they will install air-conditioning if other options are not sufficient.

Indoor installable kits

Moving on to the workshops that took place to distribute the indoor installable kits, in the pilot site of Pazardzhik, 56 kits were distributed and used, either regularly (40%), or for a short period of time (12.5%). All kits were the same and included the following items: an electric fan, 2 E27 LED bulbs of 5W each, and a smart plug. All the responders would buy similar products or suggest at least one of the items in the kit to someone else, with the more popular being the smart plug, chosen by 27.5% of the responders.

Outdoor interventions

In the pilot site of Pazardzhik, the partners organised an outdoor intervention in the Mladost neighborhood, where they planted trees. The activity attracted 14 people from the local community that shared with the COOLTORISE partners the issues of the neighborhood during the heatwaves and actively participated in the design and execution of the tree planting. They chose this type of activity due to their prominent need for more shaded places and more green areas.

3.1.2. Peshtera

Demographics

In the pilot site of Peshtera, 234 people attended the workshops. Also, 120 people responded to the pre-questionnaires, and 40 to the post-questionnaires. Regarding the demographics of the participants, they are mainly families, with 83% of the households having children younger than 14 years old, while 54% of them have children between

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14 and 18 years old. The elderlies, above 65 years old, cover 33% of the household members.

Heating and cooling facilities

In terms of heating and cooling facilities, 7.5% of the participants stated that their household didn't have some sort of heating facilities, while 30% didn't have air-conditioning. Also, 36.7% of the responders stated that they were not able to keep their dwellings adequately hot during winter, while 40.8% couldn't keep them adequately cool. Furthermore, 52.5% didn't use any other equipment for cooling, while 39.2% used fans. As alternative practices, often showers and sleeping in cooler places than the bedroom was found useful from the responders with 23.3%, and 21.67% respectively. On the bright site, more than half of the participants, 58.33%, didn't face any issues with paying their bills in the last 12 months.

Setting the baseline

The main purpose of the pre-questionnaires was to set the baseline for the households. According to the results of the analysis, 47% of the participants stated that they feel their energy consumption is not normal for their type of household. Also, half of them didn't know where to seek energy saving advice, with 83.33% believing they pay too much for their energy bills. In the question "*I feel confident on how to save energy*", 58.3% responded disagree/strongly disagree, and in the question "*I feel confident in helping others save on their energy bills*" 66.67% responded *disagree/strongly disagre*e. Lastly, on the question "*I am aware of how different energy saving tariffs can be used to lower my energy bills*", 61.67% responded *disagree/strongly disagree*, and 30% responded *not agree nor disagree.* These results are the starting point of COOLTORISE for the Peshtera pilot site.

After the workshops

After the workshops, the participants had some time to try implementing the practices and overall knowledge they gained. Then the pilot partners contacted some of them, to participate in the post-questionnaires and evaluate the knowledge they acquired.

Energy culture

In the energy culture workshops, 90% of the participants had an air-conditioning facility. All stated that after the workshop they learned new ways to keep their dwellings adequately cool, in order to need less the air conditioning. As a result, 85% of the participants stated that they managed to improve the thermal comfort in their dwelling, while all stated that they are now aware of how different tariffs can be used to lower energy bills.

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Energy bills

The post-questionnaires contained also questions about the reduction of the energy bills and the workshops' impact on coping with these bills. However, as already mentioned in the case of Pazardzhik, the energy crisis has affected the potential impact of these workshops on energy bill costs. In the case of Peshtera, they formed a small focus group to conduct the energy bills workshop, and that's why there were only 5 participants. However, all of them stated that the workshops helped them cope with their bills, and better understand their energy bills and consumption. As for the intention of the households on whether they intended to install air-conditioning in the prospect of 1 or 5 years, for both the 1-year and 5-year prospect, the responses were divided between "yes" and "not sure yet". This was out of concern that due to the rise of temperature each year, the provided solutions would eventually be insufficient.

Indoor installable kits

In the case of the indoor installable kit workshops, in the pilot site of Peshtera, 41 kits were distributed and used, either regularly (64%), or for a short period of time (36%). These kits included an electric fan, 2 E27 LED bulbs, and a smart plug. 24 of the responders would buy similar products or suggest at least one of the items in the kit to someone else, with the more popular being the fan, chosen by 44% of the responders, with the second being the smart plug by 28% and third the E27 LED bulb with 24%.

In the general questions that all participants from the different workshops answered, 75% of them declared that they feel like the workshops helped them reduce their energy consumption above their expectations, while 22% chose "sufficiently". Then 9 out of the 40 people gave a personal estimation of this reduction, which was placed between 5% to 30%.

3.2. Spain

3.2.1. Madrid

Demographics

The Madrid case was a very extensive and successful one, with 330 people attending the workshops. 215 people responded to the pre-questionnaires, and 91 to the post-questionnaires. As for the demographics of the participants that completed the pre-questionnaire, they had 158 females, 56 males and 1 other. The participating households were families and elderly people, with 20% of the households having

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children younger than 14 years old, while elderlies, above 65 years old, cover 72% of the household members.

Heating and cooling facilities

In terms of heating and cooling facilities, according to the results, the households that didn't have heating facilities at all were 1.4% of the total sample. On the contrary, 20% didn't have any cooling facilities installed. Also, 31.16% of the responders stated that they were not able to keep their dwellings adequately warm during winter, while 29.07% couldn't keep them adequately cool. However, most of the households used alternative ways to keep their home cool and their body temperature low during summer. Of the 215 people that completed the pre-questionnaire, 126 answered this question (58.6%). The most common practice was frequent showers during the day with 51.5% of the responders choosing it, followed by the choice of wearing light clothing (39.7%), sleeping somewhere cooler than the bedroom (26.2%), and the reduction of time spent at home (17.4%). The percentages exceed 100% because the responders were able to choose more than one option. Furthermore, 89.4% used fans as an alternative cooling tool. On the question about the difficulties on paying the energy bills in the last 12 months, only 31 people responded (out of the 215), with 20 of them stating that they faced some difficulties (9.3%).

Setting the baseline

The pre-questionnaires reflected the starting point of the households before participating in the COOLTORISE workshops. In the question "*I feel that my energy consumption is normal for my type of household*", 138 people responded out of 215. According to the results, 19.5% of the households responded "*agree*", and 15.8% responded "*nor agree or disagree"*. Also, of the 133 people that responded to the question about searching for energy advice, 29.76% of them didn't know where to seek energy saving advice. In addition, 29.77% believe that they pay too much for their energy bills, while in the question "*I feel confident on how to save energy*", we have a 19.1% that responded "*agree*", and 15.35% responded "*nor agree or disagree*" (141/215 responses). These percentages mean that we have a partially informed audience in this case, with some basic knowledge on energy savings. In the question "*I feel confident in helping others save on their energy bills*" 33.02% responded *disagree/strongly disagree*, and 17.21% responded "*nor agree or disagree*" (138 answers). Lastly, on the question "*I am aware of how different energy saving tariffs can be used to lower my energy bills*", 35.35% responded *disagree/strongly disagree*, and 10.23% responded *not agree nor disagree. Also, 12.09% of the households responded "agree".* These results are the starting point of COOLTORISE for the Madrid pilot site.

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After the workshops

After the workshops, the participants had some time to try implementing the practices and overall knowledge they gained. Then the pilot partners contacted some of them, to participate in the post-questionnaires and evaluate the knowledge they acquired. In Madrid, they held separate workshops on energy culture, energy bills, the indoor installable kits, and they also held one outdoor intervention.

Energy culture

The workshop on energy culture had 138 participants, with 55 of them responding to the post-questionnaires. According to the total number of households participating in the post-questionnaires (91 households), 60 of them had air-conditioning, while 29 didn't. From the households with air-conditioning facilities, 61.7% stated that during the workshops they learned new alternatives to keep their dwellings cool, and now they can reduce the use of the air-conditioning, while 38.33% were unsure if the effectiveness of the practices. The most common practices they picked up from the workshops were natural ventilation (38.8%) and the habit of closing the shades during the day to keep the sun rays out of the house (42.35%). In terms of improving the thermal comfort of the dwelling, the reactions were relatively positive. Of the 52 people that responded to the question "I feel like this activity has improved the thermal comfort of my dwelling", 44.2% of the participants responded "*agree/strongly agree*", and the same percentage responded "*nor agree or disagree*". Lastly, 81.4% of the respondents stated that they are now aware of how different tariffs can be used to lower energy bills (agree/strongly agree). In the questions related to the intention of the households to install air-conditioning in the prospect of 1 or 5 years, the percentages were negative by 93% and 96% respectively. The households in Madrid were very committed to not installing air-conditioning for both economic and environmental reasons.

Energy bills

Regarding the results from the energy bills workshops they had 141 participants with 42 of them participating in the post-questionnaires. Based on the results of the post-questionnaires, in the question "*Overall, this activity has helped me cope with my energy bill*", 64.29% responded "*agree/strongly agree*", while 26.19% responded "*nor agree or disagree*". Finally, in the question about if they better understand their energy bills and consumption, 71.43% of the households responded "*agree/strongly agree*". Also, 23.81% responded "*nor agree or disagree*".

Indoor installable kits

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In the pilot site of Madrid, they hosted a small focus group to support the Installable Kit workshops. The focus group consisted of 5 participants that made regular use of the kits. Two of the participants received a set of a tap aerator and a slow cook, and the other three toolkits had an electric fan and a cooling towel, a smart plug and, a plug extender, and the last one had sunshields. All 5 participants would buy similar products or suggest at least one of the items in the kit to someone else. Due to the low number of participants, it is not possible to conclude the most famous item from the kits.

Outdoor interventions

The pilot site in Madrid had also the opportunity to organise one outdoor intervention with 59 residents participating in the activities related to the outdoor intervention (co-diagnosis, co-design, and implementation). 4 of them completed the post-questionnaire. Due to the nature of the activity, it was more challenging to reach out to them and gather the post-questionnaires, and many of the participants didn't give their contact details.

As for the type of outdoor interventions, the responders participated in activities of planting trees on private courtyards and mapping climatic shelters for the heat wave periods. Also, they stated that these activities helped and will help reduce the overall temperature of the neighbourhood creating a "cooler" environment. The benefits from such interventions can be the creation of "climatic shelters" during the summer, the decrease in outdoor temperatures that can lead to the reduction of indoor temperatures, the new spaces to socialise with neighbours and strengthen community links, and the improvement of outdoor spaces in habitability.

Overall, 80 out of the 91 participants in the COOLTORISE activities in Madrid responded to the question about the workshops' impact on energy consumption reduction. The responses were mixed and it appeared a bit difficult for the households to calculate if and how this reduction happened. 26.83% of the households responded that the difference in their energy consumption felt very little, while 24.39% didn't know how to respond. On the other hand, 23.17% of households stated that the workshops helped them reduce their energy consumption beyond their expectations. In numbers, most of the participants placed this reduction between 5% and 15%, while others provided some more explanatory answers.

Due to the energy crisis and the very high energy bills, the reduction of energy consumption in comparison with the summer of 2021 doesn't secure the reduction of the energy bill. This makes it particularly difficult to calculate the energy saving and also to reflect this reduction in the bill price. Many of the households, even though

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they had an air-conditioning facility had already stopped using it to save energy or they had already cut other energy spending activities. The conclusion of this discussion was that even if they tried to save energy this didn't reflect on their energy bills, and they continued to struggle with paying them.

Heatwave alarm

The pilot site in Madrid is the one of the two pilot sites that created the heat wave alarm channel. In May 2022, the partners created a Whatsapp business channel, that counts 51 subscribers. The information that the participants received was two-fold: On the one hand they were informed about the upcoming heatwaves, and on the other hand, they received specific guidelines and suggestions to bear with the heat.

3.2.2. Barcelona

Demographics

In Barcelona's pilot site, a total of 84 households participated in the workshops. Out of these, 36 people completed the pre-questionnaires, while 8 responded to the post-questionnaires with 75% of them being women and 25% men. The demographic data revealed that 19.4% of the participants had children under 14 living in their households. Moreover, 61% have people aged 19-65 years old, while 36% of the households have individuals over 65.

Heating and cooling facilities

Regarding the heating and cooling facilities in their households, 28% of the respondents (10 people) reported not having any heating system installed, while another 28% stated that they cannot afford to keep their homes adequately warm. On the other hand, 61% of the participants claimed that they can afford to keep their homes cool, while 36% reported that they cannot. In terms of air conditioning, half of the households had it installed (18 out of 36), while the other half did not. However, a significant majority (64%) of respondents reported using fans as an alternative way to keep their homes cool. Additionally, wearing light clothing (25%) and taking multiple showers a day (11%) were the most commonly reported alternative methods that participants use to keep themselves cool. When asked about facing difficulties in paying their energy bills in the last 12 months, 32 people answered (out of 36) with 25 respondents reported that they did not face any difficulties, while 7 respondents faced some difficulties, with one of them facing it twice or more.

Setting the baseline

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The primary aim of the pre-questionnaires was to establish a baseline for the households. The results revealed that 31% of the participants feel that their energy consumption is not normal for their type of household, while 28% remain neutral, and an equal percentage expressed that they feel their energy consumption is normal (the remaining 14% did not answer the question). At the same time, 53% of the participants feel that they are not paying too much for their current energy bills. According to the participants' answers, 33% of them didn't know where to seek energy-saving advice, while 39% expressed feeling confident about their level of knowledge on how to save energy. Meanwhile, 25% of the participants reported lacking confidence in their ability to help others in reducing their energy bills. Additionally, 31% feel that they can assist others in reducing their energy bills, while 25% remain neutral and 19% did not answer. Regarding awareness of using different energy tariffs to lower their energy bills, 39% of the respondents strongly disagreed or disagreed with the statement. These results are the starting point of COOLTORISE for the Barcelona pilot site.

After the workshops

Following the workshops, the participants that agreed to participate in the post-questionnaires were contacted, to evaluate their learning. In Barcelona, they held workshops on energy culture and indoor installable kits.

Energy culture

In the post-questionnaires conducted after the energy culture workshops, 8 participants provided their responses. Among them, only one participant reported having an air conditioning system in his home, who remained neutral when asked whether he learned alternative ways to combine the use of air conditioning with energy-saving practices during the workshops. The rest of the participants, who did not have an air conditioning system installed, reported learning alternative ways to keep their homes cool during the workshops, and installing an air conditioning system was no longer a priority for them. Additionally, half of the participants reported a positive impact on the thermal comfort of their homes due to the workshops, while the other half remained neutral. Closed shades during the day (88%) and natural ventilation early in the morning or at night (50%) were the most reported alternatives used to keep their homes cool. The percentages exceeded 100% because respondents were able to select more than one option.

Regarding the questions about energy bills, when the participants asked whether the workshops helped them reduce their energy consumption, 75% of participants answered "above my expectations/sufficiently," while only 13% responded "very little." Out of the 8 respondents, 3 provided their personal estimates of the percentage reduction in their energy bills. More specifically, 2 participants reported a 50%

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reduction, while one reported a 25% reduction. Additionally, 25% of respondents indicated that they were aware of how different energy tariffs could be used to lower their energy bills, while 63% remained neutral.

Indoor installable kits

During the indoor installable kits workshops held in the Barcelona pilot site, 5 kits were distributed among the participants, all of whom used them regularly. The kits included various items such as an electric fan, a sunshield, a smart plug, a G23 led bulb, and a plug extender (2 out of 5 kits), while 3 of the kits also had a plug-in timer. All participants expressed their intention to purchase one or more of the kit's items or recommend them to others. The most popular item was the electric fan, with 40% of participants choosing it, followed by LED bulbs and plug-in timers, both at 20%.

Out of the 7 participants who reported not having an air conditioning system installed in their dwellings, 4 stated that they have no intention of installing one in the near future. At the same time, 3 remained undecided about their short-term plans. In terms of mid-term plans, 3 participants stated that they would not install air conditioning, while 4 remained uncertain.

Heatwave alarm

The pilot site in Barcelona is the second pilot site that launched the heat wave alarm channel. The pilot partners decided to launch two channels, one on Whatsapp which was a broadcast lists for Barcelona and Santa Coloma de Gramenet, and one on Telegram for the Barcelona region. The two channels have a total number of 32 subscribers.

3.3. Greece

Demographics

In the pilot site of Greece, 200 people from several municipalities participated in the workshops. Also, 52 people responded to the pre-questionnaires and 31 to the post-questionnaires with 55% of them being women and 45% men. According to the participants' demographics, it seems that we have both families and elderly as 52% of the people who answered the questionnaire reported having individuals over 65 living in their households. Additionally, 52% have people aged 19-65 years old, while 53% of the households have children under 18.

Heating and cooling facilities

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In terms of heating and cooling facilities, only one person of the respondents stated that his household didn't have some sort of heating facilities. At the same time, a significant number 77% reported that they did not have air-conditioning equipment. Moreover, 88% of the participants stated that they can't keep their household warm enough for the winter, while 56% reported that they can't afford to keep their house adequately cold in the summer. The vast majority, specifically 85% of the participants, reported that they use fans to cool themselves off. The most common alternative ways that the participants use to keep their dwellings cool is to reduce the time spent at home, shower more than once a day and wear light clothing. Also, all households reported that they faced arrears during the last 12 months one or more times.

Setting the baseline

The primary objective of the pre-questionnaires was to establish a starting point for the households. According to the results of the analysis, 78.85% of the participants stated that they feel their energy consumption is not normal for their type of household, with all the participants feeling that they are paying too much with their current energy bills. Furthermore, 88.46% of them didn't know where to seek energy-saving advice, while 92.31% expressed feeling uncertain about their level of knowledge on how to save energy. As a result, all participants reported lacking confidence in their ability to help others in reducing their energy bills. In the question, "*I am aware of how different energy tariffs can be used to lower my energy bill*", we have an 80.77% that responded, "*strongly disagree/disagree*". The results obtained from the pre-questionnaires are the starting point of COOLTORISE for the Greece pilot site.

After the workshops

Following the first workshops, the participants were given a period of time to apply the practices and knowledge they had acquired. All participants who completed the pre-questionnaire also participated in the workshops that followed. However, the post-questionnaires were given to 31 participants who were also the ones who received the "cooling kits".

Energy culture and energy bills

The workshops about energy culture and energy bills took place at the same day, with 31 people participating in them. All of the participants who had an air-conditioning system installed at their household (16%) reported that after the workshop they learned how to combine the air conditioner with alternative systems (fans, evaporative coolers, etc.) to save energy. In addition, the vast majority of the respondents (83.87%) stated that installing an air conditioner is not a priority for them, as they learned alternative methods for keeping their dwelling cool. Furthermore, all participants

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indicated that the activity had a positive impact on the thermal comfort of their dwelling. The most commonly reported alternatives used at home to keep it cool included closed shades during the day, use of towels or equivalent under the door to reduce the warm wind coming from outside, and use of plants to decrease the indoor temperature (29.03%).

In terms of the questions regarding energy bills, 64.52% of the participants stated that the workshop helped them in managing their energy expenses, and 77% indicated that they can understand better their energy bills.

Moreover, 87% of the respondents stated that they are aware of how different energy tariffs can be used to lower their energy bill. Also, in the question "*Has your participation in the COOLTORISE workshops helped you reduce your energy consumption*", 61% of the participants answered "*above my expectation/sufficiently*" and 39% "*very little*". Then 15 out of the 31 people gave a personal estimation of this reduction, which was placed at 4% on average.

Indoor installable kits

During the indoor installable kits' workshops held in the Greek pilot site, a total of 30 kits were distributed and used by participants, either regularly (74%) or for a shorter period (26%). The kits consisted of various items, including sun shields and E27 led bulbs (32%), electric fans and Wi-Fi power strips (39%) and smart plugs and cooling towels (29%). Additionally, 97% of participants expressed interest in purchasing similar products oor recommending at least one item from the kit to others. According to the participants' responses, there was no clear product that stood out among the kit items. Each product received a similar level of preference. However, the sunshields were slightly preferred, with 19% of participants indicating they would purchase them again. Electric fans and cooling towels followed closely behind, with 13%.

When participants asked about their plans to install air conditioning equipment in the short-term or mid-term, 84% of them indicated they did not plan to install it in the short term. However, of these participants, 29% were uncertain about their mid-term plans and only 3% of participants said they planned to install it within the next five years. Also, 52% of participants indicated they will not install air conditioning equipment in the mid-term future.

3.4. Italy

Demographics

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In the pilot site of Italy, a total of 159 households participated in the workshops, out of which 70 responded to the pre-questionnaires and 26 to the post-questionnaires. In terms of the participants' demographics, the majority of households were composed of adults and elderly individuals, with 52.30% of responders reporting the presence of individuals aged 19-65 years old and an equal percentage having people aged over 65 living in their households. Furthermore, only a small proportion of households (13.84%) had children under 18.

Heating and cooling facilities

In terms of heating and cooling facilities, a majority (83%) of the respondents reported that their household have some sort of heating facilities. However, only 37% of them stated that they can keep their household adequately warm. Regarding air conditioning equipment, 40% of participants reported that their dwelling is not equipped with it, while 49% reported that they cannot afford to keep their home adequately cool in summer. At the same time 57% of respondents reported using fans to cool themselves off, while the most common alternative way seems to be the frequent showers during the day with a total of 37% of the participants to prefer it. On a positive note, 60% of the households reported that they did not face arrears during the last 12 months.

Setting the baseline

In the pre-questionnaires, 42% of the participants expressed feeling that their energy consumption is not typical for their household type. Additionally, 40% of the respondents reported that they feel they are not paying too much with their current energy bills, while 22% disagreed with this statement. In addition, nearly half of the participants (49%) reported being familiar with where to find energy-saving advice, and an equal percentage (48%) are knowledgeable about how various energy tariffs can be utilised to reduce their energy expenses. Furthermore, a percentage of 54% expressed confidence in their ability to conserve energy, while 48% reported feeling capable of assisting others in reducing their energy costs.

After the workshops

After a certain amount of time from the workshops, the households that were interested in participating in the evaluation of the workshops were contacted, to assess the knowledge they had acquired.

Energy culture and energy bills

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According to the post-questionnaires answered by the participants of the energy culture and energy bills program, all respondents who had air conditioning equipment in their dwellings reported that they learned new ways to combine the air conditioner with alternative systems to save energy after participating in the workshops. On the other hand, 83% of respondents who did not have an air conditioner installed stated that during the workshops, they learned alternative systems to keep their dwelling cool, and installing an air conditioner was no longer a priority.

After the workshops, 58% of the participants reported an improvement in the thermal comfort of their households. When asked about their preferred method of cooling their homes during the summer, the majority (85%) indicated natural ventilation while the outside temperature is lower (early in the morning or during the night).

In the post-questionnaires, participants were asked about the impact of the workshops on their ability to reduce energy costs and improve their understanding of energy bills. The results showed that 62% of the respondents felt that the workshops helped them manage their energy expenses better, while 65% reported that they now have a better understanding of their energy bills. Furthermore, 65% of the respondents reported having knowledge of utilising diverse energy tariffs to reduce their energy bills.

Out of the 12 participants who did not have air conditioning equipment in their homes, 11 indicated that they do not intend to install it in the short term. Moreover, 64% of these participants also stated that they do not plan to install air conditioning equipment in the mid-term either, while the remaining 36% were uncertain about their mid-term plans.

In general, when the participants were asked if their participation in the COOLTORISE workshops helped them to reduce their energy consumption, the majority (77%) answered “above my expectations/sufficiently”, and only a percentage of 15% answered “very little”.

Indoor installable kits

In the Italian case, 8 indoor installable kits were delivered to the SEPA volunteers, to install them to the social houses where householders involved in COOLTORISE live. The SEPA volunteers are also residents of the social houses. After SEPA volunteers had received the items, they proceeded to install them in the common areas with the help of households. From the feedback given by SEPA volunteers on the items, it emerges that the most liked items were the led bulbs and the motion sensor led bulbs. SEPA volunteers stated that it was very easy to install them, and they could also see some benefits in terms of energy savings. The item less appreciated was the fan.

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4. Evaluation results

The biggest challenge the project faced was the energy crisis that stroked Europe in the last year. This had as a result the price spike of energy bills, and many people found themselves in the difficult position of not being able to pay their bills. Many households put an effort into reducing their energy consumption both during summer and winter, but due to the raised prices, they were unable to reduce their bill cost. This made it particularly difficult to estimate the energy and cost reduction generated by the project activities and had an impact on the different workshops.

To imprint the impact of the first summer activities the deliverable presents the results in combination with the objectives and goals set at the beginning. These results are presented based on the three criteria of completion, engagement, and effectiveness. Not all measuring factors have specific KPIs so in some cases the third column is marked as N/A.

4.1. Completion

To confirm the completion of the activities, four indicators should be measured: The total number of participants in all activities, the kits that were distributed, the outdoor interventions that took place, and the number of heatwave channels that were created. The results are gathered in the table below:

Table 21 Completion of activities indicators

Completion criterion	1st summer	KPI
Total num. of consumers participating in the workshops/activities	2,879	7,240
Kits distributed	131	310
Num. of outdoor interventions	2	20
Num. of channels created	3	10

In the table above, one can see the total number of participants in the activities, 2,879 people, with the KPI for the participants by the end of the project, to reach 7,240 consumers in a conservative scenario. This means that during the first summer, the project managed to reach 40% of this KPI. In addition, the project partners distributed 145 indoor installable kits, covering 47% of the total number of kits they have to

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distribute during the project. The same percentage goes for the outdoor interventions as well, while for the number of channels launched, they reached 30% with 3 channels. The target of the project partners is to use the time between the two summers to re-evaluate their strategies and be ready to achieve the KPIs in the second summer.

4.2. Engagement

Moving on to the second criterion, the engagement of the households should be proven. The engagement is measured through the total number of people participating in the pre- and post-questionnaires, the installed and used indoor kits and the intention of the households to buy similar products themselves or suggest them to others, the number of participants to the outdoor interventions, and the number of subscribers to the heatwave alarms. The results are presented in the table below:

Table 22 Engagement indicators

Engagement criterion	1st summer	KPI
Total num. of people participating in the pre/post questionnaires	Pre: 596 (45.2%) Post: 236 (40%)	Pre: 70% of the total participants Post: 30% of the pre-
Installed/used kits & intention to buy similar products	131	310
Num. of participants in the outdoor interventions	73	310
Num. of subscribers (heatwave alarms)	83	3,100

As was mentioned in the beginning of chapter 3, not all pilot sites conducted all the different activities, and they decided to put more effort in the energy culture and energy bills workshops that appeared to be the most valuable for the households. In this sense, the partners fell behind in the outdoor interventions and the heatwave alarm channels. On the other hand, the indoor installable kits had a great success, with all of the households receiving a kit to state that they used them and they would recommend at least one of the items in the kit to someone else (more details in chapter three). As for the pre- and post-questionnaires, the partners managed to have a complete pre-questionnaire from 45.2% of the participants, and a post-questionnaire

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from 39% of the pre-questionnaire responders. The KPI for the post-questionnaires was reached. The pre-questionnaires appeared to be more challenging for the households and a redesign of the questions to be shorter and more direct is needed.

4.3. Effectiveness

The last criterion is the effectiveness of the activities. The measuring factors included the behavioural change, and the new strategies, and skills that the households acquired, their satisfaction with the increased indoor comfort, their impression and personal estimation of the energy consumption reduction they achieved, and the energy bill reduction, as well as the effectiveness of the heatwave alarms in terms of accurately inform the households about the upcoming heatwaves. The table below presents the results in percentages:

Table 23 Effectiveness indicators

Effectiveness criterion	1st summer
Behavioural change, strategies, new skills/knowledge (based on the questionnaires)	83% of the responders stated that during the COOLTORISE workshops they learned new alternatives in order to need less or not at all the air-condition. The solutions came from the energy culture workshops and the suggestions made by the SEPAs, but also directly from the installable indoor kits and the tools the project provided.
Satisfaction with the increase in indoor comfort	52% of the responders stated that using the knowledge and tools of the project they managed to improve their thermal comfort significantly without increasing the energy cost.
Impressions regarding energy consumption reduction	Although difficult to calculate, approximately 72% of the participants stated that they feel they managed to reduce their energy consumption while using the low/no budget solutions provided by COOLTORISE.
Energy bill reduction	The question about energy bill reduction was the most challenging to answer. Due to the energy crisis and the higher energy prices, the households didn't manage to see a noticeable difference in bill costs. However, about 66% of the households mentioned that the tools and knowledge they acquired from the workshops helped them cope with their energy bills and control the raised prices. Also, they now understand better their energy bills and the respective charges (68%).

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On time alarm for the upcoming heatwave	Based on the data from the channels, the alarm-messages regarding the heatwaves reached the subscribers in time, complemented with guidelines and suggestions to cope with the heat.

The results above reflect the responses of the participants to the pre- and post-questionnaires, and their personal estimation on the energy reduction and the improvement of thermal comfort. The percentages from one pilot site to another are mostly similar and the results are presented on average. In each of the pilot dedicated section in chapter three, the specific percentages per pilot are presented.

4.4. Combined impact of the first summer

This section contains some factors to measure the impact of the activities and the overall people that were reached and involved in the activities in different ways. These factors include the overall number of engaged consumers during the activities, the total number of SEPAs involved, and the total number of stakeholders reached through the communication events of the project. Lastly, the project partners tried to measure the primary energy savings and reduction of GHG emissions caused by COOLTORISE.

4.4.1. Primary energy savings and reduction of GHG emissions

Energy savings can be measured using energy meters, such as electricity and gas meters, to measure the amount of energy used over a given period of time. GHG emissions reduction can be measured using a combination of emission factors (which convert energy use into GHG emissions) and inventory methods to quantify the amount of GHG emissions released. One of the goals of COOLTORISE is to reduce the energy consumption of energy-poor households and reduce their GHG emissions. This was one of the most challenging parts of the project.

The unfortunate event that is happening over the past year is the energy crisis that has affected all European countries. The energy crisis today is primarily due to a lack of sustainable energy sources. Many countries rely on fossil fuels for their energy needs, but these sources are finite and produce large amounts of air pollution. Renewable energy sources such as solar, wind, and geothermal are becoming increasingly popular, but they require significant investments in new technologies and infrastructure in order to be viable. Additionally, the world still heavily relies on coal, oil, and natural gas, which have been linked to climate change and environmental degradation. To address the energy crisis, countries must invest in sustainable energy sources, institute strong environmental regulations, and promote energy efficiency.

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The project partners did their best to guide the households towards more energy-efficient behaviour, given the circumstances. On the one hand, the COOLTORISE activities can assist households and give them new tools and alternatives to cope with the heat. On the other hand, the project targets energy poor households that were already trying to reduce their energy consumption, and this leaves a thinner space for further reduction and energy saving. This position was further supported by the post-questionnaires, where the responders found it difficult to explain if and how the workshops helped them reduce their consumption. On the bright sight, they were positive that the activities introduced them to new low/no budget solutions to cope with the heat.

The questions that were used to reflect the households' estimation of the reduction of their energy consumption were the following:

8. Overall, this activity has helped me cope with my energy bills

10. Overall, has your participation in the COOLTORISE workshops helped you reduce your energy consumption

10b. If possible, please provide a percentage of this reduction (personal estimation)

Energy savings: As has been already mentioned, due to the energy crisis, energy bills have been raised. This means that the reduction in energy consumption does not lead to a reduction in energy bills. However, according to the post-questionnaire results, the majority of the households stated that the activities helped them cope with their energy bills. This didn't necessarily mean that they managed to lower their bill, rather than better control the increased cost. On average, about 67% of the households were in favour of this statement in all pilot sites. In addition, most of the households estimated that the knowledge they gained led to a reduction in their energy consumption. More specifically, about 73% of the total number of households agreed with this statement. Some of them tried to give a personal estimation of this reduction which was placed between 2% and 15% in most of the pilots. This is aligned with the potential primary energy savings foreseen in the Grant Agreement: an expected reduction of 5 – 20%, with an average of 7% in the case of electrical energy consumption. These figures were derived from a report by the European Environment Agency (2013).

According to the grant agreement, each pilot was required to measure Primary Energy Savings (PES) using last year's and this year's household energy bills to determine the average percentage reduction in household energy consumption after participation in COOLTORISE activities. However, this seemed to be challenging for the pilots as most of them struggled to obtain these bills. As a result, the estimated Primary Energy

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Savings (PES) during the first summer was measured according to the mean personal estimations of the reduction in the households' energy bills after their participation in the COOLTORISE activities. Most of the pilots faced a limitation with a significant number of households that could not provide the actual reduction of their energy consumption or an estimation of it. However, based on the responses received, the mean energy reduction reported in Madrid was 8%, in Barcelona 40%, in Greece 4%, and in Bulgaria 10%, while in Italy's pilot none of the households gave a personal estimation of their reduction.

Although the measurement of PES based on households' personal estimations, as received from the post-questionnaires, addressed the lack of bills and provided reasonable values on energy consumption reduction, some pilots did not receive this information from the questionnaires, while others received too optimistic estimations. Thereby, for those pilots, the reduction used to measure PES was estimated by the mean reduction of the rest of the pilots' savings. Specifically, in Barcelona's pilot the mean energy reduction reported was 40% which may seem too optimistic, while in Italy's pilot, none of the households gave a personal estimation. Therefore, the percentage of energy savings used for those two pilots was 7%, which is the mean reduction using the personal estimations received from the rest of the pilots. Also, the 7% reduction in energy consumption is aligned with the percentage used in G.A.

Applying these percentages to the mean households' Primary Energy Consumption (PEC) as set in the Grant Agreement and taking into consideration the number of households reached through the COOLTORISE activities, the total PES in the first summer can be estimated. The table below presents those results:

	SPAIN (MADRID)	SPAIN (BARCELONA)	GREECE	ITALY	BULGARIA	TOTAL
Estimated mean households' PEC in summer (kWh) [1]	2,895 kWh	2,920 kWh	4,257 kWh	2,530 kWh	2,024 kWh	-
Reported mean energy savings due to COOLTORISE activities (%)	8%	7%	4%	7%	10%	-
Mean households' PES in summer	231.6 kWh	204.4 kWh	170.28 kWh	177.1	202.4 kWh	-

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(kWh)						
Number of households reach in summer 2022	330	97	200	175	421	1,194
Total estimated PES in summer 2022 (kWh)	**76,428 kWh**	**19,827 kWh**	**34,056 kWh**	**30,992.5 kWh**	**85,210 kWh**	**246,513.5kWh**
Target for the whole project (kWh) [1]	**182,700 kWh**	**163,200 kWh**	**357, 600 kWh**	**230,100 kWh**	**284,000 kWh**	**1,220,000 kWh**

[1] Baseline and target described in section 2.1.2 *Primary energy savings triggered by the project* of the Grant Agreement.

Following these calculations, it is estimated that households participating in the COOLTORISE activities managed to save around 246,513.5 kWh, which represents the 20 % of the target for the whole project. This year savings will be accumulated with next years' savings and following this trend the consortium expects achieving projects targets. Considering the rise in energy bills mentioned above, this is a significant achievement and demonstrates the effectiveness of the project's key performance indicators (KPIs) in promoting behaviours that can lead to energy saving. Additionally, the overall results suggest that the COOLTORISE activities were successful in helping households reduce their energy consumption and contribute towards the project's overall goals.

GHG emissions: In order to derive an estimation of the overall reduction in CO_2 emissions resulting from the COOLTORISE activities, it was necessary to obtain the households' personal estimations of their consumption as reported in the post-questionnaires. Subsequently, these estimations were applied to the estimated CO_2 emissions of households stipulated in the Grant Agreement, while taking into account the number of households that were engaged in the interventions. The table below presents the estimated CO_2 saving per pilot and in total:

	SPAIN (MADRID)	SPAIN (BARCELONA)	GREECE	ITALY	BULGARIA	TOTAL
Estimated household CO_2 emissions in summer (tCO2eq) [1]	1.762 tCO2eq	1.802 tCO2eq	4.806 tCO2eq	1.597 tCO2eq	1.743 tCO2eq	-
Reported mean	8%	7%	4%	7%	10%	-

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energy savings due to COOLTORISE activities (%)						
Mean households' PES in summer (tCO2eq)	0.141 tCO2eq	0.126 tCO2eq	0.192 tCO2eq	0.112 tCO2eq	0.174 tCO2eq	-
Number of households reach in summer 2022	330	97	200	175	421	1,194
Total estimated CO_2 savings in summer 2022 (tCO2eq)	**46.51 tCO2eq**	**12.24 tCO2eq**	**38.45 tCO2eq**	**19.56 kWh**	**73.38 tCO2eq**	**190.14 tCO2eq**
Target for the whole project (tCO2eq) [1]	**111 tCO2eq**	**100,8 tCO2eq**	**403.6 tCO2eq**	**145.4 tCO2eq**	**244 tCO2eq**	**1,004.8 tCO2eq**

[1] Baseline and target described in section 2.1.3 Reduction of greenhouse gas emissions triggered by the project of the Grant Agreement.

Following these calculations, it is estimated that households taking part in COOLTORISE activities saved around 190.14 tCO2eq, which is equivalent to 19% of the project's overall target.

More specifically, the pilots of Madrid and Bulgaria managed to reach over the 30% of the expected CO_2 savings according to the conservative scenario, while the pilot in Greece achieved 9.5% of the target. On the other hand, the pilots in Barcelona and Italy reached 12% of the total CO_2 savings KPI. The varying success rates among the pilots may be attributed to differences in household demographics, climate, and cultural factors. Despite this, considering the limitations encountered as well as the energy bills' raisings, the overall estimated CO_2 savings of 186.7 tCO2eq achieved by the participating households represents a significant step towards achieving the project's overall target of 1,004.8 tCO2eq.

Although personal estimations provided a temporary solution, the partners recognised the need for more accurate data and explored the option of combining energy bill requests with the distribution of "coolkits" and regular follow-ups for the second summer.

A complementary approach to estimate the CO_2 savings was through the households' intention to install air-conditioning equipment in the short and medium future. The post-questionnaire reflected this intention through the following questions:

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19. Do you intend to install air conditioning equipment in the short term (coming year)?

20. Would you install air conditioning equipment in the mid-term (coming 5 years)?

According to the participants' responses, the intention to install air conditioning equipment was generally negative, especially in the near future. More specifically, the majority of households surveyed in the COOLTORISE project were not interested in installing air conditioning in the near future, with 77% responding negatively to the idea of installing it within the next year. For the question regarding installation in the next 5 years, the responses were more balanced, with 59.2% responding negatively, 27.5% unsure, and 13.3% responding positively. The increase in positive responses for the 5-year plan was influenced by the rising temperature and the concern that alternative low-impact solutions may not be sufficient in the future.

Air conditioning is a significant contributor to total greenhouse gas (GHG) emissions in Europe. The European Environment Agency estimates that GHG emissions from air-conditioning in EU households in 2020 were around 45 million tonnes of CO2 equivalent (EEA, 2021). According to the European Commission's Joint Research Centre, the average air-conditioning unit in a household produces between 0.75 and 1.7 kg-CO2eq emissions per hour (European Commission, 2021). Taking into consideration this number and the post-questionnaire's results, it is possible to estimate that households that will not install air-conditioning facilities can prevent emissions equal to 71.3 to 161.5 Kg-CO2eq (0.0713 – 0.1615 tCO2eq) per hour of use in the next year, and 59.6 to 135.2 Kg-CO2eq (0.0596 - 0.1322 tCO2eq) per hour in the next 5 years.

4.4.2. Total number of engaged consumers

In order to prove the impact of the project on energy poor households, the project has to estimate the total number of consumers engaged in the activities. In a conservative scenario, engagement of a minimum of 3,100 households, which represents a minimum of 7,240 consumers, is foreseen. In an optimistic scenario, the total amount will reach up to 4,290 households and 10,037 consumers. The final number of consumers involved in the project is derived based on the number of participants who: attended, at least, one of the workshops (Tasks 3.1 to 3.4); were effectively interviewed (Task 3.3); or participated in the indoor installable kits (Task 3.5) or outdoor interventions (Task 3.6).

Based on the above criteria, to effectively calculate the total consumers, the total number of households participating in the activities will be multiplied by the average number of members per household. The table below presents the results:

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Table 24 Total number of consumers engaged in the activities

Country	Number of households	Members per household	Consumers: 1st summer results	Total consumers KPI
Bulgaria	421	*2.3*	968	2,300-3,450
Greece	200	*2.2*	440	1,320-1,650
Italy	175	*2.3*	403	1,495-1,875
Spain (Madrid)	330	*2.5*	825	1,125-1,688
Spain (Barcelona)	97	*2.5*	243	1000-1,375
Total	**1,223**	***2.3***	**1,879**	**7,240-10,037**

In the table below one can observe that the partners managed to reach about 40% of the total consumers that have to reach based on the conservative scenario by the end of the project. This result leaves room for improvement, but it is a great start. The pilot partners are working on the optimisation of the engagement and delivery strategies of the workshops in order to reach and surpass the KPIs by the end of the second summer.

4.4.3. Total number of SEPAs

Another KPI for the evaluation of the impact of the COOLTORISE activities is the total number of trained SEPAs. The final numbers after the first summer are presented in the *D2.3 Energy agents report summer I,* which was submitted in February 2023. According to this deliverable, all pilot partners completed the SEPA training and created two groups: the SEPA volunteers and the SEPA coordinators (also unpaid) that were responsible to overlook the work of the SEPA volunteers. The goal was not only to train the SEPAs in order to conduct the activities but also to achhieve capacity building for them to obtain new skills for both their personal and professional life. During the first summer, a total of 226 SEPAs, 37 SEPA coordinators, and 189 SEPA volunteers were trained. In the case of Bulgaria, they managed to train 41 volunteers and 20 coordinators, in Greece 28 volunteers and 3 coordinators, in Italy 26 volunteers and 8 coordinators, in Barcelona 34 volunteers and 3 coordinators, and in Madrid 60 volunteers and 3 coordinators. The roles and workflow of the SEPAs are described

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thoroughly under D2.3. The table below presents the SEPAs per pilot site. In general, the KPIs are met, or very close to being met, from the first summer. The table below presents the expected numbers of trained SEPAs per pilot site for the whole duration of the project, and the results of the first summer:

Table 25 Total number of SEPAs engaged for the training

COUNTRY	No. SEPAS VOLUNTEERS	No. SEPAS COORDINATORS	Expected no of volunteers by the end of the project	Expected no of coordinators by the end of the project
BULGARIA	41	**20**	96-143	4-7
GREECE	28	**3**	57-71	2-3
ITALY	26	**8**	61-77	3-4
SPAIN (BCN)	34	**3**	37-52	2
SPAIN (MAD)	**60**	**3**	37-52	2

The pilot partners selected volunteers with diverse professional backgrounds to act as SEPA coordinators, based on their respective fields of expertise. The SEPA coordinators were specifically recruited from areas such as engineering, urban planning, sustainability, and social sciences. In Bulgaria, technical experts from energy agencies and municipal administrators were selected as SEPA coordinators, with 10 from energy agencies, 2 from the Municipality of Pazardzhik, 4 from Partner MOP, and 2 from Partner CSEG. In Italy, professionals working in the energy field were chosen, with 2 from the Italian project partners and 2 from local agencies, including a social housing company and the agency for energy and sustainability of Parma. In Greece, the SEPA coordinators consisted of local environmental activists with an interest or expertise in energy or engineering. For Madrid, architects from UPM, experts in energy poverty, and sociologists with volunteering experience with vulnerable households were chosen as coordinators. Finally, in Barcelona, energy poverty activists with expertise in social and community mobilisation were selected as coordinators.

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Based on the results presented in the table above, the pilot site in Madrid has already achieved the SEPA KPI for both the volunteers and coordinators. In addition, all pilot sites have reached or surpassed the optimistic number for the SEPA coordinators. Finally, they have managed to train about half of the total SEPA volunteers they need to reach the KPI, putting themselves on a good track for the second summer.

4.4.4. Stakeholders reached through media and events

Under T4.4 a criterion of the impact of the project is the number of stakeholders reached through media and communications under T5.2 and T5.3. Each partner organised or participated in relevant events where the COOLTORISE project was communicated and presented to relevant stakeholders, like public authorities, the scientific community, CSOs and NGOs, and consumers. Below, there is a table from the *D5.5 intermediate report on dissemination and communication,* updated with figures of up to M18 with all the events COOLTORISE was presented by the project partners. The total number of participants in these events is 1,839 up until February 2023.

Table 26 Number of participants reached through COOLTORISE events

Partner	Event – short description	Target group reached	Level of event	Participants
UPM	5 meetings with relevant stakeholders	Public authorities, CSOs	Local	9
UPM	- ENGAGER Conference (12/04/2022) - Energy Push project dissemination event via streaming (27/04/2022) - ENGAGER Cafe (06/05/2022) - VII International Congress of Young Researchers with a Gender Perspective (15/06/2022) - ENGAGER Cafe: Minimum energy needs: From theoretical approach to real case studies, On the cooling demand and indoor overheating (04/11/2022)	Scientific community, general public	EU	120

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UPM	Communication event at the "Orcasur" senior centre to publicise the project among the community	Consumers	Local	8
UPM	- 19/09/2022 EUSEW Summer energy poverty “Thinking outside of the box” - 28/09/2022 EUSEW 2022, session “Diversifying the energy transition: gender perspectives in energy poverty policies” ** - 06/10/2022 EESAP Congress - 27/10/2022 Grenoble INP- Energy poverty in Europe, session 1: What can i do as a student? - 17/11/2022 AMPS Transformative teaching, "Training future architects towards energy poverty challenges" - 17/10/2022 JIDA Jornadas sobre innovación docente en arquitectura, "SEPAs. Una experiencia de Aprendizaje y Servicio en materia de pobreza energética de verano" - 23/11/2022 Jornada Facturas Imposibles, Lecciones aprendidas desde la intervención en pobreza energética. - 30/09/2022 La Noche Europea de los Investigadores - 07/10/2022 EASLHE, 5th European Association of Service-Learning in Higher Education, Session 9 The SDGs in practice, "Bringing architecture and engineering students closer to the social reality of energy poverty" (no data available for stakeholders reached) - 24/10/2022 Tackling energy poverty: EU approach & sharing best practices, organised	Stakeholders – local, national, EU	Local, national, EU	1,102

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	by the Czech Presidency of the Council of the European Union - 04/11/2022 ENGAGER cafe: Minimum energy needs: From a theoretical approach to real case studies, "On the cooling demand and indoor overheating" - 09/11/2022 European Economic and Social Committee "Woman in energy poverty" (no data available for stakeholders reached) - 8/12/2022 "Is the European Green Deal gender-sensitive?", organised by Centre of European Policy Studies (CEPS) - 14/02/2023 Meeting with Social Services of the city council - 21/02/2022 Jornada del dre a l'energia, L'energia és el teu dret!, organised by Fundació Municipal València Clima i Energia			
Ecoserveis	- Jornada 10 anys pobresa energètica de ACA (February, 22nd 2022) - Aliança contra la pobresa energètica: Debat intern sobre la pobresa energètica d'estiu (July, 6th 2022)	General public, public administrations, CSOs	National	70+
Ecoserveis	Barcelona WorkShops for citizens. Realised in July-August 2022	Citizens, consumers	Local	70
Ecoserveis and ABD	1. Meeting with the La Xarxa metropolitana de refugis climàtics (XMRC) managed by the Àrea Metropolitana de Barcelona. 2. Ana Romero Càlix (from Àrea	Public local authorities, stakeholders General Public,	Local	10

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	Metropolitana de Barcelona - AMB) explained the COOLTORISE project during the V Forum de Medi Ambient i Món Local in Mataró (Barcelona). 28/02/2023 3. The project was presented at the ApS of the University of Barcelona (Ambientals Major). It was also to raise awareness and invite students to be volunteers.	stakeholders, local authorities Students	Local Local	1 5
Parma municipality	ANCI national event - 8/11/21 - Parma	Italian local authorities	National	400 municipalities
Aisfor	National Conference "The role of Municipalities in fighting Energy Poverty – The launch of the first EPAH call (Il ruolo dei comuni nel contrasto alla povertà energetica – il lancio del primo bando EPAH), 15.02.2022, online event, link to the event: https://call.energypoverty.eu/webinars/12-Il-ruolo-dei-comuni-nel-contrasto-alla-poverta-energetica-Il-lancio-del-primo-bando-EPAH	Municipalities, foundations, NGOs, CSOs	National	120
Aisfor	EEDAL Conference on Energy Efficiency in domestic and light sources, 1-3 June, 2022, Toulouse, France. Link to the event: https://eedal-ls21.sciencesconf.org	Researchers, policymakers, NGOs	EU	30
Association CSEG	Meetings with stakeholders: local administrations from Pazardzhik Province to promote the COOLTORISE project	Representatives of Public adminis	Local	25

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		trations		
Association CSEG	National conference co-organised by CSEG "Intelligent Cities and Regions in Action" in Velingrad, Bulgaria. Link to the Agenda: https://www.eap-save.eu/ABEA2021/Agenda%20ABEA%2029-30.11.2021_Nat%20Conference_BG_%20final.pdf	Municipalities, NGOs, researchers, other public administrations	National	130
Association CSEG	Presentation of COOLTORISE at the kick-off meeting of SAVE4WASTE project, 01.04.2022	NGOs, public administrations	Local	12
Association CSEG	Co-organization of a national conference in Sofia, Bulgaria on Energy Poverty "Energy Efficiency and RES – how to meet the challenges of the energy transition and the energy poverty", 30.11.2022	Public administrations, NGOs, researchers, other stakeholders	National	53
Association CSEG	Presentation of COOLTORISE at an international conference called "Circular Economy – the Number One Priority for the European Green Deal"	Public administration, NGOs, researchers, other stakeholders	EU	62
Peshtera Municipality	Meetings with stakeholders from municipalities of Batak, Bratsigovo, and Peshtera on 10, 25 November, and 14 December 2021.	Public administrations, CSOs,	Local	27

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		NGOs		
ViLabs	EUSWE open days event: Energy communities – Greece, Online event, Date: 30.08.2022, Link: https://sustainable-energy-week.ec.europa.eu/sustainable-energy-days/sustainable-communities-energy-greece-2022-08-30_en	SMEs, Policy Official, H2020 projects, local actors	EU	40
ViLabs	1. Prosvasi talks: Η ενργειακή κρίση με πρακτικούς όρους (energy crisis in practical terms) 2. Five activities in Elderly clubs in Thessaloniki	Public authorities/local regional national policy makers, CSOs, NGOs, general public Vulnerable citizens	Regional Local	20 120
All partners	EUSEW 2022, the extended programme, 19.09.2022 * Project partners of COOLTORISE organised this event.	EU stakeholders	EU	170
Total number of stakeholders reached by active participation or organisation of thematic events and presentation of COOLTORISE:				**2,604**

Except for the events mentioned above, a series of communication activities have taken place through the website and social media, publications in newspapers,

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journals, and magazines, as well as TV and radio. The results of these activities are presented below:

Table 27 Summary table of C&D activities by COOLTORISE – First year

№	Tool / Activity	Target group reached	Number reached
1.	Project website, containing SEPAs training materials, news, communication toolkit (poster, banner, leaflet), events section. The website shows 500-600 unique visitors per month in last 4 months. This number grows steadily as of the project start.	Citizens, policymakers, researchers, general public – WP2, WP3, and WP5	5,864 unique visitors
2.	Social media channels of COOLTORISE: • Twitter: 94 followers • Facebook: 102 followers • LinkedIn 812 connections These 3 channels have been established from the scratch with the start of the project.	Citizens, policymakers, research and academia – WP2, WP3, and WP5	36,650
3.	Social media of project partners – already existing channels of project partners contributed significantly for the communication activities of COOLTORISE in this first half of the year.	Research and academia, NGOs, citizens, consumers, public administrations – mainly affecting WP2, and WP3 activities.	69,667
4.	Publications in newspapers, journals, magazines: 31 press publications have been reported by project partners in the first half of the project.	General public – affecting mainly WP5	30,767
5.	Events where COOLTORISE was presented: Partners reported 45 active participations at events or directly organising energy poverty events where COOLTORISE was part of the Agenda. Most of these events had national and EU	Stakeholders, policymakers, public administrations. Affecting	1,839

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	coverage, reaching out a wide range of stakeholders. There were also local stakeholder meetings reported within this category.	mainly WP5.	
6.	Other communication tools: radio and TV interviews, mailing campaign, and advertising. These activities targeted mainly at citizens of the COOLTORISE regions. Partners had different approaches: some were taking advantage of their regular company newsletters to reach out citizens, while others printed out project leaflets, which were distributed to citizens from target neighbourhoods. Some partners reported to undertake interviews on popular broadcasted radio and TV channels which led to approaching a significantly high number of citizens.	General public, citizens – WP3, and WP5	500,000 +

Based on the two tables above, the final number of reached stakeholders through media and events is **more than 550,000**. The KPI for this factor is **15,000** people throughout the entire project duration. However, due to the multiplying effect of social media and channels like TV or radio, this number has significantly exceeded the KPI already by February 2022.

It goes without doubt that the project partners should update their strategies to become more effective and reach the KPIs by the end of the project. However, the positive feedback from the involved households and their intention to get involved again in the project activities, or receive more information about it, paves the way for a successful second summer.

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5. Conclusion and lessons learned

During the first summer, the pilot partners of COOLTORISE made their first attempt to create a sustainable model that can help households to combat energy poverty. The lessons learned from this first summer will guide the partners to redesign their strategies and become more effective and engaging during the second summer. This document presented the evaluation methodology and the overall evaluation of the activities that took place during the first summer of the project. In the beginning, the theoretical framework of this evaluation was presented with all the different KPIs and interlinked impact types. Then the specific results per pilot site were presented. This summer, the most impactful and useful activities, seemed to be the energy culture and energy bills workshops, while the households were interested in the indoor kits as well. As for the evaluation criteria and KPIs of the project, the partners achieved more or less 40% of the final KPIs, with very positive feedback from the households.

One of the most vital sources of information in the project are the pre- and post-questionnaires. Both questionnaires are detailed and especially in the case of pre-questionnaires it appeared particularly difficult to have all participants answer it. The conclusion was that the project partners need to update the pre-questionnaire in order to make the questions shorter, while also reducing the overall number of questions. Also, a more interactive approach during the workshops would be more helpful in order to acquire the needed number of pre-questionnaires. In the case of post-questionnaires, phone interviews seemed to be a suitable way to gather the necessary answers. After-workshop focus groups can be another way of evaluating the workshops' impact, especially on the issues of energy and bill reduction.

During the implementation of the COOLTORISE activities, another challenge that the project partners encountered was related to the measurement of primary energy savings (PES) and greenhouse gas emissions reduction. According to the grant agreement, each pilot was required to measure PES using last year's and this year's household energy bills to determine the average percentage reduction in household energy consumption after participation in COOLTORISE activities. However, this seemed to be challenging for the pilots as most of them struggled to obtain these bills, and as a result, they had to rely on personal estimations provided by the participants. Although this seemed like a good option to address the lack of bills and obtain reasonable values on energy consumption reduction, some pilots did not receive this information from the post-questionnaires, while others received too optimistic estimations. Thereby, for those pilots, the reduction they achieved was estimated based on the mean reduction according to the rest of the pilots' values. In order to address this issue for the second summer, the partners explored alternative methods of data collection, such as combining energy bill requests with the distribution of the

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"coolkits" and the regular follow-ups. This solution can positively affect both the evaluation of the kits themselves, and the overall energy savings calculation of the households.

The project partners have finalised the update of the pre-questionnaire and are currently working on the post-questionnaire modifications, so as to be prepared for the second and last COOLTORISE summer. At the same time, they are designing their updated customised strategies based on the needs and special characteristics of each pilot for a successful second summer.

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6. References

Covenant of mayors. (2016). Retrieved February 25, 2023, from https://mycovenant.eumayors.eu/docs/seap/19514_1459614153.pdf

EEA 2021 https://www.eea.europa.eu/publications/fluorinated-greenhouse-gases-2021

EEA, 2022. Is Europe reducing its greenhouse gas emissions?. Retrieved February 28, 2023, from https://www.eea.europa.eu/themes/climate/eu-greenhouse-gas-inventory

Energy Poverty Advisory Hub (EPAH), 2020. Retrieved February 28, 2023, from https://energy-poverty.ec.europa.eu/index_en

European Commission, 2018. Energy efficiency directive. Energy. Retrieved February 24, 2023, from https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en

European Commission. 2021. Eco-Regulation on Energy Labelling for Air Conditioners. [online] Available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/products/air-conditioners [Accessed 18 January 2021].

European Environmental Agency (2013) Achieving energy efficiency through behaviour change: what does it take? EEA Technical report, no 5/2013. Available in: https://www.eea.europa.eu/publications/achieving-energy-efficiency-through-behaviour/file

General Assembly of the United Nations, “Resolutions and Decisions adopted by the General Assembly during its 70th session A/RES/70/1,” 2017.

Sustainable energy action plan (SEAP) / sustainable energy and climate action plan (SECAP). com. (2018). Retrieved February 28, 2023, from https://com-east.eu/en/faq-3/itemlist/category/226-sustainable-energy-action-plan-seap-sustainable-energy-and-climate-action-plan-secap/

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7. ANNEX

7.1. Pre-questionnaire[1]

Pre-activity questionnaire

1. Is your dwelling equipped with heating facilities?

☐ Yes – central heating or similar
☐ Yes – other fixed heating
☐ Yes – non-fixed heating

1a. Is the heating system efficient enough to keep the dwelling warm?

☐ Yes
☐ No

☐ No – no heating system at all

1b. Is the dwelling sufficiently insulated against the cold?

☐ Yes
☐ No

2. Can your household afford to keep its home adequately warm?

☐ Yes
☐ No

3. Do you use any of the following alternatives at home to keep warm?

☐ Concentrate the heating of the house in one or two rooms only.
☐ Avoid ventilating
☐ Wear extra warm clothing
☐ Use hot water bags, electric blankets, etc.
☐ Reduce time spent at home by going to public spaces.
☐ Others:

_____

4. Is your dwelling equipped with air conditioning?

☐ Yes

[1] This pre-activitity questionnaire version was later updated for the activities of 2023. Here is included the previous version, which is the one used for all the activities developed in 2022.

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4a. Is the cooling system efficient enough to keep the dwelling cool?

☐ Yes

☐ No

☐ No

4b. Is the dwelling sufficiently insulated against the warm?

☐ Yes

☐ No

5. Do you use in your dwelling any other equipment for cooling?

☐ Fans

☐ Evaporative cooler

☐ Others:

_____

6. Can your household afford to keep its home adequately cool?

☐ Yes

☐ No

7. Do you use any of the following alternatives at home to keep cool?

☐ Sleeping somewhere cooler than the bedroom.

☐ Shower more than once a day to freshen up.

☐ Wearing only underwear.

☐ Reducing time spent at home by going to public spaces.

☐ Others:

_____

8. Do you have any of the following problems with your dwelling?

☐ A leaking roof

☐ Damp walls/ floors/foundation

☐ Rot in window frames or floor

9. In the past twelve months, has the household been in arrears, i.e. has been unable to pay the utility bills (heating, electricity, gas, water, etc.) of the main dwelling on time due to financial difficulties?

☐ Yes, once

☐ Yes, twice or more

☐ No

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10. In case you have your bills at hand, could you provide an estimate of your energy consumption?

Electricity: _____ kWh; _____ €
Others (gas, water): _____ kWh; _____ €

11. What is the area of your dwelling? Please, exclude common areas, parking and outdoor spaces.

☐ <50 m^2
☐ 50-100 m^2
☐ >100 m^2

12. How would you describe the main residence that your household lives in?

☐ Detached house
☐ Semi-detached/terraced house
☐ Apartment or flat in a building with less than 10 dwellings
☐ Apartment or flat in a building with 10 or more dwellings
☐ Other type of accommodation

13. What is the tenure status of the main residence that your household lives in?

☐ Ownership without mortgage
☐ Ownership with mortgage
☐ Rent
☐ Reduced/free rent
☐ Others:

_____

14. How many people live in your household?

Under 14 years old: _____
Between 14 and 18 years old: _____
Between 18 and 65 years old: _____
Above 65 years old: _____

15. How many employed persons are there in the household?

Employed full-time: _____
Employed part-time: _____

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16. Please provide an estimate of your household's annual net income.

Annual net income: _____ €

17. I feel confident about if my energy consumption is higher or lower than normal for my type of household.

☐ Strongly disagree ☐ Agree ☐ Nor agree/dissagree ☐ Agree
☐ Strongly agree

18. I know where to seek for energy savings advice.

☐ Strongly disagree ☐ Agree ☐ Nor agree/dissagree ☐ Agree
☐ Strongly agree

19. I feel confident about my current energy price, that I am not paying too much.

☐ Strongly disagree ☐ Agree ☐ Nor agree/dissagree ☐ Agree
☐ Strongly agree

20. I feel confident on how to save energy.

☐ Strongly disagree ☐ Agree ☐ Nor agree/dissagree ☐ Agree
☐ Strongly agree

21. I feel confident to help others saving on their energy bill.

☐ Strongly disagree ☐ Agree ☐ Nor agree/dissagree ☐ Agree
☐ Strongly agree

22. I am aware of how different energy tariffs can be used to lower my energy bill.

☐ Strongly disagree ☐ Agree ☐ Nor agree/dissagree ☐ Agree
☐ Strongly agree

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7.2. Post-questionnaire

Post-activity questionnaire for all WP3 activities

Dear participant,

You are invited to participate in a survey relevant to the workshops and training that you have received from the COOLTORISE H2020 project. The goal of this survey is to obtain your opinion and positions and to measure the newly acquired knowledge from your participation in the COOLTORISE interventions. This survey will last no more than 7 minutes. A copy of the results of this study will be provided to you upon request. No identifying information about you will be made public and any views you express will be kept completely confidential. Findings from this study will be reported in scholarly journals, academic seminars and research publications. Should you have any questions regarding the research and our project, please feel free to contact the interviewer or the Coordinators of the H2020 COOLTORISE Project.

Kind regards,
The COOLTORISE team

Responsible partner:

☐Bulgaria (Peshtera)

☐Bulgaria (Pazardzhik)

☐Greece

☐Italy

☐Spain (Barcelona)

☐Spain (Madrid)

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Interventions:

23. Please check the types of intervention you have participated in:

☐ Energy culture ☐ Energy Bills ☐ Indoor kits ☐ Outdoor interventions

☐ Heat warning alarms ☐ Cool-kids

If "Energy culture" go to questions: 2, 3, 4, 5, 6, 10-10.b, 11, 19, 20
If "Energy bills" go to questions: 2, 3, 8, 9, 10-10.b, 11, 19, 20
If "Indoor kits" go to questions: 2, 3, 5, 10-10.b, 12, 13, 14, 19, 20
If "Outdoor interventions" go to questions: 15, 16, 17, 19, 20
If "Heatwave alarms" go to questions: 18-18b
If "Coolkids" go to question: 7
Common questions: 1, 21, 22, 23, 24

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24. Do you have an installed air conditioner in your dwelling?

☐ Yes (if yes, skip questions 4, 19, 20)
☐ No (if no, skip question 3)

25. After participating in the energy culture workshops, I know how to combine the air conditioner with alternative systems (fans, evaporative coolers etc.) to save energy.

☐ Strongly disagree ☐ Disagree ☐ Nor agree/disagree ☐ Agree ☐ Strongly agree

26. After participating in the energy culture workshops, I am aware of alternative systems to keep my dwelling cool, and now installing an air conditioner is not a priority.

☐ Strongly disagree ☐ Disagree ☐ Nor agree/disagree ☐ Agree ☐ Strongly agree

27. I feel that this activity has improved the thermal comfort of my dwelling

☐ Strongly disagree ☐ Disagree ☐ Nor agree/disagree ☐ Agree ☐ Strongly agree

28. Do you use any of the following alternatives provided by the workshops at home to keep it cool?

☐ Closed shades during the day
☐ Use of plants to decrease the indoor temperature

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☐ Natural ventilation, either early in the morning or during the night, while the outside temperature is lower
☐ Use of towels or equivalent under the door to reduce the warm wind coming from outside
☐ Others: _____
☐I still did not have the chance but I will use_____
☐ No

29. The coolkids workshops facilitated my participation in the COOLTORISE activities.
☐ Strongly disagree ☐ Disagree ☐ Nor agree/disagree ☐ Agree ☐ Strongly agree

30. Overall, this activity has helped me cope with my energy bills.

☐ Strongly disagree ☐ Disagree ☐ Nor agree/disagree ☐ Agree
☐ Strongly agree

31. I feel that I understand better my energy bills and consumption.

☐ Strongly disagree ☐ Disagree ☐ Nor agree/disagree ☐ Agree
☐ Strongly agree

32. Overall, has your participation in the COOLTORISE workshops helped you reduce your energy consumption?

☐ Not at all ☐ Very little ☐ Sufficiently ☐ Above my expectations ☐ I don't know

13b. If possible, please provide a percentage of this reduction (personal estimation):
_____%

33. I am aware of how different energy tariffs can be used to lower my energy bill.

☐ Strongly disagree ☐ Disagree ☐ Nor agree/disagree ☐ Agree ☐ Strongly agree

34. Which "cooling tools" were included in your kit?

☐ Electric fans

☐ Smart plugs

☐ G23 led bulbs

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☐ E27 led bulbs

☐ E27 Motion sensor led bulbs

☐ Wi-Fi power strips

☐ Cooling towel

☐ Sunshields

☐ Plug-in timer

☐ Ventilator

☐ Plug extender

☐ Tap aerators

☐ Reflective solar film

☐ Slow cooker

35. Did you use the kits?

☐ Yes, regularly

☐ Yes, but only for a few days

☐ No, I didn't find them useful

☐ No, I couldn't install them

36. Would you buy any of the kit items by yourself to use in your home or recommend it to a person close to you?

☐ Yes (if yes, which item?_____)

☐ No

37. What kind of outdoor activities did you participate in?

☐ Street watering during heatwaves

☐ Painting white external walls and fences

☐ Installing water spraying systems or fountains

☐ Creating shady places by planting trees or putting tends

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☐ Planting trees and other plants on private courtyards

☐ Other:_____

38. Do you feel that these activities have/will help(ed) reduce the overall temperature of the neighbourhood creating more "cool" places?

☐ Not at all ☐ Very little ☐ Sufficiently ☐ Above my expectations ☐ I don't know

39. Do you consider these outdoor interventions might be useful for any of the following? Please select as many as you consider.

☐ Creating "climatic shelters" to keep cool during the summer.

☐ Helping reduce indoor temperatures by decreasing outdoor temperatures.

☐ Creating spaces to socialise with neighbours and strengthen community links.

☐ Improving outdoor spaces inhabitability related to other parameters besides thermal comfort (visual comfort, acoustic comfort,…)

☐ Increasing safety and security of public spaces.

☐ I don't see any benefit.

☐ Other benefits: _____

40. As a member of the heat wave alarm group, were you informed of all the upcoming heat waves during the summer?

☐ Yes, I was informed before they started

☐ Yes, but the notification came after the heat wave started

☐ Sometimes I was informed

☐ No, the application/platform didn't work

21b. Did this service help you be prepared before and during the heat waves (for example by providing advice along with the notification)?

☐ Yes
☐ No

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41. Do you intend to install air conditioning equipment in the short term (coming year)?

☐ Yes
☐ No
☐ Not sure yet

42. Would you install air conditioning equipment in the mid-term (coming 5 years)?

☐Yes

☐ No

☐ Not sure yet

43. Please provide any additional suggestions/comments to help us improve the workshops (optional) (open question)

Demographics

44. Gender of the responder

☐ Male ☐ Female ☐ Nonbinary ☐ Other ☐ Prefer not to say

45. Age group of the responder:

☐ 18-24 years old

☐ 25-34 years old

☐ 35-44 years old

☐ 45-54 years old

☐ 55-65 years old

☐ over 65 years old

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46. Which of the following general income categories best describes your personal income last year? ***(Please note that this is an optional question, and that the questionnaire is anonymous. This information is part of a demographic questionnaire that will allow researchers to analyse how factors like impact influence their conditions). Your personal data are fully protected.***

☐ <10.000

☐ 10.001-15.000

☐ 15.001-20.000

☐ 20.001-30.000

☐ > 30.000

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