Overview of boiler & oven replacement activities and campaigns in nine pilot regions

Report D6.2

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Abstract

Half of Europe's energy consumption is used for heating or cooling. However, in 2019 58 % of the 105.7 million space heaters installed in EU-27 – that were > 61 million units – have been inefficient non-condensing oil and gas boilers.

To achieve the climate targets and make Europe independent of oil, coal and natural gas, changes in this sector are essential.

The aim of REPLACE is to motivate and support people in eight different countries to replace their old heating systems with more environmentally friendly alternatives. Simple renovation measures that reduce overall energy consumption are also part of the program.

To reach that goal, REPLACE project brings together installers, chimney sweeps, politicians, and other key players at one table, regionally.

This report summarizes the experiences made with developing, implementing, and steering adequate phase-out campaigns and activities, tailored to the situation of nine different pilot regions in eight countries taking part at the project REPLACE. The campaigns and activities were jointly developed with regional/local public and market actors, forming so called Working Local Groups that steered and facilitated the measures taken to phase-out a range of energy carriers, like oil, natural gas, coal, direct electricity, and inefficient log wood usage from the residential heat market.

Executive Summary

REPLACE supports households in replacing their old, inefficient heating equipment with modern, clean and climate-friendly heating technologies that are more comfortable and resilient. In the light of the current energy and climate crises facilitating energy systems based on regional renewable energy sources – instead of fossil energy sources imported from abroad – becomes of high relevance to ensure security of supply.

The need to switch from fossil fuels to renewable heating and cooling systems has become urgent due to climate change and the inefficient use of energy in Europe. The REPLACE project aims to support this transition by implementing replacement actions in nine regions across Europe. This report highlights the success of the project and the importance of developing campaigns to make the switch to climate-friendly systems feasible. The current political situation, dependence on oil, gas, and coal from Russia, and rising energy prices further motivate this transition.

Given the different legal, regulatory and supporting (e.g. financial) framework conditions, market structures and circumstances, purchasing power and market development statuses, there is no one-fits-all solution to the challenge of phasing out oil, natural gas, coal, inefficient log wood and electricity only heating equipment from within the European residential heat markets.

The REPLACE project has dedicated its WP6 to implement replacement campaigns, which aim to inform consumers about sustainable heating solutions and encourage them to replace their old, inefficient heating systems. The focus of this report is to provide an overview of the boiler and oven replacement campaigns that took place in nine pilot regions across eight European countries, including Austria (Federal State of Salzburg), Bosnia and Herzegovina (Canton of Sarajevo), Bulgaria (Rhodope Mountain Region), Croatia (City of Zagreb incl. three bordering counties, Primorsko goranska County), Germany (Bavarian Oberland), North Macedonia (Skopje Region), Slovenia (Slovenia), and Spain (Castilla y León Region).

Report D6.2 was created as a result of Task 6.1 of the REPLACE project, which aimed to create customized action plans for the implementation of the replacement campaigns for each pilot region based on previous research. The action plans were designed to include specific details such as activities, timelines, stakeholders, and other essential information required for successful implementation. This report provides a summary of the customized action plans developed for each pilot region. Some of the activities were modified during the implementation of the replacement campaigns. The customized action plans developed for each pilot region were designed to be flexible, and some modifications were necessary to ensure successful implementation. The purpose of action plans was to provide a framework for the implementation and guide stakeholders in the conduction of the replacement campaigns.

The REPLACE project has found that through collaborative efforts with public and market stakeholders, there are various customized activities and strategies available to facilitate the phase-out of fossil heating systems. The report summaries the outcomes and lessons learned from the implemented campaign activities, some of which will continue beyond the project's completion.

Table of Contents

1 | Overview of campaign activities

1.1. Campaign plan by March 2021

The REPLACE project partners needed to define their adapted strategy by selecting at least 8 out of 14 pre-defined activities described in the Description of the Action. The chosen activities has to include at least 6 options out of the first 9, with the first two being obligatory, and at least 2 showcases out of the options 10-14, with at least one collective action.

Following, a matrix shows which activities and measures were chosen by the REPLACE project partners by March 2021.

Table 1: Overview about selected activities by March 2021

	Activity/target region	AT	BG	BiH	HR1[1]	HR2[2]	DE	NM	RS	SL	ES
1	Policy driven "Energy-saving campaign" with annual labelling for boilers					X	X	X		X	X
2	Six techno-economic feasibility studies		X	X	X	X	X	X	X	X	X
3	REPLACE (R)HC replacement information hubs		X	X	X	X		X	X	X	X
4	Heating systems replacements information at consumer fairs and festivals		X	X	X	X				X	X
5	Cooling system replacements information at consumer fairs and festivals		X								
6	100 % renewable heating or cooling labelling campaign			X			X	X	X	X	X
7	Best practice RHC systems open day/house events			X		X	X	X	X	X	X
8	Regional field trips to best practice RHC systems		X	X	X	X	X				
9	Two to three webinars on the usage of the "REPLACE your Heating System Calculator" and the "Online technology briefs with info-graphics"		X		X			X	X	X	
10	Show case - mobile heating containers facilitation	X					X				X
11	Show case - support of installers and/or energy utilities/service companies to become plant (+ energy efficiency) contractors					X		X	X		

[1] North-West Croatia, City of Zagreb incl. three bordering counties
[2] Primorsko-goranska county

12	Realisation of a pilot project for replication - innovative collaboration models between installers and plant (+ energy efficiency) contractors		X				X		X	X	
13	Show-case - realisation of collective actions	X	X	X	X	X	X	X	X	X	X
14	Show/pilot project - implementation of innovative TRL6 multi-functional façade systems										
15	Phase-out oil and gas marketing campaign	X									
16	All-round carefree packages for boiler replacement	X									
17	Exploitation, integration and dissemination of financing and affordability issues	X									
18	Information evenings on municipal level regarding replacing oil and gas boilers by climate-friendly solutions	X			X						
19	Innovative alternative or additional boiler or oven replacement activities		XX	X	X					X	

Some of the activities have been implemented in all or most of the regions, such as techno-economic studies for end consumers (6 per region), establishment of replacement information hubs, open cellar/house events or facilitating collective actions.

For more specific activities, the regions have chosen which ones to implement, depending on the local context and conditions defined in previous WPs, such as information at consumer fairs and festivals, webinars for consumers, labelling campaigns (for consumers that switch to 100 % renewable heating or cooling to display at their houses and for installers to label the age of a heating system and its recommended time of replacement), show-casing mobile heating containers to bridge over sudden breakdowns, or facilitate innovative collaboration models between installers and plan contractors among others.

Some promising alternative activities not initially foreseen in the GA have been considered as well, such as the introduction of an all-round carefree package in Austria, aligning services of different crafts in a one-stop-shop offer, coordinated and supervised by one person taking care and being the contact point to the household for all services.

1.2. Implemented campaign activities

The following table provides an overview of the campaign activities implemented in the individual pilot regions at the end of the project.

Table 2: Overview of boiler and oven replacement campaigns activities in 9 pilot regions

Activity/pilot region		AT	BG	BiH	HR[3]	HR[4]	DE	NM	SL	ES
1	Labelling of boilers					X	X	X	X	X
2	Techno-economic pre-feasibility studies		X	X	X	X	X	X	X	X
3	Municipal information hubs		X	X	X	X		X	X	X
4	Heating system replacement info at consumer fairs and festivals		X	X	X	X			X	X
5	Cooling system replacement info at consumer fairs and festivals		X							
6	Labelling of 100 % renewable heated houses			X			X	X	X	X
7	Open cellar/house events			X		X	X	X	X	X
8	Regional field trips to best practice RHC systems		X	X	X	X	X			
9	Webinars showing how to use the "REPLACE your Heating System Calculator"		X		X			X	X	
10	Facilitating emergency mobile heating devices	X					X			X
11	Facilitating installers to become contractors					X		X		
12	Facilitating collaboration of installers and contractors		X				X		X	
13	Realisation of collective actions	X		X	X	X	X	X	X	X
14	All-round carefree packages for heating system replacements	X								
15	Tackling financing and affordability issues	X								
16	Information evenings on municipal level				X					
17	Innovative other boiler or oven replacement activities						X	X	X	X

All of the listed activities serve to increase the adoption of renewable heating and cooling (RHC) systems and increasing awareness of energy-efficient heating practices across various regions in Europe. The activities include labelling of boilers and 100 % renewable heated houses, organising municipal information hubs and field trips to best practice RHC systems, facilitating emergency mobile heating devices, collaboration of installers and contractors, and realizing collective actions to promote RHC systems. Additionally, the activities aim to address financing and affordability issues and provide information through webinars, information evenings, and all-round carefree packages for heating system replacements. The diverse range of joint activities undertaken by the Local Working Groups in the nine pilot regions during the boiler and oven replacement campaigns is indicative of the varying

[3] North-West Croatia, City of Zagreb incl. three bordering counties
[4] Primorsko-goranska county

levels of advancement in clean heat transition, cultural practices, consumer demands, and regulatory frameworks.

Overall, these initiatives and activities reflect a growing recognition of the need to transition away from fossil fuels and towards more sustainable heating and cooling systems. By promoting the adoption of renewable energy technologies, these pilot regions are taking important steps towards achieving their climate and energy goals.

In conclusion, the listed activities demonstrate a commitment to promoting sustainable heating and cooling systems in Europe, and it will be interesting to see how these efforts evolve in the coming years.

2 | Short summaries of replacement campaigns

This chapter gives an overview of the activities and campaigns that have been successful, the lessons learnt on what has not been successful (if any), and the added value of the project to the nine REPLACE pilot regions from eight countries. The transfer of experience to other countries is also discussed where applicable. Additionally, the chapter reports on campaigns and activities that will continue beyond the project's duration.

2.1. Austria: Province Salzburg

As a result of a discussion process that included several meetings with the Department of Energy Management and Consulting of the Office of the Province of Salzburg and a kick-off meeting with the Local Working Group (LWG) that was set up to define and implement a boiler replacement campaign tailored to the needs of the pilot region of the Province of Salzburg, the following set of activities was jointly agreed to be implemented in the pilot region (as of March 2021).

Table 3: Overview of proposed activities according to the first action plan and status by the end of the project

Boiler replacement campaign activity	***End of project status***
Phase-out fossil fuels marketing campaign	Discarded
All-round carefree packages (ARCP) for boiler replacement	Ongoing, beyond project life
Jointly organized boiler room inspection measures	Implemented as part of ARCP
Promotion of mobile heat devices	Implemented as part of ARCP
On-site information evenings for end consumers	Discarded
Addressing financing and affordability issues	Implemented as part of ARCP

Oil and gas boilers are usually robust, durable appliances that can last for over 20 years with minor repairs. Switching to renewable energy requires a lot of information, time, coordination and money (20 to 30 thousand EUR at that time) and is not a very simple process. In addition, people often shy away from a 5-day building site. Older people living in houses built in the 70s and 80s with an old, outdated oil or gas boiler in the basement are often not prepared for such a project. They often think that the next generation should take care of this. In addition there are people who do not have the necessary funds, cannot get a loan (due to age), cannot afford to replace the boiler or it is no longer practical (demolition, retirement home). In general, boilers are usually only replaced when there is no other option. In addition, there is often no time to make an informed, well-considered decision. Because of these problems or time constraints, 1:1 replacements are very common, as they are usually the cheapest option in the short term.

The most debated topic on the agenda was the all-round carefree packages (ARCP) concept for boiler replacement in order to remove key barriers that households face when switching from oil to renewable energy sources or district heating. These barriers include the need for reliable information on technology choice, navigating the support system and decision-making, the complexity of

implementation, and key issues such as affordability and financing. Ideally, everyone involved in such an ARCP (energy advisors, installers, manufacturers, etc.) would offer a standardised ARCP for a given household and speak a common language. The Department of Energy Management and Consulting (Salzburg) suggested that the ARCP approach therefore could be based on free, independent energy advice. Based on these fruitful discussions, the LWG and the Department of Energy Management and Consulting (Salzburg) have been interested since then in defining this approach more concretely and actively supporting such initiatives.

The ARCP for boiler replacements concept has been developed

Over the years 2020 and 2021, the all-round carefree package (ARCP) for boiler replacement has been developed through a separate, comprehensive stakeholder process. Finally, the ARCP concept has been tailored for replacing old oil/gas/logwood/direct electricity heating systems in single-family houses, semi-detached houses or terraced houses with renewable and district heating systems. As a further result, the main objectives of the ARCP concept were to

- Make the boiler replacement as easy, fast and future-proof as possible
- Reduce complexity and time, no more 1:1 emergency replacement
- Pass on measures recommended by public energy consultants, including (minimum) energy efficiency measures (and beyond where appropriate) in order to enable all actors in the refurbishment to speak a common language regarding recommended solutions that are suitable for the site (across crafts)
- Provide people with everything they need for the changeover
- Households can find such services via a one-stop-shop web portal listing ARCP suppliers nearby, offering what they need.

In the second half of 2020, the AEA, together with the Department of Energy Management and Consulting (Salzburg), undertook a preliminary identification and preparation of the issues to be addressed for implementing the new ARCP service concept. It turned out that the three proposed campaign activities – "Jointly organised boiler room inspection activities", "Promotion of mobile heating devices" and "Addressing financing and affordability issues" – could become an integral part of the ARCP concept. The marketing campaign for phasing out fossil fuels and the local information evenings for end users could not be implemented, due to changing market conditions. Basically, the boiler replacement market was already overheated by 2021 and the LWG did not want to put any more pressure on the market with these two previously proposed activities.

As a follow-up step, exploratory discussions were held with potential ARCP providers in the first quarter of 2021. 23 interviews were conducted with general managers, sales and technical managers and installers. A total of 17 companies (manufacturers, wholesalers, utilities, installers) showed interest in offering their services in the one-stop-shop for boiler replacement in the province of Salzburg. Next an ARCP provider workshop was held in March 2021. The focus was on the conditions of participation and the specification of the ARCP. These aspects were then further developed by the AEA.

The result of that process is that the ARCP supplier coordinates and supervises all trades via one contact person on site and provides all necessary contracts or acts as a general contractor for the household. In 90 % of cases, an ARCP covers all the required services and defines binding criteria for quality assurance and energy efficiency. 15 activities became a mandatory part of the ARCP for boiler replacements and must be carried out by any ARCP provider signing the terms of participation. It is called the “basic all-round carefree package”, basic ARCP for boiler replacements.

Furthermore, ARCP providers commit to rapid implementation. The ARCP service includes an emergency boiler replacement without interruption. This is done by a mobile first aid heating service that heats within 24 hours. This gives households 3 weeks time to make an informed decision about a fuel switch in case of system breakdown. Furthermore, ARCP suppliers must act and react fast, predictable and (energy) efficient in every case. This includes

- Feedback to households max. 3 days after first contact; appointment for on-site inspection
- Offer for recommended solution max. 2 weeks after site visit
- Completion date in any case in accordance with current funding conditions

In terms of quality assurance, each ARCP one-stop-shop offer must go through the following steps.

- Public energy advice to implement the most appropriate solutions for the site; in Salzburg, public energy advisors can be consulted free of charge before the heating system is replaced.
- Minimum energy efficiency first/energy savings measures (those are the "boiler room check measures", that were integrated into the ARCP, which save at least 10-15 % of energy without any loss of comfort):
    - Upgrading the basement heating and hot water systems to the latest technology
    - Optimisation of hot water preparation and integration
    - Insulation of pipes, fittings and valves in the basement or unheated rooms
    - Hydraulic balancing of the entire heating system, carried out by the installer
    - Adjustment of the heating system and circulation pump to the heating curve, carried out by the installer
    - Training the homeowner in the adjustment and control of the heating system
    - One year performance check.
- and the provision of mobile heating equipment for emergency breakdowns within 24 hours of contact.

In addition, voluntary ARCP services can be offered - up to and including thermal renovation of the building(s) (components), cellar or attic clearance, PV, solar thermal systems, etc. These voluntary ARCP services also include some that address financing and affordability challenges, such as the option to pay in rates rather than a one-off investment, or plant and energy efficiency contracting models.

Implementation and outreach of the ARCP one-stop-shop web platform

In the 2nd quarter of 2021 a rollout concept for the pilot initiative in Salzburg province was elaborated. Negotiations took place between AEA, the Department of Energy Management and Consulting (Salzburg) and the Austrian Federal Ministry for Climate Action. In the end, an agreement was reached to implement a klimaaktiv /Replace one-stop shop online platform, which will offer all-round carefree boiler replacements in *up to four Austrian provinces*. Once implemented, the one-stop-shop web platform could be operated *for up to four years*, until March 2026. Klimaaktiv is the Austrian climate protection initiative of the Federal Ministry for Climate Action and integral part of the Austrian climate strategy. It´s primary objective is to launch and promote climate-friendly technologies and services.

AEA, through its work within REPLACE, was able to secure additional public funding for the web based one-stop-shop, which otherwise would not have been possible through REPLACE alone, and which could thus be used three years beyond the project's duration. The establishment of the web platform also required a public tender for defined IT services, which was also fully managed and coordinated by AEA. The web platform sorglos-kesseltausch.at went online in July 2022. The one-stop-shop enables a matchmaking of households in need of a renovation and ARCP providers. Homeowners, via a simple search form, can easily find ARCP providers nearby, delivering the services identified as appropriate by energy consultation or needed in addition (see below).

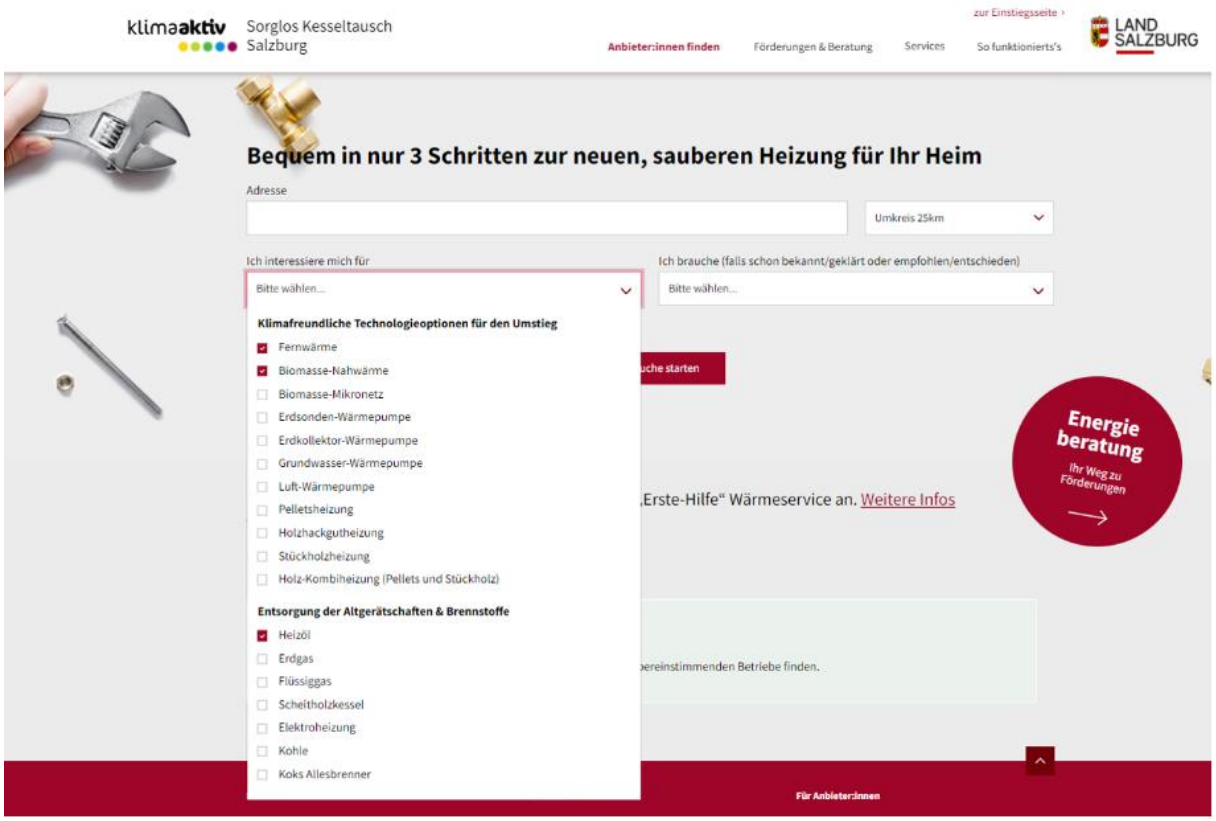


Figure 1: Matchmaking page of the all-round carefree web platform for heating system replacements

As a result of the search, ARCP providers delivering what is needed (the installers acting as single contact point residing nearby, respectively) are listed according to their distance to the household making the enquiry. The service is free of charge to all parties involved and does not require any personal data from households. In the next step, households can easily and conveniently contact the ARCP provider, e.g. by phone or e-mail, in the latter case they can attach the energy consultation protocol and/or an energy performance certificate of their home. This speeds up the process, which then continues as described above.

Lessons learned

While the ARCP for the boiler replacement activity was successfully prepared, the implementation was not successful due to unexpected, exceptional market conditions. As a result of the Russian invasion of Ukraine, the ensuing energy crisis and the resulting sharp rise in energy prices, as well as households' fears of gas supply disruptions, many households wanted to become independent of oil and gas as heating fuels in the second half of 2022.

Due to the energy crises and the high demand for boiler replacements, the order books of potential ARCP suppliers in August 2022 were full a year in advance, and some of the components needed could only be delivered in 9 to 12 months' time. This meant that even firm prices could not be defined before then. As a result, it was difficult to even get an offer from an installer without waiting a long time; waiting lists for households are common now.

In summary, shortly after the launch of the web platform, potential ARCP suppliers were no longer able to sign up to the terms of participation and offer high quality, all-inclusive services, which was not expected by the team in charge of the one-stop-shop web platform.

End of March 2023 AEA conducted several interviews with potential ARCP suppliers to sound out, whether and when it could be possible to relaunch the one-stop-shop web platform. While single installers were in favour for a quick relaunch after the heating season, the interviewed manufacturers uniformly were against a relaunch in 2023. The heating system manufacturers said the year 2023 is needed to overthink some processes and to improve and optimise them. It was said that there is certainly a lot of potential in this approach and it is hoped that they will be able to take advantage of the new offer in 2024.

The main idea of the ARCP boiler replacement concept is to offer households an easier access to make a replacement of their old heating system by a new climate-friendly one as easy and quickly as possible, i.e. a clearly defined and quality assured boiler replacement with rather tight implementation schedule. The overheated market revealed and caused several problems and challenges in supply chain and quality of implementation. Therefore, the idea of the ARCP concept cannot be realised under current market conditions.

National outlook: In general, the ARCP one-stop shop provides a good basis for boiler replacement in energy poor households. The ARCP and the conditions of participation (binding) for ARCP suppliers include quality assurance points and procedures. Low and very low income households in Austria receive up to 100 % of the investment in a boiler replacement through a (capped) one-off subsidy. The quality assurance procedures and mandatory ARCP services are designed to meet these specific needs.

International outlook: If the pilot of this unique one-stop-shop for boiler replacement proves successful, it will be a significant achievement for the project, as the approach could be replicated/extended to other European regions. The ARCP boiler replacement concept was presented at the final project conference in Brussels, in March 2023 (pdf download).

2.2. Bosnia and Herzegovina: Canton of Sarajevo

The replacement campaign in Sarajevo Canton faced significant challenges due to the energy crisis, COVID-19, and energy market price increases. The lack of consistent financial incentives at the state and regional levels also contributed to slowed progress in the heat transition process. However, despite these obstacles, the project team was able to successfully implement all planned activities with some minor modifications. The support of local municipalities was critical in reaching a larger number of end-users, who were the intended beneficiaries of the project.

Prior to the implementation of the campaign, a well-defined action plan was developed in collaboration with the Local Working Group (LWG) to ensure alignment with local conditions and implementation possibilities in the target region. The project demonstrated flexibility by adapting campaign activities to the local context, which enhanced efficiency and outreach. The campaign activities were successful overall, with six out of eight activities being deemed highly successful, while the remaining two were considered less successful. This highlights the importance of thorough planning and continuous evaluation to achieve the best possible outcomes in future campaigns.

As for the successful activities, the project team introduced pre-feasibility studies as a step towards informed decision making on heating system replacement due to the energy crisis and market fluctuations in Sarajevo Canton. The team conducted seven feasibility studies and communicated with building owners to gather information and identify their preferences. The studies showed that the pellet heating system was the most preferred option due to its affordability and compatibility with existing coal-fired heating systems. The activity resulted in 7 building owners having a detailed analysis of their heating system and gaining an innovative approach to heating system replacement. The

activity generated significant interest from end-users, and the team hopes that this approach will continue as an ongoing practice.

The activity "REPLACE (R)HC replacement information hubs" involved setting up info-hubs in institutions to distribute project materials and provide direct advice to end-users. Despite initial difficulties due to the pandemic, three info-hubs were successfully organized and announced through media and social networks, resulting in approximately 1,000 visitors. The project team distributed materials made calculations for end-users using the REPLACE calculator, and gathered information and contacts for further activities. The direct impact of the activity was significant, as users benefited from energy consultations and learned about the replacement process and the use of the REPLACE calculator.

The "100 % renewable heating or cooling labelling campaign" aimed to promote sustainable practices in Sarajevo Canton by labelling houses that use 100 % renewable energy for heating. The project team labelled 30 houses on-site, promoting the use of renewable energy sources in buildings and encouraging more people to adopt these technologies. This new practice resulted in successful interest from citizens. Additionally, the labelling raised public awareness about the benefits of renewable energy sources and their potential to reduce greenhouse gas emissions and combat climate change.

In the activity "Best practice RHC systems open day/house events," eight open house events were organized in Sarajevo Canton, allowing homeowners to share their experiences with renewable energy technologies. Participants had the opportunity to see renewable energy systems in action and learn more about how they work. Homeowners who have invested in renewable energy technologies were able to support each other and encourage others to follow in their footsteps.

The project team organized regional field trips to showcase best practices in renewable heating and cooling systems. The municipality of Olovo was selected as a prime destination for its numerous examples of good practices in renewable energy and environmental protection. During the visit, participants had the opportunity to see several facilities that had successfully transitioned their heating systems to renewable energy sources. The study visit provided a chance for participants to network with other professionals and stakeholders in the field of renewable energy, fostering new partnerships and collaborations. The visit also helped to exchange past experiences and develop ideas for more innovative solutions for sustainable heat energy supply. The dialogue between hosts and visitors encouraged discussions about the key challenges and obstacles faced by consumers when switching to renewable energy heating systems. Overall, the visit was inspirational, giving participants a sense of what is possible and motivating them to act in their own communities.

The "Knowledge transfer and capacity building of intermediaries and authorities on energy poverty" activity involved a training session on tackling energy poverty in Bosnia and Herzegovina, attended by representatives from relevant ministries, local self-government units, heating system manufacturers, installers, and NGOs. The training covered key topics related to energy poverty and potential measures to alleviate it in the country. The session was led by experts with extensive experience in the field, and participants engaged in constructive discussions on the challenges and strategies for addressing energy poverty. The activity was successful in bringing together key stakeholders, increasing awareness and understanding of the issue of energy poverty, and fostering collaboration on developing policies and programs to combat it. The direct impact of the activity was increased knowledge and capacity building among stakeholders, which may lead to positive impacts in the long term.

The "Heating systems replacements information at consumer fairs and festivals" activity aimed to disseminate project activities and support campaign implementation. Due to COVID-19, many events that gathered the target group were cancelled, making implementation challenging. In January 2023, Enova presented the project at the Sustainability Fair in Sarajevo, answering visitors' questions and

demonstrating how to obtain information using the REPLACE calculator and heating matrices. Although successful in reaching the target audience, the activity is considered less successful due to being held at the end of the project and having a lower number of visitors.

The activity "Show-case - realisation of collective actions" aimed to implement collective actions for the replacement of heating systems in the pilot region of Sarajevo Canton. However, citizens' lack of interest in carrying out independent actions and the absence of subsidies in the area posed challenges to the activity's implementation. Although three companies contacted for joint procurement of pellets did not express interest, the project team identified an alternative activity by collaborating with OMC Technics d.o.o., resulting in the successful replacement of heating systems in three buildings. Despite encountering challenges, the activity's implementation resulted in commendable achievements and highlighted the importance of promoting collective activities for significant benefits to citizens.

The REPLACE project has brought great added value to the region by introducing and implementing many activities for the first time in the Sarajevo area. The project has also brought together all project stakeholders, which has been shown to be necessary for a successful transition.

Lessons learned from the project include the importance of focusing on energy efficiency measures in addition to system replacement, engaging end-users and stakeholders through educational activities, providing access to adequate information, and carefully explaining the functioning of new systems to prevent rebound effects.

Recommendations include encouraging decision-makers to prioritize energy efficiency and climate-friendly heating and cooling systems, providing financial incentives and support for the implementation of energy efficiency measures and replacement of heating systems, increasing access to education and information, encouraging the development of training and certification programs for installers and chimney sweepers, and engaging with intermediaries and financial institutions to increase financing options for energy efficiency projects.

The REPLACE project provided the Canton of Sarajevo and by extension, Bosnia and Herzegovina, with an opportunity to learn from countries with more experience and implement the acquired knowledge in the region. The successful establishment and implementation of the campaign will allow for the replication of these activities in other regions of Bosnia and Herzegovina.

2.3. Bulgaria: Rhodope Mountain Region

Rhodope region is a rural mountainous region in Bulgaria, with low GDP per capita and a high share of energy poor households. Due to the relatively low temperatures in the region and the low energy performance of residential buildings, the heating demand is high. The dominant heating resource is firewood, sometimes combined with coal briquettes, typically burned in inefficient individual stoves.

Successful campaign activities

Pre-feasibility studies targeted households using typical (for the region) inefficient heating technology, fuelled by coal briquettes, fire-wood, and/or direct use of electricity, and interested in replacing it. Detailed criteria for the selection of the households were elaborated. Seven applications complied with the criteria: 1 multi-family building and 6 single family houses. Additionally, one community centre was assessed, as the municipal administration committed to using it as a good practice example and REPLACE information hub. All necessary data and information were collected onsite. During the discussions with the building owners, their preferences were identified, and their questions were answered. The assessments were carried out using the “REPLACE your Heating System Calculator” and for some buildings additional calculations were performed in MS Excel. Detailed pre-feasibility reports

were elaborated, communicated to the building owners, uploaded at the REPLACE website, and largely disseminated, so that a number of households living in similar buildings with similar heating systems can benefit too.

The local authorities have close links to and are generally trusted by citizens in their position as independent information provider, so establishing **information hubs** there could reach and influence many. In 9 municipalities, REPLACE printed materials were placed at appropriate locations in the buildings of municipal administrations and/or relevant municipal services, or disseminated in other ways. In many cases, the municipal representatives participating in the Local Working Group of REPLACE and will be available to guide citizens interested in replacements. Some municipalities are regularly publishing REPLACE news and outcomes on their websites and Facebook profiles.

Two large consumer fairs dedicated to both energy performance of buildings and residential heating and cooling were organized. Both fairs included 10-12 stands promoting the project, other relevant initiatives, and technology suppliers. At the REPLACE stand, experienced heating & cooling professionals provided printed materials and advise to the visitors. A 3-day fair, located in a professional school and organized in parallel with relevant events at the school, was attended by students, teachers, energy companies, and the general public. The second fair, 2-day long, took place at the main square of Smolyan, in order to attract as many visitors as possible. At the fairs, more than 2,000 pieces of REPLACE printed materials were distributed and advice was provided to about 100 consumers.

A large and modern multi split air to air heat pump offers many benefits to the residents in multi-family buildings: higher efficiency and lower total cost, compared to individual air conditioning systems, full automation, and high reliability. As such systems are not available in the residential buildings in Rhodope region, a **field trip** to a hotel using that system was organized. An identical system is applicable to a multi-family building, as it allows individual heat metering and allocation to each consumer. There were 28 participants, mostly students and teachers from a relevant technical school, as well as municipality representatives. Two BSERC heating experts and a representative of the producer of the demonstrated heat pump delivered PowerPoint presentations and answered the questions of the audience. Later, the group visited the heat pump system. A package with all REPLACE printed materials was distributed to all participants and additional materials were provided for dissemination in the school. The teachers were inspired to include lessons about heat pumps in the students' curricula, so they were provided with relevant teaching materials.

Within the campaign, REPLACE outputs were promoted at **two events**, each attracting policy makers, intermediaries, consultants, and consumers. At a conference, dedicated to sustainable heating in Central and South-East Europe, the REPLACE calculator was promoted as a reliable and independent assessment tool and its potential users were trained. The REPLACE presentation was attended by more than 60 persons and a video recording is available online. Later, BSERC co-organized a two-day hybrid national event, attended by more than 200 participants. REPLACE presentations covered programmes and initiatives for decarbonization of the residential heating and cooling and the project outputs, with an emphasis on the calculator.

To make the choice of **private financing** for heating replacement easier, information was collected about the conditions offered by the main private banks in Bulgaria. A comparative assessment of conditions was developed for a typical loan used for heating replacement, where the loan amount, loan period, and others are fixed for all options. The document enabled residents to easily compare the different bank offers, e.g. to compare the total loan expenditures, bank requirements, etc. Unfortunately, such a document becomes quickly outdated, if not regularly updated.

Less successful campaign activities

An attempt to implement a **collective wood pellet purchase** in two towns – Bratsigovo and Smolyan was made. During meetings with Bratsigovo residents interested in participating in a collective action, BSERC presented the initiative, including benefits to households, implementation steps, and support offered by REPLACE. The initiative was generally supported by the residents. The main issue that remained unsolved was to identify the group leader to be in charge of the purchase organization – somebody who is trusted by the community, knowledgeable about the pellet market, and willing to undertake this task. Some proposed that the local authority takes this role, but the proposal was declined. A similar attempt was made in Smolyan. Only few households expressed their interest in joining the initiative, perhaps because of the sharp increase of wood pellet prices, resulting in lower interest of residents to use pellets for heating. Despite the low current interest, the municipality will continue to promote the initiative and in case of interest, a meeting with the residents will be organized. To support these and other future initiatives in Rhodope region and beyond, guidelines have been elaborated (available in Bulgarian at the REPLACE website) and disseminated.

A **collective domestic hot water system in a multi-family building**, using an air-water heat pump, is an excellent replacement solution for buildings using electrical boilers or solid fuels for hot water supply. Within REPLACE, an appropriate multi-family building with interested residents was identified. BSERC introduced the project concept and the past experience with a successful action in a building in Varna city. Data about the heating and hot water consumption were collected. The pre-feasibility study confirmed the financial viability of the project. The possible financing schemes, project implementation stages, and the offered support from REPLACE in the process were explained. Some residents were, however, hesitant, considering the necessary construction works as a hassle, so the initiative did not reach an implementation phase within REPLACE. The availability of an existing hot water distribution system within the building appeared to be an important success factor. To promote such collective actions, comprehensive guidelines have been developed (available in Bulgarian at the REPLACE website) and disseminated.

Many households in the region cannot afford the initial investment in an advanced heating technology. Following a first round of discussions with heating technology suppliers, it was decided to develop a financial product, where a **supplier acts as a loan aggregator** for tens or hundreds of heating replacements in households (supplier's clients), implemented by the supplier's network of installers. Discussions with financial institutions showed their general interest in the scheme. However, during the second round of discussions with heating suppliers, focusing on the requirements of the financial institutions, it turned out that in general suppliers are willing neither to take additional risk (e.g. provide collateral) nor to increase their administrative burden to manage loans. The situation was further complicated by the substantial change in the market conditions, e.g. sharp increase in heat pump demand (making suppliers not interested in additional clients) and sharp increase of pellet price (making pellet-based heating unattractive at the moment). Lessons learned are: (1) financial institutions need to be involved in the first dialogue with suppliers; (2) the quick change of the market conditions could compromise such an initiative, if moving slowly.

Implementation of a pilot residential heating replacement was promoted to several municipalities. The full documentation package from a similar successful pilot was provided to them. As no EU/national financing was available for such a pilot project, the municipalities were offered assistance by BSERC for the experimentation with only 1-2 single-family houses, where the replacement is funded by the municipal budget. The idea was supported by some, but its realization was postponed until a large-scale heating replacement programme emerges, so that the pilot project is used as a test.

The option of an **own financial product** (loan) offered through municipal financing institutions to households willing to replace their heating system was discussed with several municipalities. This idea, however, was not supported by any of them.

Added value to the region

The campaign demonstrated the multiple benefits associated to the switch to cleaner and more efficient renewable heating and cooling, to a large share of the consumers, investors, intermediaries, and public authorities in the region.

Additionally, the campaign guided these stakeholders, e.g. by promoting REPLACE outputs, such as the calculator, best practice examples, handbooks, etc. towards the implementation of successful replacement projects. For example, consumers became aware of how to choose the best system and what steps to be followed, while the public authorities how to more effectively disseminate information and guide citizens in the field.

Furthermore, through the close collaboration with local authorities throughout the campaign, they are much more committed to increase their ambitions towards making residential heating more sustainable.

Transfer of the experience to other regions

A large-scale national dissemination of REPLACE outputs and results was carried out, reaching about one million consumers, public authorities, and heating/cooling professionals. Considering that almost entirely channels with national coverage were used, the vast majority of the reached stakeholders were outside Rhodope region.

The experience of the campaign in Rhodope region is fully transferable to other Bulgarian regions. Not all heating solutions appropriate for the residents in the region, however, are relevant for the other Bulgarian regions, due to the different temperature, different fuels used for heating, different renewable energy potential, and different density of the heat consumption.

Activities beyond the project life

The following activities resulting from the REPLACE campaign will continue beyond the project:

- The informational hubs at several municipalities will continue running, providing printed materials, advise, and online information to residents.
- Lessons about heat pumps will be included in the curricula of the students in “Hristo Botev” Technical School.
- Smolyan municipality is committed to continue its efforts towards the organization of collective pellet purchasing by its residents.

2.4. Croatia: City of Zagreb incl. three bordering counties

The local partner faced several significant challenges during the replacement campaign in North- West Croatia region, including an energy crisis, market price increases, and the COVID-19 pandemic, which slowed progress in the transition process. Despite these obstacles, the project partner was able to successfully implement all planned activities with some minor modifications, thanks in part to the support of local municipalities.

Prior to implementing the campaign, the project partner REGEA developed a well-defined action plan in collaboration with the Local Working Group (LWG) to ensure alignment with local conditions and implementation possibilities in the target region. The team also demonstrated flexibility by adapting campaign activities to the local context, which improved efficiency and outreach.

Of the nine campaign activities, eight were deemed highly successful, while one was considered less successful. The successful activities included initiating an intermediary campaign, pre-feasibility studies, REPLACE (R)HC replacement information hubs, the 100 % renewable heating or cooling labelling campaign, informing consumers about (R)HC heating systems' replacements and related REPLACE offers and activities at large consumer fairs and festivals, webinars, and on-site information evenings for end consumers to replace fuel oil boilers.

The activity of "Facilitating the realization of collective actions" for boiler and oven replacement in households was considered less successful in Croatia. This is because the concept of collective actions is not well understood or utilized in the country.

North-west Croatia has been successful in implementing various activities and campaigns aimed at promoting the usage of renewable heating and cooling (RHC) systems. These initiatives have been organized by the Local Working Group and local government, in collaboration with citizens and stakeholders from the energy sector, with the aim of increasing energy efficiency and reducing energy consumption.

The activity intermediary campaign initiated in the region aimed to bridge the gap between citizens and available funding opportunities offered by county governments. This helped increase awareness among consumers about the funding options and made it easier for them to access the support they needed to install RHC systems. The local partner REGEA provided technical assistance to local and regional authorities, resulting in successful policy measures and subsidies for over 100 end consumers. The region plans to share their experiences with other authorities to identify innovative financing solutions. The policy measures implemented by the REPLACE project serve as an excellent example of sustainable energy and heating system planning on a local level.

The local partner REGEA successfully implemented pre-feasibility studies as a step towards informed decision-making on heating system replacement in North-west Croatia. The team conducted eight feasibility studies and communicated with building owners to gather information and identify their preferences. The studies showed that the pellet or log wood heating system was the most preferred option due to its affordability and compatibility with existing oil heating systems. This activity resulted in 7 house owners having a detailed analysis of their heating system and gaining an innovative approach to heating system replacement. One study was conducted to replace individual gas boilers in a multi-apartment building with a new, clean, and climate-friendly solution(s). The total living area of the building was estimated to be 17,500 m² divided among 170 apartments with over 500 residents. As the calculator tool within the REPLACE project did not cover large multi-apartment buildings, a modified analysis was performed to achieve reasonable parameters as results. The study compared two possible decarbonization options - heat pumps and connection to district heating systems (DHS). A modified set of data was used in the calculations due to an alternative approach taken. This campaign generated significant interest from end-users, and the local partner REGEA hopes that this approach will continue as an ongoing practice.

The 3 Citizen's Info Hub established in the North-West Croatia region have been successful in providing consumers with access to relevant information about RHC systems, their usage and the benefits they offer. This has helped increase awareness among consumers and has made it easier for them to make informed decisions about installing RHC systems. The most successful information hub was established in the city of Velika Gorica (Zagreb County) to inform people about renewable heating sources and

tenders published by the city. The hub was staffed for 5 days, for 8 hours each day. In addition to providing information, a person was trained to continue informing people about the project and systems for renewable heating sources. This effort was aimed at promoting the use of renewable energy sources in the community. The information hub in Velika Gorica was successful in reaching a large number of people, with approximately 19,000 visitors. Additionally, an estimated 1,000 visitors were reached through other information hubs, bringing the total number of visitors to 20,000. The impact of this activity was significant in terms of promoting the use of renewable heating sources and informing the community about tenders published by the city. The establishment of information hubs has been a successful activity in the REPLACE project, as it allows end-consumers to access and share promotional materials beyond the project lifespan.

REGEA participated in three exhibitions during the REPLACE project, engaging with over 4,500 visitors, including end consumers, intermediaries, and investors. They distributed user-friendly handbooks and tools tailored to different groups, such as installers, plumbers, and investors, containing planning guidelines, technology factsheets, implementation guides, and best practice examples. The participation in the fairs has contributed to raising awareness about the REPLACE project's goals, promoting the replacement of old, inefficient heating systems with more sustainable and energy-efficient alternatives. The materials developed within the project can be used as a reference to plan, design, and implement sustainable and energy-efficient heating systems beyond the project's lifetime. Continuing to promote and use these materials can further promote the transition to more sustainable heating systems.

The labelling campaign aimed to label existing boilers in households visited by chimney sweepers and installers and communicate the benefits of replacing old boilers with renewable heating or cooling systems. The campaign was planned in cooperation with chimney sweepers, installers, and REGEA, and targeted the high season of boiler service and maintenance. The Environmental Protection and Energy Efficiency Fund offers subsidies for energy renovation of family houses, making it easy to identify households that have replaced their old systems. The campaign started with a visit to 4 households by REGEA, while chimney sweeps and installers in the target regions distributed 60 labels.

The information evenings organized in cooperation with local governments and LWG members have been successful in providing end consumers with information about the replacement of fuel oil boilers with RHC systems. This has helped increase the number of consumers who have replaced their fuel oil boilers with RHC systems and has helped reduce energy consumption in the region.

The organization of regional field trips to best practice RHC systems for consumers, intermediaries and investors has helped increase awareness about the benefits of RHC systems and has made it easier for consumers to make informed decisions about installing these systems.

The Webinars conducted on the usage of the consumer-friendly “REPLACE your Heating System Calculator” have been successful in providing consumers with information about the cost-benefit analysis of installing RHC systems. This helped consumers to make informed decisions about installing these systems and has helped reduce energy consumption in the region.

REGEA, local partner of the REPLACE project, along with a Local Working Group, attempted to promote collective actions for boiler and oven replacement in households in Croatia. However, the activity was not very successful. Despite this, REGEA and the working group initiated an awareness-raising program and free counselling to promote energy renovation in Croatia, resulting in the active participation of 1,000 applicants in target regions. This approach highlights the importance of sustainable development and the need for resources, support, and clear communication to promote sustainable practices. It also has the potential to create a broader movement for change and contribute to a more sustainable future in Croatia.

In conclusion, the activities and campaigns implemented in North-west Croatia have been successful in promoting the usage of RHC systems and have helped increase energy efficiency in the region. The transfer of experience from these initiatives can be applied in other countries to promote the usage of RHC systems and reduce energy consumption.

The REPLACE project has had a significant impact on the North-West Croatia region, introducing various new activities and engaging all project stakeholders, which is essential for a successful transition.

Key lessons learned from the project include the need to focus on energy efficiency measures, involve end-users and stakeholders in educational activities, provide adequate information, and prevent rebound effects by carefully explaining the functioning of new systems.

Recommendations for future projects include prioritizing energy efficiency and climate-friendly heating and cooling systems, offering financial incentives and support for energy efficiency measures and system replacements, increasing access to education and information, promoting training and certification programs for installers and chimney sweepers, and engaging with intermediaries and financial institutions to increase financing options for energy efficiency projects.

The REPLACE project provided a unique opportunity for the North-west Croatia region and other neighboring counties to learn from more experienced countries and apply their knowledge in the region. By introducing and implementing several activities for the first time in the North-west Croatia region area, the REPLACE project has contributed significantly to the region's growth and development, enabling the replication of its activities in other parts of Croatia.

2.5. Croatia: Primorsko goranska County

In Primorsko-goranska County, Local Working Group (LWG) meetings were held continuously. During the meetings, all the project activities were discussed. The information provided by the LWG members were of great value in achieving the foreseen goals, since they had valuable inputs on the events which were planned and how to motivate the end consumers. The four LWG meetings that were held were very successful, with all LWG members contributing to the discussion and giving their advice on how to tackle possible obstacles and challenges during the implementation of activities within Work Package 6.

No changes were made in terms of selected project activities. However, some of them were modified due to various challenges during the project and were pursued in a modified form. One of the main obstacles during 2020 and 2021 was the COVID-19epidemic which caused a halt in a lot of project activities. The most affected were activities that can be performed only physically (e.g. open day house event, regional field trip etc.). However, the pandemic also affected the ability to establish further contacts and communication with other stakeholders to define the activities. Some other obstacles were the drastic increase in energy prices in Europe in 2022, unmotivated consumers etc.

Starting with the activities estimated to have been successful, the first one is the annual labelling for boilers and an accompanying folder. EIHP placed several labels and distributed them to local stakeholders and members of the Local Working Group. EIHP personnel presented and distributed the boiler labels during other events such as open house day events, information hubs and at any event where EIHP staff held a presentation of REPLACE. Therefore, many end consumers was affected by this action.

The next successful activity was the six techno-economic feasibility studies. In collaboration with the key stakeholders, six cases were identified in the Primorsko-goranska County. Prior to conducting the

techno-economic feasibility studies, all identified beneficiaries were contacted, introduced with the REPLACE project and all the necessary information was provided. Data collection for all studies was carried out in face-to-face meetings, while the consumers were contacted beforehand via phone calls. All the systems had an old fuel oil boiler. The planned replacements were for the large volume building of a solid biomass boiler, for multifamily houses district heating and for the single-family house heat pumps. However, district heating is not available on the island of Cres where both multifamily houses are located, therefore other renewable options were suggested.

Activity 3 was the establishment of information hubs. This action is of great importance for making progress towards more informed consumers. The implementation strategy for this action includes offering materials produced within the project, e.g. flyers, posters, rolls ups, technology briefs, handbooks etc. in total there are five information hubs established at the premises of RES Croatia, EIHP, REA Kvarner, City Hall of Mali Lošinj and City Hall in Crikvenica.

The participants especially enjoyed the visits to the good practice examples. They commented that the information they received about the investments, prices and technical parameters was of great use to them. The related activity was an open day/house event to a best practice system in Mali Lošinj. The house has six rooms and uses a log wood boiler to cover the heating demands, solar panels to cover the electricity consumption and batteries which store energy.

The regional field trip to best practice RHC systems was also very successful. The visit to the Elementary school “Jelenje-Dražice” in Dražice, which is a village very close to the city of Rijeka, was held on 14th March 2023. The presenter of this good practice example was Mr. Dražen Lisjak, who has extensive experience in designing biomass systems. The visit started with a presentation of all the components and parameters. After that, the participants had a lot of questions, so the discussion was fruitful. The pellet boiler has an installed capacity of 250 kW, while the distribution system in the school is floor heating.

The remaining three activities could be considered less successful. Due to previously described issues, there were some challenges in their organization, or the interest of the stakeholders/consumers/installers was low. However, they were pursued in a modified form and had a good impact, even though they were not performed in the planned way.

Activity 4, which was “Informing consumers about (R)HC heating systems’ replacements and related REPLACE offers and activities at large consumer fairs and festivals” has proven to be quite challenging. Namely, due to the COVID-19 pandemic and restrictions on large gatherings, the fairs were in large part cancelled or rescheduled. EIHP researched possible events, however all of them were postponed due to the corona virus. Furthermore, EIHP discussed this during the Local Working Group meetings. Based on the input of the LWG, EIHP contacted the City of Rijeka to present REPLACE at the Energy Day of the City of Rijeka, however they stated that the event will not be held due to poor interest of consumers. Furthermore, EIHP contacted REA Kvarner but did not get their feedback regarding the Energy Day of Primorsko-goranska County. Zagreb Energy Week was also considered; however, this event was unfortunately not held during the REPLACE project timeframe. Still, EIHP presented REPLACE at an event in Rijeka on 17th February 2023 to the public. The event in question was “CEKOM DEMO LAB – Demonstration of part of the solutions created as part of CEKOM Project for smart cities” and hosted 47 participants. During the presentation, special emphasis was put on the REPLACE Calculator and Heating Matrix. These tools were of great interest to the participants. They asked a lot of questions about different options and how to assess the parameters needed for the analysis.

A further activity was “Supporting installers and/or energy utilities/service companies to become plant (+ energy efficiency) contractors”. EIHP researched the possible showcases to be demonstrated,

however, no such example was found. Therefore, it was decided to hold a webinar for the installers, as planned, called "Podrška u poslovanju instalaterima/uslužnim tvrtkama" (engl. "Support in the business operation of installers/service companies"). Two experts from EIHP held presentations relevant to this topic. The first one was named "System of certification of RES installers in the Republic of Croatia". The legal framework, the process and reasons for certification and education and other topics were explained in detail. The second presentation was about at solar thermal collectors and their installation. All the relevant parameters were described: types of collectors, their principle of operation, basic mechanism of heat transfer, typical values of the flow, recommended number of collectors, efficiency of different types of collectors, the angle of inclination and the orientation of the collector etc. The event was well attended, bringing together 15 participants.

During 2020 and 2021, the activity "Facilitating the realization of collective actions" could not be held due to the COVID-19 pandemic. The plans for this activity were further discussed during the LWG meetings, especially at the fourth one. As suggested, EIHP called the participants who applied for funding published by the Environmental Protection and Energy Efficiency Fund. EIHP asked them if they would be interested in a joint purchase of pellets for a discounted price which EIHP will negotiate with a pellet manufacturer. However, none of them were interested, therefore this action could not be pursued in the planned form. Consequently, in February 2023, EIHP decided to make alterations, and to hold a webinar called "Olakšavanje realizacije zajedničkih akcija" (engl. "Facilitating the realization of collective actions"). The webinar's goal was to promote sustainable collective actions and contribute to better overall acceptance and understanding of the benefits of renewable energy technologies. Therefore, two external and one EIHP expert have held presentations on those subjects. The event was well attended, bringing together 17 participants. There were three topics, all connected to the subject and of interest to participants: "Good practice examples of biomass in heating", "Experiences and indicators of successful engagement of end-users in the development and pilot projects of RES", and finally "REPLACE Calculator and Heating Matrices".

Within REPLACE, issues such as rebound, lock-in effects, gender aspects and energy poverty issues were discussed. In Croatian Primorsko-goranska County, EIHP tried to incorporate and discuss these issues through all the activities. At the 3rd LWG meeting, one of the primary topics was these issues. The LWG members were asked how these issues can be tackled and through which activities should they be addressed. Additionally, at various REPLACE events these questions were raised by the audience and further commented. For example, during the activities such as boiler labelling, data collection for techno-economic pre-feasibility studies, open day house event and regional field trip, these issues were discussed with the participants. EIHP informed them of the most recent changes in legislation that affected gender and energy poverty issues, as well as lock-in and rebound effects.

Some of the activities will remain beyond the project's lifetime. For example, the activity that can be seen as established for longer term is the formation of information hubs. The hubs include most of the promotional materials of the REPLACE project, and any consumer can take them and read them to gain more information.

The open day house event and the regional field trip have proven to be a great motivation to the participants. The activities were a great opportunity not only to ask the installers/experts on the heating systems, but to also ask the owners about their first-hand experience and the challenges that they faced. By spreading the news of these kind of events on its social media channels, EIHP wants to motivate other companies to organize similar events. Also, EIHP organized a webinar for installers on 9th March 2023. EIHP believes that lessons learned at the webinar can be adopted and implemented by the installers and energy advisors in the long-term.

By spreading the word of these types of projects, other businesses may be motivated to participate and pursue activities such as the ones in this project in the future. Lessons learned include the

recognition of importance of the local working groups and their inputs, the successfulness of replacement campaigns (especially field trips and open day house events), the high interest of consumers in the renewable technologies and making an informed decision etc. Therefore, EIHP will keep spreading the word of the lessons learned during this project.

2.6. Germany: Bavarian Oberland

In the Bavarian Oberland, all planned activities could be successfully implemented despite the COVID situation. The information events of two actions - the facilitation for installers to become contractors and the collective action – were merged in order not to overburden fully strained stakeholders.

The first action was about making households aware of the official energy efficiency label that chimney sweepers have been using for heating systems older than 15 years since 2016. To raise awareness of the efficiency label, EWO conducted an interview with a master chimney sweeper from the Oberland who explained what the label means, when action is needed and what options are available for climate-friendly heating. An article, which was based on this interview, was distributed to households in the region.

In a second action, pre-feasibility studies were carried out with six households in the region who wanted to use the REPLACE calculator to calculate their planned heating replacement. The houses ranged in size from 125 m^2 to 220 m^2, were occupied by young families and older people, and had previously been heated with gas or oil heating systems. The six studies were carried out in March and April 2022.

In a third action, 100 % RHC house labels were given to households that were already heating with 100 % renewable energy. The campaign served to show that households in the Oberland already heat in a climate-friendly way, to honour exemplary households and to encourage others to follow suit. The regional climate protection managers and EWO disseminated the new label through their channels and called on citizens to apply. So far, 10 awards have been given out in the region. The presentation of the first award by EWO was publicised in the press, on the website and in social media.

As a fourth action, open house events were organised to give end consumers the opportunity to see modern climate friendly heating systems first-hand and ask questions. Thirteen private households and one town hall opened their doors between 1 and 17 October 2021 and showed almost 50 interested citizens their climate-friendly heating systems and answered questions. A wide range of technologies were on display.

As a fifth action, Energiewende Oberland organised regional excursions to local heating networks. To show interested citizens on site how local heating networks work and how they are implemented, Energiewende Oberland organised trips to four private networks operated by farmers in January 2022. In March 2022, it was also possible to visit four municipally operated networks. A total of around 60 visitors took part in the two events.

To raise awareness of mobile heating containers, which can help to avoid a 1:1 replacement of fossil heating systems and make time for informed decisions, EWO, in a sixth action, compiled a list of suppliers of seven mobile heating containers from the region. In November 2021, the list was published on the EWO website, and disseminated to the regional press and 88 municipal newsletters. A showcase about them was published.

The seventh action was to support local heating engineers to become contractors for municipal utilities. In an eighth action, stakeholders were supported in setting up a local district heating network. As the target groups of the two actions overlapped, and in order not to overburden the fully strained

stakeholders, the two information events were combined into one date. EWO gave useful tips to interested parties, a representative of a bank informed on sustainable financing and operators of agricultural heating networks reported from practice. Around 60 participants, including mayors, architects and energy consultants, attended the event. Showcases for the two campaigns were published.

Added value of the project REPLACE to the pilot region

Through the support of the REPLACE project, Energiewende Oberland was able to help private individuals apply for several million euros in BAFA funding to convert their heating systems in a climate-friendly way. This was done by promoting the topic, providing background information and tools (REPLACE calculator, matrix, manuals, best practice examples), open house days for on-site visits, a video on subsidies and application, and support with the application itself.

The climate protection managers in the region were also able to benefit from the project's offers. Through the combination of financial resources and working time in the region, it was possible to implement an Oberland-wide media campaign on the topic of the heat transition. They were able to participate in the project's open house days and, together with project partner EWO, organised visits to three districts. The concept and materials of open house days and field trips to local heating networks are available for the climate protection managers to repeat. The 100 % RHC label is also awarded by them and the website www.wärmewende-oberland.de including the heating REPLACE calculator, heating matrix, mobile heating containers, manuals on heating exchange etc. supports the climate protection managers in their advisory work.

The project has provided the professionals in the region with extensive networking opportunities. In addition, the experts had access to background information and tools developed in the project. The bundled information and tools on the Energiewende Oberland website have relieved and supported the fully strained stakeholders in their work. Through extensive exchange and information within the framework of REPLACE, EWO was able to give professionals in the region an impetus to rethink and direct their focus towards climate-friendly heating options and implementation possibilities.

As part of REPLACE, EWO has also supported the authorities in founding the Regional Heat Supply (RWV) Blaues Land GmbH. The foundation aims to plan heating systems and local heating networks in the participating municipalities, organise their construction and guarantee their operation. Authorities were able to benefit from REPLACE as well since EWO was able to support the municipality of Penzberg in the creation of an action plan that also includes the area of heat transition for both municipal properties and private individuals.

Transfer of experience

Despite the Corona situation, the German REPLACE partners were able to present the project and its results at numerous thematically suitable international events. This enabled the project experiences to be passed on to other countries as well as to the German event participants outside the project region.

Activities that may remain beyond project life

With the website www.wärmewende-oberland.de, Energiewende Oberland was able to establish its own platform on the topic of the heat transition within the framework of REPLACE. Through the region-wide marketing campaign and the project activities, the site is anchored in the region and institutionalised for the topic of the heat transition. In connection with the Interreg project GO Altbau (January 2023 - December 2025), the website will be expanded to include additional information on the topic of saving energy in existing buildings.

REPLACE activities that will continue beyond the project include the 100 % RHC campaign. After 10 awards have already been presented during the project, there are another 90 signs that have been produced for the purpose of dissemination. The REPLACE calculator will continue to be kept up to date until November 2025 so that households can calculate their heating exchange projects in advance.

With regard to the open house days and the field trips, the REPLACE campaigns have provided the concepts, the materials (e.g. call for participation, registration form, detailed list of dates, press release) and also the network of visit locations. The visits can thus be repeated if necessary. In addition, the climate protection managers are interested in including the open house days in their event kits. The list of providers of mobile heating containers remains on the website www.wärmewende-oberland.de and new providers can be added.

As far as support for stakeholders who would like to become contractors is concerned, Energiewende Oberland is known to the relevant stakeholders as a contact partner through the REPLACE campaign, the knowledge is available at Energiewende Oberland, and EWO will continue to help interested parties in the future. Through the REPLACE project, Energiewende Oberland has been able to support numerous stakeholders in the region in setting up or expanding a local heating network. The topic of local heating networks will remain the focus and offer of Energiewende Oberland in the coming years, which will continue to support interested parties in planning and implementation.

2.7. North Macedonia: Skopje Region

In KAGoP (Karposh, Gjorche Petrov and Aerodrom) region several activities were considered successful, such as the annual labeling for boilers, conducting techno-economic pre-feasibility studies, the labeling of 100 % renewable heated houses, a webinar showing how to use the “REPLACE your Heating System Calculator” and facilitating the realization of collective actions. The rest of the activities could be classified as less successful, or activities with impact lower than expected. They are the municipal information hubs, open house events and facilitating collaboration of installers and contractors, partially influenced by the pandemic and lack of stakeholder’s dedication for certain activities.

The activity “annual labeling for boilers” was implemented with assistance from the LWG within the KAGoP region. With support from the LWG it was possible to identify potential houses that are using inefficient heating systems. At the end, 8 different households with old heating systems were visited and advised for better and greener alternatives.

Another activity was the conduction of 7 techno-economy studies (Macedonian and English versions) for the replacement of old heating systems with modern, more efficient, and environmentally friendly systems, with prior online surveys and phone calls with the interested end-users.

The response to the 100 % RES labeling activity was overwhelmingly positive as almost 80 citizens were interested and willing to be an example of environmentally aware end-users. As part of the 3 separately organized events, representatives from different municipalities shared the labels among the end-users who have installed a renewable heating system. At the event in Karposh, even the mayor expressed his contentment with this successful campaign.

The activity for organizing webinars consisted of 3 webinars that were held in the timespan of a couple of months and were attended by around 100 participants. The first webinar was organized online, on the topic: Overview of sustainable technologies and examples of good practices for replacement of heating and cooling systems. The second webinar was held on-site in a venue, on the topic: Decarbonization of the heat sector. The third and last of the series of webinars was held online, where

the REPLACE calculator, matrix, and a country specific excel-based tool was presented. The country specific tool is following the structure and calculator models similarly to the REPLACE calculator, but is focused on the inverters. It takes into account several efficient technologies and as results it shows for each type of house or building what is the best air-to-air heating pump option. Hence this tool calculates the economic and environmental aspects that would occur with the replacement.

The activity "Realization of collective actions" was composed of a techno-economic study for a representative multi-apartment building in the KaGoP region. The study assessed the economic feasibility of collectively purchasing inverter heat pumps (air-air heat pumps) and PV systems and sharing energy in a residential multi-apartment building. Based on the analysis, a procedure for analyzing the techno-economic viability of such systems was developed. This procedure can be replicated for other use cases, not only in the KaGoP region, but also more widely, thus pointing toward possible policy recommendations in the area of energy communities and collective actions. Through an open dissemination event, the study was presented to a wide variety of interested actors, including citizens, representatives from municipalities, companies working with heating and/or PV installation as well as policy makers and consultants in the energy sector.

As a starting point for the establishment of municipal information hubs and greater involvement of the municipalities a guideline for the implementation of the info hubs was developed. In February 2021, the info hub in the municipality of Aerodrom was officially introduced to the citizens. Additionally in the same time a virtual info hub was created as a Facebook page. In May, the info hub in the municipality of Gjorce Petrov was officially introduced to the citizens with an event attended by 12 participants. Furthermore, an info hub in the Municipality of Karposh was established in conjunction with another H2020 ComAct project related to energy efficiency.

The activity for house events covered two best practice RHC systems installed in the KAGoP region. The first example was a 4kW air-water heat pump and a distribution system with high temperature radiators in a 90 m^2 apartment in a newly completed building. The latter was a 100 m^2 house with a distribution system heated by a 16 kW pellet boiler, with additional installed solar collectors for sanitary purposes. Both cases have automatized regulation systems, which can be easily handled remotely. During the house events, only the SDEWES team and an energy controller were present. The results of these events were later shared in workshops attended by representatives of the SDEWES-Skopje team, the energy controller, and the house owners. Examples of the installed systems, including photos and technical characteristics, were promoted in events organized within the project.

The facilitation of innovative collaboration models was supported with a roundtable with valuable inputs from eight relevant key stakeholders. The concept of the workshop included a presentation, a world style cafe roundtable of discussion and live interaction with virtual post-it notes using ZOOM whiteboards.

Some of the activities that are envisaged to remain beyond project life are the municipal info hubs and the virtual info hub that will further disseminate replacement activities in the KAGoP region and news about the RHC technologies and their benefits. Although it is not considered as a campaign activity, as an indirect link we assume that the REPLACE calculator and the add-on inverter calculator will be continuously used.

A final event where all the results from the REPLACE project will be shared to different stakeholders will possibly be organised after the project end. Furthermore, as a follow-up activity the proposed collective action could be realized. However, these activities cannot be guaranteed and strongly depend on the end-user's willingness to invest and integrate the concept that we developed as a pre-feasibility study.

The campaign's activities most certainly shifted consumers' minds towards more sustainable heating solutions. The end-users, intermediaries and investors learned about the state-of-the-art technologies, got acquainted with the best practices in different countries and regions, and have a better overview of the current heating and cooling situation, considering the challenges and barriers that exist in KAGoP region. The overall feedback was positive, the stakeholders very satisfied with our activities and are willing to support further development in the field of RHC. Yet the main challenge in the heat market remains. The needed finances for heating system replacement and lack of subsidies, especially with the new energy crisis and drastic increase of fuel prices, pose a great challenge. Greater involvement from the end-users and other intermediaries is something that should be worked on in the future, as the ground for awareness raising and knowledge exchange was established. An activity that could be pointed out and recommended for other regions is the study for collective actions, where a building is acting as an energy community. Such a concept if nicely performed could make a great impact on the local level, and further on the national level, in enabling greater independence from energy imports.

KAGoP region is already known as a more advanced region in the RHC sector on the national level, as many projects and similar activities are already performed in these three municipalities. The results were communicated to a broad spectrum of audience covering different backgrounds, such as end-users, policy makers, municipal representatives, installers, RES companies, investors, academicians, researchers and many more. The results were shared through different means, including social media, websites, newsletters on international level, and more importantly via the events, meetings, workshops, seminars organized during the REPLACE project. Further communication and transfer of experience could be done via the virtual info hub that was established on Facebook.

2.8. Slovenia: Slovenia

In a development process comprising of several workshops with the Slovenian REPLACE Local Working Group (LWG), nine sets of activities jointly were agreed on jointly to be implemented in Slovenia. Although at that moment in time all activities were planned to pursue further, the execution of some was already under threat: open day/house events due to Covid-related unclear conditions of possible physical events and the annual labelling for boilers due to the fact that the responsible ministries for energy labelling expressed their apathy to making boiler labelling for new and existing boilers compulsory similar as it was for heat pumps at the time being.

Nevertheless, the labelling campaign proceeded and turned out as a successful part of the REPLACE project. Although the activity was called 100 % RHC system, the Slovenian label doesn't include such a statement since this strictly speaking is meant for biomass boilers only. The label promotes green heating in general. The households that use technical systems for heating, cooling and domestic hot water preparation that exploit renewable energy sources were invited to the campaign and thus received a "renewable heating or cooling label", when they met the conditions of such a system. LWG members had the ability to access municipalities in Slovenia and that was used especially in order to publicize the labelling campaign. Two **LWG partners were able to contact each of the 212 municipalities in Slovenia**. Partners conveyed details concerning the REPLACE project and requested that they post a report on their website to advertise renewable heating solutions and the opportunity to earn a REPLACE label. Households applied for the label through an online form, where they were requested to take a picture of the label on the house/boiler/heat pump and sent it to JSI for reporting purposes. In the end, **350 labels were sent out to households and 1,000 to chimney sweepers.**

Due to several REPLACE campaigns that took place in parallel, the awareness among households, that was the main focus group, increased substantially. It all kick-started in October 2021 with a nation-

wide PR campaign (that was primarily focused on collective actions of joint RHC purchase), where the consumers were made aware of:

1. The fact that there exists a choice for their current heating status that can be changed, while they were stuck at the current status quo for years before;
2. The fact that if consumers are proactive, they can gather enough information to make more informed decision;
3. Possible solutions to their existing heating system and
4. Options where they can find additional tools/information.

One of the **key added values** of the project lies in the cooperation with energy advisory offices. Across Slovenia there are **55 energy advisory offices** with 49 advisors. All offices are now well equipped with REPLACE project findings and tools (calculator, matrices) and furthermore, 30 advisors participated at the REPLACE webinar where they were trained about the use of the REPLACE calculator. All advisors participated as well in the annual training, organized by Eco Fund, where they were informed about REPLACE tools and promotional material. Due to these activities, the **REPLACE calculator is now a regular part of the work of Slovenian energy advisors**. Collective action was implemented in 2022 and households were made aware of recommended visits at the energy advisory offices and the REPLACE calculator.

The added value for equipment suppliers and other market actors lies in the promotion of renewable heating systems. By promoting greener, cleaner technologies based on the economic and environmental aspect consumers are being motivated to increase the uptake of this technologies.

Many campaign activities were designed to last for several years, which guarantees the long-term effect of REPLACE project's results.

- Chimney sweepers got over 1,000 printed labels from JSI and can further promote green technologies with these labels.
- Energy advisory offices received over 1,000 printed REPLACE leaflets about basic replacement process information, matrices and calculator, which is sufficient for several years to come.
- On a permanent basis a web-based information point was established with Borzen and Eco Fund. The goal was to guarantee long term presence and recognition also as an long-term result of the REPLACE project.
- Eco Fund's public calls for subsidies will further integrate information about REPLACE tools and project results through a national web-based information point.

During the execution of the campaign, it became evident that sustaining publicity across online and TV platforms was a critical element for increasing the public's knowledge. **In October 2021, the REPLACE PR campaign was conducted, resulting in over 3,500 individuals using the online calculator and over 3 million people being reached by the promotion through web-based articles**. After that, the calculator was predominantly used by the energy advisors and people that replaced their old heating system. To ensure the public is kept up to date on pertinent issues, this campaign should be run multiple times annually to make people aware of the inefficiencies of their boiler, as well as the possible advantages of replacing it. In the scope of REPLACE the campaign was ran only once due to limited resources and thus presents a challenge that could be improved in the future. Key organizations (Borzen and Eco Fund) had already been informed of the facts and it is anticipated that they will conduct a similar campaign in the future.

The collective action "Replace oil for the sake of the environment" for the joint purchase of heat pumps proved to be a great mix of support activities and improved business models. The approach was based on three steps: (1) step by step education process, (2) test of knowledge and coupon receipt and (3)

joining a group of investors that replaced a fuel oil boiler with a heat pump. The initial goal was to reach and encourage 50 boiler replacements and, in the end, we almost reached 150 replacements. So the activity proved to be more successful than expected, especially since JSI has already received invitations from the industry for campaign repetition and energy advisors already gave their input on how o further improve the campaign. In the scope of the project the campaign was not repeated due to lack of resources. Should JSI repeat a similar **collective action** campaign and consider all the suggestions it **would be structured** like this:

1. Step by step education process
2. Knowledge test
3. Expression of interest for investment in either biomass boiler or heat pump
4. Receiving an offer from three different (pre-chosen by JSI) manufactures

The approach can be replicated in all other EU countries, since it proved very promising and had a big actual impact with almost 1 kt CO_2 reduction. It is also a way to get the best possible offer on the market and in the case of lack of subsidies in some countries, it's also a option for consumers to get the best values for your money.

To boost phase-out activities of old, inefficient boilers two key factors played a pivotal role in Slovenia. The first one is the availability of subsidies that stimulate households to invest several thousand Euros into renewable technologies. The second one is an extensive PR campaign that must reach target groups. For Slovenia it proved successful to have an extensive online promotion on several portals, while the REPLACE calculator was further promoted on the national television program as well.

2.9. Spain: Castilla y León Region

The strategic orientation of the Replace boiler replacement campaign was based on the contributions gained from several actions, e.g. the Castilla y León Bioenergy Regional Plan and its updates, the Local Working Group meetings, the thermal renewable strategy and in line with the climate change and energy transition law draft of Castilla y León ,the conclusions from the workshop implemented in the first project meeting in Austria, bilateral discussions with key stakeholders and conclusions from previous REPLACE project tasks (framework conditions reports, stakeholders mindset survey and instruments developed).

Once the draft information was prepared for the action plan it was discussed with the Local Working Group in a specific workshop, to agree on the aim of the specific campaign activities and the level of cooperation expected from them.

The campaign activities included measures involving public authorities (regional and local), consumer organizations, intermediaries, biomass associations/cluster, ESCOs, District Heating promoters, installers and promoter associations from this sector and other groups involved with the biomass value chain.

One of the main results of the REPLACE campaign in Castilla y León included the elaboration and placement of 400 REPLACE labels (boiler labelling and renewable label for homes) managed by EREN, Escan and members of the LWG.

Some examples of REPLACE labelled installations were monitored by Escan during the entire process and embed specific labels on buildings and boiler rooms that meet efficiency and low pollution targets. The verification visits included two 120 kW installations for heating; another installation with two 150 kW unit boilers for five buildings in the same town and two 220 kW units with a buried chip silo that heats four buildings.

Another success of the project in this region is the elaboration of nine techno-economic pre-feasibility studies. 6 were originally planned but increased to 9 in 2023. Owners of one single family house and eight apartments buildings which involved building areas ranging from 250 m^2 to 13,000 m^2 that replaced oil or gas boilers by biomass boilers have benefited from these studies.

The implemented information hubs were 7 offices that provide face to face, phone or email information to families and other end-users on how to replace their heating systems by renewable technologies. 260 consumers used this offer per month. Other information hubs were in the EREN building and in the other three energy agencies in the region (2 provincial, 1 local) and in public regional buildings in synergy with regional information on grants/subsidies, and in other fairs of tourism or the Showcase Valladolid Fair.

A workshop and networking event involving around 60 professionals was organized for capacity building and experience exchange, with an additional technical visit (free tour) during the Expobiomass fair & Congress 2021 in Valladolid.

The planned open house events have been replaced by the edition of 4 videos that focus on the promotion of biomass systems in family houses. The videos show cases of a biomass central heating system for a block of apartments, a biomass district heating system only for homes and a biomass district heating system combining homes and other building types. The videos show different types of biomass users in different cities and how these installations work in practice and maintenance and include some testimonials from installers, promoters, and the users.

REPLACE Videos are available through the website of the regional energy agency of Castilla y Léon, EREN, to the REPLACE project: Proyecto REPLACE | Energía y Minería | Junta de Castilla y León (jcyl.es)

Besides the videos are also available on YouTube:

- Video on biomass boiler installation in a single-family house: (187) Instalación de caldera de biomasa en una vivienda unifamiliar. - YouTube
- Video on biomass boiler installation in a block of apartments: (187) Instalación de caldera de biomasa en edificio de viviendas, comunidad de vecinos. - YouTube
- Video on biomass district heating in Valladolid: (187) Red de Calor de Biomasa en Valladolid. - YouTube
- Video on biomass district heating in Soria: (187) Red de Calor de Biomasa en Soria. - YouTube

During the Expobiomasa showcase a “Free tour” was organised around the fair to introduce the different technologies and manufacturers of biomass.

In this tour one of the LWG members (as professional sector representative) and EREN staff explained to the participants the newest biomass equipments, pellets characteristics, labels, certificates, and other interesting data during the biomass fair in Valladolid.

A webinar of the REPLACE tool calculator was organised with the attendance of general public, mainly from some vocational training centres but also professionals of the sector.

Regarding collective actions, different proposals were analysed, such as pellets producers that organise an aggregate selling and buying platform.

EREN and environmental regional stakeholders are supporting the implementation of possible biomass logistic rural-urban hub which are foreseen to be in the areas of Villablino and Almanza. Further possible locations are still being analysed.

This collective action is going on track, and it is expected to receive some subsidy from the Just Transition Plan. The action promoted by an environmental regional public company includes cooperation with different key actors in the initiative such as the public councils, private and public owners and managers of the forest/land areas, a public regional company, biomass distributors and transport operators. It would be additionally a good possibility to incentive self-employment in the region and support the economy in those areas.

The objective of these hubs is to aggregate biomass offers in strategic areas called for its subsequent distribution. These biomass hubs will function as logistical centers where individuals or entities with biomass can transport it as a raw material. The biomass can then be processed as required (such as drying, cutting into chips or branches, or manufacturing into pellets or briquettes) to meet market demand, and stored for subsequent distribution.

Further successful activities of the REPLACE campaign have been the consumers labelling, the prefeasibility studies, and the high number of views of the 4 videos with the examples of biomass boilers in different kind of family houses.

The activities that will continue beyond the project duration are the meetings with members of the LWG. On 14th March 2023 the last project meeting with LWG members took place and the REPLACE partners offered to continue the meetings and the LWG members showed their interest in continuing this collaboration.

3 | Austria: Federal State of Salzburg

3.1. Recap of first action plan

As a result of a discussion process that included several meetings with the Department of Energy Management and Consulting of the Office of the Province of Salzburg and a kick-off meeting with the Local Working Group (LWG) that was set up to define and implement a boiler replacement campaign tailored to the needs of the pilot region of the Province of Salzburg, the following set of activities was jointly agreed to be implemented in the pilot region (as of March 2021).

Table 4: Overview of proposed activities according to the first action plan and status by the end of the project

Boiler replacement campaign activity	***End of project status***
Phase-out fossil fuels marketing campaign	Discarded
All-round carefree packages (ARCP) for boiler replacement	Ongoing, beyond project life
Jointly organized boiler room inspection measures	Implemented as part of ARCP
Promotion of mobile heat devices	Implemented as part of ARCP
On-site information evenings for end consumers	Discarded
Addressing financing and affordability issues	Implemented as part of ARCP

In Austria, at the kick-off meeting of the Local Working Group (LWG) that took place in July 2020, 25 stakeholders discussed the problems and challenges of boiler replacement and the idea of an All-Round Carefree Package for Boiler Replacement (ARCP). The meeting was hosted by AEA and the Department of Energy Management and Consulting of the Office of the Province of Salzburg.

Oil and gas boilers are usually robust, durable appliances that can last for over 20 years with minor repairs. Switching to renewable energy requires a lot of information, time, coordination and money (20 to 30 kEUR at that time) and is not a very pleasant process. In addition, people often shy away from a 5-day building site. There are people who do not have the necessary funds, cannot get a loan (due to age), cannot afford to replace the boiler or it is no longer practical (demolition, retirement home). In general, boilers are only replaced when there is no other option. In addition, there is often no time to make an informed, well-considered decision. Because of these problems or time constraints, 1:1 replacements are very common, as they are usually the cheapest option in the short term. Policymakers are increasingly promoting the switch to renewables and the associated benefits. However, there are a number of further bottlenecks that hinder the phase-out of oil boilers in households. These include the limited availability of skilled workers and installers, as well as funding regulations and availability (stop-and-go federal funding).

The most hotly debated topic on the agenda was the all-round carefree packages (ARCP) concept for boiler replacement in order to remove key barriers that households face when switching from oil to renewable energy sources or district heating. These barriers include the need for reliable information on technology choice, navigating the support system and decision-making, the complexity of implementation, and key issues such as affordability and financing. In principle, the LWG and the Department of Energy Management and Consulting (Salzburg) have been interested since then in defining this approach more concretely and actively supporting such initiatives.

Over the following year, the all-round carefree package for boiler replacement has been developed through a separate, comprehensive stakeholder process. It turned out that the three proposed campaign activities - "Jointly organised boiler room inspection activities", "Promotion of mobile heating devices" and "Addressing financing and affordability issues" - could become an integral part of the ARCP concept (more details below).

According to the table above, the activities that were cancelled are the marketing campaign for phasing out fossil fuels and the local information evenings for end users.

The reason for the cancellation of the fossil fuel phase-out marketing campaign was that the local working group wanted to avoid overheating the boiler replacement market. In the course of 2021, applications for subsidies for boiler replacements in the pilot region of Salzburg province doubled compared to previous years. This was due to rising fossil fuel prices and increasingly attractive subsidies. In October 2021 - in parallel with the increased prices for boiler replacements and the general price increase - the federal government increased the general subsidies for a fuel switch from fossil fuels to renewable energies or district heating from 5,000 euros to up to 7,500 euros per heating system in a private household.

Funding is provided for the replacement of a fossil heating system (oil, gas, coal/coke all burners and electricity-operated night or direct storage heaters). An important factor in the choice of a new heating system is the possibility of connection to a climate-friendly or highly efficient local/district heating network. If this is the case, only the switch to local/district heating can be funded. If this is not possible, either a wood-fired central heating unit or a heat pump can be funded. In order to make clean heating and thermal renovation of buildings possible for everyone in Austria, the Ministry of Climate Protection (BMK) has secured a record budget of 1.9 billion euros in subsidies for 2022 to 2025. For 2022, more than half a billion euros (590 million) have been budgeted.

The availability of installers to households became much tighter, households had to wait months or more than half a year for offers from installers in 2021, and the REPLACE team did not want to overheat the market by launching a marketing campaign for heating system replacement on top of this situation. At that time, installers in Austria typically made the majority of their sales in bathroom and sanitary installations. As a result of Covid-19 and the lockdowns, which forced households to stay at home, households invested more in such installations. This was also a major reason for the limited availability of installers.

The local information evenings for end users were planned to promote the launch of the web platform offering ARCP for boiler replacements. However, due to unexpected market developments, it was not possible to successfully launch and promote the platform, e.g. through information evenings.

3.2. Activities implemented and tested

3.2.1. New activities

No new or alternative activities related to the first action plan were implemented.

3.2.2. Overview of performed, tested & fine-tuned activities

The following table gives an overview of the activities carried out and their preparation and execution phases.

Table 5: Overview of the activities performed, their preparation and duration in Austria

Latest Status Quo		**Starting point & fine-tuning**	
Activity	**Short description**	**Preparation phase**	**Implementation phase (re-design)**
All-round carefree packages (ARCP) for boiler replacement	Web platform that enables households to find installers offering defined all-round carefree packages for boiler replacements.	January 2021 to mid-July 2022	Launched mid-July 2022, had to be stopped shortly after launch, can be potentially run until March 2026
Jointly organized boiler room check measures	Integral part of the ARCP package (energy efficiency first principle).	As above	As above
Promotion of mobile heat devices	Integral part of the ARCP package in the event of boiler failure (avoiding fuel lock-in) or replacement during the heating season.	As above	As above
Addressing financing and affordability issues	Integral part of the ARCP package (voluntary special services).	As above	As above

3.2.3. Successful activities

So far, none of the planned and implemented activities have proved successful in real-life conditions.

3.2.4. Less successful activities

3.2.4.1. Activity “All-round carefree replacement packages (ARCP)”

Discussions on barriers at the first LWG meeting in July 2020 revealed that having to take care of your own heating system is not an attractive matter. Usually, households only really deal with their heating system when something is not working or it is broken. Older people shy away from implementing major measures on their homes. At an advanced age, many no longer feel able to implement or organise a major project themselves and therefore tend to leave these things to the next generation. Young families lack time or resources. Young families are busy with so many other things and obligations that they often lack the time and possibilities to organise a heating exchange themselves. They do not have the time to consult the various tradesmen involved. Multi-party houses are more technically and decisionally demanding, as more actors have to be involved, and the are technologically more challenging.

After the first LWG meeting in July 2020 the Austrian REPLACE team was therefore asked by the LWG member Department of Energy Management and Consulting, Office of the Provincial Government of Salzburg to develop a one-stop-shop approach aimed at replacing old oil/gas/logwood/direct electricity heating systems in single-family houses, semi-detached houses or terraced houses with renewable and district heating systems.

The objectives of the ARCP concept are to

- Make the boiler replacement as easy, fast and future-proof as possible
- Reduce complexity and time, no more 1:1 emergency replacement
- Speak a common language regarding recommended solutions that are suitable for the site (across crafts)
- Pass on measures recommended by public energy consultants, including (minimum) energy efficiency measures (and beyond where appropriate)
- Provide people with everything they need for the changeover, through a central supplier or a single point of contact (i.e. the installer) to co-ordinate all issues and crafts required
    - households can find such one-stop-shop services via a web portal listing ARCP suppliers nearby.

The following figure gives an overview of the three pillars of the ARCP concept for boiler replacements.

Figure 2: Overview of the three pillars of the Austrian all-round carefree package (ARCP) concept for boiler replacements

In the second half of 2020, the AEA, together with the Department of Energy Management and Consulting (Salzburg), undertook a preliminary identification and preparation of the issues to be addressed. The next figure provides an overview of the issues that have been prepared for discussions with potential ARCP providers.

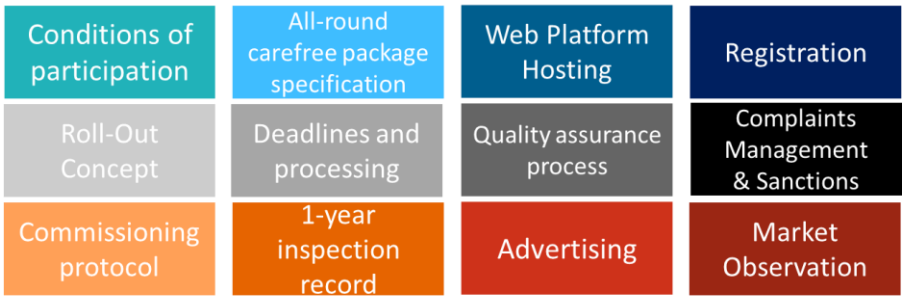


Figure 3: Overview of issues to be addressed in developing the ARCP concept for alignment with potential ARCP providers

As a next step, exploratory discussions were held with potential ARCP providers in the first quarter of 2021. 23 interviews were conducted with general managers, sales and technical managers and installers. A total of 17 companies (manufacturers, wholesalers, utilities, installers) showed interest in offering their services in the one-stop-shop for boiler replacement in the province of Salzburg. Next an ARCP provider workshop was held in March 2021. The workshop dealt with the issues shown in Figure 3. The focus was on the conditions of participation and the specification of the all-in-one package. These aspects were then further developed by the AEA.

The result of that process is that the ARCP supplier co-ordinates and supervises all trades via one contact person on site and provides all necessary contracts or acts as a general contractor for the household. In 90 % of cases, an ARCP covers all the required services and defines binding criteria for quality assurance and energy efficiency. The following 15 activities became a mandatory part of the ARCP for boiler replacements and must be carried out by any ARCP provider signing the terms of participation. It is called the “basic all-round carefree packgage”, basic ARCP for boiler replacements.

15 mandatory services of the “basic all-round carefree package”	
1. Assistance with grant applications	8. Professional disposal of old appliances and fuel
2. Submission of necessary permits	9. Development of the heat pump heat source
3. Application for an energy performance certificate	10. Installation of new heating system
4. Mobile first aid heating service	11. Hydraulic balancing of the heating system
5. Construction of biomass storage room, connection to district heating system or power current connection for heat pump	12. Adjustment of the heating system (heating curve etc.)
6. Boiler room renovation (up to the heat delivery and distribution system)	13. One year performance check and optional maintenance contract for the first five years of operation
7. Chimney renovation (up to new construction)	14. Proper handover, customer training and acceptance of the new heating system
15. Notification of completion	

Figure 4: 15 mandatory services of the “basic all-round carefree package” for heating replacements

Furthermore, ARCP providers commit to rapid implementation. The ARCP service includes an emergency boiler replacement without interruption. This is done by a mobile first aid heating service that heats within 24 hours. This enables 3 weeks to be able to make an informed decision about a fuel switch in case of system breakdown. Furthermore, ARCP suppliers must act and react fast, predictable and (energy) efficient in every case. This includes

- Feedback to households max. 3 days after first contact; appointment for on-site inspection
- Offer for recommended solution max. 2 weeks after site visit
- Completion date in any case in accordance with current funding conditions

In terms of quality assurance, each ARCP one-stop-shop offer must go through the following steps.

- Public energy advice to implement the most appropriate solutions for the site; in Salzburg, public energy advisors can be consulted free of charge before the heating system is replaced.
- Minimum energy efficiency first/energy savings measures (those are the "boiler room check measures", that were integrated into the ARCP, which save at least 10-15% of energy without any loss of comfort):
  - Upgrading the basement heating and hot water systems to the latest technology
  - Optimisation of hot water preparation and integration
  - Insulation of pipes, fittings and valves in the basement or unheated rooms
  - Hydraulic balancing of the entire heating system, carried out by the installer
  - Adjustment of the heating system and circulation pump to the heating curve, carried out by the installer
  - Training the homeowner in the adjustment and control of the heating system
  - One year performance check.
- and the provision of mobile heating equipment for emergency breakdowns within 24 hours of contact.

In addition, voluntary ARCP services can be offered - up to and including thermal renovation of the building(s) (components), cellar or attic clearance, PV, solar thermal, etc. The following figure shows a selection of the currently up to 22 voluntary ARCP services that have been discussed to be offered by potential ARCP providers.

Selection of up to 22 offered voluntarily special ARCP services	
1. Cellar and attic cleaning service	8. Grid connection gain (grid operator)
2. Insulation of the top floor ceiling	9. Online monitoring of system performance
3. Comprehensive thermal refurbishment	10. Provision of a system performance guarantee
4. Refurbishment of individual parts of the building	11. Maintenance contract for more than 5 years
5. Drainage of rooms	12. Plant or energy savings contracting
6. Tiling, painting	13. Instalment payment models
7. Amendments at the electricity meter box, earthing resistor ("house electrician")	14. Photovoltaic and/or solar thermal system

Figure 5: Selection of up to 22 offered voluntarily special ARCP services

Figure 5 shows two measures that can help alleviate financing and affordability problems. Plant or energy performance contracting or instalment payment schemes, rather than a one-off upfront investment, can help households to make heating system replacement more affordable. In this way, financing and affordability issues are addressed in addition to the following financing improvements introduced at the policy level during the project.

It was also planned to invite banks to offer their services for easy access to financing a heating system replacement via the platform at a stage when the web platform was being set up. This has not yet happened. However, some banks have shown interest in such an option during initial discussions.

Excursus on financial incentives introduced for low-income households

At the end of 2021, the government launched the "Clean Heating for All" subsidy programme, which came into force at the beginning of 2022. To ensure that everyone can really afford climate-friendly heating, the switch to climate-friendly heating for low-income households will be supported with additional subsidies of up to 100% of the investment (with defined upper limits). The full 100% subsidy can be applied for by households whose joint income is in the lowest two income deciles - i.e. for a

one-person household not exceeding 1,454 euros net. A 75% subsidy is granted to households in the third income decile, i.e. single-person households whose net income does not exceed 1,694 euros. There are caps of total eligible costs for heating systems defined for 100% coverage by subsidies. Only natural persons living in a detached, semi-detached or terraced house are eligible to apply. The majority of the funding is provided by the EU. The funding is accompanied by energy and implementation advice.

In the 2nd quarter of 2021 a rollout concept for the pilot initiative in Salzburg province was elaborated. Negotiations took place between AEA, the Department of Energy Management and Consulting (Salzburg) and the Austrian Federal Ministry for Climate Action. In the end, an agreement was reached to implement a klimaaktiv/Replace one-stop shop online platform, which will offer all-round carefree boiler replacements in up to four Austrian provinces. Once implemented, the one-stop-shop web platform can be operated for up to four years, until March 2026. Klimaaktiv is the Austrian climate protection initiative of the Federal Ministry for Climate Action and integral part of the Austrian climate strategy. It´s primary objective is to launch and promote climate-friendly technologies and services.

AEA, through its work within REPLACE, was able to secure additional public funding of about 100,000 EUR for the web based one-stop-shop, which otherwise would not have been possible through REPLACE alone, and which could thus be used for several years beyond the project's duration. The establishment of the web platform also required a public tender for defined IT services, which was also fully managed and coordinated by AEA.

Overall, the development of the web-based one-stop-shop required a large number of coordination meetings: five in the course of the design phase and a workshop with potential ARCP providers; nine in the course of clarifying the funding, lifetime and reach of the platform; and 24 meetings in the course of the implementation of the web platform alone, as well as a workshop with ARCP providers in the test phase and another workshop shortly before the launch of the online platform.

The web platform "sorglos-kesseltausch.at" went online in July 2022, finally. The next figure shows the landing page of the web platform.

Figure 6: Landing page of the all-round carefree web platform for heating system replacements

The one-stop-shop enables a matchmaking of households in need of a renovation and ARCP providers. Homeowners, via a simple search form can easily can find ARCP providers nearby, delivering the services identified as appropriate by energy consultation or needed in addition (see below).

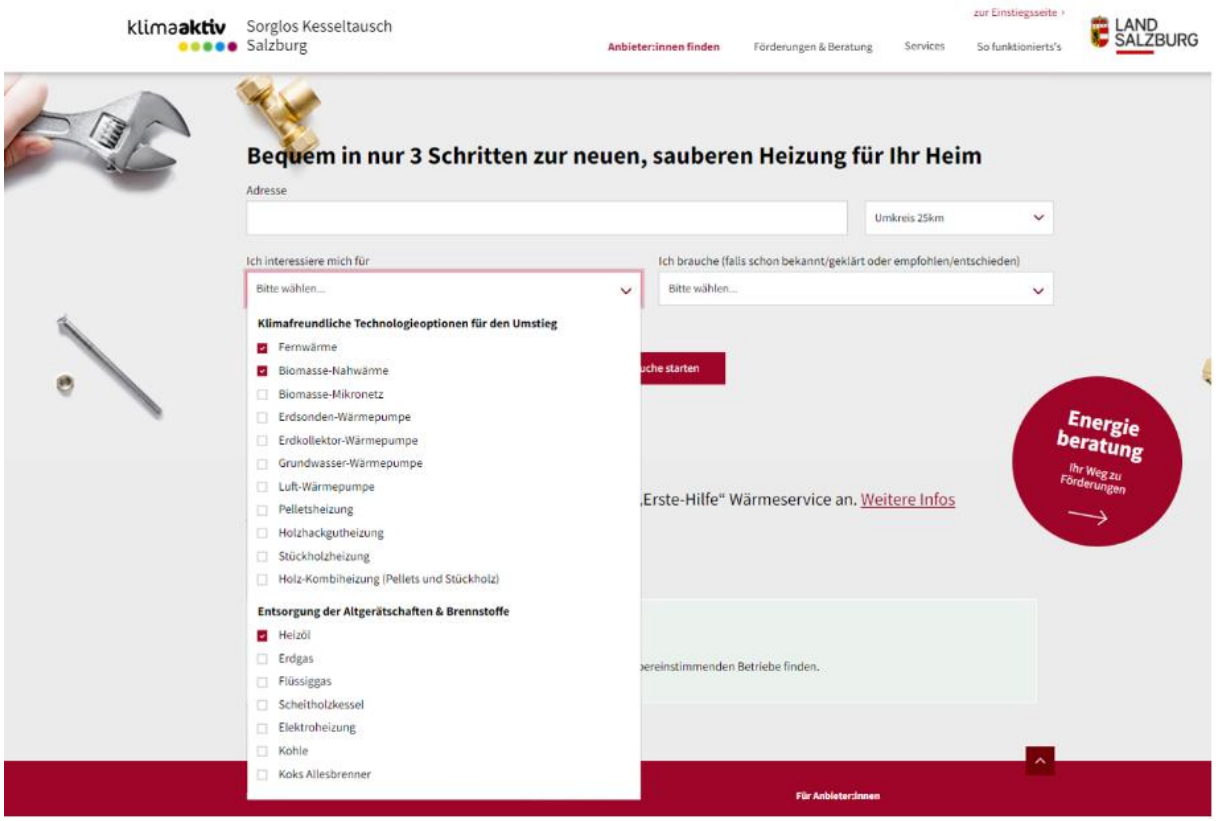


Figure 7: Matchmaking page of the all-round carefree web platform for heating system replacements, Salzburg province

As a result of the search, ARCP providers delivering what is needed (the installers acting as single contact point residing nearby, respectively) are listed according to their distance to the household making the enquiry. The service is free of charge to all parties involved and does not require any personal data from households.

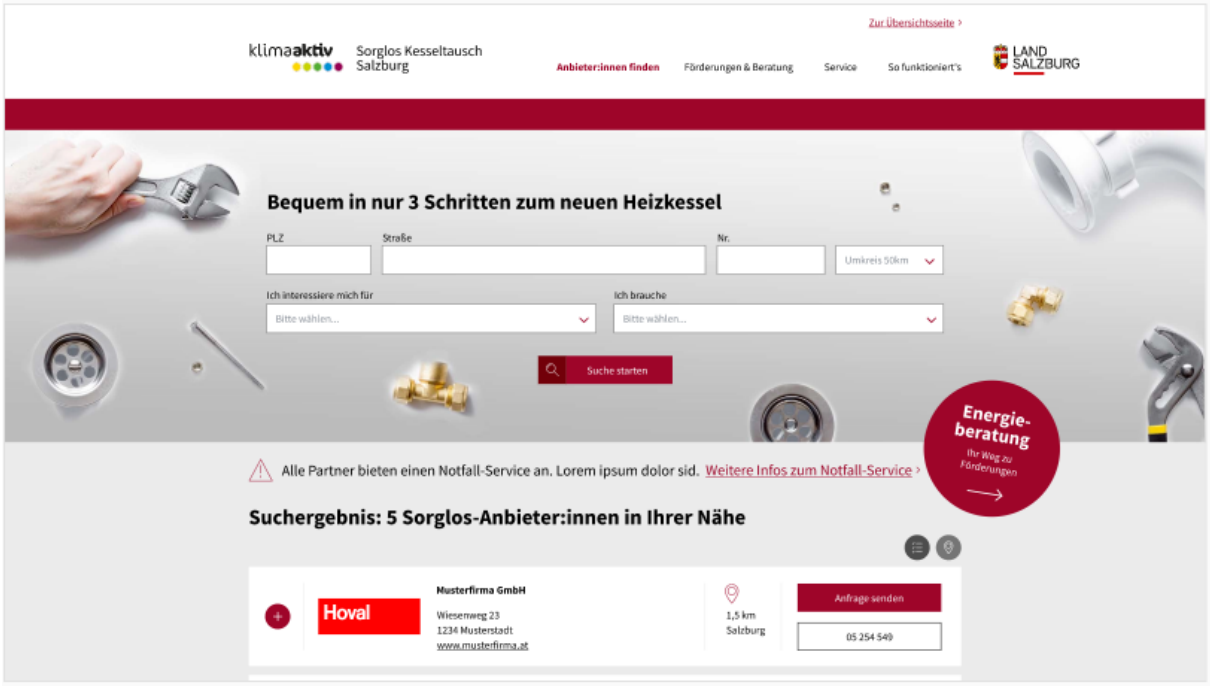


Figure 8: Search result on the matchmaking platform

In the next step, households can easily and conveniently contact the ARCP provider, e.g. by phone or e-mail, in the latter case they can attach the energy consultation protocol and/or an energy performance certificate of their home. This speeds up the process, which then continues as described above.

Reason why the ACRP activity is considered less successful (for the time being)

While the ARCP for the boiler replacement activity was successfully prepared, the implementation was not successful due to unexpected, exceptional market conditions. As a result of the Russian invasion of Ukraine, the ensuing energy crisis and the resulting sharp rise in energy prices, as well as households' fears of gas supply disruptions, many households wanted to become independent of oil and gas as heating fuels in the second half of 2022.

Due to the energy crises and the high demand for boiler replacements, the order books of potential ARCP suppliers in August 2022 were full a year in advance, and some of the components needed could only be delivered in 9 to 12 months' time. This meant that even firm prices could not be quoted before then. As a result, it was difficult to even get an offer from an installer without waiting a long time; waiting lists for households are common.

In summary, shortly after the launch of the web platform, potential ARCP suppliers were no longer able to sign up to the terms of participation and offer high quality, all-inclusive services, which was not expected by the team in charge of the one-stop-shop web platform.

End of March 2023 AEA conducted several interviews with potential ARCP suppliers to sound out, whether and when it could be possible to relaunch the one-stop-shop web platform. While single installers were in favour for a quick relaunch after the heating season, the interviewed manufacturers uniformly were against a relaunch in 2023.

The main idea of the ARCP boiler replacement concept is to offer households an easier access to make a replacement of their old heating system by a new climate-friendly one as easy and quick as possible,

i.e. a clearly defined and quality assured boiler replacement with rather tight implementation schedule. The overheated market revealed and caused several problems and challenges in supply chain and quality of implementation. The heat replacement industry says 2023 is needed to do the homework and to improve and optimise processes. It was said that there is certainly a lot of potential here and it is hoped that they will be able to take advantage of the new offer in 2024.

Direct Impact

Potential ARCP suppliers in mid-2022 were reluctant to sign the terms of participation and offer ARCP services, because of the challenges explained above. Boiler manufacturers reported that their orders made back in 2022 will need by mid-2023 to be realised. Therefore, new clients (e.g. coming in from the ARCP web platform) could not be served in a timely manner in addition. The ARCP web platform therefore will further remain set offline for 2023. Hopefully, market conditions will ease by the end of the 2024 heating season, enabling collecting experiences with this unique pilot action, from that time onwards. The founders of the ARCP web platform are prepared to relaunch the platform by that time.

The following figure shows possible benefits of participating at the new one-stop shop offer for all-round carefree package providers.

Advertising value through professional appearance with public authorities
• Free listing on sorglos-kesseltausch.at website • Independent provincial energy advisors can refer to sorglos-kesseleltausch.at in their advisory talks • New offer for households with little time on their hands • Image "we craftsmen tackle it together" • Promotion of the campaign by the federal government, the province and klima**aktiv**
Lower overhead costs and supply failure risks
• Good data is available due to the household passing on the energy advice protocol • Households find a prefabricated service package and search more specifically via independent website
Acting together can save costs
• A division of labour, where sensible and possible, enables efficiency gains (↑ boiler changeover rates) for mutual benefit
Attractive offer for households: A total package is better than having to organise individual crafts yourself

Figure 9: Possible benefits of participating in the new one-stop-shop offer for all-inclusive package providers

A further learning expected from the pilot one-stop-shop initiative is the kind of cooperation models that are expected to be introduced among installers and manufacturers that would allow both to benefit from. The terms of participation do not interfere in those relationships. The interviews conducted in the ARCP creation process revealed some initial thoughts about possible ways of cooperation.

One idea is to reduce the burden on installers by having manufacturers organise the dismantling and disposal of old equipment and the marketing of any remaining fuel oil on their behalf. Depending on the manufacturer, this could include breaking through the building envelope, excavation and concrete work to create the foundations, and delivery of the new equipment to the exact location of the installation. Other ideas include hydraulic or system design support. At this stage, it is not possible to say whether, or to what extent, installers would actually be prepared to hand over tasks (up to and including competencies) or - with a view to gaining access to a larger number of contracts with the same number of staff - to enter into such collaborations.

The next figure shows possible benefits of participating at the new one-stop shop offer for households.

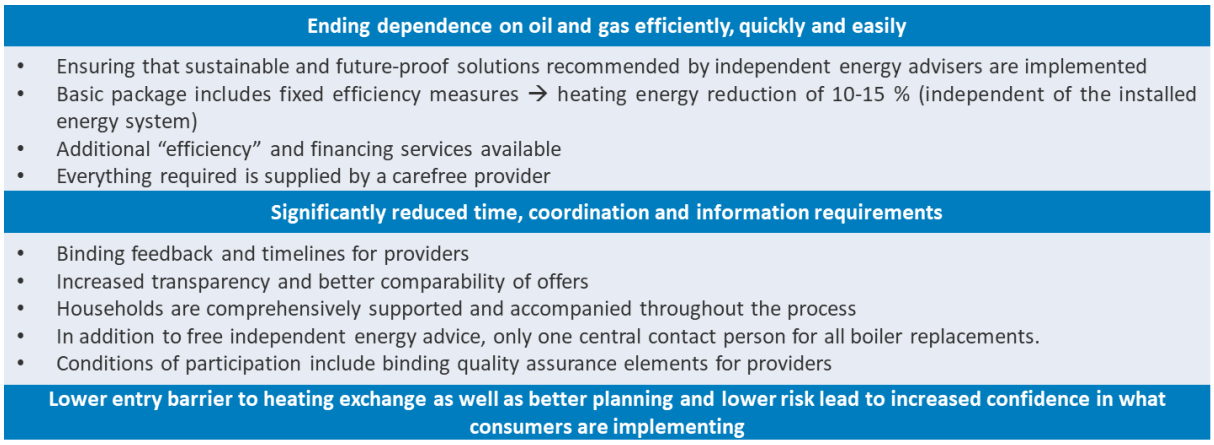


Figure 10: Possible benefits of participating at the new one-stop shop offer for households

It may turn out that the new offer is particularly suitable for the implementation of gas and oil boilers into climate-friendly heating systems under the new subsidy scheme for low-income households. As the ARCP concept and the mandatory fulfilment of its participation conditions (as well as quality control and sanction mechanisms) ensure a higher than usual quality of implementation (and higher energy savings actually achieved), the higher share of public funds used for each exchange would be ensured to be invested wisely and for the sustainable benefit of vulnerable end-users.

Accompanying communication

Communication about ARCP to households was put on hold for the reasons described above (see cancellation of the originally planned activities "Marketing campaign to phase out fossil fuels" and "On-site information evenings for end users"). Potential ARCP providers (such as installers, boiler manufacturers, energy suppliers, heating equipment wholesalers) were invited to become ARCP providers on the web platform, which was finalised in July 2022. Potential ARCP suppliers could not be found in the current market conditions described above due to supply chain and order book issues. Until there is a critical mass of ARCP providers on the web platform, it will not be communicated to households as it would not be attractive to them.

SWOT

The ARCP concept introduces higher product and service quality and overall energy efficiency than a normal boiler replacement. It creates a one-stop-shop where households receive all the trades needed for the replacement from one supplier. Participation conditions ensure that suppliers provide high quality, energy efficient and verified services. The integrated, mandatory public energy advice ensures that the energy saving first principle is considered and that appropriate technical solutions are implemented. Households can send the public advice report to potential ARCP suppliers for tender. This saves time, and up-front and accompanying energy efficiency measures save money in the short term (lower heat load = lower investment) and long term (i.e. lower heating bills as energy saving potentials are exploited both, to a higher degree and more sustainable).

Table 6: SWOT of Activity "All-round carefree packages (ARCP) for boiler replacement"

	Helpful to achieving the objectives	**Harmful** to achieving the objectives
Internal origin *(attributes to the implementing bodies)*	**Strengths** The ARCP web platform is operated by independent public bodies and is free of charge for suppliers and households. It is an	**Weaknesses** The conditions for participation in the ARCP scheme may entail additional costs for suppliers and households. While the additional costs for

	independent, product-neutral matchmaking platform with no commercial interests on the part of the platform operators. Quality is ensured through conditions of participation for ARCP suppliers and market/quality monitoring by the public bodies operating the platform. It is believed that such conditions will build household confidence in this new service.	households will be recouped through energy savings that would otherwise not be realised, suppliers will have a higher project coordination effort. In addition, there is no experience of the associated risks that the pilot might face in its operation, as such a pilot project is unique. However, many parties see more opportunities than risks and were therefore interested in making it happen.
External origin *(attributes to the project environment)*	**Opportunities** In a buyer's market (oversupply), households can choose the cheapest and best offer as installers have empty order books. Competitive market conditions prevail. Such market conditions would be good for the introduction of the ARCP concept, as suppliers are more likely to be interested in offering higher quality services that differentiate them from their competitors.	**Threads** In a seller's market (excess demand), installers have full order books anyway and there is no need for them to offer higher quality products such as the ARCP concept. Such market conditions make it difficult to introduce the ARCP concept, as is currently the case. Suppliers have no need or time to offer additional/higher quality ARCP services.

3.2.5. Addressing of horizontal aspects (gender, poverty etc.)

As described in the introductory text to the ARCP action, elderly people often own old and outworn oil or gas boilers. The majority of elderly people is female. Therefore, the ARCP web platform particularly **benefits women**.

The offer of mobile heating devices in case of breakdown situations, avoids emergency like-for-like replacements and therefore a **lock-in of fossil fuel heating systems**.

Mandatory public energy advice ensures that households get the whole picture to improve the energetic performance of their house. This includes recommendations on possible measures to improve the energetic quality of the building shell, before or in parallel, the heating system is replaced. Minimum energy saving (boiler room check) measures help that at least 10-15% of energy savings are achieved, even if further energy saving measures cannot be taken or are not needed. The minimum energy saving measures and the training of house owners how to run and steer the new heating system help to increase the awareness on heating and therefore lower **rebound effects.** This is also true for the obligatory “One year performance check”. This is an excellent chance to compare the planned with the actual energy consumption and to learn from the service technician or installer what can be done to further improve the performance of the new heating system.

The ARCP or the terms of participation binding for ARCP providers, respectively include quality assurance items and procedures that make it a good basis for boiler replacements in **energy poor households** for the future; as those households in Austria receive up to 100% of the replacement investment refunded via a (capped) one-off subsidy. The quality assurance procedures carried out by the Department of Energy Management and Consulting of the Office of the Province of Salzburg and the fulfilment of the mandatory ARCP services meet these specific requirements.

3.2.6. Activities that may remain beyond project life

The project team was encouraged to make the most out of the resources available, and to design, implement and present the activities to the relevant local (or national) actors and team up with them, in a way that would allow the most successful and impactful practices to continue beyond the duration of the project.

The project team succeeded to implement the action “All-round carefree replacement packages (ARCP)” in a way that it will prevail beyond the project life – which originally was to end in October 2022 and was prolonged until April 2023. The ARCP web platform is scheduled to run until March 2026 and may be extended to four Austrian provinces if the pilot in the province of Salzburg proves successful or is replicated.

While the ARCP web platform was set offline in autumn 2022 – as for the challenging market conditions – for a year, the founders of the ARCP web platform are prepared to relaunch the platform in 2024.

3.2.6.1. Institutionalised or longer-term anchored activities

The ARCP web platform because of its embedding in a public environment and funding to run for up to four years will serve as a institutionalised or longer-term activity. The ARCP web platform initially has been developed for the REPLACE pilot region Province of Salzburg. For the time being it is financed to run at least for a year, until mid-June 2023. Based on the contract with the IT service company, selected via a public tender, it can be run for up to 4 years.

3.2.6.2. Potential follow-up actions or continuity

The ARCP web platform can be extended to three further Austrian provinces and for up to 4 years of runtime.

Hopefully, market conditions will ease, to enable collecting experiences with this unique pilot action, in the near future.

3.2.7. Added value of the project Replace to the pilot region

Since the ACRP could not be implemented in the pilot region as planned, due to the framework conditions in 2022, no added value could (yet) be generated directly in Salzburg. However, the platform is still planned for a later launch and can then make a valuable contribution to making it easier for households to switch to renewable heating systems. In addition, the platform can be extended to three other provinces if there is a need there. Some of the main potential benefits of piloting the unique one-stop-shop have already been mentioned in the 'Direct Impact' sub-chapter above.

3.2.8. Lessons learned from the action and recommendations

It is hoped that market conditions will ease in the near future to allow for lessons learned from hands-on experiences from this unique pilot.

At this stage, it can be concluded that clear, recognisably defined, all-round carefree boiler (ARCP) replacement packages have the potential to deliver significant benefits / improved market conditions for end consumers. Among the benefits are

- Recognition and trust (i.e. transparent minimum and quality criteria developed by ARCP provider representatives together with the Salzburg government)
- Reduction of time and information expenditure, better coordinated, more efficient site operations (shorter site duration)
- Coordination of all necessary trades
- Assumption of risk and guarantee by the ARCP provider (similar to a general contractor for the technical measures - and in the case of contracting also for the economic reliability of the system / energy efficiency measures)
- In addition to independent energy advice, a single point of contact for the entire boiler replacement process, from commissioning to handover with the household, i.e. the installer or a service technician
- Clearly defined basic/obligatory and additional special/voluntary ARCP services (ranging from an offer of temporary heating systems, handling of subsidies, over training and operational energy efficiency assurance at handover, to financing options (instalments, contracting models); etc.)

3.2.9. Transfer of experience for other regions and countries

In general, the concept of the One-Stop-Shop for boiler replacement is a promising idea that can be implemented in this form in other countries. There are a variety of advantages and the later implementation will hopefully allow to gain important experience that can support and facilitate the implementation in other countries. The concept was presented to the public at conferences in Austria and also at the final conference of REPLACE.

4 | Bosnia and Herzegovina: Canton of Sarajevo

4.1. Recap of the first action plan

The implementation of the replacement campaign began with the selection of project proposal activities that could be adapted to suit the local conditions of the region. The Local Working Group for the Sarajevo Canton region reviewed and chose the activities during their initial meeting. The following table provides an overview of the 8 activities that were selected and successfully implemented during the campaign in Sarajevo Canton. Some adjustments were necessary to accommodate the local conditions and circumstances encountered during the 3-year project period.

Table 7: Overview of proposed activities according to first action plan

Activity	**Status**
Six techno-economic feasibility studies	Pursued further
REPLACE (R)HC replacement information hubs	Pursued further in a modified form (re-designed)
Heating systems replacements information at consumer fairs and festivals	Pursued further
100 % renewable heating or cooling labelling campaign	Pursued further
Best practice RHC systems open day/house events	Pursued further
Regional field trips to best practice RHC systems	Pursued further
Knowledge transfer and capacity building of intermediaries and authorities	Pursued further
Show-case - realisation of collective actions	Pursued further in a modified form (re-designed)

The implementation of project activities has been significantly impacted by the energy crisis, COVID-19, and a substantial increase in market prices. In the Sarajevo Canton region, as well as at the state level, there are no consistent financial incentive programs for replacing heating systems and/or energy sources, or any kind of support that would contribute significantly to this transition. The energy and health crises have compounded the existing problem of already low living standards and slowed down the transition process, as families' priorities have shifted towards providing basic living conditions.

Despite the encountered problems and obstacles, the project team has successfully implemented all the activities outlined in the action plan. Only a few activities were slightly modified due to various factors, as explained in the subsequent subsections. During implementation, representatives of several municipalities in the Sarajevo Canton region provided significant support, significantly facilitating and enabling the reach of a larger number of population - the end-users, for whom this project was ultimately intended.

4.2. Activities implemented and tested

4.2.1. New activities

Enova did not implement any new activity, all activities were implemented in accordance with the adopted action plan.

4.2.2. Overview of performed, tested & fine-tuned activities

The table below gives an overview of the activities carried out in the area of Sarajevo Canton. Also, a description of how their preparatory phase and implementation went.

Table 8: Overview of activities and their preparation and run-time.

		Recent Status Quo	Starting point & fine-tuning	
	Activity	Short description	Preparation phase	Implementation phase (re-design)
1.	*Six techno-economic feasibility studies*	Development of 6 pre-feasibility studies for replacement of old heating systems with alternatives proposed	Preparation of the study was preceded by fine-tuning of the values in the calculator. The studies were initially promoted through info hubs where input data and information were taken from the owners for the preparation of the studies.	The activity was implemented between January 2022 and the end of February 2023. Throughout this period, the team maintained regular communication with building owners to ensure that the studies were aligned with their needs and preferences.
2.	*REPLACE (R)HC replacement information hubs*	Established 3 info hubs in premises of Center for Energy, Environment and Resources, Municipality Novo Sarajevo, and Municipality Ilijaš	Started in August 2021 Institutions, municipalities and organizations identified as potential locations for setting up info hubs were contacted	October 2021 – March 2022 Distribution of project materials (leaflets, info sheets, examples of good practices, heating matrix, etc.), direct on-site consultations with members of the project team, quick calculations using the REPLACE calculator.
3.	*Heating systems replacements information at consumer fairs and festivals*	Promotion of project activities, results and distribution of the materials at the fairs and festivals	September 2021 – January 2023 Research for the purpose of identifying fairs and festivals where the project will be promoted, which are in line with the concept and goal of the project	January 2023 Presentation of the project and distribution of the project materials at the Sustainability fair for end-consumers
4.	*100 % renewable heating or cooling labelling campaign*	Labelling of buildings that are heated with 100 % renewable energy sources,	August – September 2021	September 2021 – February 2023

		which includes pellets, log-wood, wood chips and heat pumps (in the case of Sarajevo Canton).	Preparation (design and printing) of labels, and identification of households that are heated with 100 % renewable energy sources.	The continuous implementation of the house labelling activity resulted in a total of 25 houses with the REPLACE label. The activity was promoted through the info hubs, media campaigns, and social media.
5.	*Best practice RHC systems open day/house events*	Organization of visits to households that have already replaced their heating system in order to promote examples of good practice. The activity enabled interested end users to receive direct information from the house owners regarding the replacement of the heating system.	November 2022 – January 2023	February 2023 Organized open house events in 8 households with about 30 participants - end users
6.	*Regional field trips to best practice RHC systems*	Organization of visits to examples of good practice in the region for project stakeholders with the aim of transferring knowledge and experience.	January – October 2022 Identification of best practices in the region, contacting potential hosts, promotion of activities and gathering of participants, arranging a visit	November 2022 Organization of visits to three buildings in the municipality of Olovo, which use wood chips, heat pumps, and a combination of solar panels and pellets for the heating. A total of 19 participants attended the visit.
7.	*Knowledge transfer and capacity building of intermediaries and authorities*	Organization of capacity building event on energy poverty for government representatives and professionals	December 2022 - February 2023 Defining the concept and objectives of the event, expanding the roster of potential attendees, drafting invitation letters, and selecting proficient instructors who will facilitate the training.	March 2023 Implementation of the training “Tackling energy poverty in Bosnia and Herzegovina – the first step of the energy transition”.
8.	*Show-case - realisation of collective actions*	Facilitation of the joint action of end users, and other stakeholders in the implementation of heating system replacement activities.	January 2022 – January 2023 Meetings with stakeholders, LWG, and end users to identify the collective action that will be implemented.	February 2023 Implementation of collective action in 1 building and 2 households, in cooperation with a company, specialized in the distribution and installation of dust mites’ systems.

4.2.3. Successful activities

4.2.3.1. Development of six techno-economic feasibility studies

The concept of pre-feasibility studies for heating system replacement is not something that has previously been known or implemented in Sarajevo Canton. Because of energy crisis, citizens were more and more suspicious and cautious in the decision to replace their heating system due to constant market fluctuations and the impossibility of assessing how efficient and cost-effective the system will be at the same time. For this purpose, Enova actively promoted the creation of pre-feasibility studies during the project as one of the basic steps in making informed decisions when replacing the heating system. Ultimately, a total of 7 feasibility studies were done.

Reasoning why activity is classified successful

The implementation of info-hubs generated a special interest in conducting feasibility studies, where project team members interacted directly with end-users for several days. During this period, data was collected for a total of six studies. The seventh study was initiated based on data obtained from an end-user who expressed interest in participating in the activity. Throughout the preparation and refinement of these studies, the project team maintained continuous communication with building owners via phone to gather detailed information, determine possibilities, and identify their preferences.

Figure 11: Taking input information for pre-feasibility study on the info-hub in Sarajevo

All households analyzed currently use coal-fired heating systems. Most of the buildings currently have a central distribution system, which is one of the benefits of the replacement since there is no need for additional investment. Some buildings have been proposed measures that need to be taken before the replacement itself to ensure the full efficiency of the heating system, and this mainly refers to the insulation of the outer envelope of the building, the ceiling, but also to the inspection of the system. What is visible is that in several cases, regardless of the recommendations for alternative options recommended by the calculator, the owners mainly considered the pellet heating system as an alternative option. From the conversation with the owners, it was possible to decide that this decision prevailed above all for financial reasons, since the pellet boiler is significantly cheaper than, for

example, a heat pump. Furthermore, all buildings currently using coal heating systems have designated space for pellet storage, which is an added advantage.

Direct impact

The activity resulted in a total of 7 building owners having a detailed analysis of their heating system with detailed information on potential replacement options. This approach significantly changed the way of thinking of the owners and enabled them to make informed decisions. In addition, the project promoted an innovative, end-user-friendly, and cost-effective approach to the replacement of the heating system, which has not been done so far in Sarajevo Canton or Bosnia and Herzegovina.

In addition, the activity had a significant impact in terms of the great interest shown by the end users for the preparation of studies. Due to lack of time, the project team was not able to agree on certain requirements during the project, but this is certainly an activity that will continue after the project. In this regard, we hope that this approach will become an ongoing practice.

4.2.3.2. REPLACE (R)HC replacement information hubs

The implementation of the activity of setting up info-hubs in institutions was designed so that project materials for distribution are placed in certain locations. Since the campaign activities aimed to reach as many end users as possible, Enova decided to adapt the mentioned activity in such a way that members of the project team were present every day at the info-hubs.

Institutions and municipalities in the area of Sarajevo Canton were contacted, which were considered as locations where the largest number of citizens circulate. At the very beginning, the implementation of this activity was difficult due to the circumstances caused by the COVID 19 pandemic. The implementation of the activity actively began after the measures due to the pandemic were significantly eased and when the risk to people's health was reduced.

As part of the campaign, three info-hubs were organized in the Center for Energy, Environment and Resources, Municipality Novo Sarajevo, and Municipality Ilijaš.

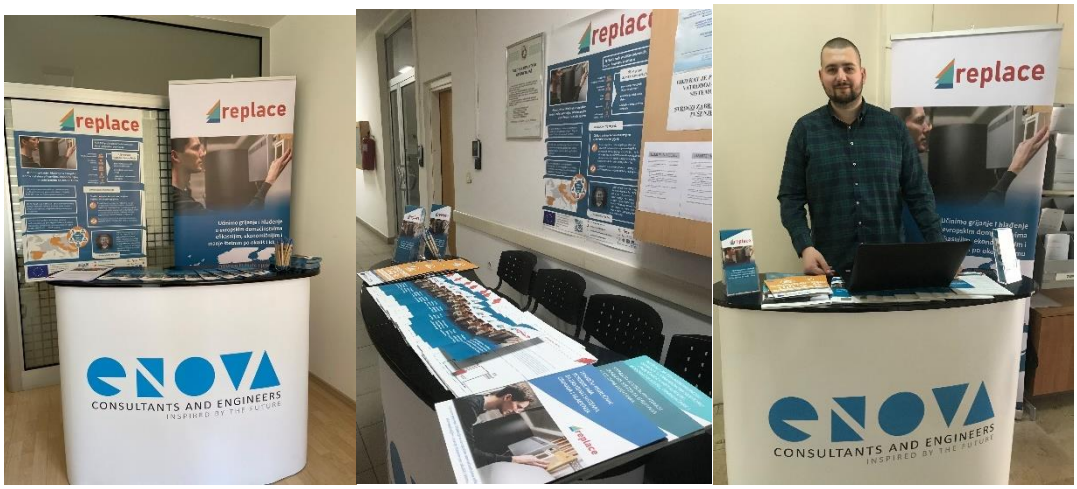


Figure 12: Info-hub set ups from Bosnian pilot region

Reasoning why activity is classified successful

Each info hub was previously announced through the media and social networks, which resulted in the visit of a large number of people (approx. 500 people). In addition, the stay of the project team members proved to be significantly effective in the sense that people could get direct advice on the

spot. All the materials created within the project were distributed to the visitors and quick calculations were made using the REPLACE calculator and recommendations based on the REPLACE matrices. In this way, it was ensured that news and information about the project and project activities reach a large number of end users, which is the essence of the campaign. Also, information and contacts for the preparation of feasibility studies, interested participants for the activity of house labelling, and a study visit to examples of the best practice of the heating system were gathered at the info-hubs.

Figure 13: Visitors at info hubs in Bosnian pilot region

Direct impact

Many users benefited from direct energy consultation with members of the project team and information about all the steps that need to be taken during the replacement. Also, the REPLACE calculator was shown to the end users, the principle on which it works, which significantly influenced the increase in the number of REPLACE calculator uses.

4.2.3.3. 100 % renewable heating or cooling labelling campaign

Giving importance to sustainable heating systems through certification and labeling of facilities was not previously present in Sarajevo Canton. By labeling these houses, we recognize and celebrate the homeowners' commitment to renewable energy and reducing their carbon footprint. This can encourage more people to adopt renewable energy sources and promote sustainable practices. As part of the project, the house labeling was done on-site by the project team.

Figure 14: House label in Canton Sarajevo

Reasoning why activity is classified successful

The possibility of house labelling was promoted in parallel through other campaign activities and ultimately resulted in a total of 30 houses in the Canton of Sarajevo that were labelled as being heated with 100 % renewable energy sources. By labelling houses that use 100 % renewable energy for heating, Enova aims to promote the use of renewable energy sources in buildings and encourage more people to adopt these technologies. Since this is a new practice that has not been present in the region until now, we can say that the interest of citizens and the number of marked objects reached is quite successful.

Figure 15: Houses labelled within campaign in Sarajevo

Direct impact

Labelling provides transparency and clarity to potential buyers or renters about the energy efficiency of a house. This information can help them make informed decisions about the environmental impact of their housing choices, given that homes that use renewable energy sources are becoming more

valuable in the real estate market. By labelling these houses, many other homeowners will be encouraged to invest in renewable energy systems. Also, the labelling of houses using 100 % renewable energy for heating raised public awareness about the benefits of renewable energy sources and their potential to reduce greenhouse gas emissions and combat climate change.

4.2.3.4. Best practice RHC systems open day/house events

A total of 8 open house events were organized in Sarajevo Canton in different parts of the region. In addition to the team members and the host, about 30 participants attended the events. Taking into account that currently, the greatest interest of end users is for pellet heating systems and that they are precisely the most common sustainable option, open house events were organized in households that heat with pellets. Pellets worth 50 euros were purchased for all hosts of visits within the project as an encouragement and reward for setting a positive example in the local community.

Reasoning why activity is classified successful

Homeowners who have already installed renewable energy systems could share their experiences with visitors, explaining how they made the decision to invest in renewable energy and the benefits they have seen since installing the technology. Seeing the technology in action and hearing about its benefits from homeowners who have already made the investment was a powerful motivator for many people.

Figure 16: Open house events in Bosnian pilot region

Direct impact

These events provided an opportunity for people to see renewable energy technologies in action and learn more about how they work. This hands-on experience helped to dispel any misconceptions about the reliability or efficiency of these technologies. Open house events also helped to build a sense of community among homeowners who have invested in renewable energy technologies. By sharing their experiences and knowledge, they were able to support each other and encourage others to follow in their footsteps.

4.2.3.5. Regional field trips to best practice RHC systems

While preparing for the activity, the project team identified several potential locations that could serve as inspiration for visitors. Ultimately, the municipality of Olovo was selected for its numerous examples of good practices in renewable energy and environmental protection. Olovo is known for investing heavily in renewable energy systems and energy efficiency projects, making it a prime destination for showcasing the benefits of transitioning from traditional energy sources. During their visit, participants had the opportunity to see several facilities that had successfully transitioned their heating systems to renewable energy sources, resulting in significant cost savings, improved air quality, and reliable energy supply. These facilities had previously relied on fossil fuels like fuel oil and coal, but had since switched to renewable energy sources that were locally available, establishing self-sustaining and energy-efficient systems.

During the visit, the participants had the opportunity to visit:

- Olovo sports hall – a system of solar collectors in combination with pellet boiler,
- High school “Musa Ćazim Ćatić” and Elementary school “Olovo” – a wood chip boiler room,
- JZU spa and recreation center ” Aquaterm ” – a heat pump system (water-water).

Figure 17: Three facilities visited during field trips in Bosnian pilot region

Reasoning why activity is classified successful

The study visits provided a chance for participants to network with other professionals and stakeholders in the field of renewable energy, fostering new partnerships and collaborations. Participants could observe the practical applications of renewable energy heating systems, which can help them better understand the technology and how it works in real-world settings. The study visits were inspirational for participants, giving them a sense of what is possible and motivating them to take action in their own communities.

Figure 18: participants in the study visit in Bosnian pilot region

Direct impact

In addition to the presentation of good practices, the visit also helped to exchange past experiences, but also to develop ideas for more innovative solutions for sustainable heat energy supply. Also, a dialogue was encouraged between hosts and visitors about the key challenges and obstacles faced by consumers when switching to heating systems based on renewable energy sources. Since the energy transition is necessary, the establishment of a heating systems based on renewable energy sources will be soon necessary for all consumers, and this visit was held as an introduction to welcome it more readily.

4.2.3.6. Knowledge transfer and capacity building of intermediaries and authorities on energy poverty

This activity involved a training session on tackling energy poverty in Bosnia and Herzegovina, attended by representatives from relevant ministries, local self-government units, heating system manufacturers, installers, and NGOs. The training covered key topics related to energy poverty and potential measures to alleviate it in the country. The session was led by experts with extensive experience in the field, and participants engaged in constructive discussions on the challenges and strategies for addressing energy poverty. The activity was successful in bringing together key stakeholders, increasing awareness, and understanding of the issue of energy poverty, and fostering collaboration on developing policies and programs to combat it. The direct impact of the activity was increased knowledge and capacity building among stakeholders, which may lead to positive impacts in the long term.

Trening: Suzbijanje energetskog siromaštva u Bosni i Hercegovini – prvi korak energetske tranzicije

Datum: 20. 03. 2023. godine

Mjesto održavanja: Hotel Courtyard by Marriott Sarajevo, Skenderija 1

Agenda:

Sesija / tema	Predavač	Vrijeme
Riječi dobrodošlice i uvod u trening	Vedad Štaljo, ENOVA	12:00 – 12:05
Prezentacija projekta REPLACE	Vedad Štaljo, ENOVA	12:05 – 12:20
Energetsko siromaštvo u kontekstu energetske tranzicije	Dr.sci. Dženila Agić, Centar za energiju i ekologiju	12:20 – 13:20
Postojeći zakonski okvir i pokazatelji energetskog siromaštva u BiH		
Kafe pauza		13:20 – 13:40
Mjere za ublažavanje energetskog siromaštva	Dr.sci. Dženila Agić, Centar za energiju i ekologiju	13:40 – 15:00
Trenutne mjere za prevazilaženje energetskog siromaštva u BiH		
Diskusija, zaključci	Učesnici i predavači	15:00 – 15:15
RUČAK		15:15

Figure 19: Training agenda for the training session on tackling energy poverty in Bosnia and Herzegovina

Reasoning why activity is classified successful

The activity was considered successful due to its ability to bring together key stakeholders in the energy sector to discuss the pressing issue of energy poverty in Bosnia and Herzegovina. The training provided an opportunity for representatives from relevant ministries, local communities, and the non-governmental sector, as well as installers, to jointly explore measures that can contribute to reducing energy poverty. Participants expressed satisfaction with the training content and the opportunity to discuss the topic.

The training also highlighted the lack of a clear definition and methodology for determining and monitoring energy poverty in Bosnia and Herzegovina. The existing legal framework was found to be insufficient, with certain public policies only partially addressing the issue. The presentation of a case study conducted in Tuzla Canton provided insights into measures households can take to save energy and mitigate energy poverty. The discussion that followed, particularly among representatives of local communities, focused on measures that could be replicated in the Sarajevo Canton. Overall, the training provided a platform for constructive discussions and exchange of ideas on how to combat energy poverty in Bosnia and Herzegovina.

Figure 20: Training on energy poverty in Sarajevo Canton

Direct impact

The direct impact of the activity was the increased awareness and understanding of the issue of energy poverty among key stakeholders in Bosnia and Herzegovina. The training provided a platform for stakeholders to network and collaborate on addressing the issue, which may lead to the development of new policies, programs, and projects aimed at reducing energy poverty. Additionally, the presentation of the case study and good practice examples provided participants with practical solutions and ideas for mitigating energy poverty. Overall, the training contributed to building capacity and knowledge among stakeholders, which can lead to positive impacts in the long term.

4.2.4. Less successful activities

4.2.4.1. Heating systems replacements information at consumer fairs and festivals

The promotion of the project at fairs and festivals aimed at disseminating project activities as well as supporting the implementation of campaign activities. Although this activity faced a large number of challenges, it was eventually implemented.

Reasoning why activity is classified less successful

From the very beginning of the implementation of the campaign, Enova continuously followed all the events planned at the regional and national level. It was known that several events are held annually that gather the target group of the project, however, due to the circumstances caused by the Covid

pandemic, all these events were cancelled. This made the implementation of this activity significantly more difficult.

In January 2023, Enova was invited to present the project at the Sustainability Fair held at CosmoHub in Sarajevo. The Sustainability Fair was intended for the general public/end customers, who wanted to get acquainted with innovative technologies of sustainable development, their possibilities for application, but also accessibility for end-users.

Figure 21: Poster for the announcement of the fairCosmoHub

At their booth, representatives of the REPLACE team welcomed many visitors and answered questions from end consumers regarding the possibilities of replacing the heating system. The largest number of questions, as expected, was related to prices, profitability, and the investment return period. In this regard, the team took the opportunity to demonstrate how they can easily obtain this information using a quick calculation in the REPLACE calculator as well as an overview using the REPLACE heating matrices. During the fair, a presentation on the REPLACE project was also held, attended by citizens of Sarajevo Canton of various occupations and fields of activity. After the presentation of the project results, both in BiH and in the partners' regions, the interest of the participants to use REPLACE tools and opportunities increased significantly.

Besides being implemented, the activity is considered less successful due to the fact that it was held at the very end of the project and that the number of visitors was lower compared to large events.

Figure 22: REPLACE booth, visitors, and project presentation at Cosmo fair

Direct impact

The event was intended for end users who are interested in sustainable solutions that they can implement in their home. Citizens' interest in replacing the heating system was huge and accompanied by a large number of questions, which means that we can say that the goal of the activity was achieved

- that the information reached the target group. Also, during the event, materials created within the project, which are intended for end users, were distributed.

4.2.4.2. Show-case - realisation of collective actions

The implementation of collective actions was a particularly challenging activity since this concept was not previously known in the area of Sarajevo Canton, and it is one of the reasons why citizens are hesitant to participate in such actions. Financial concerns, such as credit debt requirements and the low standard of living, make it difficult for citizens to fund any activities related to the replacement of heating systems independently. Therefore, it was crucial to work closely with local working group representatives to identify which collective actions could be applied in the pilot region of Sarajevo Canton. However, after discussing various ideas, it became apparent that citizens lacked interest in carrying out independent actions due to the need for independent financing and the absence of subsidies in the area.

Reasoning why activity is classified less successful

After consultation with LGW representatives, the Sarajevo Canton area's collective action plan focused on the joint procurement of pellets within local communities in collaboration with local producers. Three companies, Terzić d.o.o., Hifa Petrol, and Drvosječa d.o.o., were contacted in August 2022, but none expressed interest in holding a joint meeting due to the energy crisis caused by the COVID-19 pandemic and the war in Ukraine, which led to a significant increase in pellet prices in Bosnia and Herzegovina. In 2022, pellet prices rose from 350 BAM per ton to 1000 BAM per ton, significantly affecting the heating system market. The market only stabilized in November 2022.

As a result, the project team sought solutions and alternative activities for the implementation of a collective action. Through their project activities, which involved contacting a large number of heating system producers and distributors who recognized the importance of the REPLACE tools, Enova explored current market demand and user preferences. One company, OMC Technics d.o.o., expressed its desire to participate in the project activities. The concept was designed to offer customers a free energy consultation by the project team prior to installation, in collaboration with installers, a free inspection and analysis of the current system, and the households participating in the activity received the REPLACE label, indicating that they heat with 100 % renewable energy sources.

Cooperation with the company resulted in the joint replacement of a coal-fired boiler with a pellet-fired one in a building with three apartments where 3 families live. The owners decided on a joint investment since the current boiler was a bad state and the need to improve thermal comfort and reduce the physical effort for heating purposes. In addition, the heating system was replaced in two more buildings, where the collective action was reflected in the cooperation between the project team, the installer and the end users. The project team offered free information, consultation, and analysis, and the installer (company) provided benefits in the context of a free inspection of the current system.

Figure 23: Building in which the heating system in Sarajevo was replaced by a collective action

Direct impact

Despite encountering numerous challenges, the implementation of the activity successfully resulted in the replacement of heating systems in three buildings, which is a commendable achievement given the conditions and resistance faced during the process. Through discussions with members of the LWG, it was concluded that promoting collective activities is crucial to bringing significant benefits to citizens, particularly in terms of financial savings.

Figure 24: Site visit to the apartment in Sarajevo in which the system was replaced

4.2.5. Addressing of horizontal aspects (gender, poverty etc.)

The project activities carefully addressed important aspects such as gender, poverty, lock-in, and rebound effects. The project aimed to be "gender-responsive" and to ensure that both men and women have equal opportunities to participate in decision-making processes and activities. Women may have more difficulty accessing information and resources for heating system replacement and may have different priorities and preferences for heating and cooling systems compared to men. However, despite these potential barriers, women have shown more interest and willingness to work on activities related to increasing energy efficiency, replacing heating systems, and environmental protection.

The country has not officially recognized energy poverty within its legal framework, leading to a lack of accurate figures and systematic solutions in this matter. The lack of democratization of the energy sector, inefficient use of energy, and lack of affordable energy contribute to the growth of energy poverty. To address this, the campaign activities were designed to reach as many people as possible, with a focus on smaller urban and rural areas given that pensioners and women living in rural areas are more vulnerable compared to others, and thus, the most affected.

Given that rebound effects can occur when new energy-efficient systems are introduced in a way that new systems may lead to an increase in energy consumption to achieve higher levels of thermal comfort than before, which could offset the anticipated energy savings. To avoid rebound effects, the project focused not only on the replacement but also on preventing energy losses through measures such as conducting energy audits, installing insulation, and replacing joinery.

4.2.6. Activities that may remain beyond project life

The development of pre-feasibility studies proved to be one of the most successful activities, but also one for which there is a great need. In this regard, Enova will continue the activities of creating pre-feasibility studies for the replacement of heating systems, which will additionally ensure the continued use of the benefits provided by the REPLACE calculator. In addition, all the materials that were created within the project will continue to be used and disseminated.

4.2.6.1. Institutionalised or longer-term anchored activities

As stated in the previous subsections, it is planned for the development of pre-feasibility studies to become a standard practice. In this regard, efforts will be made to improve and expand the information contained in these studies, as well as to establish an energy advisory system.

4.2.6.2. Potential follow-up actions or continuity

All activities have the potential for the experiences and acquired knowledge through their implementation to be used for their improvement and further replication. What is particularly positive is that the REPLACE activities have not remained limited to the pilot region and it is expected that in the future, activities will be implemented in other regions of Bosnia and Herzegovina as well.

Educational training sessions have proven to be an excellent point for networking and exchanging experiences, but there has also been a need for this type of activity. In the future, it is planned to organize different kind of trainings for which the materials produced within the project will certainly be used.

4.2.7. Added value of the project Replace to the pilot region

We can safely say that the REPLACE project has brought great added value to the region because a large number of activities were introduced and implemented for the first time in the Sarajevo area. This particularly applies to the intensive campaign of providing support and information to end-users, which has proven to be extremely successful. In addition, end-users have been provided with tools that they can use independently and that can contribute to informed decision-making.

Furthermore, the project has for the first time brought together all project stakeholders (decision-makers, intermediaries, end-users, etc.), which has been shown to be necessary for dialogue to improve the sector as well as for a successful transition.

4.2.8. Lessons learned from the action and recommendations

Replacing a heating system is not a simple process and there are many factors that influence such a decision. In conversations with end-users during the implementation of the activities, it was realized that the main reasons for resistance to this type of change are prejudices and lack of knowledge about the (technological) possibilities. In this regard, one of the conclusions of the project is that in addition to providing financial support and a stable market, it is necessary to continuously educate citizens about the aspects and benefits of heating system replacement.

One of the lessons learned from the project include the importance of focusing on energy efficiency measures in addition to system replacement, engaging end-users and stakeholders through educational activities and providing access to adequate information, and carefully explaining the functioning of new systems to prevent rebound effects.

Some of the recommendations include:

- Encourage decision makers to prioritize energy efficiency and climate-friendly heating and cooling systems
- Provide financial incentives and support for the implementation of energy efficiency measures and replacement of heating systems
- Increase access to education and information on energy efficiency measures and the benefits of climate-friendly heating and cooling systems
- Encourage the development of training and certification programs for installers and chimney sweepers to ensure the safe and effective installation and maintenance of heating systems
- Engage with intermediaries and financial institutions to increase financing options for energy efficiency projects

4.2.9. Transfer of experience for other regions and countries

The REPLACE project provided the Canton of Sarajevo, and by extension Bosnia and Herzegovina, with an opportunity to learn from countries with more experience and implement the acquired knowledge in the region. The campaign's successful establishment and implementation, as well as the broad reach of its activities, will allow for the replication of these activities in other regions of Bosnia and Herzegovina. As the first of its kind, the REPLACE project emphasized the importance of focusing on end-users when addressing these types of issues. Enova plans to continue sharing the knowledge and experience gained through education and the preparation and implementation of new projects aimed at improving and accelerating the necessary energy transition.

5 | Bulgaria: Rhodope Mountain Region

5.1. Recap of the first action plan

In the Rhodope region, following regular discussion with the members of the Local Working Group, 10 activities were planned in March 2021 to be included in the REPLACE campaign. All these activities were pursued further until March 2023. Most were completed successfully, while others advanced only partially. The activities are listed in the below table.

Table 9: Overview of proposed activities according to the first action plan

Activity	Status
Action 1: Six techno-economic feasibility studies	pursued further in a modified form (re-designed)
Action 2: Establishment of REPLACE (R)HC replacement information hubs	pursued further
Action 3: Informing consumers about (R)HC heating systems' replacements at large consumer fairs and festivals	pursued further
Action 4: Informing consumers about cooling systems' replacements at large consumer fairs and festivals	pursued further
Action 5: Organisation of regional field trips to best practice RHC systems	pursued further
Action 6: Performing two to three Webinars to consumers	pursued further in a modified form (re-designed)
Action 7: Facilitating the realization of innovative collaboration models between installers and plant contractors	pursued further
Action 8: Facilitating the realisation of collective actions	pursued further in a modified form (re-designed)
Action 9: Pilot project for residential heating replacement, initiated by a municipality	pursued further
Action 10: Promotion and development of financial instruments	pursued further

5.2. Activities implemented and tested

5.2.1. New activities

There were no new activities implemented, compared to the first action plan.

5.2.2. Overview of performed, tested & fine-tuned activities

Table 10: Overview of activities and their preparation and run-time.

	Latest Status Quo	Starting point & fine-tuning	
Activity	Short description	Preparation phase	Implementation phase (re-design)
Six techno-economic feasibility studies	Heating replacement was assessed in typical residential buildings, using REPLACE calculator	March 2021 – March 2022	April 2022 – November 2022
Establishment of REPLACE (R)HC replacement information hubs	Printed materials available at relevant municipal buildings; Online dissemination through municipal websites and Facebook profiles	March 2021 – March 2022	May 2021 – October 2022
Informing consumers about (R)HC heating systems' replacements at large consumer fairs and festivals	Organization of open-space fairs in the city of Pazardzhik and the city of Smolyan	March 2021 – September 2021	September 2021
Informing consumers about cooling systems' replacements at large consumer fairs and festivals	Organization of open-space fairs in the city of Pazardzhik and the city of Smolyan	March 2021 – September 2021	September 2021
Organisation of regional field trips to best practice RHC systems	Students, teachers, and municipal staff visited a heat pump system in Pamporovo	June 2021 – February 2023	February 2023
Performing two to three Webinars to consumers	A webinar + a hybrid event to promote REPLACE calculator and other outcomes to consumers, intermediaries, and others	March 2022 – November 2022	June 2022 & November 2022
Facilitating the realization of innovative collaboration models between installers and plant contractors	Development of a financial scheme, in which the technology supplier acts as a loan aggregator for a number of heating replacements in households	January 2022 – June 2022	June 2022 – February 2022
Facilitating the realisation of collective actions	1) Collective purchase of wood pellets by a number of households; 2) Collective domestic hot water supply in a multi-family building, using air-water heat pump	March 2021 – November 2022	May 2022-March 2023
Pilot project for residential heating	Municipalities organizing a pilot heating replacement in households,	March 2021 – October 2021	June – October 2021

replacement, initiated by a municipality	using the experience of a similar past pilot.		
Promotion and development of financial instruments	Promotion financing opportunities for heating replacement; discussion with municipalities about how they can support replacement projects in households.	May 2022 – September 2022	September 2022 – March 2023

5.2.3. Successful activities

5.2.3.1. Techno-economic feasibility studies

A preliminary agreement was made with the administrations of seven Rhodope municipalities – Chepelare, Kardzhali, Ardino, Momchilgrad, Dospat, Devin, and Bratsigovo to implement one techno-economic feasibility study in the residential sector of each municipality. The idea was to assess a typical building in each municipality in Kardzhali this is a multi-family building and, in all others, – a single family (1-3 families) building. The target were only households using typical inefficient heating technology (such as fuelled by coal briquettes, fire-wood, and/or direct use of electricity) and that were interested replacing it.

Detailed criteria for the selection of households that would receive a free pre-feasibility study were elaborated and distributed to the municipal authorities, which, in turn, announced calls for applications. Residents expressed their interest in getting a feasibility study. Seven applications complied with the criteria, including 1 multi-family building in Kardzhali, 3 single family houses in Bratsigovo, 2 single-family houses in Ardino, and 1 single-family house in Chepelare.

Although REPLACE targets only residential buildings, the municipal administration of Ardino asked BSERC to also assess the community centre building, where a heating replacement was planned. In exchange, considering that this is the municipal building visited by most residents the municipal administration committed to: 1) Use the heating replacement in the community centre as a good practice example to be demonstrated to the population; 2) To place all REPLACE printed materials at appropriate places in the building, using it as an informational hub.

The BSERC team contacted all building owners, sent to them a list with all information/data requirements and agreed the date and time of the onsite visits. Each of the 8 buildings was visited and the data and information were collected. During the discussion with the building owners, their preferences and concerns were identified and their questions were answered. The assessments were carried out using the REPLACE calculator and for some buildings additional calculations were performed in MS Excel.

Figure 25: An assessed single-family house in Bratsigovo, using firewood and coal briquettes for heating

A detailed pre-feasibility report has been elaborated for each building. The reports were communicated to the building owners and largely disseminated with their agreement.

Reasoning why activity is classified as successful

The pre-feasibility studies are considered as success, because:

- They validated the REPLACE calculator;
- They showed that in most cases switching to a cleaner and more efficient system is a profitable investment;
- The selection of typical buildings and the large-scale dissemination of the pre-feasibility reports makes it possible to guide a number of residents not covered by the studies;
- The discussion with building owners provided valuable insights about their perception and knowledge.

Direct impact

The direct short-term impact of the pre-feasibility studies is 352 MWh annual primary energy savings and 10,000 EUR annual cost savings, according to REPLACE impact monitoring calculations.

Accompanying communication

The results of the pre-feasibility studies are available at the project website and BSERC website and the links were largely disseminated within Bulgaria via press releases and social media.

SWOT

Table 11: SWOT of Activity "Techno-economic feasibility studies"

	Helpful to achieving the objectives	Harmful to achieving the objectives
Internal origin (attributes to the implementing bodies)	**Strengths** Willingness of residents to replace their heating and therefore to support the study Availability of a reliable assessment tool (REPLACE calculator) Involvement of experienced heating technology experts	**Weaknesses** Underheating of some of the dwellings makes investments in new technologies much less profitable
External origin (attributes to the environment)	**Opportunities** Large replication potential of the results in similar buildings Wider use of REPLACE calculator, which was validated via the studies	**Threads** Substantial changes of fuel prices, technology prices, or technology parameters would make the studies less relevant in the long term.

5.2.3.2. Establishment of REPLACE (R)HC replacement information hubs

The local authorities (municipalities) have close links to and are generally trusted by citizens in their position as independent information provider. So, the establishment of information hubs at the municipal administrations has the potential to reach many households and influence their heating solution.

Following discussions with the municipalities in the Rhodope region, various information hub opportunities emerged. The following ones have been implemented:

- REPLACE printed materials were placed at appropriate locations in the buildings of municipal administrations and/or relevant municipal services in municipalities of Smolyan, Kardzhali, Bratsigovo, Chepelare, and Ardino. The municipal LWG members are available to provide advice to residents.
- REPLACE printed materials were supplied for dissemination to residents to the municipal administration of Batak, Velingrad, Devin, and Dospat.
- Bratsigovo municipality is regularly publishing REPLACE information at both the Facebook profile of the Mayor and the municipality website.
- Ardino municipality regularly publishes REPLACE information on the Facebook profile of the municipality, whose followers are most of the municipality residents.
- Other municipalities in the region (e.g. Chepelare and Dospat) used their Facebook or website for announcements of REPLACE events and outputs.

Figure 26: REPLACE materials in Bratsigovo municipality

The printed materials provided to the municipalities include all REPLACE printed materials: technology factsheets, REPLACE leaflets, good practice brochure, handbook for consumers, and handbook for intermediaries.

Reasoning why activity is classified as successful

The activity is considered as a success, because:

- Locating printing materials at relevant municipal buildings, combined with experienced municipal experts to provide advise is an effective way to reach and influence residents
- Advantage was taken of the most popular online channels in each municipality

Direct impact

- More than 10,000 printed materials distributed to residents
- More than 20,000 residents in the region reached via online communication.

5.2.3.3. Informing consumers about (R)HC heating systems' replacements at large consumer fairs and festivals

Two large consumer fairs were co-organized by the H2020 projects REPLACE and NZEB Roadshow. Both took place in September 2021 and were dedicated to both: energy performance of buildings (topic of NZEB Roadshow) and residential heating and cooling (topic of REPLACE). Both fairs included 10-12 stands to promote the two projects, other relevant initiatives, and relevant technology suppliers.

At the REPLACE stand, two experienced heating & cooling professionals provided printed materials and advise to the visitors. They promoted the benefits, associated to advanced heating solutions, using solar energy, biomass, and ambient air/water/soil temperature.

The first fair was 3-day long, from 2nd to 4th September 2021, located in the Professional School of Architecture and Construction in the city of Pazardzhik. The attendees were students, teachers, energy companies, and the general public. Many visitors were attracted by the parallel events dedicated to sustainable buildings and sustainable heating/cooling, which took place in the school.

The second fair was 2-day long, on 23rd and 24th September 2021, located in the main square of Smolyan. The location was selected to attract a maximum number of visitors.

Figure 27: Consumer fairs in Pazardzhik (left) and Smolyan (right)

Reasoning why activity is classified as successful

The activity was considered as success, due to the large number of visitors attracted to REPLACE stands during the 5 days of the fairs. Many of the visitors showed sincere interest in the promoted heating/cooling solutions.

Direct impact

- More than 2,000 pieces of REPLACE printed materials distributed, mainly to consumers.
- Advice provided to about 100 consumers.

Accompanying communication

The fairs were announced through several press releases, websites, and tens of Facebook posts.

5.2.3.4. Informing consumers about (R)HC cooling systems' replacements at large consumer fairs and festivals

Cooling system replacement (via heat pumps) was promoted together with heating system replacement at the fairs in Pazardzhik and Smolyan – see above. The benefits of advanced cooling solutions, such as efficiency, reliability, comfort, and health benefits were promoted to all interested consumers.

5.2.3.5. Organisation of regional field trips to best practice RHC systems

A large and modern multi split air to air heat pump offers many benefits to the residents in multi-family buildings: higher efficiency and lower cost (considering both energy and investment costs), compared to individual air conditioning systems, full automation, and high reliability. As such systems are not

available in any of the residential buildings in the Rhodope region, it was decided to organize a trip to visit such a system installed in the Sunny Hills hotel in Pamporovo resort. An identical system can be installed in a multi-family building, as it allows individual heat metering and allocation to each consumer.

The trip took place on 21st February 2023. There were 28 participants, mostly students and teachers in the subject "Electrical equipment" from the Technical School "Hristo Botev" in the city of Smolyan. Additionally, there were municipality representatives from Smolyan. A bus was hired to transport the participants.

At the hotel, two BSERC heating experts and a representative of the producer of the demonstrated heat pump delivered PowerPoint presentations and answered the questions of the audience. Later, the group visited the heat pump system.

Figure 28: Presentations and discussions at the lobby of Sunny Hills hotel in Pamporovo

A package with all REPLACE printed materials was distributed to all participants. Additional materials were given to the teachers for dissemination in the school. Following the interest of the school director and teachers to include the lessons about heat pumps in the students' curricula, the PowerPoint presentations from the visit and additional materials were e-mailed to them after the visit.

Reasoning why activity is classified as successful

The demonstrated heat pump is likely to be the most promising heating technology for the multi-family buildings in Bulgaria. The visit was a rare opportunity for (future) professionals to get acquainted with the technology. It is very likely that the visit inspired the teachers to include lessons about heat pumps in their students' curricula.

Direct impact

A promising technology was introduced to 28 (future) professionals.

Accompanying communication

The visit was promoted through bilateral communication with the director of the school and representatives of municipalities.

SWOT

Table 12: SWOT of Activity Organization of regional field trips to best practice RHC systems

	Helpful to achieving the objectives	Harmful to achieving the objectives
Internal origin (attributes to the implementing bodies)	**Strengths** Efficient, automated, cheap, and environmentally friendly heating and cooling solution. Very high interest by students and teachers from the technical school.	**Weaknesses** No residential buildings with such a heat pump in the region.
External origin (attributes to the environment)	**Opportunities** Large replication potential in multi-family buildings. Future education of professionals in the field.	**Threads** The replication might be threatened by the difficulty to organize the residents in multi-family buildings to implement such a collective action. This would limit the application to existing buildings only.

5.2.3.6. Performing two to three Webinars to consumers

The REPLACE outputs were promoted at two virtual events, both of which attracted a wide variety of target groups – policy makers, intermediaries, consultants, and consumers.

A 5-day "CLEAN ENERGY FOR PEOPLE" online conference was co-organized by ZaZemiata, E3G, and Bankwatch. The conference was dedicated to sustainable heating and covered Central and South-East Europe. On 22nd June 2022, BSERC delivered a detailed presentation about the REPLACE calculator, in order to promote it to public bodies, intermediaries, and consumers in the region as a reliable and independent assessment tool and to train its potential users. REPLACE presentation was attended by more than 60 persons and video recording was uploaded in Facebook and YouTube (Clean energy for people [day 2] - YouTube).

Later, on 30th November 2022, BSERC co-organized a two-day hybrid national event, which took place in Hotel Hyatt, Sofia. The event was attended by more than 200 participants, including on-site and online ones. Within the event, a substantial time was dedicated to REPLACE. The presentations covered programmes and initiatives for decarbonization of residential heating and cooling and the REPLACE outputs, with an emphasis on the calculator. A recording of the REPLACE session is available at BSERC's channel: https://www.youtube.com/watch?v=qjLDx4UmQGA

Figure 29: REPLACE presentations from 22nd June 2022 (left) and 30th November 2022 (right)

Reasoning why activity is classified as successful

The project outputs and other relevant information were promoted to a wide audience of target groups, both within and outside the Rhodope region.

Direct impact

More than 260 people attended of the events.

Accompanying communication

Both events were largely promoted by their organizers. BSERC, as co-organizer of the event on 30th November2022, promoted this event in social media.

5.2.4. Less successful activities

5.2.4.1. Facilitating the realization of innovative collaboration models between installers and plant contractors

A substantial barrier for a large number of households in the region was the lack of capital to afford the initial investment in an advanced heating technology. To address it, following a first round of discussions with heating technology suppliers in 2021, it was decided to make an effort to develop a financial product, where a supplier acts as a loan aggregator for tens or hundreds of heating replacements in households (supplier's clients), implemented by the supplier's network of installers. Discussions with financial institutions showed their general interest in the scheme. However, during the second round of discussions with heating suppliers in 2022, focusing on the particularities, such as the requirements of the financial institutions, it turned out that suppliers are willing neither to take additional risk (e.g. provide collateral) nor to increase their administrative burden to manage loans. The situation was further complicated by the substantial change in the market conditions, e.g. sharp increase in heat pump demand (making suppliers not interested in additional clients) and sharp increase of pellet price (making pellet-based heating unattractive at the moment).

Reasoning why activity is classified less successful (for the time being)

The financial product / scheme development was postponed, because of both temporary difficulties (changed demand for the technologies) and concerns of suppliers that would require substantial effort (beyond the possibility of REPLACE) to address.

5.2.4.2. Facilitating the realisation of collective actions

In Bulgaria, collective actions related to energy (e.g. energy communities) are not available, except for few examples, mostly implemented within pilot projects. This can be attributed mainly to the lack of relevant legislation and unwillingness of large parts of the population to participate in these kinds of activities. Within REPLACE, in the Rhodope region, an attempt was made to implement two types of collective actions, as described below.

Collective wood pellet purchase

Collective wood pellet purchasing by a large number of households is a relatively simple action, not facing any legal barriers, and with clear benefits, the main ones being lower pellet price and opportunities to ensure higher pellet quality, compared to an individual purchase. As only one such an action was identified prior to REPLACE in the region (but it was unsuccessful and discontinued), the project team decided to go in this direction.

In Rhodope region, following discussions with the respective local authorities, it was decided to implement such a pilot action in two towns – Bratsigovo and Smolyan. In 2021 and 2022, Bratsigovo was the only Rhodope settlement with the majority of households using pellets for heating. During meetings Bratsigovo residents interested in participating in a collective action, BSERC presented the initiative, including benefits to households, implementation steps, and support offered by REPLACE.

Figure 30: Meeting with Bratsigovo residents on 15th June 2022

The initiative was generally supported by the residents in Bratsigovo, mainly because they experienced varying (often poor) pellet quality during the past years. The main issue that remained unsolved was to identify the group leader to be in charge of the joint purchase - somebody who is trusted by the community, knowledgeable about the pellet market, and willing to undertake this task. During the discussions and after that via bilateral talks, efforts were put to identify such a person, but with no success. Some proposed that the local authority takes this role. The municipality, however, declined.

Immediately after the attempt in Bratsigovo, in the summer of 2022, a similar initiative started in Smolyan - the only settlement in Rhodope region with a residential heating replacement project. The project, funded by Operational Programme Environment (OPE), is implemented by the municipal authority and provides free-of-charge modern heating equipment to over 3,000 households, using solid fuels for heating in Smolyan. As most replacements were planned for the heating season 2022/2023, it was decided to promote to each household switching to pellets the collective purchase opportunity.

Following that promotion, several households expressed interest in joining the initiative, but their number was below the minimum set number of 25 households. The reason for the low interest was the sharp increase of wood pellet prices from 180 €/t (autumn 2020) to 480 €/t (autumn 2022), resulting in lower interest of residents to choose pellet boilers as a replacement option within the OPE project. Despite the low current interest, the municipality will continue to promote the initiative and in case of interest, a meeting with the residents will be organized.

Based on REPLACE experience, and a literature review, guidelines to support these kind of activities and other future initiatives in the Rhodope region called “Collective purchase of wood pellets by households – why and how?” have been elaborated in Bulgarian language (available at REPLACE website) and disseminated.

Figure 31: Guidelines for collective wood pellet purchasing and guidelines for collective hot water supply in a multi-family building

Collective domestic hot water system in a multi-family building

The collective domestic hot water system in a multi-family building, using an air-water heat pump, is an excellent replacement solution for buildings using electrical boilers - the majority of multi-family buildings in Rhodope region and Bulgaria in general. The idea to offer such a solution within the REPLACE campaign came from BSERC team members, who initiated and organized the successful implementation of that solution in a multi-family building with 48 apartments in the city of Varna (outside Rhodope region) prior to REPLACE, which was most likely the only replacement of this kind implemented in Bulgaria. The new hot water solution included 2 high-temperature heat pumps, 2 hot water accumulators, one recirculation pump for the hot water, a hot water supply network, a heat meter, a common and individual water meters, and an automation system.

Within REPLACE, an appropriate multi-family building (high number of apartments, using electrical boilers) was proposed by a member of the Local Working Group. The residents of the building were interested in cheaper and more efficient heating and domestic hot water supply. During the first meeting with them, BSERC introduced the project concept and the past experience with the building in Varna. Additionally, data about the heating and hot water consumption were collected. Next, the pre-feasibility study confirmed the financial viability of the project. The possible financing schemes, project implementation stages, and the offered support from REPLACE in the process were explained.

Before the development of the project design and requesting offers from potential investors, the residents were requested to confirm their interest to implement the replacement. Some of them were hesitant, considering the necessary construction works as a hassle. As normally decisions to invest in such innovative solutions require a longer time, no significant advancement could be expected within REPLACE. To promote such collective actions, however, a comprehensive guidelines have been developed and disseminated. They are available at the REPLACE website in Bulgarian.

Reasoning why activity is classified less successful (for the time being)

Neither of the two types of collective actions reached a pilot phase, although both have large potential for realization. The experience of the project team, however, was reflected in guidelines that can be followed in future such initiatives.

Accompanying communication

The collective wood pellet purchasing was largely promoted to the residents of Bratsigovo and Smolyan through the respective municipal authorities.

SWOT

Table 13: SWOT of Activity "Facilitating the realisation of collective pellet purchase"

	Helpful to achieving the objectives	Harmful to achieving the objectives
Internal origin (attributes to the implementing bodies)	**Strengths** Lower pellet price Higher pellet quality Less transaction costs	**Weaknesses** No experience in collective actions, associated with fear and lack of trust Low interest in pellets, due to their high price in 2022 No volunteers willing to lead the group purchase
External origin (attributes to the environment)	**Opportunities** Lower pellet prices would substantially increase the interest in the initiative. Municipal authorities may take the lead, at least in pilot projects.	**Threads** If inappropriate group leader is selected, the success of the initiative is at risk.

5.2.4.3. Pilot project for residential heating replacement, initiated by a municipality

Prior to REPLACE, a member of BSERC's project team was involved in a project in Novi Iskar municipality, where the municipality initiated a pilot project to replace the firewood and coal – fueled heating system by a modern wood pellet – fuelled heating system in 30 households. The experience with this small project allowed the municipality to later implement a much larger heating replacement project.

A similar approach was promoted by the REPLACE team in the municipalities of Devin, Dospat, Chepelare, Ardino, and Kardzhali. The full documentation pack used in Novi Iskar municipality was provided to the interested Rhodope municipalities. As no EU/national financing was available for such a pilot project, municipalities were offered assistance by BSERC for the experimentation with only 1-2 single-family houses, where the replacement is funded by the municipal budget. The idea was supported by some of the municipal experts. Its realization, however, was postponed until a large-scale heating replacement programme emerges on the horizon, so that the pilot project is used as test run.

Reasoning why activity is classified less successful (for the time being)

Unfortunately, no such pilot project took place within REPLACE, perhaps because the municipal authorities did not see a clear perspective for a large-scale replacement programme.

5.2.4.4. Promotion and development of financial instruments

One of the key barriers for residential heating replacement is the lack of financing for the initial investment in a modern heating technology. Except for two public programmes covering a very limited number of municipalities, private financing remains the only option for the majority of residents.

To make the choice of private financing easier, information was collected about the conditions offered by the main private banks in Bulgaria. A comparative assessment of conditions was elaborated for a typical loan used for heating replacement, where the loan amount, loan period, and other factors are fixed for all options. As a result, the user is able to easily compare the different bank offers, e.g. by comparing the total loan expenditures and the bank requirements.

In addition to the development and promotion of the abovementioned assessment, the BSERC team discussed with several municipalities the opportunity that they develop an own financial product (loan) offered through municipal financing institutions to households willing to replace their heating system. This idea, however, was not supported by any of the municipalities.

Reasoning why activity is classified less successful (for the time being)

A part of this activity, concerning the development and promotion of a comparative assessment of the conditions of the private banks, can be considered as successful.

The part related to the development of financial products of municipalities, however, did not succeed.

5.2.5. Addressing of horizontal aspects (gender, poverty etc.)

All REPLACE activities in the Rhodope region aim to promote the switch to cleaner, more efficient, and automated or less labour-intensive technologies, such as heat pumps, solar collectors, and pellet boilers. By addressing the abovementioned three problems, such a technology switch would substantially improve the position of women, as they are still responsible for a large part of the work involved, they are more affected by the disadvantages.

The campaign in the region addressed energy poverty by: (1) Developing and promoting financing schemes and public and private financing sources that allow energy poor households to afford better technologies, energy performance contracting, energy supply contracting, soft loans, grants, etc. (2) Focus on cheaper heating, hot water supply, and cooling solutions; and (3) Using communication channels that easily reach vulnerable consumers, such as energy poor.

Concerning the rebound effect, throughout the campaign it was highlighted that energy efficiency renovation of homes is the first and priority action that needs to be implemented before the replacement of the heating system. Additionally, individual energy efficiency measures in homes, measures to increase the efficiency of the heating system, and metering of the energy consumption were recommended. Many campaign materials and actions raised people's awareness about the importance to save energy and reduce the environmental impact of heating. These activities are both very efficient and effective, considering the overall low level of awareness of the population in the region.

Examples of lock-in effects were presented to consumers and intermediaries to make them aware of the importance of early heating planning, before the current system urgently needs replacement. In 2020, one of the most wide-spread deceptions of stakeholders in the Rhodope region was that the best heating choice is natural gas, as it is a clean, cheap, and automated solution. The project team constantly explained the price risk, security of supply risk, and the GHG emissions that will have price implications through the planned ETS II scheme.

5.2.6. Activities that may remain beyond project life

The following activities resulting from the REPLACE campaign will continue beyond the project:

- The informational hubs at several municipalities will continue running, providing printed materials, advise, and online information to residents.
- Lessons about heat pumps will be included in the curricula of the students in “Hristo Botev” Technical School.
- Smolyan municipality is committed to continue its efforts towards the organization of collective pellet purchasing by its residents.

5.2.7. Added value of the project REPLACE to the pilot region

The campaign demonstrated the multiple benefits associated to the switch to cleaner and more efficient renewable heating and cooling, to a large share of the consumers, investors, intermediaries, and public authorities in the region.

Additionally, the campaign guided these stakeholders, e.g. by promoting REPLACE outputs, such as the calculator, best practice examples, handbooks towards the implementation of successful replacement projects. For example, consumers became aware of how to choose the best system and what steps to be followed, while the public authorities gained knowledge on how to more effectively disseminate information and guide citizens in the field.

Furthermore, through the close collaboration with local authorities throughout the campaign, they are much more committed to increase their ambitions towards making residential heating more sustainable.

5.2.8. Lessons learned from the action and recommendations

Each of the 10 campaign activities resulted in lessons learned, which need to be taken into account in future campaigns. The main ones were shared in the description of the respective activities above, while the detailed ones are available in the respective reports (e.g. pre-feasibility study reports, guidelines for the implementation of collective actions).

5.2.9. Transfer of experience for other regions and countries

A large-scale national dissemination of REPLACE outputs and results was carried out, reaching about 1 million consumers, public authorities, and heating/cooling professionals. Considering that almost entirely channels with national coverage were used, the vast majority of the reached stakeholders were outside the Rhodope region.

The experience of the campaign in Rhodope fully is transferable to other Bulgarian regions. Not all heating solutions appropriate for the residents in the region, however, are relevant for the other Bulgarian regions, due to the different temperature, different fuels used for heating, different renewable energy potential, and different density of the heat consumption.

6 | Croatia: North-West Croatia

6.1 Recap of the first action plan

The North-West Croatia region encompasses three counties - Karlovac, Krapina-Zagorje and Zagreb or the City of Zagreb, which is classified as a county according to the City of Zagreb Act. This indicates that the project had a wide reach and had a significant impact on the local communities within these areas. By engaging with the LWG and incorporating their valuable insights, the project had a better chance of success in achieving its goals and making a positive difference in the region. An overview of proposed activities according to the first action plan is shown in the following table. No changes were made in terms of selected project activities, however, one of them was pursued in a different form, which will be described in more detail in the following subchapters.

Table 14: Overview of proposed activities according to the first action plan for North-West Croatia

Activity	**Status**
1. Initiating intermediary campaign to bridge the gap between citizens and available funding possibilities offered by county governments	Pursued further
2. Techno-economic pre-feasibility studies	Pursued further
3. REPLACE (R)HC replacement information hubs	Pursued further
4. Heating systems replacements information at consumer fairs and festivals	Pursued further
5. 100 % renewable heating or cooling labelling campaign	Pursued further
6. Regional field trips to best practice RHC systems	Pursued further
7. Two to three webinars on the usage of the "REPLACE your Heating System Calculator" and the technology briefs"	Pursued further
8. Information evenings on municipal level regarding replacing oil and gas boilers by climate-friendly solutions	Pursued further
9. Facilitating the realization of collective actions	Pursued in a modified form (re-designed)

The COVID - 19 posed a significant obstacle to project activities in 2020 and 2021, particularly those that required physical presence such as open house events and field trips. Additionally, the pandemic impacted the project's ability to establish communication and contacts with other stakeholders. Apart from COVID-19, the project activities were also affected by the sharp rise in energy prices in Europe in 2022, resulting in consumers choosing to buy newer versions of non-renewable systems.

In North-West Croatia, three alternative activities were planned, an intermediary campaign to bridge the gap between citizens and available funding possibilities offered by county governments, information evenings on the municipal level and a 100 % renewable heating or cooling labelling campaign.

Despite external factors and reasons affecting the project, none of the activities were abandoned, only the realization of collective actions was modified to adapt to the local circumstances.

6.2 Activities implemented and tested

6.2.1 New activities

North-West Regional Energy and Climate Agency (REGEA) decided to stay with the originally proposed activities and implement them as planned. This decision has been based on several factors, such as the feasibility and effectiveness of the proposed activities, the input and feedback received from LWG and other stakeholders, as well as the project's timeline and available resources. By sticking with the original plan, REGEA felt more confident in achieving the project's objectives and making a positive impact in the North-West Croatia region.

6.2.2 Overview of performed, tested & fine-tuned activities

The table below provides a comprehensive overview of the various implemented activities, including both their preparatory and implementation phases. Additionally, the table highlights the importance of careful planning and execution to ensure the success of each activity. The actions have been implemented between January 2021 and February 2023, and have been accompanied by an intensive local media campaign through web portals and social networks to showcase the project's results and encourage good practices.

Table 15: Overview of activities and their preparation and implementation phase in Nort-West Croatia

		Starting point & fine-tuning	
Activity	Short description	Preparation phase	Implementation phase (re-design)
1. Initiating intermediary campaign to bridge the gap between citizens and available funding possibilities offered by county governments	Supporting county governments in implementing and marketing public calls and funds for installation of RES systems, as well as to provide support to the citizens/end users who have decided to replace their old heating systems and use available funding.	January 2021: information, counseling, and education on the use of renewable energy sources to target groups - citizens, entrepreneurs, employees of city and county administration, coordination of project documentation, and assistance in the preparation of public calls for grants) in target regions	Since January 2021
2. Techno-economic pre-feasibility studies	Conducted eight techno-economic studies. All the old systems were fired by fuel oil and natural	May/June 2022: Identification of houses and buildings with help of LWG members	October 2022 - February 2023:

	gas, and proposed replacements included solid biomass boilers, heat pumps and connection to the district heating system		Data collection and conducting the pre-feasibility studies
3. *Establishment of REPLACE (R)HC replacement information hubs*	Established three information hubs in Krapina-Zagorje County, Karlovac County and Zagreb County	January 2021: Preparation of the material, training persons in charge of the information hubs from local partner REGEA	January 2021 –December 2022 Distribution of the material to LWG members, other stakeholders, and end-consumers; promotion, the local partner REGEA attended the information hub several times and shared news and tips for replacing the heating system within the REPLACE project.
4. *Heating system replacement info at consumer fairs and festivals*	REGEA participated at three fair/festivals	June 2021 - September 2022 Researching and identifying relevant festivals and fairs in 2021 and 2022, related to renewable heating and cooling. Three potential fairs were identified. REGEA has applied to participate as an exhibitor to present and inform fair visitors about (R)HC heating systems' replacements and related REPLACE offers and activities.	Presentation and promotion of REPLACE at the following fairs: ● Greencajt festival which took place in the city of Zagreb on 1st of December 2021; ● Greencajt festival which took place on 4th of June 2022 ● Fair which took place in the City of Krapina (Krapina-Zagorje County) on 9th of September 2022.
5. *100 % renewable heating or cooling labelling campaign*	Identification was made from an online list from the national Environmental Protection and Energy Efficiency Fund that subsidizes RES heating systems. REGEA started the campaign with a visit to 4 households, while chimney sweepers and installers in the target regions distributed 60 labels.	October 2021: Identification of houses which installed heating systems on RES. January/February 2022: Establishing contact with the homeowners	March 2022 – January 2023: Labelling 64 houses
6. *Regional field trips to best practice RHC systems*	REGEA organized in cooperation with LWG members the regional field trip to best practice RHC systems	February 2022 Identification of best practice RHC system with LWG members	May 2022: Visit the best practice RHC system

7. Two to three webinars on the usage of the "REPLACE your Heating System Calculator" and the technology briefs	REGEA organized two webinars targeting end-consumers, municipality representatives, policy makers and industry representatives.	March 2022 –December 202 Gathering information and looking into possible solutions - be part of an existing webinar or organize it as an independent event	1st held in April 2022 2nd held in January 2023
8. *. Information evenings on municipal level regarding replacing oil and gas boilers by climate-friendly solutions*	REGEA in cooperation with LWG members organized two Information evenings on municipal level	February/March 2021 Communicating with target regions and preparing the events	1st held in May 2021 2nd held in July 2021
9. Facilitating the realization of collective actions	*REGEA, launched raising awareness program through the following activity:* • *Initiating intermediary campaign to bridge the gap between citizens and available funding possibilities - Encourage consumers to participate in the tender published by the Environmental Protection and Energy Efficiency Fund*	January 2021 Investigating how to implement collective actions in target regions - Joint actions of citizens, such as group purchases of equipment/pellets or municipal efforts to benefit consumers, have not been adequately promoted or recognized in target region North-West Croatia. To this fact, REGEA try to re-design Activity collective actions involving a wide range of citizens and stakeholders to support collective actions within existing campaign.	January 2021 – December 2022

6.2.3 Successful activities

6.2.3.1 Initiating intermediary campaign to bridge the gap between citizens and available funding

The importance of this action lies in solving the problem that single-family houses comprise 65 % of housing stock in Croatia and with most of them built before 1987, thermal insulation and heating systems are not up to current energy standards. For the first time since 2015, during 2020 and 2021, a public call was announced for the allocation of funds from the Fund for Environmental Protection and Energy Efficiency for the co-financing of measures for the energy renovation of family houses in the Republic of Croatia, including the installation of renewable heating systems.

Based on this, the county governments in North-West Croatia are co-financing the replacement of old, inefficient boilers with new renewable energy heating systems. Through the REPLACE project local partner REGEA provided support to county governments in implementing and marketing these public calls and funds, as well as to citizens who have decided to replace their old heating systems. REGEA has provided information, counselling, and education on renewable energy sources to various groups, including children, youth, citizens, entrepreneurs, city, and county employees.

The main goal of this campaign was to help end users with low income to lower their energy bills by installing an efficient heating system which leads to energy savings.

In September 2022 EPEEF published another call which only co-finances projects for the use of renewable energy sources for own consumption, i.e., measures for the installation of systems for the use of renewable energy sources in existing family houses in the Republic of Croatia. The condition for applying for the calls is that the house has an energy performance certificate and an energy audit report. With the help of REPLACE resources, REGEA wanted to help the Krapina-Zagorje County to encourage households in applying. The Krapina-Zagorje County has issued a public call, with the help of REGEA experts and in line with the REPLACE project's objectives, to co-finance the preparation of energy audit reports and energy performance certificates for single-family homes. REGEA's assistance was crucial in making this decision, and the REPLACE project have provided additional support for the initiative. The call aimed to promote renewable energy use and improve energy efficiency in buildings. REGEA prepared all the tender documentation and helped the county in conducting the tender.

The county has issued a call for proposals with the intention of providing the opportunity for as many of its citizens as possible to prepare high-quality technical documentation for application to the Fund's announced calls. For this purpose, the County provided HRK 100,000.00 (13,280.00 EUR) from its budget. Vouchers were allocated to beneficiaries for the justified costs of preparing an energy audit report and an energy performance certificate for family homes: up to 100 %, but no more than HRK 2,500.00 (332 EUR with VAT). At the end of 2021, 28 users received subsidies and signed contracts with the county. The total approved amount for 28 users is EUR 7,770.98. The call is available on the link: https://www.kzz.hr/javni-poziv-sufinanciranje-energetskih-certifikata-za-obiteljske-kuce

The county provided the funds with the input of the REGEA because they recognized that this would facilitate and help the citizens to install a new heating system using renewable energy sources. This laudable measure and the subsidy received from the County would reduce end consumers' costs of installing a new heating system when applying to the national fund. Overall, this collaborative effort within REPLACE is a positive example of how agencies and local governments can work together to promote sustainable energy use and reduce the carbon footprint of their communities.

Zagreb County in Croatia published public calls in 2019 and 2020 to co-finance photovoltaic systems and biomass boilers for single-family homes. However, the County faced difficulties in conducting the tender procedure and received complaints from citizens. To avoid such difficulties and reach more citizens, REGEA provided technical assistance to Zagreb County in REPLACE in 2021 in the preparation of documentation for the public tender for application of persons to co-financing photovoltaic systems and biomass boilers for family homes. REGEA regularly responded to inquiries of potential applicants via phone. The received applications were processed, and technical assistance was provided in the preparation of the contract. REGEA employees reviewed reports on the intended use of the support with all accompanying documentation, and requests were prepared for the transfer of funds from Zagreb County through vouchers for all users of the funds. The maximum amount of funds that an individual user can obtain for the installation of photovoltaic systems within the 2021-year call is 50% of the eligible costs, i.e. a maximum of 20.000 HRK (~2.600 EUR). Zagreb County has secured a total of 600,000 HRK (~79.635,00 EUR) for the installation of photovoltaic systems in the Zagreb County Budget for 2021, and the secured funds will be distributed among applicants with the highest number of

points. The maximum amount of funds that an individual user could obtain for the installation of biomass boilers (pellets/wood) was 50% of the eligible costs, i.e. a maximum of 15,000 HRK (~2,000 EUR). Financial resources were allocated to 32 beneficiaries, 6 users installed biomass boilers and 25 users installed photovoltaic.

The municipalities play an important role in achieving international, national, regional and local goals to reduce greenhouse gas emissions through improving energy efficiency and increasing the use of renewable energy. Developing Sustainable Energy (and Climate) Action Plans (SE(C)AP) is an effective and important first step in this process. The City of Velika Gorica and the City of Karlovac developed SECAP in cooperation with REGEA during 2020/2021.

To continuously implement a proactive energy policy and actively participate in preventing global warming and the negative consequences of climate change, the City of Velika Gorica decided to participate as a pilot city in the REPLACE project

The goal of the REPLACE project was to motivate and support users in Velika Gorica to replace their old heating and cooling systems with more environmentally friendly alternatives. Since the campaigns were very successful for Krapina-Zagorje County and Zagreb County, REGEA wanted to transfer such supporting policy instruments/measures to the city of Velika Gorica. For the first time, the city of Velika Gorica secured funds in its budget for the co-financing of the installation of system based on renewable energy sources for households. The city of Velika Gorica and the Development Agency VEGORA on 26.04.2021 (day of renewable energy sources) held an online press conference together with REGEA where it was announced that the city is publishing 3 public calls for citizens to install systems based on renewable energy sources (public call for co-financing the use of renewable energy sources for the production of electricity in households for their own consumption, Public call for co-financing the replacement of inefficient fireplaces for family houses with heat pumps in the area of the City of Velika Gorica and public call for co-financing the energy renovation of family houses in the area of the City of Velika Gorica). Velika Gorica received 15 project applications, out of which 4 were approved, 1 user installed a heat pump, 3 users installed photovoltaic systems. Since this was the first tender for encouraging renewable energy sources and energy efficiency measures, the budget for co-financing was limited to HRK 200,000 (EUR 26,550.00) for all calls. Following the success of the first call, city of Velika Gorica will publish a similar public call in 2023.

The REPLACE project aims to promote energy efficiency and reduce greenhouse gas emissions through the implementation of energy renovation measures in public buildings. However, to achieve these goals, it is important to educate citizens about the importance of energy efficiency and the impact of climate change on the environment and society. With all this in mind, REGEA has integrated educational and information measure within the framework of the REPLACE project - in two SECAPs for the cities of Velika Gorica (Zagreb County) and Karlovac (Karlovac County). The activities carried out as part of this measure include the following:

1. The establishment of info hubs where citizens can get all the necessary information about the possibilities of increasing energy efficiency in the household, replacing inefficient heating and cooling systems with more efficient systems, and other measures to increase energy efficiency and reduce energy poverty;
2. Informing citizens about the possibilities of using high-efficiency technologies for heating and cooling through workshops and lectures to households;
3. Carrying out information campaigns on increasing energy efficiency and the possibilities of replacing inefficient heating systems in households;

4. Encouraging citizens to use tools and methods for improving energy efficiency in households available within the REPLACE project;
5. Implementation of collective actions aimed at motivating citizens to increase energy efficiency in homes.

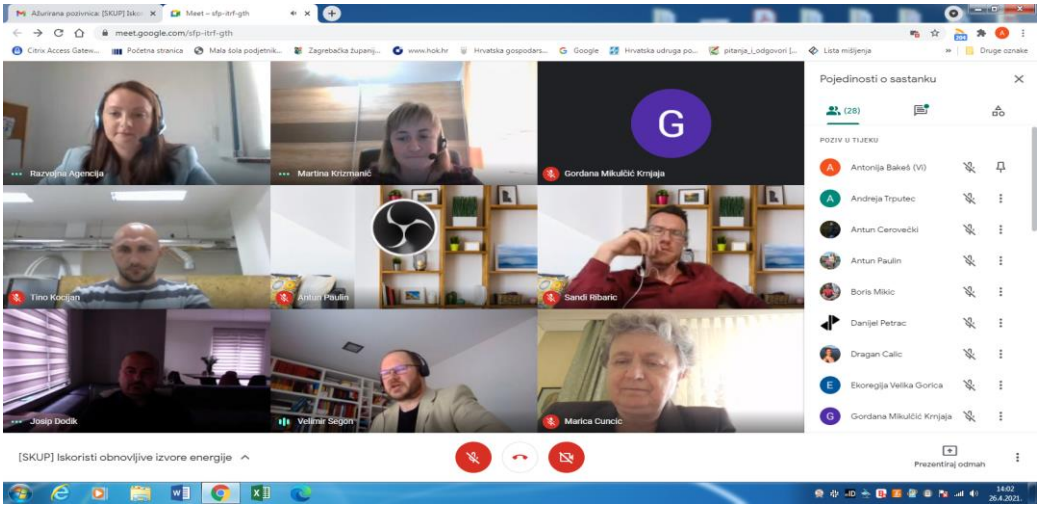


Figure 32: Online press conference Use renewable energy sources – announcement of public calls of the city of Velika Gorica

Reasoning why activity is classified successful

This activity was successful for several reasons. Firstly, it utilized effective policy instruments/measures to encourage users to replace their old heating and cooling systems with more environmentally friendly alternatives. By offering co-financing for renewable energy sources for households, the project motivated users to switch to more sustainable options. Secondly, the successful campaigns in Krapina-Zagorje County and Zagreb County provided valuable experience in promoting renewable energy and energy efficiency measures, which was transferred to Velika Gorica, resulting in a well-planned and well-executed project. Thirdly, the availability of funds in the city's budget for the co-financing of renewable energy systems made it possible to implement the project. Additionally, the support and cooperation of REGEA, target regions, and the local government were instrumental in the success of the project.

Direct impact

The project helped 100 end consumers receive subsidies for climate-friendly heating system replacements, and the spread of information through various means, such as a press conference, an information workshop, and an information corner accessible to everyone interested in the topic, also contributed to the success of the project.

Accompanying communication

On April 26th, 2021, the city of Velika Gorica and the Development Agency VEGORA hosted an online press conference with REGEA to announce the publication of three public calls for citizens to install renewable energy systems. The announcement was made on the Day of Renewable Energy Sources and highlights the city's commitment to sustainable development. The policy measures were also disseminated through press conferences, workshops, information evenings, online portals, the REGEA Facebook page, the REPLACE website, newspapers, and targeted county websites. The information

was accessible to everybody interested in the topic, highlighting the city's commitment to sustainable development.

6.2.3.2 Every beneficiary in lead of a target region performs a minimum of six techno-economic feasibility studies

In North-West Croatia, 90 % of renewable energy sources are used for heating, primarily fuel wood and there are only a few examples of heating on pellets, wood briquettes, and wood chips. The LWG stakeholders collaborated with REGEA to identify eight cases for the analysis of single object supply, and prior to conducting feasibility studies, all beneficiaries were contacted and informed about the REPLACE project and provided with the necessary information.

To support consumers in making the right replacement choice with a new and climate friendly heating system, a campaign for techno-economy studies was conducted in the North-West Croatia region. The feasibility studies were free of charge for the owners which were interested in replacing their old heating system. This campaign was performed by REGEA with support of the LWG based on a telephone call, online interview and direct contact with the homeowners. Through this activity, eight techno-economic studies were completed.

The feasibility studies have been prepared following building type categories outlined in the table below.

Table 16: Prefeasibility studies in target region North-West Croatia

Building type	Number of studies	Current heating system	Region	REPLACE option
Single family house	4	Fuel oil	Zagreb County	Solid biomass boilers
Multifamily house	3	Fuel oil	Karlovac County, Krapina-Zagorje County	Solid biomass boilers
Large volume building (multi-apartment building)	1	Natural gas	City of Zagreb	District heating system, heat pumps

Within the interview, the replacement consultancy was performed by using the REPLACE Your Heating System Calculator. The in-depth details of the parameters inserted and the results for a whole range of heating solutions calculated are available in Croatian and English versions of the studies. Since the created tool within the REPLACE project does not cover large multiapartment buildings, a modified analysis has been performed to achieve reasonable parameters as results. Due to alternative approach (excluding the REPLACE calculator), a modified set of data has been requested and used in calculations to compare two possible decarbonisation options. The activity was initiated in June 2022, eight techno-economic studies were carried out to assess the feasibility of replacing old fuel oil-fired systems with more sustainable alternatives, such as solid biomass boilers, heat pumps and connections to the district heating system.

Seven analysed houses were heated with fuel oil and the suggested new systems are either pellet boilers or log wood boilers, which are suitable alternatives in respect to the target regions.

One large volume building (multi-apartment building) is also included in the analysis, with the replacement of individual gas boilers by heat pumps or a connection to the district heating system.

Reasoning why activity is classified successful

This activity conducted by REGEA in North-West Croatia can be considered successful based on several factors. Firstly, the campaign was able to provide free techno-economic feasibility studies to homeowners interested in replacing their old heating systems, which could potentially lead to a significant reduction in carbon emissions and promote sustainable alternatives. Secondly, the campaign completed eight feasibility studies for different types of buildings and heating systems in the target regions, providing in-depth details of the parameters and results for a range of heating solutions calculated in Croatian and English versions. This suggests that the campaign was able to reach a diverse group of homeowners and provide them with customized solutions based on their individual needs. Additionally, the suggested replacement options for the seven houses heated with fuel oil were solid biomass boilers, while the large volume building could be replaced with either heat pumps or connected to a district heating system, indicating that the campaign was successful in promoting sustainable heating alternatives. Lastly, the campaign was initiated in June 2022 and completed the feasibility studies by using a telephone call, online interview, and direct contact with the homeowners, indicating that the campaign was able to adapt to the COVID-19 pandemic and still reach its intended audience. Overall, the success of the campaign can be measured by its ability to provide customized solutions, promote sustainable alternatives, and adapt to the challenges of the pandemic.

Direct impact

The direct impact of this performed activity is the completion of eight techno-economic feasibility studies for different types of buildings and heating systems in North-west Croatia.

The identified households intend to replace their old heating systems with new green technologies in the future and some are already in the implementation stage. The initial number of consumers who were influenced was eight homeowners and all the household members who lived with them. However, it is expected that these consumers further communicated the results of the analysis with others, which encouraged them to consider replacing their systems as well. Therefore, the number of consumers who may have been influenced by the initial group is likely to be greater than eight.

Accompanying communication

The REPLACE calculator was advertised by REGEA, a local partner, on their website, online portals, and in a local newspaper in Zagreb and Krapina Zagorje County. The promotion was part of a marketing campaign in 2021 and 2022. The calculator was also shared on social media via REGEA's Facebook page, with regular updates posted to engage an online community. The calculator was promoted through members of the working group and through targeted local authorities in the counties. Users who applied for studies were also made aware of the project due to the effective promotional advertising activities.

6.2.3.3 Establishment of REPLACE (R)HC replacement information hubs

The project has established three information hubs in Krapina-Zagorje County, Zagreb County, and Karlovac County. These hubs serve as a place for citizens to learn about heating replacement options and the project itself. Info hubs have been established chronologically as follows:

- 1st Info hub was established in Krapina-Zagorje County on 18th of January 2021.
- 2nd info hub was established in Karlovac County on 15th of February 2021.
- 3rd info hub was established in Zagreb County on 3rd of March 2021.

Reasoning why activity is classified successful

The most successful info hub was in the city of Velika Gorica which belongs to Zagreb County. REGEA established a info hub in the utility company where the companies VG Komunalac, VG Vodoopskrba, VG Čistoća and Gradsko housing economy are located. 500 employees are employed in the building, who provide services to citizens every day, such as payment of parking, water fees, water connections, payment of garbage, burial fees, etc. All these employees who work there in the communal center pass through the info hub every day. The city of Velika Gorica has 61,198 inhabitants according to the last census of 2021. The info hub was established on March 3, 2021, and from then until the end of 2022, it was visited by approximately 19,000 people. Over a period of five days, a person from REGEA was present at the hub for eight hours each day. Their primary responsibility was to provide information about REPLACE, but they also trained a local employee to educate visitors about renewable heating sources. The trained person can continue informing people about the project and systems for renewable heating sources. The establishment of information hubs can be continued to promote the use of renewable energy sources and inform the community about tenders published by the city.

Citizens come to the utility centre and can be informed about heating and cooling systems regarding renewable energy sources. The info corner is equipped with an exhibit of a solar collector, which is a starting point for education and information about the advantages of installing such systems on renewable energy sources. The info corner was designed as a place in which every citizen of the City of Velika Gorica can obtain information they are interested in, and which are necessary for the better and more energy efficient quality of life. It is a place which allows citizens to obtain information quickly and easily on the on-going national tenders for family houses (increasing energy efficiency, installation of renewable energy systems), as well as on-going tenders of the City of Velika Gorica.

All established info hubs are equipped with various project and promotional materials, which are prepared and disseminated within the REPLACE project, such as project flyers in Croatian language, Best Practice examples from project countries translated into Croatian, promotion material on residential heating systems (logwood, pellets, woodchip heating systems, heat pumps, solar collectors) from producers and installers which are part of the LWG.

The main goal of the info hubs was to raise awareness about the use of renewable sources and help consumers to take informed decisions on how to replace their inefficient heating and cooling systems towards modern climate-friendly, economic resilient and efficient systems. The info hubs will work during the whole lifetime of the REPLACE project and beyond.

The citizen’s info hubs contributed to inform visitors the topics of energy poverty, energy efficiency, renewable energy sources and sustainability. Citizens who are concerned about the expected high rise in energy prices can get advice and information on how to reduce their heating and electricity bills. Persons in charge of the info hubs talked to the citizens about energy efficient measures that can contribute to significant energy savings and related costs that can be achieved by changing behavior.

In addition, the info hubs provided other information on the possibilities of financing energy efficiency measures and renewable energy heating systems and simple measures to start to improve energy conditions in the household. The promotional materials and some visitors to the information hubs are shown in the figures below.

Figure 33: Visitor visited REPLACE info hub in Krapina-Zagorje County

Figure 34: REPLACE info hub in Krapina-Zagorje County (Prefect of Krapina-Zagorje County visited the info hub)

Figure 35: REPLACE info hub in the utility company in the city of Velika Gorica (Zagreb County)

Figure 36: REPLACE info hub in the Karlovac County

Direct impact

The establishment of citizen's info hubs in North-West Croatia region, specifically in Krapina-Zagorje County, Karlovac County, and Zagreb County, has brought citizens closer to the topics of energy poverty, energy efficiency, renewable energy sources, and sustainability. The info hubs have helped

raise awareness about the use of renewable sources and enabled consumers to make informed decisions on how to replace their inefficient (R)HC systems with modern climate-friendly, economic resilient, and efficient RHC systems. Visitors to the info hubs were able to get tips for improving energy efficiency with the aim of reducing bills for any of the energy products. The impact of this activity was seen in the number of people who visited the info hubs, which was approximately 19,000 people in the city of Velika Gorica and 1.000 visitors have been estimated from other info hubs, in total the hubs reached 20.000 visitors.

Accompanying communication

The accompanying communication for the establishment of the REPLACE (R)HC replacement information hubs was comprehensive and utilized various channels to advertise its availability. The activity was advertised in local newspapers, online portals, workshops, the REPLACE website, and the REGEA Facebook page, ensuring that the message reached a wide audience. The accompanying communication highlighted the benefits of the information hubs and provided information on their location and availability. The communication was informative and encouraged individuals to visit the information hubs to learn more about renewable energy systems and how to replace their existing systems with more efficient ones. The use of multiple channels ensured that the message reached a wider audience and provided easy access to information on renewable energy systems. The accompanying communication was effective in promoting the establishment of the information hubs and encouraging individuals to take action towards more sustainable energy practices.

6.2.3.4 Heating system replacement info at consumer fairs and festivals

For the implementation of this action, it was necessary to research major fairs, festivals, and expos, not only on a regional level but also on the national level to find the most relevant ones. Large consumer fairs and festivals are a good place to meet with interested citizens, but also with facilitators, investors, and installers.

Reasoning why activity is classified successful

REGEA identified 3 festivals and fairs related to renewable heating and cooling during the project with support from the LWG. Based on the results of this research, REGEA signed to participate as an exhibitor to present and inform fair visitors about (R)HC heating systems' replacements and related REPLACE offers and activities.

REGEA participated in the following fairs:

- Greencajt festival which took place in the city of Zagreb on 1st of December 2021;
- Greencajt festival which took place in the city of Zagreb on 4th of June 2022
- Fair which took place in the City of Krapina (Krapina-Zagorje County) on 9th of September 2022.

On December 1, 2021, REGEA participated in the first Greencajt festival, the first green festival in Croatia. The event brought together green experts, innovators, small manufacturers of renewable energy systems, and enthusiasts in the field of sustainable development to offer educational content and showcase green initiatives and projects in the expo zone.

The festival lasted for 3 days, REGEA attended only the first day of the festival. On the first day, there were 1000 visitors at the fair. Over the three days of the festival, there were a total of 5000 visitors.

REGEA's Managing Director participated in a panel discussion titled "Where is Croatia on the path to adapting to climate change and energy transition, and what can we do today to be a sustainable,

solidary, and smart society in ten years?" During the discussion, he highlighted the goals of the REPLACE project and invited participants to visit the project booth.

REGEA participated in the second Greencajt festival on June 4th, 2022 and distributed REPLACE Handbooks to the visitors. Julije Domac, Managing Director of REGEA, participated in a panel discussing the use of natural gas for heating and the potential for decarbonization of Croatian cities. Domac highlighted that REGEA's international project, REPLACE, offers online tools and manuals that can help users choose green heating technologies. The panel concluded that subsidizing energy costs for natural gas is not a long-term solution to the climate crisis, and that citizens must become aware of the situation and start acting towards a green transformation. Domac invited attendees to visit the REPLACE project exhibition corner for more information. The Greencajt festival lasted for three days, with REGEA attending only on the first day when there were 1500 visitors in attendance. In total, the festival attracted 5000 visitors over the three-day period.

The third event, held on September 9, 2022, was part of a three-day international trade fair in Krapina, Croatia. The fair featured 157 exhibitors from various industries and sectors, including energy, agriculture, finance, and traditional and modern trades. The fair attracted over 1,500 visitors, including specialists and members of the public. As part of the fair, REGEA collaborated with a company that specializes in the production of steam boilers, pressure vessels, and heat exchangers. The aim of this collaboration was to promote the REPLACE project, which encourages the replacement of old, inefficient heating systems with more environmentally friendly alternatives. The REPLACE handbook for installers, plumbers, chimney sweepers, and investors was also distributed to fair visitors. The fair was jointly organized by the Krapina-Zagorje County, the City of Krapina, the Chamber of Crafts of Krapina-Zagorje County, HGK – Krapina County Chamber, and Radio Kaj.

Figure 37: REGEA participated at the fair in the city of Krapina (Krapina- Zagorje County)

Figure 38: REGEA participated at the Greencajt festival which took place in the city of Zagreb on 4th of June 2022

Figure 39: Managing Director of REGEA participated at the panel called By, by gas at the Greencajt festival which took place on 4th of June 2022

Figure 40: REGEA participated at the Greencajt festival which took place in the city of Zagreb on 1st of December 2021

Figure 41: Managing director of REGEA participated at the panel during the Greencajt festival which took place in the city of Zagreb on 1st of December 2021

Direct impact

The direct impact of REGEA's participation in the three fairs was that they were able to reach a total of 4,500 end consumers, intermediaries, and investors with information about the REPLACE project and its goals. By participating as an exhibitor, REGEA was able to inform visitors about (R)HC heating systems' replacements and related REPLACE offers and activities, including the online tools and manuals available on the REPLACE project's website.

Accompanying communication

The accompanying communication for REGEA's REPLACE project involved having a presence at the Greencajt festival, where the director participated in panels and displayed manuals at an exhibition stand. The project was also presented at the Krapina fair, where the REPLACE pilot Krapina-Zagorje county invited REGEA to showcase the tools and handbooks developed during the project. Communication activities of fair organizers were effective in informing participants about alternative systems, with 4,500 attendees at the fairs. The REPLACE website was also used to promote the fairs.

6.2.3.5 100 % renewable heating or cooling labelling campaign

The aim of the labelling campaign for100 % renewable heating or cooling was to highlight the efforts of heat consumers switching their heat system to renewable energies. *The Environmental Protection and Energy Efficiency Fund* once per year publishes calls for subsidies Energy renovation of family houses. Therefore, the households that have replaced the old systems with this funding offer were easy to identify.

Reasoning why activity is classified successful

The main objective was to label existing renewable boilers in households visited by the chimney sweepers as well as communicating the benefits of the boiler replacement. Before the start of the campaign activity, installers, and chimney sweepers have been reached through their representatives, who are members of the LWG. The high season of boiler service and maintenance is in autumn before the heating season or at the beginning of the heating season. During that time, chimney sweepers and installers are inspecting and servicing boilers, which has been a good opportunity to label the boiler and familiarise households about the replacement benefits.

Figure 42: REGEA in collaboration with partner EWO, produced the boiler label

The 100 % renewable heating labelling campaign was an effective way to showcase how people in the region have switched to climate-friendly systems and to motivate others to follow their example.

REGEA started the campaign with a visit to 4 households, while chimney sweeps and installers in the target regions distributed 60 boiler labels.

Figure 43: Boiler labelling campaign with local partner REGEA and household in the municipality of Zagorska Sela (Krapina-Zagorje County)

Figure 44: Boiler labelling campaign with local partner REGEA and household in the city of Klanjec (Krapina-Zagorje County)

Figure 45: Boiler labelling campaign with local partner REGEA and household in the city of Zaprešić (Zagreb County)

Figure 46: Labelling campaign with local partner REGEA and household in the municipality of Kumrovec (Krapina-Zagorje County)

Direct impact

The direct impact of the labelling campaign for 100 % renewable heating or cooling systems is that households that have replaced their old heating systems with renewable energy sources are now identifiable. By labelling their boilers, it serves as a visual cue to other households that it is possible to switch to renewable energy and that there are benefits to doing so.

The campaign also aimed to communicate the benefits of replacing old heating systems with renewable energy sources, such as reducing greenhouse gas emissions and saving money on energy bills. By familiarizing households with these benefits, the campaign may have encouraged more households to consider making the switch to renewable energy.

The visit to the four households and the distribution of 60 boiler labels by chimney sweeps and installers is a small but important step towards increasing awareness and adoption of renewable heating and cooling systems. These activities will continue beyond the project. Over time, as more households adopt renewable energy sources, the impact of this campaign will continue to grow.

Accompanying communication

The accompanying communication aimed to educate homeowners on the efficiency of heating RES systems. This was achieved by preparing suitable labels, handbooks, and other materials that presented the benefits of using such systems. Once contact was established with the homeowners, the initiative's results were disseminated on the REPLACE website for wider reach and engagement.

6.2.3.6 Organization of regional field trips to best practice RHC systems

Field trips are among the most effective ways of stimulating a technology diffusion process and engaging potential users. A field trips has been organised in agreement with LWG members and their suggestions as they are mostly “on-the-field” and are aware of the best options for this kind of activity.

The invitation by REGEA was accepted by 7 participants. In total 9 participants were part of the study tour (incl. 1 representative from REGEA and 1 house owner).

Reasoning why activity is classified successful

REGEA, in collaboration with LWG members, organized a study tour to an exemplary household in Krapina-Zagorje on May 19, 2022. The purpose of the field trip was to stimulate a technology diffusion process and engage potential users by showcasing a combined 45kW log/pellet boiler with 2 buffer storage tanks of 2000l and one solar boiler of 300l installed in practice. The field trip was attended by 7 participants who were accompanied by 1 representative from REGEA and 1 house owner, making a total of 9 participants.

The exemplary household is located in Velinci, a small village that belongs to the Municipality Kumrovec. The house was built in 1985 and previously supplied with heat by a gas boiler built in 1995. The house has a living area of 350 m² and accommodates two families with a total of 6 people. By replacing the old heating system, the house inhabitants got a new and more reliable heating system, and they have no objections regarding the use of the new system.

The heating and preparation of domestic hot water is provided by vacuum solar panels located on the rooftop of the house. The use of log wood enables the inhabitants to reach the desired temperature in all rooms and to reach lower heating costs. The heating system is fully automated and can adjust the desired temperature in all rooms of the house.

The owner of the house does not experience any problems with noise or dust since the system was installed in the basement. In the first years, their economic savings were very large, up to 50% lower energy bills in comparison to the previous system. The replacement of the heating system is also environmentally friendly because the CO_2 emission factor for the gas boiler per energy unit of fuel is 0.22 kg CO_2/kWh, and for log wood is 0.00 kg CO_2/kWh.

The investment in this system amounted to around 15,000 EUR. The investment was realized from the house owner's funds and subsidies received from the Environmental Protection and Energy Efficiency Fund (EPEEF) within the public call Energy renovation of family houses. The heating system replacement generated massive energy savings, but also savings on the energy bills, providing a practical example that can inspire visitors (end consumers) to replicate and continue to replace inefficient heating systems in other regions as well.

Figure 47: Regional study tour – combined log wood/pellet boiler installed in Municipality of Kumrovec (Krapina-Zagorje County)

Figure 48: Regional study tour – combined log wood/pellet boiler installed in Municipality of Kumrovec (Krapina-Zagorje County)

Direct impact

The direct impact of organizing a study tour is the engagement of potential users. By showcasing a practical example of a successful and cost-effective heating system replacement, the organizers hope to inspire end consumers to replicate and continue to replace inefficient heating systems in other regions as well. In total seven people participated in the study visit.

The study tour provides an opportunity for the attendees to see the system in practice and ask questions about its performance, installation, and costs. This first-hand experience can increase their understanding and trust in the technology, which can lead to increased adoption rates. Additionally, the study tour can serve as a platform for sharing best practices and exchanging ideas among the participants, which can lead to the development of new collaborations and partnerships.

Accompanying communication

The accompanying communication for the regional visit to the household that already had installed a RES heating system was localized and targeted towards the members of the LWG and stakeholders from the target regions, particularly local authorities. The stakeholders then spread the news to end-consumers in one small rural municipality. This action was also advertised on the REPLACE website, ensuring that a wider audience could learn about the benefits of renewable energy systems. The targeted approach enabled stakeholders to engage in the regional visit and provided an opportunity to learn from the experiences of a household that had already implemented a renewable energy system.

6.2.3.7 Conduction of Webinars on the usage of the consumer-friendly "REPLACE your Heating System Calculator"

To promote the "REPLACE your Heating System Calculator" REGEA organized webinars for consumers for target regions in North-west Croatia. The webinars included several sections: Introduction about REPLACE; REPLACE calculator; online technology briefs and importance of heating systems replacement; multiple benefits.

Reasoning why activity is classified successful

Webinars offer great potential of reaching out to multiple stakeholders in an interactive and engaging manner. For this reason, two webinars have been organized for different types of target groups.

The first webinar was held online on the 13th of April 2022 as a part of the round table called – Financing the green transition in multi residential buildings and industry, which was organized by REGEA. The roundtable was related to combining European structural and investment funds and private capital for financing energy efficiency measures and energy renovation of multi-apartment buildings. Involving experts from various fields created opportunities for cooperation and shed new light on responding to the challenges of aligning all available funding sources and strategic documents.

The webinar gathered 30 participants, targeting municipality representatives, policy makers and industry representatives. This event served as a good opportunity to present the "REPLACE you Heating System Calculator" to inform users that with it end consumers, intermediaries and investors can calculate planned heating replacement action beforehand and, with data from the regional situation, find out about the feasible CO_2 and economic dimension of the envisaged systems.

The second webinar on the "REPLACE your Heating System Calculator" was held on January 12, 2023, in a hybrid format that included both in-person and online participation. The primary objective of the webinar was to demonstrate the practical use of the tool to end-users. A total of 25 participants attended the webinar, including 20 in-person and 5 online.

The webinar emphasized the practical application of the tool, and the attendees were given a hands-on experience of using it. The interactive nature of the webinar provided an opportunity for attendees to ask questions and participate in discussions. The decision to hold the webinar in-person was influenced by the feedback received from citizens and consumers who preferred live interaction with the lecturer.Overall, the hybrid format of the webinar provided the best of both worlds, allowing for greater accessibility and flexibility while also providing a more personal touch for those who could attend in-person.

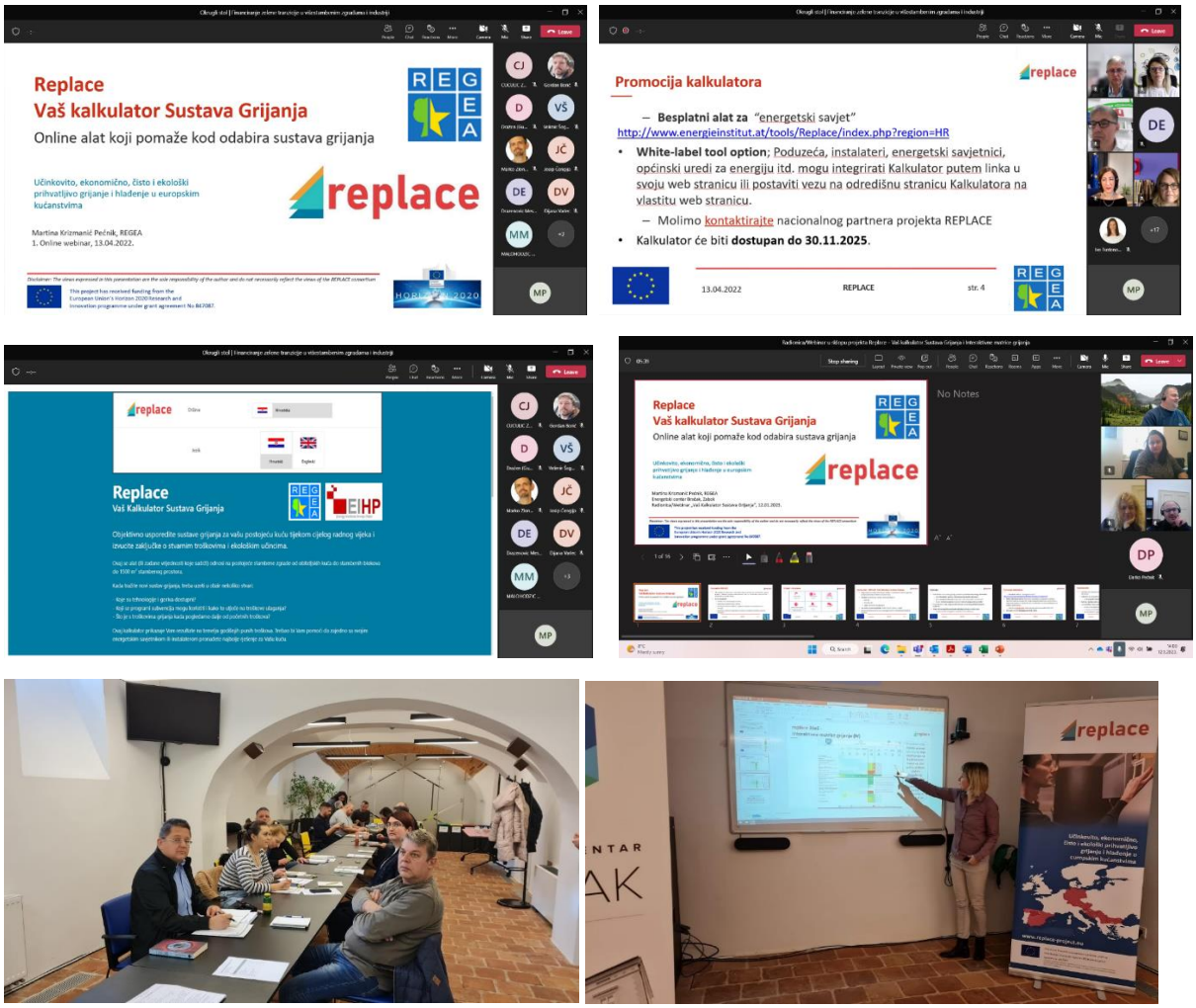


Figure 49: Photos of performed webinars in North-West Croatia

Direct impact

The direct impact of the webinars organized by REGEA for promoting the "REPLACE your Heating System Calculator" can be summarized as follows:

1. Increased awareness: The webinars served as an effective platform for disseminating information about the importance of heating system replacement and the benefits associated with it. Through the webinars, REGEA was able to reach out to a wider audience, including policymakers, industry representatives, and end-users, and create awareness about the various tools and resources available for promoting energy efficiency. In total 55 people participated in them.

2. Improved knowledge: By participating in the webinars, attendees gained a deeper understanding of the REPLACE calculator and the various technology briefs available. They were able to learn how to use these tools to assess the impact of different replacement support schemes and make informed decisions about green technologies.

3. Enhanced collaboration: The webinars provided an opportunity for stakeholders from different sectors to come together and share their knowledge and expertise. By collaborating with other experts, REGEA was able to identify new opportunities for funding and strategic

partnerships, which will help to accelerate the green transition and reduce greenhouse gas emissions.

4. Increased adoption: The practical demonstration of the REPLACE calculator during the webinars helped to encourage end-users to adopt energy efficiency measures. Attendees were able to see first-hand how easy it is to use the tool and how it can help them to save money on heating costs and reduce their carbon footprint.

Accompanying communication

The accompanying communication for the announcement of webinars was targeted and aimed to reach different stakeholders, including policy makers, installers, and households, as well as members of Local Working Groups and local authorities from all target regions. The announcement was made through the REGEA contact list, highlighting the importance of renewable energy systems and energy efficiency in households. The communication for the webinars was comprehensive and ensured that the information reached a wide audience, including those who could influence policy decisions and promote the use of renewable energy sources.

6.2.3.8 Information evenings on municipal level on replacement of oil and gas boilers by climate-friendly solutions

The experiences from Austria, Germany and other European countries showed that such events proofed to be successful and they are one of the key success factors for the involvement and participation of citizens from the very beginning in projects dealing with RES. Citizens and key stakeholders need relevant and reliable information to be convinced, motivated, and encouraged for taking the initiative and supporting the implementation process of renewable heating and cooling systems in their communities. Since relevant information about the potentials of renewable heating and cooling systems is still lacking in North-West Croatia, REGEA has with support of the LGW members held 2 events with local authorities, public bodies , NGO and citizens in the target regions.

Reasoning why activity is classified successful

The first information evening was held from REGEA with the city of Velika Gorica on May 22, 2021. The workshop was attended by 22 participants. The event focused on the measures related to the utilization of renewable sources for space heating of individual houses which are common outside of Velika Gorica's urban center. The aim of this workshop has been to inform the citizens about the opportunities identified in the cities SECAP to replace fuel boilers with sustainable heating solutions. The workshop has been organized in and focused on the rural community of Buševec, population of roughly 900, located in the southern part of the city of Velika Gorica. Buševec has a newly established energy community which aims to develop sustainable energy projects in the area, an activity which the project REPLACE is greatly supporting.

REGEA will continue to support the local Energy Community in the engagement of citizens and local stakeholders in the development of the system, model and the overall energy transition of their community and region through the REPLACE project.

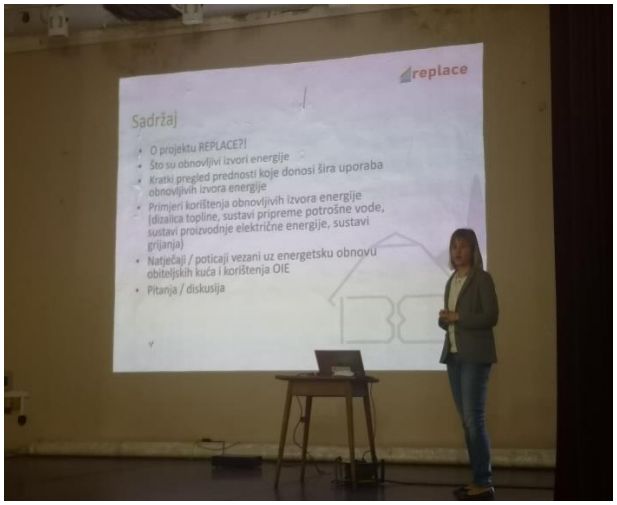


Figure 50: On-site information's evening for end consumers to replace fuel boilers in the rural community of Buševec

To attract the most relevant set of stakeholders, REGEA has, with the Municipality of Krapinske Toplice organized on 16th of July 2021 a second on-site information's evening for end consumers and relevant local stakeholders. The workshop was attended by 16 participants.

The REPLACE handbooks for end consumers developed within project were distributed to participants of the event with some technical materials of equipment manufacturers who deal with the installation of systems on renewable energy sources.

The main goals of the on-site information evenings for end consumers to replace fuel oil boilers was the following:

- Informing citizens about the purpose and objective of the project,
- Highlighting advantages of the renewable heating and cooling systems as well as communicating the benefits of the boiler replacement.
- Presenting the necessary steps to realise the project;
- Creating acceptance and confidence;
- Stimulating discussions among the citizens about the project;

- Showing different technical options and explain management models, use best practice.

The activity of holding two on-site information evenings for end consumers to replace fuel boilers can be considered successful for the following reasons:

1. Successful engagement of citizens and stakeholders: The workshops were attended by a total of 38 participants, including local authorities, NGOs, citizens, installers, plumbers, and chimney sweepers. This indicates that the events were successful in attracting the relevant set of stakeholders.
2. Dissemination of information: The events provided relevant and reliable information about renewable heating and cooling systems and the benefits of replacing fuel boilers. Participants were given handbooks, technology briefs, and technical materials from equipment manufacturers to further their knowledge and understanding.
3. Building confidence and acceptance: The events were successful in creating acceptance and confidence among citizens and stakeholders by presenting the necessary steps to realize the project and highlighting the advantages of renewable heating and cooling systems.
4. Stimulating discussions: The events successfully stimulated discussions among citizens about the project, which is an indication that the participants were interested and engaged in the topic.

Figure 51: On-site information's evening for end consumers to replace fuel boilers in the Municipality of Krapinske Toplice

Direct impact

The on-site information evenings were well received by the participants, who showed interest in replacing their fuel boilers. Many of the participants were able to gather valuable information and ask questions directly to the experts. This direct interaction was crucial in addressing the participants' concerns and helping them make informed decisions.

In summary, the direct impact of the events organized by REGEA with support from LGW members can be seen in the increased awareness, participation, confidence, and knowledge among citizens, local authorities, NGOs, and other stakeholders about the potentials of renewable heating and cooling systems, advantages of replacing fuel boilers, and the necessary steps to realize the project.

Accompanying communication

The accompanying communication for the information evenings on replacing oil and gas boilers with climate-friendly solutions was localized and targeted towards specific communities. The information was disseminated through members of working groups, the household's council of the municipality of Krapinske Toplice, and the local community Buševec in the city of Velika Gorica. Additionally, the information was made available through an online portal in the city of Velika Gorica. The accompanying communication ensured that the message was delivered to the intended audience, encouraging them to take action towards climate-friendly solutions. The approach of disseminating information through working groups, local councils, and online portals enabled the message to reach a wide audience and created opportunities for discussions on the topic in local communities.

6.2.4. Less successful activities

6.2.4.1 Facilitating the realization of collective actions

Collective actions were less successful because they could not be carried out according to the activities planned in the project. This activity has proven to be quite challenging in whole Croatia, not only in the target region North-West Croatia. In Croatia, the principle of collective action is not widely practiced, which contributes to a lack of trust among citizens and reluctance to participate in joint initiatives. Financial considerations, such as credit debt and low standard of living, are significant challenges for citizens to independently fund activities related to the replacement of heating systems.

Reasoning why activity is classified less successful

In Croatia, collective actions for boiler and oven replacement in households are uncommon, and the concept of collective action in the heating and cooling sector is not well understood or utilized. Joint actions of citizens, such as group purchases of equipment or municipal efforts to benefit consumers, have not been adequately promoted or recognized. Individual reluctance to participate in joint investments may be due to factors such as mistrust, lack of information, difficulty obtaining collective credit, or inadequate tenant protection mechanisms.

REGEA collaborated with the LWG in the target region North-West Croatia to identify collective actions for increasing energy efficiency in buildings. Ideas such as joint heating system replacements, thermal insulation, and joint procurement of pellets were discussed, but there was no citizen interest in carrying out independent actions due to lack of financing and subsidies. This made it challenging for municipalities to help with implementation of the mentioned collective action.

At the end of 2021, the Environmental Protection and Energy Efficiency Fund in Croatia issued a call for co-financing the energy renovation of existing family houses. The aim of this initiative was to reduce monthly costs for citizens in the long term and achieve better energy efficiency for their homes. To facilitate the application process, REGEA provided free counselling to citizens through 3 established information hubs in Krapina-Zagorje County, Karlovac County, and Zagreb County and the City of Zagreb. REGEA also created a short leaflet that summarises the content of the public call, making it easier for citizens to prepare the necessary documentation. By providing support to citizens in the target regions in the preparation of documentation for the public call, REGEA aimed to increase citizen

participation and help more households benefit from this program. Overall, this initiative was a significant step towards improving energy efficiency and reducing energy costs for Croatian households. The call for co-financing and the support provided by REGEA has encouraged active participation from citizens in the target regions. The fact that 1,000 citizens applied for the tender from these regions is proof that people have become more engaged and understand the significance of sustainable development. This increased participation is an important step towards achieving long-term energy efficiency and reducing the carbon footprint of Croatian households. The awareness-raising campaign was successful in engaging local communities in the process.

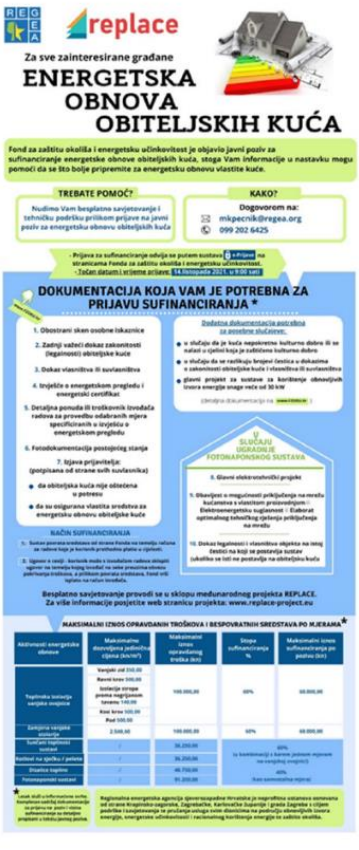


Figure 52: Leaflet made by REGEA which summarises the content of the Public Call from Environmental Protection and Energy Efficiency Fund in Croatia for co-financing the energy renovation of existing family houses

Lessons learned and recommendations: The action highlights the importance of providing support and resources to citizens to increase their participation in sustainable development initiatives. It also demonstrates the need for clear and simplified communication to ensure that citizens understand the requirements of funding applications. The call for co-financing of energy renovation of family houses is an important step towards reducing energy consumption and promoting sustainable living. REGEA's role in providing free counselling and assistance in preparing documentation is commendable as it has made the process easier for citizens. The high number of applicants is a positive sign that people are willing to adopt sustainable practices and take steps towards reducing their carbon footprint.

Two alternative workshops were held to promote collective actions in North-West Croatia.

REGEA organized a workshop on 8th of November 2021 on the benefits of renewable energy systems for 30 future engineers, during which they showcased the Energy Centre Bračak. The center is already equipped with various renewable energy systems, including a wood pellet boiler, micro-CHP, air-water heat pump, wall insulation, energy-efficient windows and doors, efficient lighting, HVAC system,

central BMS, rainwater harvesting, and wastewater treatment. In 2021, REGEA implemented a central battery system, photovoltaic system, and advanced energy management ICT system. The new systems are combined with the existing ones through the energy management system, which optimizes the utilization of all available assets. The photovoltaic system and battery system are connected to the billing metering point of the center, and surplus energy is stored in the battery. The technical tour of the center showcased how the installed combinations facilitate the utilization of heat pumps as self-consumption from PV can be increased in such cases.

Figure 53: Future installers of heating and air conditioning systems from Bedekovčina High School visited the Bračak Manor

The use of renewable energy systems in the Bračak Manor reduces carbon emissions and energy consumption, while the advanced energy management system ensures the optimal use of available assets, thereby contributing to the overall goal of promoting energy efficiency and sustainability in the region. The workshop organized by REGEA and the technical tour of the Energy Centre Bračak also play a crucial role in educating and inspiring future generations of engineers to embrace renewable energy systems and contribute towards building a more sustainable future for all.

The second workshop held by REGEA on December 12th, 2022, was an educational event aimed at building managers/janitors and locals of Krapina-Zagorje County to teach them how to efficiently use energy and manage heating systems in buildings/houses. With disruptions in the energy market leading to high energy prices, it is more important than ever to use energy effectively During the workshop, the handbooks that were created as part of the REPLACE project were distributed.

After the lecture, 60 participants had the opportunity to visit the photovoltaic power plant on the roof of the Zabok General Hospital and the Energy Center Bračak to learn more about efficient energy use. REGEA has developed short guidelines for energy-efficient management of heating systems in buildings in Krapina-Zagorje County. These guidelines include a set of measures to carry out the necessary activities of establishing functional heating systems and promoting more efficient use of energy for heating. By implementing these guidelines and changing behaviour, building managers and locals can achieve energy savings and contribute to a more sustainable future.

Figure 54: Participants listen to the workshop called how to efficiently use energy and manage heating systems in buildings/houses

Figure 55: Participants at the photovoltaic power plant on the roof of the Zabok General Hospital

Direct impact

Through the promotion of funding possibilities and the provision of free counselling and information hubs, citizens were encouraged to participate in the tender published by the Environmental Protection and Energy Efficiency Fund. As a result, 1,000 citizens applied from target regions for the tender, indicating that people have changed their behaviour and understand the importance of sustainable development. REGEA organized two workshops aimed at promoting renewable energy systems and energy efficiency. The first workshop showcased the Energy Centre Bračak, which is already equipped with various renewable energy systems and an advanced energy management system that optimizes the utilization of all available assets. The second workshop educated building managers and locals on how to efficiently use energy and manage heating systems in buildings/houses, with a focus on adopting habits, procedures, and technical solutions that reduce unnecessary consumption while maintaining desired living and working conditions. The workshops and technical tours play a crucial role in educating and inspiring future generations of engineers and building managers to embrace renewable energy systems and energy-efficient practices.

Accompanying communication

The accompanying communication aimed to encourage consumers to participate in the tender published by the Environmental Protection and Energy Efficiency Fund. The information was advertised through the channels of target counties, with one online portal in the Zagreb County used for promotion. To specifically invite relevant stakeholders to the two workshops on efficiently using energy and managing heating systems in buildings/houses, REGEA sent out emails to target stakeholders. The stakeholders included local authorities, school janitors, building managers, heating engineers, future engineers from high school, and chimney sweeps. The event was also promoted via social media, website, and the target region Krapina-Zagorje County.

SWOT

One SWOT analysis is suitable for all activities because they are subject to the same changes. A comparison between the strengths, weaknesses, opportunities, and threats of both successful and less successful activities implemented in the North-West Croatia region can be observed in the table below.

Table 17: SWOT of successfully and less successfully implemented activities in North-West Croatia region

	Helpful to achieving the objectives	Harmful to achieving the objectives
Internal origin (attributes to the implementing bodies)	**Strengths** - Showcasing best practice examples - Knowledge exchange and capacity building - Reasonable and not too high investments from households	**Weaknesses** - Lack of motivation of end-consumers - Shortage of installers and energy advisors - Lack of individual finance - Reluctance to changes of legislation and administrative procedures
External origin (attributes to the environment)	**Opportunities** - State-of-the-art technologies and heating concepts available - Completed technical studies which are ready for implementation - Environment with knowledge for implementation of new business models	**Threats** - Drastic increase in all fuel prices due to the energy crisis - Lack of national legislation on various energy topics - Lack of national legislation on energy communities and collective actions

6.2.5 Addressing of horizontal aspects (gender, poverty etc.)

REGEA's target region North-West Croatia incorporated and discussed issues such as rebound, lock-in effects, gender aspects, and energy poverty issues throughout all their activities under the REPLACE project. At the Local Working Group meeting, the LWG members discussed how to tackle these issues and through which activities they should be addressed. The audience at various REPLACE events also raised these questions and provided feedback.

In North-West Croatia the implemented REPLACE campaign helps as well to tackle energy poverty. This campaign aims to raise awareness of the rational use of energy and provide information and education to households, especially those that are more likely to experience energy poverty. The campaign also

helps households to receive subsidies for the replacement of old and inefficient heating systems with more energy-efficient and climate-friendly options, such as solar thermal systems and heat pumps. In addition, information hubs were established in target regions to provide independent, technology-neutral advice for end consumers, including information on modern heating and cooling equipment, planning guidance, and energy-saving tips. The established three info hubs have considered horizontal aspects such as gender and poverty, by providing information and resources that are accessible and relevant to all members of the community. This includes information on financial incentives for low-income households and resources for women who are interested in renewable energy.

To address gender aspects of energy poverty, it is crucial to directly involve women, as they are often the primary domestic energy users. However, women face major obstacles in switching from consumers to energy-oriented entrepreneurs, employees, and policymakers.

To overcome these obstacles, initiatives such as the REPLACE campaign provide gender-sensitive policies and training opportunities for women, as well as access to information and technical and business training. In addition, the campaign ensures that women and men have equal access to finance and consideration in public engagement programs. This helps to encourage women to embrace renewable energy solutions and support a just transition to more sustainable and inclusive development.

6.2.6 Activities that may remain beyond project life

REGEA has found that creating pre-feasibility studies for the replacement of heating systems is a successful and necessary activity, and therefore will prioritize its continuation. By doing so, REGEA will be able to preserve the advantages provided by the REPLACE calculator. Furthermore, REGEA plans to utilize and share all project materials generated during the project at future events hosted by the organization. The activities that will continue beyond the project include the 100 % RHC labelling campaign, which has already presented 64 awards and produced 86 signs for perpetuation. The REPLACE project in North-west Croatia aimed to promote sustainable energy use by bridging the gap between citizens and available funding opportunities for renewable heating and cooling systems. Through an intermediary campaign, local partner REGEA provided technical assistance to authorities and subsidies for over 100 end consumers. The policy measures implemented by the project serve as an excellent example of sustainable energy and heating system planning on a local level. This activity will continue beyond the project life and plans to share experiences with other authorities to identify innovative financing solutions will also be elaborated. The successful implementation of the REPLACE project in Krapina-Zagorje County and Zagreb County has led to its expansion to the city of Velika Gorica. The city has allocated funds for the co-financing of renewable energy systems for households and has announced three public calls for citizens to install such systems. The first round of applications received 15 submissions, out of which four were approved for co-financing. Following the success of the first call, the city plans to publish a similar public call in 2023, indicating that the initiative is set to continue beyond the scope of the initial project.

The formation of information hubs is a long-term activity established by the REPLACE project. These hubs contain promotional materials that consumers can access to gain more information about the project. The duration of this activity depends on the availability of materials and the willingness of experts to answer consumers' questions.

6.2.6.1 Institutionalised or longer-term anchored activities

The activity that can be seen as established for longer term is the formation of information hubs. They include most of the promotional materials of the REPLACE project, and any consumer can take them and read them to gain more information. The activity would of course last as long as the material is available and if there are experts willing to answer consumers' questions.

6.2.6.2 Potential follow-up actions or continuity

The implementation of various activities has the potential to yield valuable experiences and knowledge that can be used to improve and replicate similar initiatives in the future. The REPLACE activities have not been limited to the pilot regions, and it is expected that they will be implemented in other parts of Croatia in the future. Educational training sessions have proven to be an effective platform for networking and sharing experiences, which has been greatly needed. In the future, there are plans to organize various types of training sessions that will make use of the materials produced within the project. Through the implementation of REPLACE activities, there is a possibility of gaining valuable experiences and knowledge that can be used to improve similar initiatives in the future.

6.2.7 Added value of the project Replace to the pilot region

Regional field trips organized by REGEA have been proven to be highly motivating for participants. Even those who were unable to attend expressed enthusiasm for the promotion of RES sources in this way. Participants found the events to be a valuable opportunity to learn from installers, experts, and owners about their first-hand experiences and the challenges they faced. REGEA plans to suggest similar activities in future projects and promote them on social media to encourage other companies to organize similar events.

The North-West Croatia region has greatly benefited from the REPLACE project as it introduced and implemented numerous activities that were previously unavailable in the area. The success of the REPLACE project can be attributed to its intensive campaign aimed at providing support and information to end-users, which has yielded impressive results. The project has empowered end-users with tools that they can use independently, allowing them to make informed decisions and take control of their energy usage. The involvement of all project stakeholders, including decision-makers, intermediaries, and end-users, has facilitated meaningful dialogue, leading to significant improvements in the sector. By bringing together various stakeholders, the REPLACE project has fostered collaboration and cooperation, which are essential for a successful transition towards sustainable energy.

6.2.8 Lessons learned from the action and recommendations

The process of replacing a heating system is complex, and lack of knowledge and prejudices hinder the decision-making process. It is essential to educate citizens continuously, in addition to providing financial support and a stable market, on the aspects and benefits of heating system replacement. Energy efficiency measures should be prioritized alongside system replacement, and stakeholders should be engaged through educational activities and access to adequate information. To ensure safe and effective installation and maintenance of heating systems, training and certification programs should be developed for installers and chimney sweepers. Finally, intermediaries and financial institutions should be engaged to increase financing options for energy efficiency projects.

The campaign in the target region North-West Croatia aimed to encourage consumers to choose environmentally friendly heating options. It educated consumers about their possibilities and directed them to experts and websites to make informed decisions. Despite challenges such as the need for changes in the legal framework and addressing energy poverty and lack of subsidies, the local partner REGEA raised awareness and laid the foundation for further discussion.

6.2.9 Transfer of experience for other regions and countries

The REPLACE project has provided valuable knowledge and experience to the North-West Croatia region in implementing an effective energy transition. The project's success has highlighted the importance of focusing on end-users when addressing energy-related issues. REGEA plans to continue sharing its knowledge and implementing new projects to promote the necessary energy transition in the region. REGEA collaborates with different companies and institutions in the renewable energy sector and aims to encourage other businesses to participate in such projects in the future.

7 | Croatia: Primorsko goranska County

7.1 Recap of the first action plan

In Primorsko-goranska County, Local Working Group (LWG) meetings were held continuously. During the meetings, all the project activities were discussed. The information provided by the LWG members was of great value in achieving our goals, since they had valuable inputs on the events which are planned and how to motivate end consumers.

An overview of proposed activities according to the first action plan is shown in the following table. No changes were done in terms of selected project activities, however, some of them were pursued in a different form, which will be described in more detail in the following subchapters.

Table 18: Overview of proposed activities according to first action plan for Primorsko goranska County

Activity	**Status**
1. Labelling of boilers	Pursued further
2. Techno-economic pre-feasibility studies	Pursued further
3. Establishment of REPLACE (R)HC replacement information hubs	Pursued further
4. Heating system replacement info at consumer fairs and festivals	Pursued in a modified form (re-designed)
5. Open cellar/house events	Pursued further
6. Regional field trips to best practice RHC systems	Pursued further
7. Supporting installers and/or energy utilities/service companies to become plant (+ energy efficiency) contractors	Pursued in a modified form (re-designed)
8. Facilitating the realization of collective actions	Pursued in a modified form (re-designed)

As it can be seen, none of the activities were discarded, however, some of them were modified due to various external factors and reasons.

One of the main obstacles during 2020 and 2021 was the COVID – 19 which caused a halt in a lot of project activities. The most affected were activities that can be performed only physically (e.g., open day house event, regional field trip etc.). However, the pandemic also affected the ability to establish further contacts and communication with other stakeholders to define the activities. Other than COVID-19, the activities were affected by the drastic increase in energy prices in Europe in 2022 (e.g., lock-in effect of consumers choosing to buy the newer version of their non-renewable system) and other reasons described in the following subchapters.

The activities that were most affected were: at large consumer fairs and festivals; supporting installers and/or energy utilities/service companies to become plant (+ energy efficiency) contractors; facilitating the realization of collective actions.

7.2 Activities implemented and tested

7.2.1 New activities

New activities were not pursued, as EIHP decided to implement all the originally proposed activities.

7.2.2 Overview of performed, tested & fine-tuned activities

The following table gives an overview of the implemented activities, as well as their preparation and implementation phase.

Table 19: Overview of activities and their preparation and implementation phase in Primorsko goranska County

	Recent Status Quo	**Starting point & fine-tuning**	
Activity	Short description	Preparation phase	Implementation phase (re-design)
1. *Labelling of boilers*	Labeled several houses with non-renewable heating systems in Primorsko-goranska County	June 2021: Design and printing of the labels	Since April 2022: Implementing and labelling of houses, distributing the labels to local working group members, stakeholders and end-consumers
2. *Techno-economic pre-feasibility studies*	Conducted six techno-economic studies. All the old systems were fired by fuel oil, and proposed replacements included heat pumps and solid biomass boilers	June 2021 – April 2022: Identification of the buildings	April 2022 - February/March 2023: Data collection and conducting the pre-feasibility studies
3. *Establishment of REPLACE (R)HC replacement information hubs*	Established five information hubs at the premises of Energy Institute Hrvoje Požar, Renewable Energy Sources Croatia, REA Kvarner, City Hall of Mali Lošinj, City Hall in Crikvenica	Since February 2021: Identification of the potential locations	March 2021 – June 2022: Distribution of the materials to LWG members, other stakeholders and end-consumers; promotion
4. *Heating system replacement info at consumer fairs and festivals*	Identification of possible events to promote REPLACE	December 2021 – January 2023: Identification of possible events (e.g. Energy day of the city of Rijeka, Energy day of Primorsko-goranska County, Zagreb Energy week), contacting people who are in charge of the organization of such events January 2023: Establishing contact with the CEKOM LAB event organiser to present REPLACE	February 2023: Presentation and promotion of REPLACE at the event
5. *Open cellar/house events*	One case identified and visited: apartment with solar collectors; this best practice	October 2021: Identification of good practice example	April 2022: Visit to the best practice example

	example was show-cased during the presentation of REPLACE at other events	March 2022: Establishing contact with the homeowner	
6. . Regional field trips to best practice RHC systems	Organization of the regional field trip to an elementary school near the city of Rijeka which was identified as a best practice heating system example	February 2021: Identification of the best practice heating system	March 2023: Visit to the best practice heating system
7. . Supporting installers and/or energy utilities/service companies to become plant (+ energy efficiency) contractors	Organization of the webinar for installers	February 2021 – January 2023: Gathering information and looking into possible solutions	March 2023: Organization of the webinar
8. Facilitating the realization of collective actions	Organization of webinar for end-consumers	October 2021 – January 2023: Investigating possible options; identifying end-consumers who would be able to implement the collective action; due to low interest deciding on holding the webinar	March 2023: Organization of the webinar

7.2.3 Successful activities

7.2.3.1 Labelling for boilers by installers and chimney sweepers and accompanying folder

65 % of all installed space heaters in Europe achieve the energy label class C or D, which is quite low. The replacement decisions by consumers are mainly made in “emergency situations”, i.e. when the boiler is broken. Because of the importance to solve this “emergencies” fast, there is no time for the informed decision and in most cases the exchange is made in terms of replacing the defective part, i.e. the fuel remains the same. To overcome this problem, the proper and on-time informing of consumers is important.

Reasoning why activity is classified successful

EIHP placed several labels on old and inefficient systems in households. Furthermore, EIHP distributed the labels to local stakeholders and members of the Local Working Groups. Also, EIHP personnel distributed the boiler labels during other events within this work package: open house day event, information hubs and at any event where EIHP staff held a presentation of REPLACE. Therefore, a large number of end consumers was affected by this action, not only the ones where the label was placed, but also the visitors to their homes who saw the labels.

Figure 56. Example of REPLACE boiler labelling in Primorsko-goranska County

Direct impact

Other than the households where EIHP placed them, the boiler labels were also distributed to local stakeholders and members of the Local Working Groups who further distributed them to their network of end-consumers. Therefore, a large number of end consumers was affected by these actions, not only the ones where the label was placed, but also the visitors to their homes.

7.2.3.2 Conduction of six techno-economic feasibility studies

In collaboration with the key stakeholders, six cases were identified in the Primorsko-goranska County. Prior to conducting the techno-economic feasibility studies, all identified beneficiaries were contacted, introduced with the REPLACE project and all the necessary information was provided.

Reasoning why activity is classified successful

Data collection for all studies was carried out in face-to face visit, while the consumers were contacted beforehand via phone calls. Data collection for the analysis was carried out carrying in mind all the parameters required for the REPLACE your Heating System Calculator which was utilized in order to perform the analysis. The results of the data analysis were the base for the techno-economic feasibility studies.

EIHP was obliged to perform analysis for the households described in the following table. In the table the REPLACE options for the new system are also indicated. Not all of them could be implemented, for example, there is no district heating network on the islands of Cres and Lošinj where some of the studies were conducted, therefore for those households' other options were suggested. In the final column is shown the selected option.

Table 20: Prefeasibility studies in Primorsko-goranska County

Building type	Number of studies	Current heating system	REPLACE option	Selected final option
Single family house	3	Fuel oil	Heat pump	Heat pump
Multifamily house	2	Fuel oil	District heating system	Wood pellet boiler
Large volume building (multi-apartment building)	1	Fuel oil	Solid biomass boilers (e.g. wood pellets)	Wood pellet boiler

In the following figure pictures of the face-to-face meetings which were conducted in order to gather all the necessary data for the pre-feasibility studies are shown.

Figure 57: Face-to-face visit to gather the necessary data in Primorsko goranska County

Direct impact

The number of consumers influenced is six homeowners and all the household members who live there, but it is expected that when the analysis was performed, the consumers further communicated with others about the results, and therefore encouraged them to think about replacing their systems.

7.2.3.3 Establishment of REPLACE (R)HC replacement information hubs

This action is of great importance for making progress towards more informed consumers. The implementation strategy for this action included offering materials produced within the project, e.g. flyers, posters, rolls ups, technology briefs, handbooks, information on REPLACE offers and activities.

Reasoning why activity is classified successful

The first REPLACE information hub was implemented in RES Croatia. The primary goal of the association is to encourage a general social agreement that the future of Croatia is in renewable energy sources. RES Croatia advocates new business models in the energy industry which have a huge potential for the introduction of innovations. Renewable energy sources projects offer the possibility of more qualitative financial partnerships and regional development through investments of citizens

and entrepreneurs in projects by way of group financing. Therefore, this was a perfect setup for the REPLACE project activities.

Other information hubs include those which were established at the premises of EIHP, REA Kvarner, City Hall of Mali Lošinj and City Hall in Crikvenica.

In the following figures the promotional materials at the information hubs can been seen.

Figure 58: Information hubs in Primorsko goranska county

Direct impact

The number of impacted consumers is potentially large. The materials were presented in person when the information hubs were established, but since they were continuously present at the premises of selected stakeholders and EIHP, anyone who was interested could take the materials and ask any questions they might have.

7.2.3.4 Open day/house events regarding best practice RHC systems

For the implementation of this action, it was necessary to select a household as a good practice example and make engagement strategy for the owner of the household in order to invite participants of the event. Organisation activities were performed by EIHP.

Reasoning why activity is classified successful

For the purpose of this event, invitations were sent to the potential participants via e-mail in which they were asked to confirm their participation. The implementation of this action was supported by photographs and signed participants list. In addition to publishing the news of the event, EIHP provided a brief overview of the organized event by publishing it on its website and LinkedIn.

EIHP contacted Mr Šarlija who has a house with six rooms and uses a log wood boiler to cover the necessary heating demand, solar panels to cover the electricity consumption and batteries which store electrical energy. He often resides there during the summer when his energy demands are quite high and the whole space must be cooled in order to ensure comfort for all residents. The system is operating since 2015 and is very interesting because it does not have a connection to the electrical grid. Therefore, the homeowner had to think of a way to satisfy the demands of the residents. In 2021, Mr Šarlija measured a total electricity demand of 5.200 kWh, which was covered by renewable solar system. He is very interested in implementing a heat pump, since it would not require any additional

maintenance (e.g. there is no need to bring wood) and it would work well with the solar system. He had some questions regarding the implementation of that system, and EIHP experts provided the answers.

Mr Šarlija was very motivated to show all those who attended how the system works and noted how satisfied he was with the system, highlighting all its' benefits. He encouraged everyone who is considering implementing cleaner and greener systems that it is worth it and that they should install it in their homes. He has also gone the extra mile and brought to the event his installer who was overseeing the whole process of installation, selected the equipment and performs regular maintenance, so he answered technical questions about the system.

Throughout the whole process, EIHP had a very good cooperation with everyone involved; from the City of Mali Lošinj with their help in finding the location and by inviting citizens to the event, to the owner who was very open to sharing his experience and the participants who showed a lot of interest in the topic. The participants had a lot of questions, and the host encouraged them to consider installing renewable energy systems into their homes. The conclusion is that these kinds of events are very useful and can help all those who are interested to take that last step and decide on a better renewable option for their home.

Figure 59: Open day house event in Primorsko-goranska County

Direct impact

The number of participants was 13. However, EIHP published the news of the event on its LinkedIn, therefore, the news of the event was spread even further.

7.2.3.5 Organization of regional field trips to best practice RHC systems for consumers/intermediaries/investors

Field trips are one of the more impactful ways to promote renewable technologies since they show their specific and direct impacts.

Reasoning why activity is classified successful

The good practice example which was selected for a fild trip was the Elementary school "Jelenje-Dražice" in Dražice, which is a village very close to the city of Rijeka. The organization of field trip was performed by EIHP and it was held on 14th March 2023. For all registered participants, a bus transportation was organized, as well as lunch at a restaurant since it was an all-day event.

The presenter of this good practice example was Mr. Dražen Lisjak, who has extensive experience in designing biomass systems though his work at the company Biomass group Ltd. Therefore, he had the most accurate data to present to the participants.

The visit started with a presentation of all the components and parameters. After that, the participants had a lot of questions, so the discussion was fruitful. The pellet boiler has an installed capacity of 250 kW, while the distribution system in the school is floor heating. The system is operating from 4 a.m. to 5 p.m. The system is automated and the technician, as well as the designer of the system at Biomass group Ltd., can see the parameters in real time. Maintenance is also done by the company Biomass Ltd. regularly, two times a year. The presenter discussed that this new boiler system reduces the amount of ashes to a minimum, specifically around 0.3 % compared to the amount of pellets. The school has a technician who collects the ashes, and then the local utility company collects them and transports them to the disposal site. Croatia has four companies which transport pellets to consumers. The pellets are brought to the machinery room through a 5x5 meter port. A solar thermal system was also considered when the project was in the design phase because the boiler supports that type of system, but it was concluded that during summer, when solar energy could be maximally utilized, there are no students because of the summer break. Therefore, it was decided not to implement it. An interesting fact is that fuel oil is 30 % more expensive than wood pellets, and 50 % more than wood chips, so this is a clear sign that the investment in such systems is cost efficient.

Figure 60: Regional field trip to the Elementary School "Jelenje-Dražice"

Direct impact

In total, 21 participants attended the regional field trip and were directly influenced. In addition to EIHP's channels where the news of the event was posted, the popular and well-known web portals "energetika-net" and Novi list have also published the news, so the impacted number of consumers is estimated to be much higher.

7.2.4 Less successful activities

7.2.4.1 Informing consumers about (R)HC heating systems' replacements at large consumer fairs and festivals

Another great way of informing the general public about the activities of project and the replacement campaign is the attendance of the large consumer fairs and festivals, not only on a regional level but also on the national level.

Reasoning why activity is classified less successful

This activity has proven to be quite challenging. Namely, due to the COVID-19 pandemic and restrictions on large gatherings, the fairs were in large part cancelled or rescheduled. Therefore, it was hard to predict the time-frame for such activities.

EIHP researched possible events, however all of them were postponed due to COVID – 19. Furthermore, EIHP discussed this during the Local Working Group meetings. Based on the input of the LWG, EIHP contacted the City of Rijeka to present REPLACE at the Energy Day of the City of Rijeka,

however they informed us that the event will not be held due to poor interest of consumers. Furthermore, EIHP contacted REA Kvarner but did not get their feedback regarding the Energy Day of Primorsko-goranska County. Zagreb Energy Week was also considered, however, this event was unfortunately not held during the REPLACE project timeframe.

Still, EIHP presented the REPLACE project to the public at event in Rijeka on 17th February 2023 to the public. The event in question was "CEKOM DEMO LAB – Demonstration of part of the solutions created as part of the CEKOM Project for smart cities" and hosted 47 participants. During the presentation, special emphasis was put on the REPLACE Calculator and Heating Matrix. These tools were of great interest to the participants. They asked a lot of questions about different options and how to assess the parameters needed for the analysis.

Figure 61: EIHP presenting REPLACE at CEKOM DEMO LAB event

Direct impact

The number of participants was 48, however, the impact was higher as most of the stakeholders communicated about the event via their social media platform after the event.

7.2.4.2 Supporting installers and/or energy utilities/service companies to become plant (+ energy efficiency) contractors

The purpose of this action was to encourage the installers and or energy utilities/service companies to expand their business with contracting models and to demonstrate a show-case example, as some of them already have a basis for growth and only require further information and advice on how to achieve that.

Reasoning why activity is classified less successful

EIHP researched the possible show-cases to be demonstrated, however, no such example was found. Therefore, it was decided to hold a webinar for installers, as planned, called "Podrška u poslovanju instalaterima/uslužnim tvrtkama" (engl. "Support in the business operation of installers/service companies"). The event was well attended, bringing together 15 participants.

After the introduction of the REPLACE activities, Mr. Andro Bačan from EIHP held the presentation "System of certification of RES installers in the Republic of Croatia". The legal framework was presented, with emphasis of the RED II Directive and Croatian Law on Energy Efficiency. The process

and reasons for certification and education was addressed in detail. The description of the process for certification was explained and the database of certified installers of renewable energy technologies was presented. The expert highlighted the requirements for obtaining the certification for installers, with specification for various technologies (solar thermal systems, heat pumps, biomass boilers, photovoltaic systems).

The second presentation was about at solar thermal collectors and their installation. All the types of collectors and their principle of operation were described. After that, the basic mechanism of heat transfer and the results of an interesting analysis conducted in Fluent were shown. Lea Leopoldović, who was the second presenter from EIHP, described the relevant parameters which need to be considered: typical values of the flow, recommended number of collectors, efficiency of different types of collectors, the angle of inclination and the orientation of the collector etc. The process of connection and installation of collectors was described in detail, as well as the estimated return of investment which was compared to traditional fuels (gas, electrical energy). Standards and testing are an important aspect to be included in the implementation of solar thermal systems, as well as market trends, which were shown at the end of the presentation.

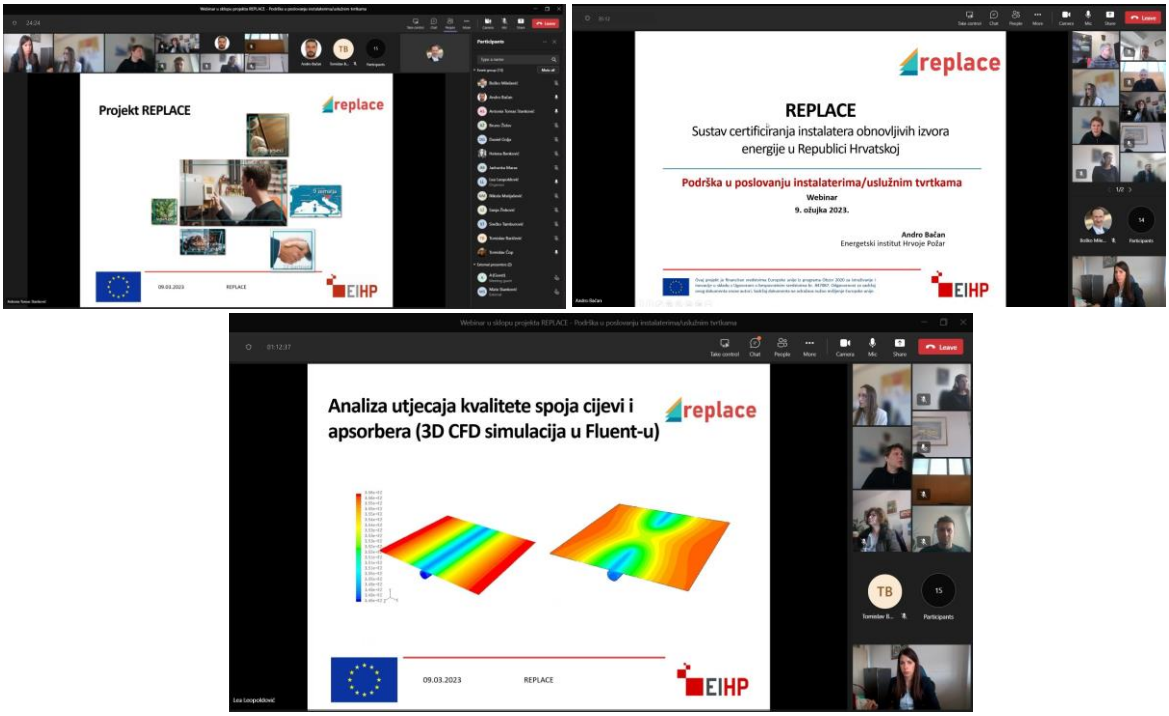


Figure 62: Webinar "Support in the business operation of installers/service companies"

Direct impact

The number of participants was 15, however, the estimated impact is higher because the news of the event was published on EIHP's website and LinkedIn.

7.2.4.3 Facilitating the realization of collective actions

The initial purpose of this action was to educate smaller groups so that they know which actions to take when building a local heating network, which can be effectively achieved by their combined effort.

Reasoning why activity is classified less successful

During 2020 and 2021 this activity could not be held due to the COVID-19 pandemic. The plans for this activity were further discussed during the LWG meetings, especially at the 4th one. As suggested by the LWG members, EIHP called the participants who applied for funding published by the Environmental Protection and Energy Efficiency Fund. EIHP asked them if they would be interested in a joint purchase of pellets for a discounted price which EIHP will negotiate with a pellet manufacturer. However, none of them were interested, therefore this action could not be pursued in the planned form.

Consequently, in February 2023, EIHP decided to make alterations, and to hold a webinar called "Olakšavanje realizacije zajedničkih akcija" (engl. "Facilitating the realization of collective actions"). EIHP contacted the Environmental Protection and Energy Efficiency Fund, as they have the best information on planned funding for renewables technologies in households. However, they responded that they will not be able to hold the presentation, namely because at that moment they do not have the information about the planned subsidizing tenders and were at the time dedicated only to processing of the previously received applications for funding. Despite this, EIHP was able to find experts in other fields to hold presentations on topics relevant to this activity.

The webinar's goal was to promote sustainable actions and contribute to better overall acceptance and understanding of the benefits of renewable energy technologies. Therefore, two external and one EIHP expert have held presentations on those subjects. The event was well attended, bringing together 17 participants.

Firstly, an external expert on biomass held a presentation on the topic of "Good practice examples of biomass in heating". Mr. Dražen Lisjak works at a company Biomass group Ltd. which specializes in the design of heating systems with biomass boilers for various objects: residential buildings, schools, kindergartens etc. The presenter described in detail the process from conceptual design to full functionality of the system, required documentation, main costs, etc. He also explained the difference between wood chips and pellets, and which would be appropriate for different objects and energy demands. Specific examples along with their costs were presented. After the presentation, the participants were interested in the process of pellet transport and how the problem of moisture in wood products is handled.

After that, another external expert, Mrs. Erica Svetec, held the presentation "Experiences and indicators of successful engagement of end-users in the of development and pilot projects of RES". She represented the company Green Energy Cooperative. Various projects in their field of work were presented, most of them concentrating on strong cooperation with end-consumers. She talked about the activities especially in the last two years and results from those projects. One of the main tools is an application which encourages users to increase their energy efficiency. She explained the most common questions they receive from citizens, highlighting that the consumers are very interested in the topic of renewable energy, but only in certain cases. For example, it is very important that the questionnaires are easy to understand so that they can complete them in a short amount of time, and also that the events they attend or consultations they receive are free of charge.

Finally, EIHP expert Lea Leopoldović talked about the REPLACE Calculator and Heating Matrices. She explained their purpose; namely that the REPLACE Heating Matrix is a tool which enables users to make a quick and easy decision on the type of system which would be appropriate for their house based on the energy characteristics of their home. For example, a person living in a residential house with an old, inefficient heating system can use it to see what the environmentally acceptable options are. The REPLACE Calculator can then be used to make a more detailed analysis of these options, especially in the economic sense. The participants commented that this is a great and useful tool to get quick and accurate recommendations.

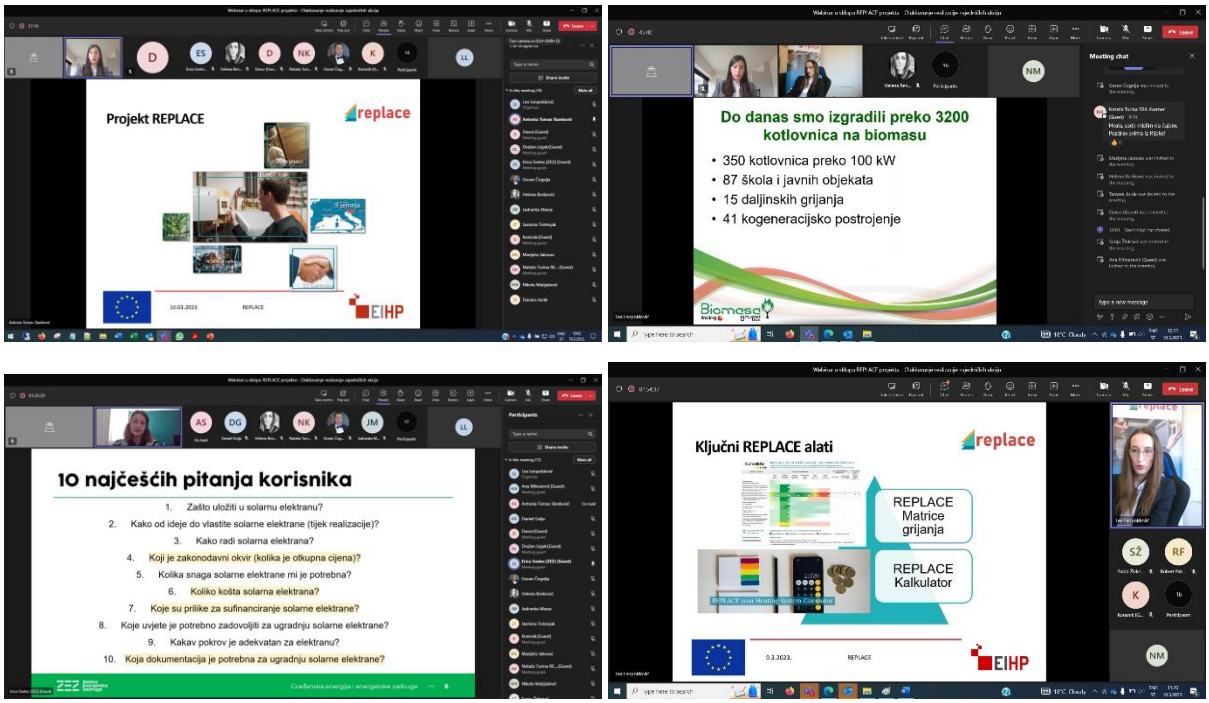


Figure 63: Webinar "Facilitating the realization of collective actions"

Direct impact

The number of participants was 17, however, the estimated impact is higher because the news of the event was published on EIHP's website and LinkedIn.

In the following table the SWOT analysis of all the described activities is shown.

SWOT

Table 21: SWOT of successfully and less successfully implemented activities in Primorsko-goranska County

	Helpful to achieving the objectives	Harmful to achieving the objectives
Internal origin (attributes to the implementing bodies)	**Strengths** - Showcasing best practice examples - Knowledge exchange and capacity building - Reasonable and not too high investments from households	**Weaknesses** - Lack of motivation of end-consumers - Shortage of installers and energy advisors - Lack of individual finance - Reluctance to changes of legislation and administrative procedures
External origin (attributes to the environment)	**Opportunities** - State-of-the-art technologies and heating concepts available - Completed technical studies which are ready for implementation - Environment with knowledge for implementation of new business models	**Threats** - Drastic increase in all fuel prices due to the energy crisis - Lack of national legislation on various energy topics

7.2.5 Addressing of horizontal aspects (gender, poverty etc.)

Within REPLACE, issues such as rebound, lock-in effects, gender aspects and energy poverty issues were discussed. In Croatian Primorsko-goranska County, EIHP tried to incorporate and discuss these issues through all the activities.

At the 3rd local working group meeting, one of the primary topics were these issues. The LWG members were asked how these issues can be tackled and through which activities should they be addressed. Additionally, at various REPLACE events these questions were raised by the audience and further commented.

For example, during the activities such as boiler labelling, data collection for techno-economic pre-feasibility studies and open day house event, these issues were commented on. EIHP informed participants of the most recent changes in legislation that affected their decisions, how to tackle gender and energy poverty issues, as well as lock-in and rebound effects.

7.2.6 Activities that may remain beyond project life

Some of the activities will remain beyond project life. These include the ones that had some form of promotional material that could be seen or further disseminated. Of course, REPLACE Calculator was highly praised by participants at all events where it was presented, so it can be assumed that it will be further used.

7.2.6.1 Institutionalised or longer-term anchored activities

The activity that can be seen as established for longer term is the formation of information hubs. They include most of the promotional materials of the REPLACE project, and any consumer can take them and read them to gain more information. The activity would of course last as long as the material is available and if there are experts willing to answer consumers' questions.

7.2.6.2 Potential follow-up actions or continuity

As mentioned in the previous subchapters, information hubs will remain beyond project life. Further printing of the promotional material would prolong this activity.

During the boiler labelling and data collection for the tecno-economic pre-feasibility studies, in addition to usual promotional material (pens, bulletin etc.), REPLACE folder was also handed out. It contained brief description of the REPLACE project, as well as the Handbook on heating and cooling technologies for end-consumers. The end-consumers were encouraged to share these materials with their friends/neighbours/relatives and in this way the promotion of REPLACE activities could remain after the project end.

Finally, actions presented at the webinar for the collective actions could be further realized. During the webinar, the topics on which biomass or solar systems would be suitable for the homes, as well as possibilities of subsidizing their new systems were discussed. Therefore, the advice the consumers got during the webinar could be implemented further, but this also depends on end-consumers themselves.

7.2.7 Added value of the project Replace to the pilot region

Open day house event and regional field trip have proven to be a great motivation to the participants. Even the participants that could not attend these events commented that they are happy to see that these type of activities are happening and that RES sources are promoted in this way. The activities were a great opportunity not only to ask the installers/experts on the heating systems, but to also ask the owners on their first-hand experience and the challenges that they faced. Spreading the news of these kind of events on its social media will motivate other companies to organize such events as well.

Also, EIHP organized the webinar for installers on 9th March 2023. The topics discussed were of great interest to the participants. They included the certification rulebook for installers and solar heating systems that could be implemented in the households. EIHP strongly believes that lessons learned at these webinars can be adopted and implemented by the installers and energy advisors in systems.

7.2.8 Lessons learned from the action and recommendations

The consumers were informed of their possibilities and encouraged to take further steps during the implementation of the campaigns. They were pleased to see that there are experts and websites where they can educate themselves and make more informed decisions. Therefore, the campaigns contributed to educating the consumers to choose more environmentally friendly heating options.

Of course, some challenges remain, such as the needed changes in the legal framework. Perhaps the most important obstacle is the energy poverty and the lack of subsidies. However, the EIHP addressed these topics during the performing of the activities and worked on raising the awareness, so the foundation for further discussion has been laid.

7.2.9 Transfer of experience for other regions and countries

EIHP works with and for a variety of companies in the field of renewable energy sources. By spreading the word of these type of projects, other businesses may be motivated to participate and pursue the activities such as the ones in this project in the future. EIHP will continue to promote its mission which is to contribute to Croatian, European, and global energy transition by multidisciplinary research, business consulting and knowledge transfer. Therefore, EIHP will keep spreading the word of the lessons learned during this project.

8 | Germany: Bavarian Oberland

8.1. Recap of the first action plan

In a development process comprising of several workshops with the regional REPLACE Local Working Group, the following activities for the Bavarian Oberland region were jointly decided.

Table 22: Overview of proposed activities according to first action plan

Activity	Status
Labelling of boilers	pursued further
Six techno-economic feasibility studies	pursued further
Labelling of 100 % renewable heated houses	pursued further
Open cellar/house events	pursued further
Regional field trips to best practice RHC systems	pursued further
Facilitating emergency mobile heating devices	pursued further
Facilitating installers to become contractors	pursued further
Realisation of collective actions	pursued further

In spite of the COVID situation, all activities could be implemented, taking into account that the information events for installers to become contractors and for the collective action "district heating network" were combined into one event. This served to not overstrain fully stretched stakeholders (interest groups for both actions are the same), to be able to inform on the newly distributed KfW and BAFA funding organization, and in expecting an improved Corona situation at the planned date.

8.2. Activities implemented and tested

8.2.1. New activities

8.2.1.1. Data loggers help households to find suitable heating system for existing buildings

Since June 2022, the German government has been planning an offensive to install heat pumps as a more climate-friendly alternative to oil and gas heating. In this way, it wants to promote a heat turnaround in buildings by moving away from fossil fuels from Russia and at the same time promote climate protection. To ensure that radiators in older existing buildings are suitable for the low flow temperatures of heat pumps, Energiewende Oberland has been offering a heating check for private households since February 2023, an offer that will continue beyond the project duration.

For this purpose, EWO has procured two data loggers from project funds, which it will lend to households free of charge from February 2023 onwards via the working groups in municipalities (agenda groups, working groups in municipal councils). The data logger regularly measures temperatures every 10 minutes and stores them. After temperature measurements over several

weeks, the sensors are removed and the device is returned to the respective working group. The data is then taken from the device and analysed by members of the working groups. In addition to the supply and return temperatures, air temperature data from the German Meteorological Service is used over the measurement period.

With the help of the data logger, households can determine how efficiently their heating system is running, what temperatures it is using to heat the house sufficiently and whether their building is sufficiently heated by a heating system such as a heat pump that operates with low flow temperatures.

Accompanying communication

The data loggers have been in use in the energy working group in Iffeldorf since February 2023. Other working groups, for example in Oberhausen and Eberfing, have already expressed interest. In addition to informing the energy and climate protection working groups, the devices are also advertised in the region with short stories on Facebook. With the loggers, EWO achieves a sustainable impact in the region by continuing to get people to have their heating system checked/replaced through the campaign launched during the project.

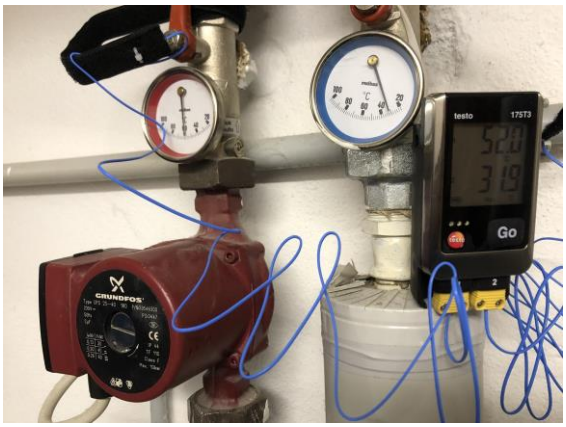


Figure 64: Temperature data logger in action

Teilnehmende Landkreise mit Kommunen

Landkreis Miesbach

Landkreis Bad Tölz – Wolfratshausen

Landkreis Weilheim – Schongau

Landkreis Garmisch – Partenkirchen

Die eigene Heizung unter der Lupe

Mit dem Datenlogger im Heizungskeller

24.03.2023

Seit Juni 2022 plant die Bundesregierung eine Offensive zum Einbau von Wärmepumpen als klimafreundlichere Alternative zur Öl- und Gasheizung. Sie will damit für eine Wärmewende bei Gebäuden die Abkehr von fossilen Energien aus Russland und zugleich den Klimaschutz vorantreiben. Um sicherzustellen, dass Heizkörper in älteren Bestandsgebäuden für die niedrigen Systemtemperaturen von Wärmepumpen geeignet sind, bietet Energiewende Oberland seit Februar 2023 einen Heizungscheck für Privathaushalte an.

Hierfür hat die EWO zwei Datenlogger aus Projektmitteln beschafft, die sie ab Februar 2023 kostenlos an kommunale Arbeitskreise ausleiht. Der Datenlogger misst regelmäßig alle 10 Minuten die Temperaturen und speichert sie. Nach Temperaturmessungen über mehrere Wochen werden die Sensoren abgenommen und das Gerät kann eigenständig über eine frei verfügbare App ausgelesen und die Daten ausgewertet werden. Nach Auslesung der Daten kann das Gerät in der Geschäftsstelle der Energiewende Oberland abgegeben werden. Zur Nutzung und Auswertung des Geräts werden Interessenten von Mitarbeitern der Energiewende Oberland im Vorfeld eingewiesen.

Zusätzlich zu den Vor- und Rücklauftemperaturen ist es sinnvoll, Lufttemperaturdaten vom Deutschen Wetterdienst über den Messzeitraum für die Auswertung heranzuziehen.

Was bringt die Messung?

Mit Hilfe des Datenloggers können private Haushalte und Kommunen feststellen, wie effizient ihre Heizung läuft, welche Temperaturen sie nutzt, um das Haus genügend zu heizen und ob ihr Gebäude durch eine Heizungsanlage wie einer Wärmepumpe genügend beheizt wird, die mit niedrigen Vorlauftemperaturen arbeitet.

In zwei privaten Haushalten konnten die Geräte bereits unter Anleitung von Energieberater Andreas Scharli getestet werden.

Messergebnisse

Familie Mayer, die ihr Haus mit einer 33 Jahre alten Gasheizung wärmt, ist überrascht über das Ergebnis: Denn bei der Auswertung wurde sichtbar, dass die Nachtabsenkung aufgrund eines defekten Reglers nicht mehr funktioniert, und dadurch jede Nacht der Kessel umsonst befeuert wird.

Figure 65: Data logger on the EWO website - usage, benefit and how to receive it

8.2.2. Overview of performed, tested & fine tuned activities

The following table gives an overview of activities and their preparation and run-time phase.

Table 23: Overview of activities and their preparation and implementation -phase

	Latest Status Quo	Starting point & fine-tuning	
Activity	Short description	Preparation phase	Implementation phase (re-design)
Labeling of boilers	Make households aware of their official boiler label and offer advice for possible replacements.	February 2020 to December 2022	January 2023
Six techno-economic feasibility studies	Free of cost feasibility studies to support households in their planned replacement action.	February 2020 to February 2022	March 2022
Labeling of 100 % renewable heated houses	Awarding households that have switched to 100 % RHC systems with a label and motivating others to follow suit.	February 2020 to July 2022	August 2022 ongoing
Open cellar/house events	Give interested parties the opportunity to see renewable heating systems in operation in their neighborhood, ask questions	February 2020 to August 2021	September and October 2021

	and pave the way to their replacement.		
Regional field trips to best practice RHC systems	Give stakeholders the opportunity to visit private and municipal district heating networks and get first-hand information for imitators.	February 2020 to December 2021	January and March 2022
Facilitating emergency mobile heating devices	Avoiding 1:1 heating system replacements by assembling and providing a list of regional/wider regional providers of mobile heating devices.	February 2020 to October 2021	November 2021 ongoing
Facilitating installers to become contractors	Support installers/energy utilities/service companies to become contractors of municipal heat networks.	February 2020 to January 2022	February 2020 ongoing
Realisation of collective actions	Support stakeholders to build and operate their own district heat network.	February 2020 to January 2022	February 2020 ongoing
Data loggers	Provide data loggers to households to check efficiency of heating system and suitability for heat pumps.	December 2022 to January 2023	February 2023 ongoing

8.2.3. Successful activities (Direct Impact/Accompanying Communication/SWOT)

8.2.3.1. Labelling of boilers

In order to inform households about the efficiency of their heating system and about energy advice and subsidies, heating systems older than 15 years have been equipped with an official efficiency label since 2016 in the target region. The labelling of boilers is done every other year by the chimney sweepers and an information map is handed over at the occasion. Nevertheless, people tend to overlook the efficiency label on their heating systems, even if they show classes C, D or E.

To generate attention for the boiler efficiency label, EWO conducted an interview with a master chimney sweep from the Oberland region. In the interview, the chimney sweep explained what the label means, when there is a need for action and what options there are for climate-friendly heating. The accompanying article also refers to the regional REPLACE website that informs on the REPLACE tools, energy saving, energy efficiency and about subsidies, and it refers to information opportunities provided by the German consumer advice centre.

Accompanying communication

The interview was published via a press release to the regional newspapers in January 2023, on the EWO website, the dedicated regional REPLACE website, social media channels (Twitter, Facebook, Instagram), in the EWO newsletter that reaches around 1000 stakeholders in the region, among others Fridays for Future and the regional climate protection managers as multipliers.

Furthermore, information about it was sent to the 88 municipal newsletters of the region that pass information on to the citizens. To inform an overregional audience, the interview was also published in English and German on the REPLACE website.

Figure 66: Boiler label on the EWO website

Figure 67: Boiler label on Instagram

Figure 68: Boiler label on [Twitter]

Figure 69: [Boiler label] in the Waakirchner Gemeindebote, March 2023, p 46/47

8.2.3.2. Conduction of techno-economic feasibility studies

The REPLACE calculator is an efficient means for end consumers, intermediaries and investors to calculate a planned boiler replacement action beforehand and, with data from the regional situation, find out about the CO_2 and economic dimension of the envisaged systems.

In order to identify participants who would like to prepare their heating system replacement with the help of a calculator pre-feasibility study, EWO contacted those who had already asked for support from the consumer advice centre. These were households who were planning to replace their heating system and were looking for support with the implementation. The selected participants were both young families who had moved into existing buildings and now wanted a climate-friendly heating system and older participants who wanted to implement a heating system replacement for themselves and also for the next generation.

The sizes of the houses ranged from 125m2 to 220m2, two of them occupied by 2 families. Four of the heating systems were older than 30 years, the two others around 20 years old, one was heated by gas, the other five by oil boilers. Their reasons for a planned heating replacement were the age of the systems, climate protection reasons, the risen fuel prices, high subsidies for climate friendly replacements, and the smell of heating oil. All of the house owners wanted to keep their existing heating distribution systems and radiators.

On the basis of the pre-feasibility studies that provided calculator-based recommended new heating systems including investments and subsidies, amortisation including CO_2 the prize and CO_2 reductions, house owners decided on new climate friendly heating systems. House owners were advised to, in addition to the studies, contact independent energy consultants and have more detailed discussions with the installers from whom they would like to obtain quotations.

On the basis of the studies and due to the fact that the municipality in question is planning a cold local heating network for climate protection reasons, one household was interested in getting connected to the planned local network. Two households that do not have access to a district heat network nor for a pellet tanker planned for air source heat pumps, saving CO_2 emissions in the range of 6 to 7t/a. And three households with access for pellet tankers, storage space for firewood and partly access to their own wood, decided on pellet boilers respectively a combination boiler with logs and pellets for space heating. The savings in CO_2 emissions ranged from 6t/a to 18t/a per household. One heating system replacement was realised in 2022, four other households planned replacements for 2023 and have applied for the according funding, one household postponed a replacement due to other priorities that needed to be realised before.

The six studies were conducted in March and April 2022 and consisted of a questionnaire for data collection provided by AEA, a webinar and phone calls. The results are available in a standardized report and a summary.

Accompanying communication

The calculator was advertised on the dedicated website www.waermewende-oberland.de which was made known via the region-wide marketing campaign in September/October 2021 (345 posters and banners, 9 press adverts, radio), via information to the heatings engineers' and chimney sweepers' guilds, to the regional climate protection managers, to the 48 members of Energiewende Oberland's competence center (engineers, contractors, municipalities, craftsmen, energy consultants, private individuals, regional banks, municipal and community utilities), at EWO's founders' meetings 2021 and 2022, in the EWO newsletter to around 1000 recipients, EWO-homepage, social media, and a video presentation.

After the feasibility studies were conducted, an article was published about the action and its results via the EWO website, social media and waermewende-oberland.de.

Figure 70: EWO newsletter with around 1000 recipients

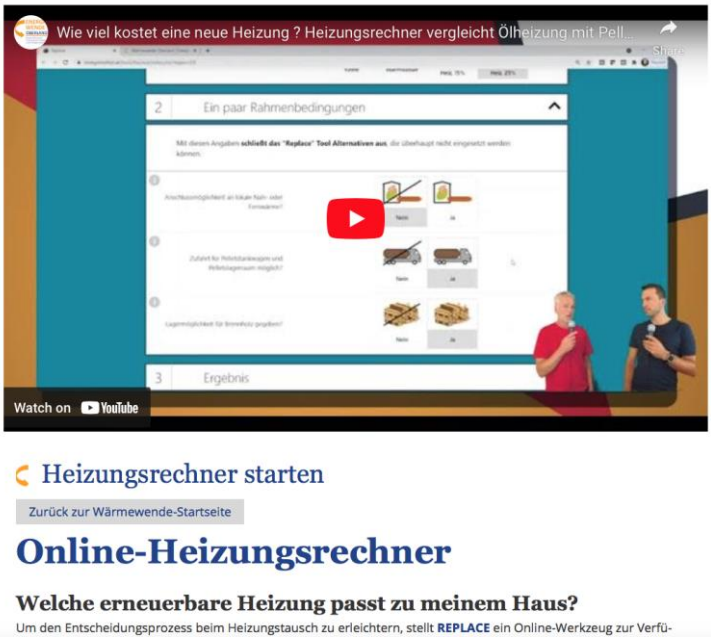


Figure 71: Calculator and explainer video on the EWO dedicated website

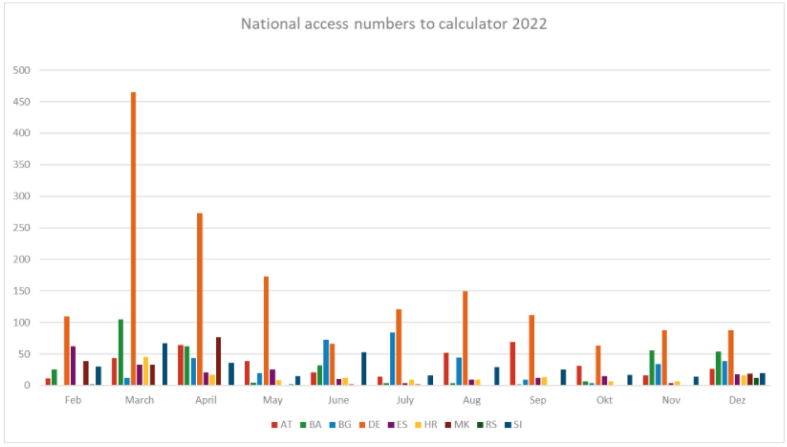


Figure 72: The REPLACE calculator was successfully advertised in the Bavarian Oberland as access numbers from 2022 show (numbers from DE in orange).

Figure 73: Results of the pre-feasibility studies on the EWO website

8.2.3.3. Labelling of 100 % renewable heated houses

The 100 % renewable heating labelling campaign, where end consumers receive a labelling if their heating systems functions 100 % with renewable energies, is an effective method to show how people from the region have switched to climate friendly systems, to honour their engagement and to motivate others to follow their example.

As a symbol for climate-friendly heating, Energiewende Oberland designed a sign made of wood that is suitable for outdoor and indoor mounting. After the 100 % RHC label and award-winning citizens were initially to be presented and advertised at a town festival or via a poster, the awarding was finally organised in a regionally effective manner with the climate protection managers. The climate protection managers are a subgroup of the REPLACE Local Working Group, can promote the award

through their channels (press, websites, social media channels) due to their direct connection to the districts and municipalities, and - due to their work for climate protection - also know citizens in their vicinity who heat in a climate-friendly way and can thus receive the label. In addition, the award was presented in the advisory boards for energy and climate protection of the districts and at the EWO's founders' meeting in November 2022 with 79 participants on site as well as 84 participants online from politics, organisations, companies, and citizens.

In August 2022, the four climate protection managers of the districts (Bad Tölz-Wolfratshausen, Garmisch-Partenkirchen, Miesbach, Weilheim-Schongau) as well as climate protection managers from seven municipalities (City of Weilheim, City of Bad Tölz, City of Wolfratshausen, Markt Garmisch-Partenkirchen, Penzberg, Murnau, Geretsried) received a 100 % RHC label as a display copy, instructions on how to promote and award the label and a heating system profile on the households' old and new heating system, heating demand, heating cost savings, energy and CO_2 savings.

The climate protection managers and EWO have since disseminated the new label through their channels (press, website, social media) and called on citizens to apply. The presentation of the first award by the EWO was publicised through the press, website and social media.

So far, 10 awards have been conferred in the region. In order to continue the campaign in the future, altogether 100 signs were produced. The award is continuously promoted through Energiewende Oberland and the climate protection managers and awarded to all those who heat in a 100 % climate-friendly way in the region.

Accompanying communication

Energiewende Oberland as well as the region's climate protection managers advertised the 100 % RHC label through their communication channels (press, website, social media). In addition, the label was made known at EWO's founders' meeting in November 2022 with 163 participants in presence and online and was presented in the advisory boards for energy and climate protection of the districts.

The heating systems of the award winners are displayed as good practice examples on the dedicated website www.wärmewende-oberland.de, provided they agree to this. The data from the heating system profile, a quote from the owners if available and a photo are presented here.

The awarding of the first REPLACE label was disseminated by EWO to the press, and also distributed on the organisation's website, social media and the REPLACE website.

100% erneuerbar Heizen

Energiewende Oberland initiiert neues Label

05.10.2022

*Im EU-geförderten Heizungstausch-Projekt REPLACE hat die Energiewende Oberland zusammen mit den Klimaschutzmanager*innen der Region eine Auszeichnung für alle entworfen, die im Oberland bereits zu 100% mit erneuerbaren Energien heizen. Sie soll diejenigen würdigen, die beim Thema Wärme schon klimafreundlich agieren, und andere zum Nachahmen motivieren.*

Die Verleihung des Labels „100% erneuerbar Heizen" erfolgt über die Energiewende Oberland oder die betreffenden Klimaschutzmanager*innen.

Bürgerinnen und Bürger im Oberland sind herzlich eingeladen, sich auf das Label zu bewerben oder andere dafür vorzuschlagen. Für die Teilnahme sind folgende Unterlagen notwendig:

- ein Foto der Anlage (je nach Wahl mit oder ohne Person)
- ein Zitat der Eigentümer*innen, wenn möglich und gewünscht (z.B. warum Sie 100% erneuerbar Heizen, was Ihnen an dem System besonders gefällt o.ä.)
- ein kurzer Steckbrief, soweit die folgenden Punkte zutreffen:
  - Ort
  - Neues Heizsystem
  - Ersetztes Heizsystem
  - Gebäudetyp (z.B. Einfamilienhaus)
  - Heizwärmebedarf vor und nach thermischer Sanierung (kWh/m2.a)
  - Installierte Heizleistung neues und altes System (kW)
  - Installationskosten gesamt
  - Jährliche Heizkostenersparnis
  - Jährliche Reduktion des Energieverbrauchs (MWh bzw. %)
  - Jährliche Reduktion der CO2-Emissionen (t_{CO2})

Figure 74: The new label is announced on the EWO website

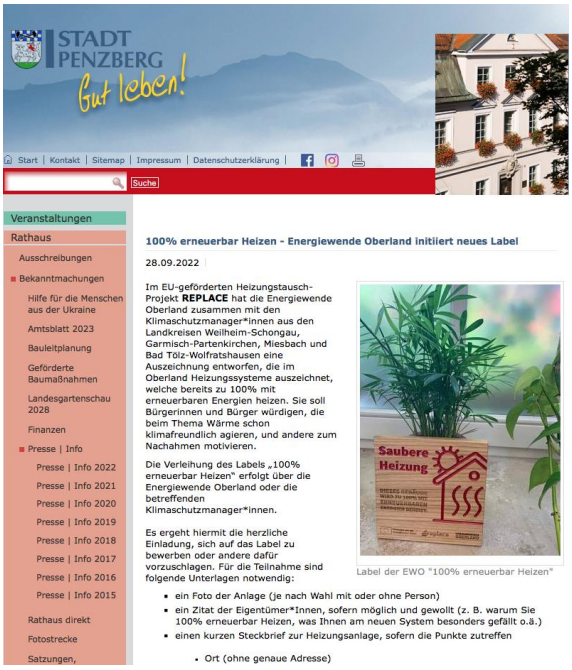


Figure 75: The REPLACE 100 % RHC label on Penzberg's municipal website

RADIO OBERLAND

NEWS WISSENSWERTES

Oberland: Bewerben für Auszeichnung für Heizungssysteme

Lesedauer < 1 Minute 23.09.2022

Im EU-geförderten Heizungstausch-Projekt REPLACE hat die Energiewende Oberland zusammen mit den Klimaschutzmanagerinnen aus den Landkreisen Weilheim-Schongau, Garmisch-Partenkirchen und Bad Tölz-Wolfratshausen eine Auszeichnung für Heizungssysteme im Oberland entworfen. Prämiert werden solche die bereits zu 100% mit erneuerbaren Energien heizen. Sie soll BürgerInnen würdigen, die beim Thema Wärme schon klimafreundlich agieren, und andere zum Nachahmen motivieren. Die Verleihung des Labels „100% erneuerbar Heizen" erfolgt über die Energiewende Oberland.

Mehr Infos finden Sie hier: Wärmewende im Oberland (REPLACE) | Energiewende Oberland (energiewende-oberland.de)

Figure 76: Regional radio station Radio Oberland announces new REPLACE label

Merkur.de Ukraine-Krieg Politik Wirtschaft Deutschland Welt Lokales

Zur Startseite

Startseite › Lokales › Weilheim › Kreisbote

Familie Kluge erhält Auszeichnung der Energiewende Oberland

Erstellt: 14.01.2023, 13:00 Uhr

Kommentare

Erster Preisträger „Saubere Heizung": Matthias Kluge heizt sein Haus in Eberfing mit einer Grundwasserwärmepumpe. Der Strom für die Pumpe kommt vom eigenen Dach. © Kluge

Eberfing – Seit Herbst 2022 gibt es die Auszeichnung „Saubere Heizung", entworfen von der Energiewende Oberland (EWO) zusammen mit den Klimaschutzmanagerinnen und -managern der Region. Der erste Haushalt, der das Holzschild von der EWO erhalten hat, ist Familie Kluge aus Eberfing, die mit einer Kombination aus Wärmepumpe und Solarstrom heizt.

Figure 77: Newspaper article on the 100% RHC label awarding

8.2.3.4. Open house events

As the REPLACE interviews in the Oberland region have shown, end consumers can be sceptical before switching to a new, climate friendly heating system, but tend to be satisfied afterwards. In order to give end consumers the possibility to view modern systems first hand and ask questions, open house days are an excellent opportunity.

In order to find out about people in the region who already have renewable heating systems, Energiewende Oberland cooperated with the regional energy and climate protection managers. The

aim was to show the various possibilities of renewable systems from pellets over fuel cells, wood chips, local heating, PV and heat pumps as well as solar thermal systems.

In close cooperation and consultation with EWO, the climate protection managers of the districts of Bad Tölz-Wolfratshausen, Miesbach and Weilheim-Schongau identified a representative selection of renewable heating systems in their districts. The appointment coordination took place via a form designed by EWO and advertised by all participants, in which interested households could enter their preferred dates, location and existing heating technology. In addition, Energiewende Oberland created the website www.wärmewende-oberland.de, which advertised not only information about the heating exchange but also the inspection dates, provided the climate protection managers with press releases and images for advertising and set up the appointment calendar for the inspections.

After several joint discussions in the team between EWO and the climate protection managers, thirteen private households and a town hall finally opened their doors between 1 and 17 October 2021, showing their climate-friendly heating systems to almost 50 interested participants and answering their questions.

From a house with a groundwater heat pump, buffer storage and photovoltaics to pellet heating systems with an exhaust gas heat exchanger, a building with a fuel cell or combinations of a PV system with storage, heat pump and tiled stove, a wide range of technologies were on display. Two visits resulted in best practice examples to read about. And two families even continued to offer to answer questions or to personally look at the installed technology of other households. Further information on climate-friendly heating, subsidies and advisory services has been made available and advertised at www.wärmewende-oberland.de.

The climate protection managers plan to include the open boiler room days developed within the framework of REPLACE in their event toolbox and to use the concept and the developed materials for future community-specific events.

Accompanying communication

In consultation with the climate protection managers and also with their financial participation, a media campaign with 345 billboard posters and banners, 9 newspaper advertisements and a theme week on the radio took place in advance to draw attention to the topic of the heat transition, the website www.wärmewende-oberland.de and the open boiler room days. The events were advertised via the EWO website, www.waermewende-oberland.de, the EWO newsletter to around 1000 recipients, social media, the districts' climate protection managers, and the press. Resulting articles on the open house days and REPLACE offers were published via the press, waermewende-oberland.de, the EWO website, the EWO newsletter, and the climate protection managers.

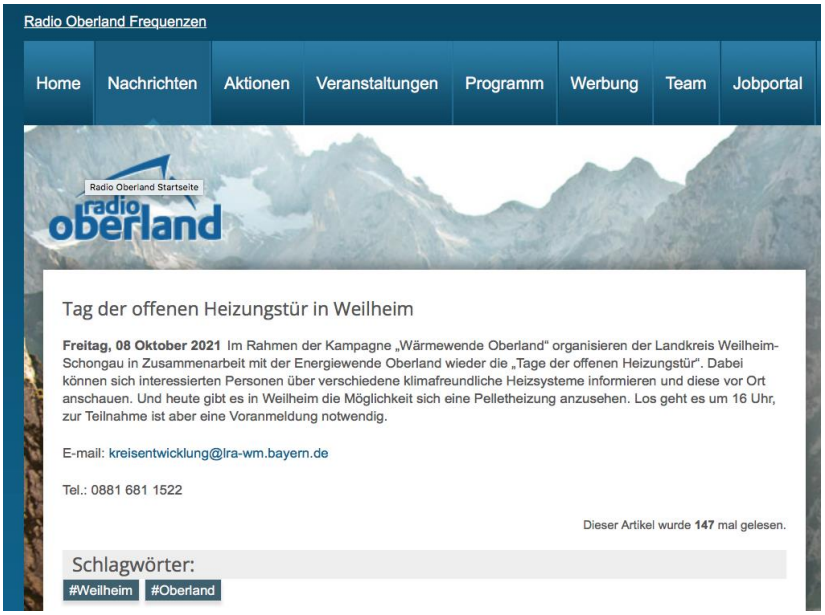


Figure 78: Radio station Oberland announces the REPLACE open house days

Figure 79: Visiting a boiler room in Wolfratshausen

Open House Days - SWOT Analysis

To give end consumers the possibility to view modern systems first hand and ask questions, open house days are an excellent opportunity. Due to the strong network and close cooperation between Energiewende Oberland, energy consultants and climate protection managers of districts and municipalities, the identification of potential households was achieved. The network of climate protection managers acted as a multiplier and increased the chance of publications in the regional press. Additionally, due to a broad network, it was possible do demonstrate different technologies evenly spread throughout the region.

Table 24: SWOT of the activity Open House Days

	Helpful to achieving the objectives	Harmful to achieving the objectives
Internal origin (attributes to the implementing bodies)	**Strengths** Due to the strong network and close cooperation between Energiewende Oberland, energy consultants and climate protection managers of districts and municipalities, the identification of potential households was achieved. The network of climate protection managers acts as a multiplier and increases the chance of publications in the regional press. Additionally, due to a broad network, it is possible do demonstrate different technologies evenly spread throughout the region.	**Weaknesses** Privacy and data protection issues account for the biggest weaknesses of this activity. In order to make it easy for interested parties to visit the "open houses" addresses etc. had to be shared. This was only possible through a closed registration procedure. Additionally, during COVID-19 health issues had to be respected and limited the amount of potentially participating houseowners.
External origin (attributes to the environment)	**Opportunities** • High energy prices, • attractive subsidies and • increasing an CO_2-tax increase the amount of interested people.	**Threads** A global pandemic is a thread due to restrictions of personal contacts, which are immanent during an open house event. Decreasing subsidies, unavailability of material or installers, fossil fuel price caps or low prices for fossil energy reduce the interest in activities like the "open house days"

8.2.3.5. Regional field trips

The Local Working Group had already emphasised at the first LWG meeting that local heating networks are an important lever for heating replacement in the Oberland. With their help, a larger number of heating systems can be replaced at once, and a high amount of CO_2 and particulate matter emissions is reduced accordingly. They are supplied with regionally available residual wood and thus contribute to regional value creation and independence from energy imports, and they help to ensure that many heaters can be replaced despite a shortage of skilled workers.

In order to show interested actors on site how local heating networks work and how they are implemented, Energiewende Oberland organised field trips to practical examples in the region. In consultation with operators, it was finally possible that **four private network operators** opened their plants for inspection on 22 January 2022. The four families in the Oberland own farms. With their local

heating networks for their own buildings as well as those in the neighbourhood, they can bring in their own residual wood and have created another mainstay alongside their farms.

In Antdorf in the district of Weilheim-Schongau, the Schweyer family has been operating a 130kW woodchip heating system since 2009, to which 4 houses with a total of 12 households are connected.

In Habach, the Strobl family has been reliably supplying heat to five houses with a total of eleven residential units since 2014.

In Leibersberg, a woodchip heating system designed for the Leibersberg hamlet with nine houses went into operation in September 2021 after only five months of construction.

In Hofheim, it was possible to visit a woodchip heating system with 199 kW, which the Singer family has been using to supply four houses and a company with heat in addition to their farm since the end of 2020.

In March 2022, **four municipally operated grids** could be visited in addition.

The municipal plant of Gmund is located in the building yard. In 2021, it replaced an existing woodchip heating system that had supplied the fire brigade and building yard for 20 years until then. The planning of new apartment blocks, a senior citizen housing complex and the connection of existing buildings made the new heating system economically feasible.

In Miesbach, the municipal heating network at Haberer Platz could be visited. In 2014, higher oil and gas prices prompted the construction of the plant. The secondary school, grammar school, the former hospital and properties of the district and city are connected.

In Warngau, the reason for building a municipal heating network was the desire to help drive the energy transition. The groundbreaking ceremony took place in March 2015, the heat and power supply started in November, and an expansion with a new engine took place in 2018/19. A total of 16 heat consumers are connected. The extension of the kindergarten is to be added.

Considerations for the construction of a municipal heating network were preceded by Valley's participation in the Bioenergy Region funding programme. Among other things, the project examined the sustainable use of wood. The energy wood study for Valley showed that there was potential for heating with the residues from forest maintenance. The climate friendly heating system substituted a 25 year old gas boiler and now supplies a new housing development with twelve houses, and the school, kindergarten and town hall as existing buildings.

On the dates in January and March 2022, the private and municipal plants were open for several hours in the morning and afternoon, respectively, so that interested people had the chance to see several plants. At the two events, altogether around 60 visitors took part.

Accompanying communication

The visits were advertised via the channels of Energiewende Oberland. In order to address the target audience for municipal heating networks (municipal representatives, wood chip suppliers, future investors, but also private individuals), an email was sent to 522 selected stakeholders in the region in addition to the announcement on the EWO website and social media.

In the case of the private heating networks, the deputy regional farmer, who herself opened a plant for inspection, also sent out the date via her network, and EWO provided the organisers with posters for display. Community operators promoted the March visit date. EWO provided the final press release on the field trips to the press and to the climate protection managers of the region for publication.

Figure 80: Poster sent to local organizers to display field trip to private heat networks

Figure 81: Visiting heating networks in Antdorf, Habach, Leibersberg und Hofheim (f.l.t.r.)

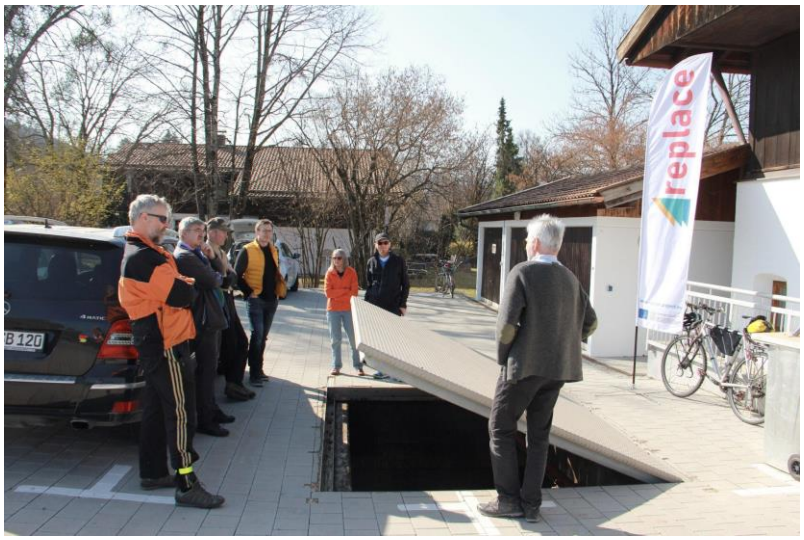


Figure 82: Visiting the heating network Gmund

Figure 83: Report on the field trip via Instagram

8.2.3.6. Facilitating emergency mobile heating devices

Mobile heating containers are a valuable possibility to avoid 1:1 exchanges when heating systems fail or are about to fail. With their help, end consumers but also operators of larger heating systems like municipalities gain time to gather information for a switch-over to renewable and climate friendly solutions.

As the Local Working Group has confirmed, mobile heating containers are a valuable option for renewable heating replacements. In order to provide a list of available mobile heating containers in the region, Energiewende Oberland first researched relevant providers. For this purpose, a call went out via the press, the municipalities, the EWO website and social media to stakeholders who own containers. In addition, EWO itself researched suppliers.

As announced by the LWG, there are only a limited number of providers in the region, so EWO also extended the search to the wider region. In November 2021, a list of four providers from the region and three more from the extended region could be compiled and published. A disclaimer is included stating that EWO accepts no liability for the quality of the service, that the list is not exhaustive and that other providers are welcome to contact EWO.

A show case on the use of a mobile heating container to support heating replacement was also published.

Accompanying communication

In August 2021, EWO sent out a call to providers of mobile heating containers via newsletter distribution to 120 addresses (REPLACE Local Working Group, municipal utilities, EWO competence center members, energy commissioners in all districts, and climate protection managers). The call was also distributed via the EWO website and social media.

In November 2021,the list was published on the EWO website, and a press release on the topic was sent to the regional press.

In addition, the 88 municipal newsletters received the press release and list of providers in November 2021 for dissemination as well.

Figure 84: Call to providers via EWO website

Figure 85: Call to providers of mobile heating containers via newsletter

Call to provider of mobile heating containers via newsletter distribution to 120 adresses in Oberland.

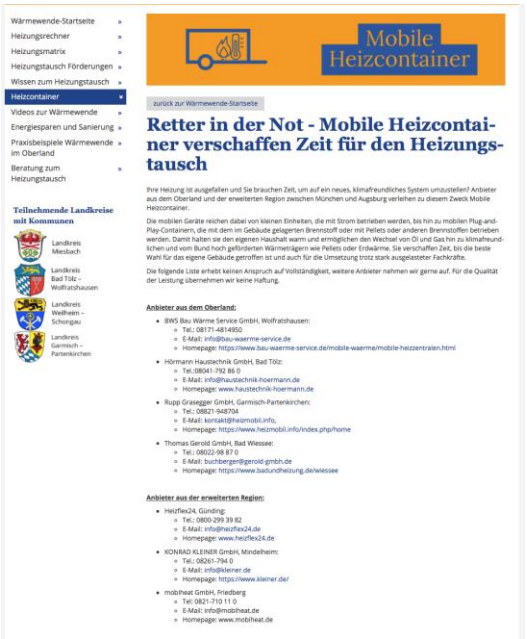


Figure 86: Advertising the mobile heating containers on [EWO's dedicated website]

Figure 87: One of the regional mobile heating container

8.2.3.7. Facilitating installers to become contractors

In case a municipality does not have its own municipal utilities, but a local heating engineer would like to take care of a local heat network, or if a municipality would like to commission the heating of its municipal buildings not to a large energy supplier, but to a local one, the model of plant contracting is a favourable way to advance with the heat transition towards climate friendly heating.

Energiewende Oberland had planned to invite interested parties to an information event to inform e.g. about the procedure and the economic construct, and answer questions.

Since the target groups for the information event on the topic of collective actions overlap and in order not to overstrain stakeholders, the information events were combined into one event. Following the information event, interested parties were able to get further information and consultation from Energiewende Oberland on the topics. A show case for this event was published.

Details of the information event and accompanying communication are reported under following section on the realisation of collective actions.

8.2.3.8. Realisation of collective actions

At the region's first Local Working Group meeting in February 2020, the LWG members emphasized that district heating is an important topic for the region. In the Oberland, there is still a great need to increase the share of renewable energies in the heating sector. Almost half of the energy in the Bavarian Oberland is used for heating, 44% of it in private households. But not everyone has to build their own heating system. An effective option is to join forces in the village and organize a district heating system together, alleviating the pressure from the shortage of skilled workers at the same time, gaining a high amount of CO_2 -reduction, gaining independence from fluctuating energy prices and oil and gas supplies from abroad, and create a greater impact on end-consumers' decisions.

The information event on 25 February 2022, organised by Energiewende Oberland (EWO) in close consultation with members of the LWG, was combined with the event for future plant contractors) to not overstrain fully stakeholders (interest groups for both actions are the same), to be able to inform

on the newly distributed KfW and BAFA funding organization, and in expecting an improved Corona situation at the planned date. Around 60 participants, including mayors, architects and energy consultants, took part at the event.

EWO provided interested parties with useful tips e.g. on how to organize a local heat network, who to contact with questions, what to look out for, and funding options. Speakers included a representative from EWO, a bank's representative who informed on sustainable financial planning, and three operators of agricultural heating networks who gave reports from the field. The event concluded with an outlook on the future of local heating networks with regard to the availability of energy wood, energy savings through renovation measures, solar drying of wood to use energy efficiently, and sector collation between heat, electricity and transport to avoid energy loss. Also the flexibility of district heating systems concerning the energy carrier as well as the topic of particulate matter were thematised. In addition, the target groups were offered the opportunity to obtain follow up consultations from REPLACE project partner Energiewende Oberland. A show case was published.

Two other REPLACE campaigns also drew the attention of stakeholders to the REPLACE collective action of local heating networks. These included the Energy Summit of Energiewende Oberland in January 2021, at which local heating networks were presented as an effective lever for the heat transition. In addition, interested parties were able to visit local heating networks in the region in spring 2022. Municipal representatives, woodchip suppliers, future investors, but also private citizens were able to take a look behind the scenes and ask questions in four local heating networks operated by farmers and four networks operated by municipalities. And a video on the EWO website provides interested parties with a brief overview on the organisation and funding opportunities for a local heating network.

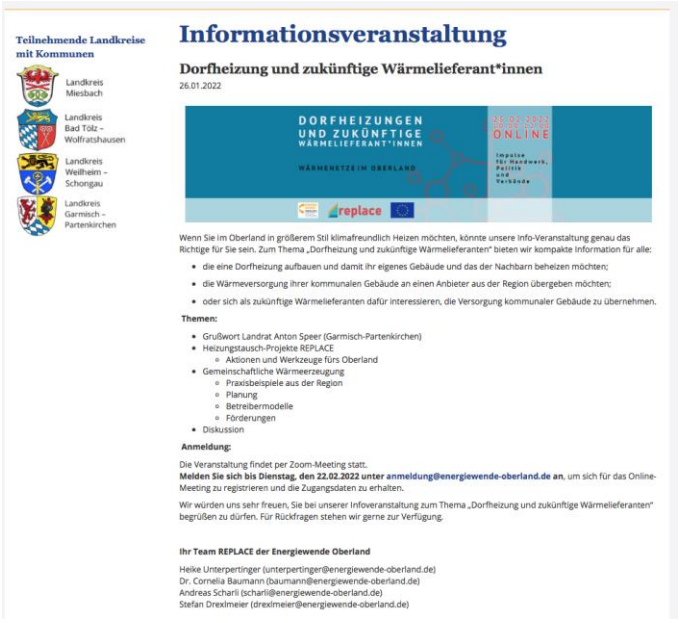
Due to high energy prices, attractive subsidies and low interest rates combined with a shortage in installer capacity, collective actions in the form of district heatings with local ownership proved to be highly effective.

In the framework of REPLACE, EWO supported stakeholders in the region to newly set up 10 district heating networks, and to re-densify 3 existing ones. EWO assisted with overall planning, including pricing as a basis for planning for future heat customers, the founding of cooperatives, the financing and planning permissions for heating houses, held information events for heating customers and supported the application for necessary funding.

EWO acquired additional in-depth expertise throughout the duration of the project and will provide this service to municipalities, enterprises and citizens in the region Oberland beyond the project duration of REPLACE.

Accompanying communication

The combined information event on the collective action and for future plant contractors was accompanied by public relations work for the target groups. In order to specifically invite the relevant stakeholders on the topic of village heating and future contractors to the event, EWO sent out a CRM campaign to over 500 selected contacts in the region. These included local authorities, advisory boards, heating engineers, chimney sweeps, the forest owners' association, guilds, energy suppliers and service providers. The event was also promoted via the EWO website and social media. To inform the public about the results, EWO sent out a press release and published the article on the EWO and REPLACE website. The video recording of the event was published together with the article and has been watched over 160 times since March 2022.



Teilnehmende Landkreise mit Kommunen

Landkreis Miesbach

Landkreis Bad Tölz – Wolfratshausen

Landkreis Weilheim – Schongau

Landkreis Garmisch – Partenkirchen

Informationsveranstaltung

Dorfheizung und zukünftige Wärmelieferant*innen

26.01.2022

DORFHEIZUNGEN UND ZUKÜNFTIGE WÄRMELIEFERANT*INNEN

WÄRMENETZE IM OBERLAND

26.01.2022 ONLINE

Impulse für Handwerk, Politik und Verbände

replace

Wenn Sie im Oberland in größerem Stil klimafreundlich Heizen möchten, könnte unsere Info-Veranstaltung genau das Richtige für Sie sein. Zum Thema „Dorfheizung und zukünftige Wärmelieferanten" bieten wir kompakte Information für alle:

- die eine Dorfheizung aufbauen und damit ihr eigenes Gebäude und das der Nachbarn beheizen möchten;
- die Wärmeversorgung ihrer kommunalen Gebäude an einen Anbieter aus der Region übergeben möchten;
- oder sich als zukünftige Wärmelieferanten dafür interessieren, die Versorgung kommunaler Gebäude zu übernehmen.

Themen:

- Grußwort Landrat Anton Speer (Garmisch-Partenkirchen)
- Heizungstausch-Projekte REPLACE
  - Aktionen und Werkzeuge fürs Oberland
- Gemeinschaftliche Wärmeerzeugung
  - Praxisbeispiele aus der Region
  - Planung
  - Betreibermodelle
  - Förderungen
- Diskussion

Anmeldung:

Die Veranstaltung findet per Zoom-Meeting statt.
Melden Sie sich bis Dienstag, den 22.02.2022 unter anmeldung@energiewende-oberland.de an, um sich für das Online-Meeting zu registrieren und die Zugangsdaten zu erhalten.

Wir würden uns sehr freuen, Sie bei unserer Infoveranstaltung zum Thema „Dorfheizung und zukünftige Wärmelieferanten" begrüßen zu dürfen. Für Rückfragen stehen wir gerne zur Verfügung.

Ihr Team REPLACE der Energiewende Oberland

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Figure 88: Invitation via [EWO website]

Bürgerstiftung Energiewende Oberland is feeling curious.
25 February 2022 ·

Ab 10:00 Uhr startet unsere Veranstaltung zum Thema "Dorfheizungen und zukünftige Wärmelieferant*innen". Seid auch auf YouTube live mit dabei:
https://youtu.be/NpjNg5S1Rtg

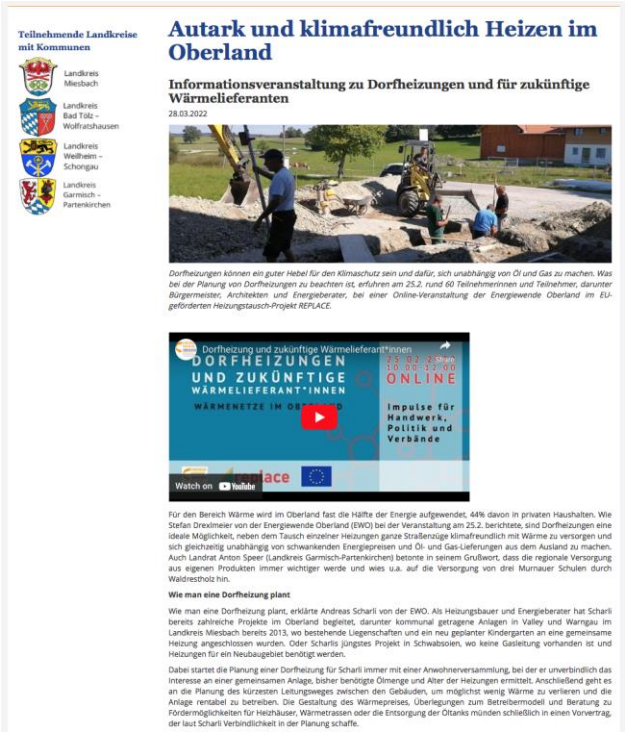
#nahwärme #wärmeversorgung #klimaschonend #oberland

YOUTUBE.COM
Dorfheizung und zukünftige Wärmelieferant*innen
Wenn Sie im Oberland in größerem Stil klimafreundlich Heizen m...

3

Like Comment Share

Figure 89: Advertising the event on [facebook]



Teilnehmende Landkreise mit Kommunen

Landkreis Miesbach

Landkreis Bad Tölz – Wolfratshausen

Landkreis Weilheim – Schongau

Landkreis Garmisch – Partenkirchen

Autark und klimafreundlich Heizen im Oberland

Informationsveranstaltung zu Dorfheizungen und für zukünftige Wärmelieferanten

28.03.2022

Dorfheizungen können ein guter Hebel für den Klimaschutz sein und dafür, sich unabhängig von Öl und Gas zu machen. Was bei der Planung von Dorfheizungen zu beachten ist, erfuhren am 25.2. rund 60 Teilnehmerinnen und Teilnehmer, darunter Bürgermeister, Architekten und Energieberater, bei einer Online-Veranstaltung der Energiewende Oberland im EU-geförderten Heizungstausch-Projekt REPLACE.

Dorfheizung und zukünftige Wärmelieferant*innen

DORFHEIZUNGEN UND ZUKÜNFTIGE WÄRMELIEFERANT*INNEN

ONLINE

Impulse für Handwerk, Politik und Verbände

Watch on YouTube

Für den Bereich Wärme wird im Oberland fast die Hälfte der Energie aufgewendet, 44% davon in privaten Haushalten. Wie Stefan Drexlmeier von der Energiewende Oberland (EWO) bei der Veranstaltung am 25.2. berichtete, sind Dorfheizungen eine ideale Möglichkeit, neben dem Tausch einzelner Heizungen ganze Straßenzüge klimafreundlich mit Wärme zu versorgen und sich gleichzeitig unabhängig von schwankenden Energiepreisen und Öl- und Gas-Lieferungen aus dem Ausland zu machen. Auch Landrat Anton Speer (Landkreis Garmisch-Partenkirchen) betonte in seinem Grußwort, dass die regionale Versorgung aus eigenen Produkten immer wichtiger werde und wies u.a. auf die Versorgung von drei Murnauer Schulen durch Waldrestholz hin.

Wie man eine Dorfheizung plant

Wie man eine Dorfheizung plant, erklärte Andreas Scharli von der EWO. Als Heizungsbauer und Energieberater hat Scharli bereits zahlreiche Projekte im Oberland begleitet, darunter kommunal getragene Anlagen in Valley und Warngau im Landkreis Miesbach bereits 2013, wo bestehende Liegenschaften und ein neu geplanter Kindergarten an eine gemeinsame Heizung angeschlossen wurden. Oder Scharlis jüngstes Projekt in Schwabsoien, wo keine Gasleitung vorhanden ist und Heizungen für ein Neubaugebiet benötigt werden.

Dabei startet die Planung einer Dorfheizung für Scharli immer mit einer Anwohnerversammlung, bei der er unverbindlich das Interesse an einer gemeinsamen Anlage, bisher benötigte Ölmenge und Alter der Heizungen ermittelt. Anschließend geht es an die Planung des kürzesten Leitungsweges zwischen den Gebäuden, um möglichst wenig Wärme zu verlieren und die Anlage rentabel zu betreiben. Die Gestaltung des Wärmepreises, Überlegungen zum Betreibermodell und Beratung zu Fördermöglichkeiten für Heizhäuser, Wärmetrassen oder die Entsorgung der Öltanks münden schließlich in einen Vorvertrag, der laut Scharli Verbindlichkeit in der Planung schaffe.

Figure 90: Report on the event on the EWO website, including the recorded video

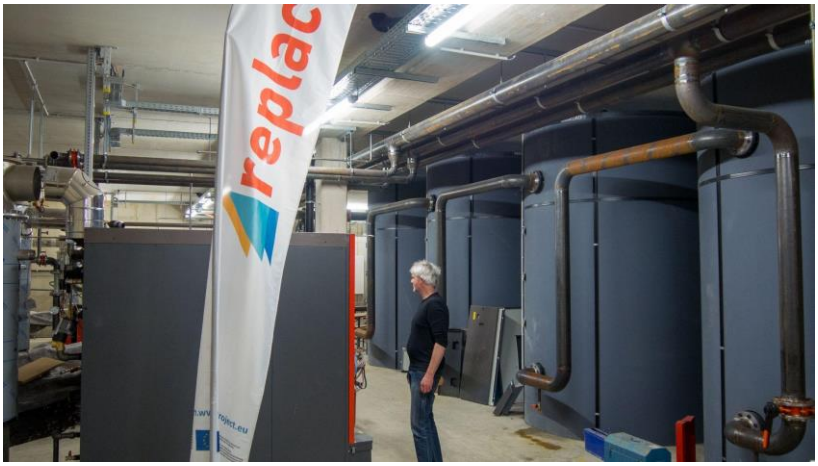


Figure 91: Realised heating network in Schwabsoien

8.2.4. Addressing of horizontal aspects (gender, poverty etc.)

In order to reach elderly people who often own old and outworn oil or gas boiler of whom the majority is female, EWO conducted an offline-marketing campaign. The campaign advertised climate friendly heating, the REPLACE open house events and the dedicated website. It was conducted in the whole Oberland region in September and October 2021 and, via 345 large billboard posters and banners, 9 advertisements in newspapers and a thematic radio week, and was easily accessible to **elder women**.

To **counter lock-in effects**, Energiewende Oberland researched providers of mobile heat containers from the region and wider region and promoted the list via the dedicated website www.wärmewende-oberland.de, a press release to regional newspapers and to 88 municipal newsletters.

To address the issue of **energy poverty**, Energiewende Oberland distributed posters from the consumer advice centre on the topic of energy saving via the climate protection managers to relevant organisations. As units of district offices and municipalities, the climate protection managers have access to the local advice centres (job centers, debt counselling centers, food banks etc.) and can disseminate the posters there. The consumer advice centre's energy advice services are independent and free of charge.

To prevent **rebound effects**, Energiewende Oberland has added a link to easy-to-implement energy-saving tips from the consumer advice centre, which tenants can implement as well, on the dedicated website www.wärmewende-oberland.de. With the heat transition campaign via classic media (posters, newspapers, radio), press releases and mailings to the 88 community newspapers in the region, EWO has comprehensively and continuously promoted the website to the target group in the region. The topics of energy saving, efficiency, and refurbishment were addressed in all REPLACE campaigns in the Oberland region.

8.2.5. Activities that may remain beyond project life

The project team was encouraged to make the most out of the resources available, and to design, implement and present the activities to the relevant local (or national) actors and team up with them, in a way that would allow the most successful and impactful practices to continue beyond the duration of the project. In the REPLACE project, Energiewende was able to implement numerous contents and actions that are also effective beyond the project period.

8.2.5.1. Institutionalised or longer-term anchored activities

With the website www.wärmewende-oberland.de, Energiewende Oberland was able to establish its own platform on the topic of the heat transition within the framework of REPLACE. Through the region-wide marketing campaign and the project activities, the site is anchored in the region and institutionalised for the topic of the heat transition. The site will continue to be maintained and promoted. In connection with the Interreg project GO Altbau (January 2023 - December 2025), the website will be expanded to include additional information on the topic of saving energy in existing buildings.

8.2.5.2. Potential follow-up actions or continuity

REPLACE activities that will continue beyond the project include the 100 % RHC labelling campaign. After 10 awards have already been presented during the project, there are another 90 signs that have been produced for the purpose of perpetuation. Energiewende Oberland and the climate protection managers from the region promote the label via their websites, social media and at events. The resulting 100 % RHC good practices are published on the Energiewende Oberland website if the households agree.

The REPLACE calculator will continue to be kept up to date until November 2025 so that households can calculate their heating exchange projects in advance. The calculator is accessible via EWO's institutionalised website www.wärmewende-oberland.de.

With regard to the open house days and the field trips, the REPLACE campaigns have provided the concepts, the materials (e.g. call for participation, registration form, detailed list of dates, press release) and also the network of visit locations. The visits can thus be repeated if necessary. In addition, the climate protection managers are interested in including the open house days in their event kits and offering them in individual municipalities, for example also as part of the regional "Climate Spring" event.

The list of providers of mobile heating containers remains on the website www.wärmewende-oberland.de and new providers can be added.

As far as support for stakeholders who would like to become contractors is concerned, Energiewende Oberland is known to the relevant stakeholders as a contact partner through the REPLACE campaign, the knowledge is available at Energiewende Oberland, and EWO will continue to help interested parties in the future.

Through the REPLACE project, Energiewende Oberland has been able to support numerous stakeholders in the region in setting up or expanding a local heating network. The topic of local heating networks will remain the focus and offer of Energiewende Oberland in the coming years, which will continue to support interested parties in planning and implementation.

8.2.6. Added value of the project Replace to the pilot region

Through the REPLACE project, Energiewende Oberland was able to help private individuals to apply for several million euros in BAFA funding to convert their heating systems in a climate-friendly way. On the one hand, this was done by promoting the topic, providing background information and tools (calculators, matrix, manuals, best practice examples), open house days for on-site visits, a video on subsidies and application, and support with the application itself.

The climate protection managers in the region were also able to benefit from the project's offers. Through the synergy of financial resources and work in the region, it was possible to implement an Oberland-wide media campaign on the topic of the heat transition. The climate protection managers were able to participate in the project's open house days and, together with project partner Oberland, organised visits to three districts, where almost 50 private individuals inspected climate-friendly heating systems. The concept and materials of open house days and field trips to local heating networks are available for the climate protection managers to repeat. The 100 % RHC label is also awarded by the climate protection managers and the website www.wärmewende-oberland.de

including the REPLACE heating calculator, heating matrix, mobile heating containers, manuals on heating exchange etc. supports the climate protection managers in their advisory work.

The project has provided the professionals in the region with extensive networking opportunities. These included the Local Working Group, the energy summit, the information event for future contractors and on the topic of local heating networks, the field trips to local heating networks, exchanges on barriers and solutions and on dealing with issues such as gender, energy poverty, rebound, lock in effects. In addition, the experts had access to background information and tools developed in the project, such as overall framework conditions and opportunities for heating exchange in the region or inventories of mind sets of relevant stakeholders. The bundled information and tools on the Energiewende Oberland website have relieved and supported the fully strained stakeholders in their work. Through extensive exchange and information within the framework of REPLACE,

Energiewende Oberland was able to give professionals in the region an impetus to rethink and direct their focus towards climate-friendly heating options and implementation possibilities.

As part of REPLACE, Energiewende Oberland has also supported the authorities in founding the Regional Heat Supply (RWV) Blaues Land GmbH. The foundation aims to plan heating systems and local heating networks in the participating municipalities, organise their construction and guarantee their operation - all within a period of about ten years. The aim is to supply properties of the municipalities, which act as shareholders, but also private homes with heat from renewable energies. The fuel for these village heating systems will mainly be residual wood chips from the region or climate-friendly energy sources that will be used in the future. Authorities were able to benefit from REPLACE in that Energiewende Oberland was able to support the municipality of Penzberg in the creation of an action plan that also includes the area of heat transition for both municipal properties and private individuals.

8.2.7. Lessons learned from the action and recommendations

Among the lessons learned through the REPLACE project is the fact that the construction of local district heating networks can help alleviate the shortage of skilled workers. Instead of replacing individual heaters in every single household, the construction of a common local heating network can supply whole streets with heat.

In addition, the great need for information in the region, which has arisen on the one hand due to high subsidies and on the other hand due to the energy crisis, could be very well met by setting up a central heat transition website. The heat transition campaign, which was possible in the region with the support of the counties, was helpful in making the website, the REPLACE calculator and other project tools known.

Another recommendation is to combine the budget of the project with the funds of the counties. As the actions and campaigns were time-consuming, human and financial resources are necessary for successful implementation.

Helpful activities were also the creation of short videos explaining, for example, the REPLACE calculator or how to apply for funding. Together with further information on the Wärmewende-website, information could be given even when demand was very high and a pre-qualification of enquiries could be carried out. The REPLACE manuals were also incorporated as individual sub-chapters on the Wärmewende-website for ease of use and search engine optimisation.

The cooperation with the consumer advice centre as a neutral, recognised provider of information, as well as EWO's own product neutrality, has proven helpful in conveying information in a credible manner. And the cooperation with the climate protection managers in the planning region was crucial for the implementation and impact of the campaigns in the region.

The lessons learned also include that regional actors and human resources were important for planning and implementing the project, that energy agencies have an impact due to their role as caretakers on the ground, and that the Local Working Groups are a good method for planning and implementing campaigns.

8.2.8. Transfer of experience for other regions and countries

Despite the COVID situation, the German REPLACE partners were able to present the project and its results at numerous thematically suitable international events. This enabled the project experiences to be passed on to other countries as well as to the German event participants outside the project region.

In order to pass on knowledge from the project to other regions or countries in the future, Energiewende Oberland is prepared to provide information on the experience gained as a speaker upon invitation. Energiewende Oberland continues to network in the European area and can transfer the knowledge from REPLACE to new projects. In addition, the website www.wärmewende-oberland.de can serve as an example for other actors who would like to establish an information platform on the topic of the heat transition.

9 | North Macedonia: Skopje Region

9.1. Recap of the first action plan

In coordination with the Local Working Group (LWG) in the Skopje (KAGoP) region throughout several meetings the following activities were agreed on to be implemented within the REPLACE campaigns.

An overview of the proposed activities according to the first action plan is shown in the table below. The choice of campaign activities remained unchanged during the project, however some of the activities had several adjustments considering the current situation and the needs in the KAGoP region.

Table 25: Overview of proposed activities according to first action plan

Activity	Status
Labelling of boilers	Pursued further
Techno-economic pre-feasibility studies	Pursued further
Municipal information hubs	Pursued further
Labelling of 100 % renewable heated houses	Pursued further
Open cellar/house events	Pursued in a modified form (re-designed)
Webinar showing how to use the "REPLACE your Heating System Calculator"	Pursued in a modified form (re-designed)
Facilitating collaboration of installers and contractors	Pursued in a modified form (re-designed)
Facilitating the realisation of collective actions	Modified from initial plan. Partially completed, pursued further in order to provide greater value to the project.

According to the table, none of the activities were discarded, however there were few that were pursued in a modified form and had to be re-designed from the initial plan, due to some unexpected factors, such as the COVID pandemic in 2020 and 2021 and the latest energy crisis in 2022.

Hence, for the house events activity, instead of inviting many stakeholders to be part of the open day and to actually see the good practices that have been installed, the SDEWES-Skopje team and an energy controller visited the households and later disseminated the identified good practices on the later on implemented workshops, due to the meeting restrictions because of the pandemic.

Regarding the webinars, two fully online webinars were held, and an additional one in a hybrid mode, as the interest for a physical seminar at that time was increased.

The campaign for facilitating the collaboration of installers and contractors had to be pursed in a modified form, only as roundtable discussions with the key stakeholders. Their valuable input, anyhow, will be used in further elaborating different collaboration models of installers and investors, but also among various other stakeholders for instance in the energy sector.

The last activity, facilitating the realization of collective actions underwent a few adjustments as well. Furthermore, the campaign was successfully completed and provided greater value to the project, by conducting a pre-feasibility study for an energy community in a building in municipality of Karposh with the idea of a joint investment in PV collectors for electricity and inverter heat pumps for heating.

The results of this activity were further disseminated on a dedicated workshop in order to share such concepts and encourage replacement for new and climate friendly heating and cooling alternatives.

9.2. Activities implemented and tested

9.2.1. New activities

There were no new activities implemented, related to the first action plan.

9.2.2. Overview of performed, tested & fine-tuned activities

The following table gives an overview of the implemented activities and their preparation and run-time phase.

Table 26: Overview of activities and their preparation and run-time in the KAGoP region

	Latest Status Quo	Starting point & fine-tuning	
Activity	Short description	Preparation phase	Implementation phase (re-design)
Labelling of boilers	Labeled 8 houses with old oil, wood stoves or electric heaters in the three municipalities	June 2022 – printing labels, July 2022 – activity promotion August/September 2022 – establishing contacts	October 2022 – identification of 8 cases and home visits
Techno-economic pre-feasibility studies	Conduced 7 techno-economic studies in Macedonian and English. Most of the old systems were old wood stoves or electric heater, to be replaced with pellet boilers or heat pumps.	February, 2022 - Google survey and phone calls for data collection	March/April 2022 – conducing 7 pre-feasibility studies (EN and MK version)
Municipal information hubs	Established three municipal info hubs (municipality of Aerodrom, Gjoche Petrov and Karposh), 1 official opening with 12 participants, 1 virtual info hub created and 1 guideline	January 2021 - Guideline for implementation of the info hub for the municipalities, February 2021 – creation of virtual Info Hub	February 2021 – established municipal info hub in Aerodrom, May 2021 – established municipal info hub in Gjorche Petrov,

	for the municipalities developed		June 2022 – established municipal info hub in Karposh
Labelling of 100 % renewable heated houses	80 participants applied for the green sticker in an open call, 3 separate events organized in the KAGoP region (1 attended by the mayor of Karposh)	October 2021 - Open call on municipal websites and social media, REPLACE virtual info hub, November 2021 – printing labels	December 2021 - 3 separate events in municipality of Karposh, Gjorce Petrov and Aerodrom, December 2021 - Campaigns results dissemination
Open cellar/house events	2 cases identified and visited: 1 apartment with air/water HP and distribution system and 2 house with combined system with pellet boiler and solar collectors.; the results were shared on the following events	August 2022 – identification of good practices, September – establishing contact with the potential cases	October 2022 – identification of 2 cases and home visits
Webinar showing how to use the "REPLACE your Heating System Calculator"	2 webinars and 1 hybrid event were organized with around 100 participants (consumers, intermediaries, investors, policy makers, etc)	April/May 2021 – preparations and invitations for the first and second webinar March 2022 - preparations and invitations for the third webinar	June 2021 – First webinar and Second hybrid seminar, April 2022 - Third webinar
Facilitating collaboration of installers and contractors	Roundtable discussion organized with 8 key stakeholders about their innovative collaboration model in the energy sector	December 2022 - gathering input, January 2023 – preparatory work for the event	February 2023 - Organization of roundtable for facilitating collaboration of installers and contractors
Facilitating the realisation of collective actions	Conducting techno-economical pre-feasibility study for a selected building that will act like an energy community and jointly purchase PV and inverters; the key messages were	January/February 2022 – gathering information, March - July 2022 – conducting a pre-feasibility study	January 2023 - Organization of CB&KE seminar for collective actions

	disseminated at a conference attended by around 40 participants.	December 2022 – preparatory work for the event	

9.2.3. Successful activities

9.2.3.1. Annual labelling for boilers

The activity “annual labeling for boilers” was completed in the last year of the REPLACE project with assistance from the LWG within the KAGoP region identifying potential houses that are using inefficient heating systems. At the end, 8 different, old heating systems were visited and advised for better and greener alternatives.

Reasoning why activity is classified successful

The official campaign promotion started in July 2022 and was completed by the end of the year, with an identification of 8 cases in the three municipalities of KAGoP region (Karposh, Gjorche Petrov and Aerodrom). The visits were conducted with an energy adviser, who explained to the end-users the perks of replacement of the current, old system with an environmentally friendly alternative.

Direct impact

The systems in the houses that we visited were different, however the focus was on the oil and electric boilers and heaters and old wood stoves, as this are technologies that are believed to have no place in the future heating market. The end-users got acquainted with the side effect of their current system and got familiarized with the most appropriate options for their particular environment. Furthermore, they expressed their gratitude for such initiative and strongly encouraged more similar actions, such as direct, bilateral and dedicated contact and advise , as was this particular activity organised within the REPLACE project.

Accompanying communication

As the contacts with the homeowners were established, suitable labels were prepared along with handbooks and other materials in order to encourage a replacement of the existing system. The results were disseminated on social media and the REPLACE website as well.

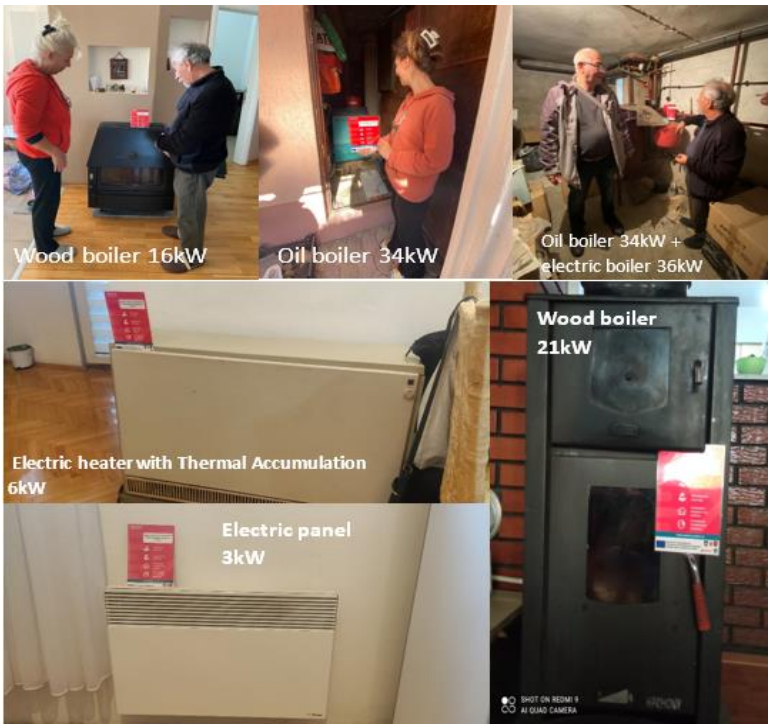


Figure 92: Site visit - activity “annual labelling for boilers” in Skopje region

9.2.3.2. Conduction of techno-economy feasibility studies

This activity was composed of 6 techno-economy feasibility studies for the replacement of old heating systems with modern, more efficient, and environmentally friendly systems. To conduct these studies, a questionnaire was promoted via the municipalities in the KAGoP region, which led to households filling it out with their heating and cooling systems data. Out of the 10+ households that filled the questionnaire, we chose 6 that had old and inefficient systems which best fit the REPLACE criteria. All of the households were contacted individually in order to gain their approval for the use of their data. After acquiring their consent, we moved towards the conduction of the studies.

Reasoning why activity is classified successful

All 6 techno-economy feasibility studies were successfully prepared. After their completion, the results were analyzed and compared to the actual data from the KAGoP region. It is deemed that the results were excellent as they coincided with the actual circumstances in the KAGoP region, and the households were very satisfied.

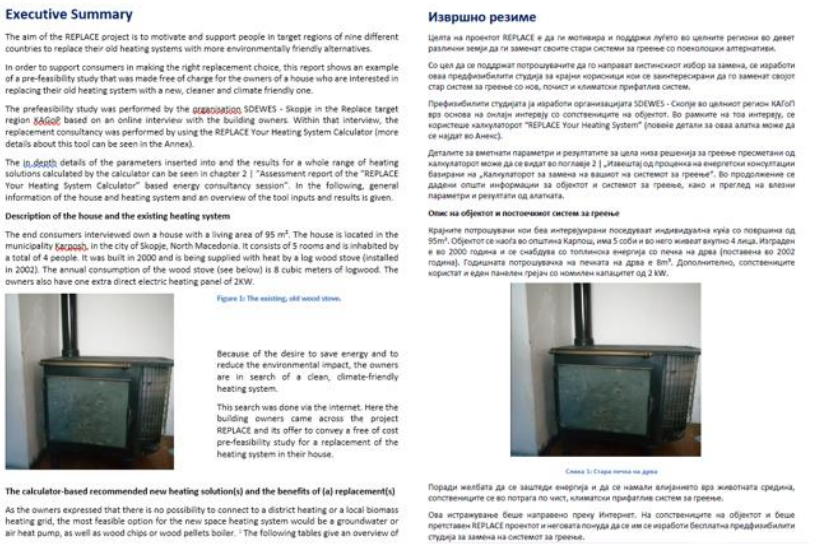
Direct impact

Out of the 6 analyzed studies, 5 were old log wood boilers and 1 was a direct electric heating system (panel heaters). This was a good representation of the KAGoP region as houses that are not connected to a district heating system are usually heated by old log wood boilers, while apartments are usually heated by panel heaters. Neither of the households analyzed in the studies could connect to a district heating system. The results from the techno-economic studies showed that for these households, the best technologies for the replacement of their heating systems were (order is dependent on the specific household): wood pellets, wood chips, air heat pumps, and groundwater heat pumps. As the wood chips technology is not widely and commercially available in North Macedonia, it was omitted as a viable result. All results showed that a replacement of the household's old and inefficient heating

systems will lead to environmental and economic benefits which would greatly benefit the households and have a positive impact on the community in the KaGoP region.

Accompanying communication

The results of the action were promoted at a dedicated event where different stakeholders (policy makers, installers, households) were present.



Executive Summary

The aim of the REPLACE project is to motivate and support people in target regions of nine different countries to replace their old heating systems with more environmentally friendly alternatives.

In order to support consumers in making the right replacement choice, this report shows an example of a pre-feasibility study that was made free of charge for the owners of a house who are interested in replacing their old heating system with a new, cleaner and climate friendly one.

The prefeasibility study was performed by the organization SDEWES - Skopje in the Replace target region KAGoP based on an online interview with the building owners. Within that interview, the replacement consultancy was performed by using the REPLACE Your Heating System Calculator (more details about this tool can be seen in the Annex).

The in depth details of the parameters inserted into and the results for a whole range of heating solutions calculated by the calculator can be seen in chapter 2 | "Assessment report of the "REPLACE Your Heating System Calculator" based energy consultancy session". In the following, general information of the house and heating system and an overview of the tool inputs and results is given.

Description of the house and the existing heating system

The end consumers interviewed own a house with a living area of 95 m². The house is located in the municipality Karposh, in the city of Skopje, North Macedonia. It consists of 5 rooms and is inhabited by a total of 4 people. It was built in 2000 and is being supplied with heat by a log wood stove (installed in 2002). The annual consumption of the wood stove (see below) is 8 cubic meters of logwood. The owners also have one extra direct electric heating panel of 2KW.

Figure 1: The existing, old wood stove.

Because of the desire to save energy and to reduce the environmental impact, the owners are in search of a clean, climate-friendly heating system.

This search was done via the internet. Here the building owners came across the project REPLACE and its offer to convey a free of cost pre-feasibility study for a replacement of the heating system in their house.

The calculator-based recommended new heating solution(s) and the benefits of (a) replacement(s)

As the owners expressed that there is no possibility to connect to a district heating or a local biomass heating grid, the most feasible option for the new space heating system would be a groundwater or air heat pump, as well as wood chips or wood pellets boiler. [1] The following tables give an overview of

Извршно резиме

Целта на проектот REPLACE е да ги мотивира и поддржи луѓето во целните региони во девет различни земји да ги заменат своите стари системи за греење со поеколошки алтернативи.

Со цел да се поддржат потрошувачите да го направат вистинскиот избор за замена, се изработи оваа предфизибилити студија за крајни корисници кои се заинтересирани да го заменат својот стар систем за греење со нов, почист и климатски прифатлив систем.

Предизибилити студијата ја изработи организацијата SDEWES - Скопје во целниот регион КАГоП врз основа на онлајн интервју со сопствениците на објектот. Во рамките на тоа интервју, се користеше калкулаторот "REPLACE Your Heating System" (повеќе детали за оваа алатка може да се најдат во Анекс).

Деталите за вметнати параметри и резултатите за цела низа решенија за греење пресметани од калкулаторот може да се видат во поглавје 2 | „Извештај од проценка на енергетски консултации базирани на „Калкулаторот за замена на системот за греење". Во продолжение се дадени општи информации за објектот и системот за греење, како и преглед на влезни параметри и резултати од алатката.

Опис на објектот и постоечкиот систем за греење

Крајните потрошувачи кои беа интервјуирани поседуваат индивидуална куќа со површина од 95m². Објектот се наоѓа во општина Карпош, има 5 соби и во него живеат вкупно 4 лица. Изграден е во 2000 година и се снабдува со топлинска енергија со печка на дрва (поставена во 2002 година). Годишната потрошувачка на печката на дрва е 8m³. Дополнително, сопствениците користат и еден панелен грејач со номинален капацитет од 2 kW.

Слика 1: Стара печка на дрва

Поради желбата да се заштеди енергија и да се намали влијанието врз животната средина, сопствениците се во потрага по чист, климатски прифатлив систем за греење.

Ова истражување беше направено преку Интернет. На сопствениците на објектот и беше претставен REPLACE проектот и неговата понуда да се им се изработи бесплатна предфизибилити студија за замена на системот за греење.

Figure 93: Accompanying communication for 6 techno-economy studies in Skopje region

9.2.3.3. Labelling of 100 % renewable heated houses

In order to highlight the effort of households and inspire, and motivate heat consumers to switch their heating system to a renewable energy source, a 100 % RHC label was designed for display in their homes. Therefore, the municipalities in the KAGoP region published an open call on their websites, so that the citizens who have a 100 % RHC system can apply and be rewarded with a green label and energy-efficient lights. Three events were organized, to hand out the labels directly to households, one in each KAGoP municipality - Karposh, Aerodrom, and Gjorce Petrov.

Reasoning why activity is classified successful

The response to this activity was overwhelmingly positive as almost 80 citizens were interested and willing to be an example of environmentally aware end-users. As part of the events, representatives from the municipalities shared the labels among the end-users who have installed a renewable heating system. On the event in Karposh, even the mayor expressed his contentment with this successful campaign.

Direct impact

The impact of this activity lies in the big number of shared labels, as well as the successful campaigns and posts on the municipalities' websites. The RHC labels will now be displayed in the citizen's houses, which will further encourage, motivate and inspire other consumers who visit these houses to replace their own heating systems with climate-friendly alternatives.

Accompanying communication

The results of the action were promoted at a dedicated event where different stakeholders (policy makers, installers, households) were present.

Figure 94: Accompanying communication for RES Labelling in Skopje region

9.2.3.4. Conduction of webinars on the usage of the consumer-friendly "REPLACE Your Heating System Calculator"

This activity consisted of 3 webinars that were held in the time-span of a couple of months. The first webinar was organized online, on the topic: "Overview of sustainable technologies and examples of good practices for replacement of heating and cooling systems". The second webinar was held on-site in a venue, on the topic: "Decarbonization of the heat sector". The third and last of the webinars was held online, where the REPLACE calculator, matrix, and a country specific excel-based tool were presented.

Reasoning why activity is classified successful

All three webinars each were attended by a great number of key stakeholders and participants, including representatives from the municipalities of the KAGoP region, representatives from the Ministry of Economy, Ministry of Environment, City of Skopje, Energy Agency, United Nations Development Programme North Macedonia, Macedonian Academy of Sciences and Arts, NGO's, Electricity Transmission System Operator of North Macedonia (MEPSO), private companies, and more. What's more reassuring is that each webinar was met with positive feedback from the participants, and a statement to that are the long and very informative discussions held as part of each event. In total 100 participants attended the webinars.

Direct impact

In all webinars, the participants were introduced to the REPLACE project and its goals as well as past and future activities which were and will be implemented in the KAGoP region. In the first webinar, which focused on sustainable technologies, many examples of good practices for the replacement of heating and cooling systems were shown to the participants. The benefits of these examples, both national and international (good practices from more experienced countries), were thoroughly discussed with the participants. Everyone agreed that they were good practices and should serve as motivation for local replacement. The importance of a greater mutual engagement of all institutions for joint work and better promotion was also stressed. The second webinar consisted of a presentation from the prominent expert and professor at the Faculty of Mechanical Engineering in Zagreb, Croatia - Prof. Dr. Neven Duic. The professor held a presentation on the topic of how to fully decarbonize the

heating sector in North Macedonia, talking about what North Macedonia can do now, and what it can do in the future toward meeting the goal of a 100 % decarbonized heating sector. In the following discussion all participants deemed the presentation as very informative and useful.The third and last webinar was about presenting the REPLACE tools, such as the REPLACE calculator, matrix, and the country-specific excel-based tool. Each tool was shown in detail, together with an example and validation of results. The tools were deemed to be of great use, especially by the representatives of the municipalities, who obliged to put links to the tools on the municipalities' websites so citizens can access the tools and get better informed more easily.

Accompanying communication

The results of the action were promoted at a dedicated event where different stakeholders (policy makers, installers, households) were present.

9.2.3.5. Realisation of collective actions

The activity for realising a collective action was composed of a techno-economic study for a representative multi-apartment building in the KaGoP region. The study assessed the economic feasibility of collectively purchasing inverter heat pumps (air-air heat pumps) and PV systems and sharing energy in a residential multi-apartment building. The collective action reflects the collective purchase of the clean technology, the bigger bargaining power obtained when the different detached houses act as a single entity (energy community) and the electricity sharing within the community due to the collective self-consumption. Based on the analysis, a procedure for analysing the techno-economic viability of such systems was developed. This procedure can be replicated for other use cases, not only in the KaGoP region, but also more widely, thus pointing toward possible policy recommendations in the area of energy communities and collective actions.

The analysis provided an analytical, techno-economic assessment related to the decarbonizing of residential heating by using shared, collectively generated clean electricity from PV systems. This is a valuable opportunity for energy sector coupling (electricity & heat) in the local context. By using inverter heat pumps instead of resistive heating, the analysis also quantifies the benefits due to the energy efficiency gains.

Reasoning why activity is classified successful

The success of this action is based on the fact that it reveals the positive economic viability and notable energy efficiency gains can be achieved with the proposed model (energy sharing in a multi-apartment building which uses PVs and heat pumps). While the analysis was performed for a single building, it can be replicated for other similar buildings that use resistive electric heating. This is especially the case in municipalities where there is no district heating and the households use old resistive storage heaters, which is a notable portion of the households in North Macedonia.

Direct impact

For the analyzed building with seven households, it was found that if all household change their existing resistive heaters with air-source inverter heat pumps and install a collective PV system on the roof of the building, they would reduce their electricity bills and energy demand and return their investment in a relatively short amount of time. Based on a realistic 3D simulation model of the building, using the PVSol software and the additional REPLACE heating calculator tool developed by SDEWES-Skopje, the results shown in the table below were obtained. In the table below NPV stands for net-present value, SCR stands for self-consumption rate and SSR stands for self-sufficiency rate.

The results show that when heat pumps are used instead of resistive heating, the primary electricity demand for heating of the building is reduced by factor of 3 (from 27,520.00 kWh to 8,632.84 kWh), while the total electricity demand, considering other energy use such as lighting, cooking, water heating etc., is reduced by about 34 %. On top of this, the electricity imported from the grid is additionally reduced by 16.33-26.70% if a collective PV is added to the rooftop of the building, depending on the size of the PV generator. A sensitivity analysis with different PV capacities shows that all PV capacities yield a positive NPV.

Figure 95: 3D simulation model of the building using the PVSol software

Table 27: Results from calculations for collective action in North-Macedonia

PV (kWp)	Total investment cost (€)	Specific investment cost (€/kWp)	Payback period (years)	NPV (€)	SCR (%)	SSR (%)	Average annual savings (€)
4.64	6,316.00	1,361.21	5.32	14,726.81	84.90	16.33	2,410.87
5.22	6,668.00	1,277.39	5.28	15,397.45	82.62	17.89	2,492.86
5.80	7,170.00	1,236.21	5.32	15,841.65	80.20	19.35	2,570.72
6.38	7,552.00	1,183.70	5.33	16,284.43	78.06	20.59	2,638.15
6.96	7,934.00	1,139.94	5.33	16,737.60	75.76	21.84	2,706.57
7.54	8,316.00	1,102.92	5.35	17,133.51	73.52	22.99	2,770.70
8.12	8,848.00	1,089.66	5.42	17,295.66	71.32	24.05	2,829.94
8.70	9,080.00	1,043.68	5.40	17,762.70	69.22	25.06	2,886.55
9.28	9,612.00	1,035.78	5.52	17,558.21	67.62	25.58	2,917.61
9.86	9,784.00	992.29	5.46	18,192.86	65.41	26.70	2,982.06

Given that about a third of settlements in Skopje, and North Macedonia in general, use resistive heaters, the business model proposed above can have a significant direct impact in terms of:

- Reducing primary energy demand of buildings
- Improving comfort of households
- Decarbonizing energy demand of buildings
- Supporting the development of new business models
- Spearheading investment in renewable energy

Accompanying communication

The results of the action were promoted at a dedicated event where different stakeholders (policy makers, installers, households) were present.

Figure 96: Accompanying communication for realization of collective actions in Skopje region

9.2.4. Less successful activities

9.2.4.1. Establishment of REPLACE (R)HC replacement information hubs

As a starting point for this activity and greater involvement of the local municipalities a guideline for implementation of the info hubs was elaborated. In February 2021, the info hub in the municipality of Aerodrom was officially introduced to the citizens. Additionally virtual info hub was created in the municipality of Gjorce Pertov was officially introduced to the citizens with an event attended by 12 participants. SDEWES-Skopje in cooperation with representatives of the local energy efficiency sector in the municipality made this hub available to all interested parties and will assist with the local initiatives to replace the existing inefficient heating and cooling systems with environmentally friendly solutions. Furthermore, an info hub in Municipality of Karposh was established in a joint event with another H2020 project related to energy efficiency.

Reasoning why activity is classified less successful

Although the activity had a good structure and an initial plan how to develop during the project lifetime and beyond, it did nor reach the estimated number of people that was envisaged to take advantage of

these hubs. The enhanced presence of available RHC information on social media, websites and other online means and lack of need or time to visit physical info hubs in the municipalities were identified a possible reasons for the lower amount of visitors.

Direct impact

In total three municipal info hub were established, and an additional virtual info hub was created. The overall impact on the municipal level could not be measured, however the virtual hub is followed by 60 users.

Accompanying communication

Information and other promotion materials were distributed at the info hubs. Moreover, a guidance on how to implement an info hub in municipalities was developed. The virtual info hubs served as a tool to disseminate all the news, seminars and workshops announcements and ongoing campaigns as well as the results from them.

Figure 97: Accompanying communication for Municipality info hubs in Skopje region

9.2.4.2. Open house events

This campaign activity covered two best practice RHC systems installed in the KAGoP region. The homeowners welcomed the SDEWES-Skopje team and an energy consultant to showcase and explain their environmentally friendly systems and the benefits that they are experiencing through them. The first example was 4kW air-water heat pump and a distribution system with high temperature radiators in a 90 m^2 apartment in a newly completed building. The latter is a 100 m^2 house with a distribution system heated by a 16kW pellet boiler, with additional installed solar collectors for sanitary purposes. Both cases have automatized regulation systems, which can be easily handled remotely.

Reasoning why activity is classified less successful

Due to the general conditions caused by the pandemic, no real open house events could be held. Only the SDEWES team and an energy consultant were present to exchange ideas with the owners of the best practice examples of renewable heating and cooling systems and to report on the later. Direct exchange with interested citizens was thus not possible, which reduces the impact. It was also assumed the there would be a higher number of households with renewable heating systems willing to participate, so that various technologies could be explored. In the end, however, there were only 2 participating households.

Direct impact

In total two good practices were showcased and their findings were disseminated to other 40 participants of another following event, as good practices adjustable for houses and apartments.

Accompanying communication

The results were further disseminated on the REPLACE event organized in the beginning of 2023 in order to share good practices among a larger audience and to encourage broader heating system replacement activities in the region.

Figure 98: Accompanying communication for activity House Events in Skopje region

9.2.4.3. Facilitating collaboration models between installers and investors

The facilitation of innovative collaboration models was supported with a roundtable with valuable inputs from relevant key stakeholders. This workshop was organised on the 13th of February 2023 in Skopje with eight attendees. The concept of the workshop included a presentation, a world style cafe roundtable of discussion and live interaction with virtual post-it notes using ZOOM whiteboards. Installers, energy utilities and service companies need to adapt to the changing legislative and technology framework in order to grow their businesses. There is significant potential for companies to broaden their business models to becoming plant and EE contractors. Possibilities of adopting ESCO models within the national legislation and contributing to the capacity building of stakeholders in terms of ability to broaden their business models were discussed. By providing international and national best practice examples a discussion was initiated with the aim of identifying the area with biggest business potential for this approach.

Reasoning why activity is classified less successful

The campaign activity for facilitating the collaboration of installers and contractors had to be pursed in a modified form, as a roundtable discussion with the key stakeholders. Their valuable input, anyhow, will be used in further elaborating different collaboration models of installers and investors, but also among various other stakeholders. However, greater attendance was expected.

Direct impact

New collaboration models were shared with the participating key stakeholders. Furthermore, several models and related challenges were tackled and discussed during the roundtable.

Accompanying communication

Handbooks and other promotional material were distributed at the workshop. The results from the event were disseminated on social media and the REPLACE website.

Figure 99: Accompanying communication for activity Facilitating collaboration models between installers and investors

SWOT

Table 28: SWOT of successfully and less successfully implemented activities in the KAGoP region

	Helpful to achieving the objectives	Harmful to achieving the objectives
Internal origin (attributes to the implementing bodies)	**Strengths** - Knowledge exchange and capacity building - Good economic viability - Reasonable and not too high investments from households	**Weaknesses** - Lack of awareness - Lack of technical knowledge - Lack of individual finance and readiness - Reluctance to changes of legislation and administrative procedures
External origin (attributes to the environment)	**Opportunities** - State-of-the-art technologies and heating concepts available - Completed technical studies which are ready for implementation - Environment with knowledge for implementation of new business models - Aligned with national energy strategy and EU directives	**Threats** - Lack of national legislation on energy communities and collective actions - Energy crisis and fuel price increase - Distorted market signals due to cross subsidies

9.2.5. Addressing of horizontal aspects (gender, poverty etc.)

Given the circumstances, few of the campaign activities also addressed some horizontal aspects such as rebound, avoiding lock-in effects or gender and energy poverty aspects when replacing heating systems. Many of the activities focused on gender issues, as they were actively carried out by women and nonetheless advised many other how to successfully run a transformation and replace their heating system, a process which tends to be more familiar to the male population. However, with our labelling campaigns, webinars and techno-economy pre-feasibility studies no one is left out from the replacement process about various heating options.

Regarding the energy poverty aspects, the government has recently repurposed additional finances and improved the subsidy schemes for these households. The latest updates from the legislation were also communicated through our campaign activities, such as the municipal information hubs and the annual boiler labeling campaign.

The rebound effect and possibilities to avoid lock-in effects were communicated during the panel discussion and roundtables with the key stakeholders and shared with the participants as a precaution that one could undertake to prevent sudden failure, thus to reduce the overall energy consumption by improving their own comfort.

9.2.6. Activities that may remain beyond project life

The project team was encouraged to make the most out of the resources available, and to design, implement and present the activities to the relevant local (or national) actors and team up with them, in a way that would allow the most successful and impactful practices to continue beyond the duration of the project.

Some of the activities that are envisaged to remain beyond project life are the municipal info hubs and the virtual info hub that will further disseminate replacement activities in the KAGoP region and news about the RHC and its benefits. Although it is not considered as a campaign activity, as an indirect link we assume that the REPLACE calculator and the add-on inverter calculator will be continuously used by energy experts in municipalities helping citizens and also by different citizens.

9.2.6.1. Institutionalised or longer-term anchored activities

The information hubs that were established within the municipalities in the KAGoP region, will be maintained there in the long term. However, their use also depend on the employees willingness to further disseminate the REPLACE materials and advise citizens.

9.2.6.2. Potential follow-up actions or continuity

The REPLACE project continued a collaboration between SDEWES-Skopje and the Municipalities of the KAGoP region which has been ongoing before the project's start and will continue after its end. As a follow-up activity the proposed collective action could be realized. However, these activities cannot be guaranteed and strongly depend on the end-user's power to invest and integrate the concept that we developed as a pre-feasibility study. Nevertheless, the capacity that was developed within the municipalities within the project, as well as the networks that were established with installers, consumers and policy makers provide a solid ground for making the three municipalities best practices examples in how they target the decarbonization of the heating sector.

9.2.7. Added value of the project Replace to the pilot region

The analysis for the realisation of the collective action was composed of a techno-economic study for a representative multi-apartment building in the KaGoP region. The study assessed the economic feasibility of collectively purchasing inverter heat pumps (air-air heat pumps) and PV systems and sharing energy in a residential multi-apartment building. Based on the analysis, a procedure for analysing the techno-economic viability of such systems was developed. This procedure can be replicated for other use cases, not only in the KaGoP region, but also more widely, thus pointing toward possible policy recommendations in the area of energy communities and collective actions. The techno-economic study was presented in an open event where different stakeholders participated and it initiated a discussion about the need for a national legislation on energy communities. More importantly, it initiated a discussion with interested stakeholders (representatives from the PV sector and the building construction sector) about the possibility of offering residents in new apartment buildings business models based on collective ownership of PV systems.

9.2.8. Lessons learned from the action and recommendations

The campaign's activities most certainly shifted consumers' minds towards more sustainable heating solutions. The end-users, intermediaries and investors learned about the state-of-the-art technologies, got acquainted with the best practices in different countries and regions, and have a better overview with the current heating and cooling situation, considering the challenges and barriers that exist in the KAGoP region. The overall feedback was positive, the stakeholders were very satisfied with the REPLACE activities and are willing to support further development in the field of RHC. Yet the main challenge in the heat market remain the needed finances for heating system replacement and lack of subsides, especially with the new energy crisis and drastic increase of fuel prices. Greater involvement from the end-users and other intermediaries is something that should be worked on as the ground for awareness raising and knowledge exchange was established. An activity that could be pointed out and recommended for other regions is the feasibility study for a collective action, where a building is acting as an energy community. Such a concept if nicely performed could make a great impact on the local, level in enabling greater independence from fossil fuels.

9.2.9. Transfer of experience for other regions and countries

KAGoP region is already known as a more advanced region in the RHC sector in north Macedonia, as many projects and similar activities are already performed in these three municipalities. The results were communicated to a broad spectrum of the public covering different backgrounds, such as end-users, policy makers, municipal representatives, installers, RES companies, investors, academicians, researchers and many more. The results were shared through different means, including social media, websites, newsletters on the international level, and more importantly via the implemented events, meetings, workshops, seminars during the REPLACE project. Further communication and transfer of experience could be done via the virtual info hub and already established social media contacts.

10 | Slovenia: Slovenia

10.1. Recap of the first action plan

In a development process comprising of several workshops with the Slovenian REPLACE Local Working Group (LWG) the following set of activities jointly was agreed on to be implemented in Slovenia.

Table 29: Overview of proposed activities according to the first action plan for Slovenia

Activity	Status
Annual labelling for boilers	pursued further
Six techno-economic feasibility studies	pursued further
REPLACE (R)HC replacement information hubs	pursued further
Information points on consumer's fairs	pursued further
Labelling-campaign for 100 % renewable heating or cooling	pursued further
Best practice RHC systems open day/house events	pursued further
Organization of webinars on the usage of REPLACE tools	pursued further
Joint purchase of RHC equipment	pursued further
Collective action with Eco fund and Borzen – development of "fuel oil phase out" offensive	pursued further

Although at that moment all activities were planned to be pursued further, the execution of some was already under threat: open day/house events due to Covid19 -related unclear conditions of possible in-person events and annual labelling for boilers due to the fact that the responsible ministries for energy labelling expressed their apathy to make boiler labelling for new purchases compulsory, similarly as it was for heat pumps at the time being.

10.1.1. Annual labelling for boilers

At the campaign preparation phase, the annual labelling for *existing* boilers was not yet mandatory, thus a policy-driven offensive was necessary. The chimney sweepers already make annual inspection of boilers and label them with data on its footprint.

The main objective of this action was to urge the relevant ministries to support the labelling of old boilers in addition to the current labelling requirements, to comply with the eco design Directive.

It involved the conduction of interviews with ministry representatives in order to gain insight into their mind-set on the connection with the Ministry of Environment and Spatial Planning and Ministry of Infrastructure. The aim of these discussions was to make a step forward in the implementation of boiler labelling. During the two years implementation, JSI's goal was to inform end-consumers about this through an intensive media campaign and promotion on social networks. Those who are interested were able to contact JSI and get their boilers labelled.

10.1.2. Conduction of techno-economic feasibility studies

Many households are not aware of techno-economic feasibility studies and have no experience or knowledge about them. Therefore, this activity should serve as capacity building and it encourages end-users to use the “REPLACE your heating system calculator”, since they mainly don’t use such any approach when choosing a heating system.

The plan for this activity was to implement it with the support of municipalities and energy advisory offices, so the consumers who need to replace their heating system could be identified more easily. In this way, municipalities could gain insight into what investments are needed for implementation of boiler replacements, and what benefits are related to different technologies, which could enable them to develop their financial plan and strategy in more sustainable direction.

Prior to conducting the techno-economic feasibility study, all identified beneficiaries should be acquainted with the REPLACE project, the execution procedure and the information that needs to be provided, as well as the contract between the beneficiary and the project team. Projects realized during campaigns life may become show cases, if consumers give their consent.

10.1.3. REPLACE (R)HC replacement information hubs

The REPLACE information hub was planned to be operated in the scope of energy advisory offices. 55 such offices are located throughout Slovenia and each of them was equipped with REPLACE project flyers, posters, technology briefs, handbooks, information on REPLACE offers and activities which were open to interested citizens. Furthermore, an energy advisor was trained in each office to elaborate the idea behind the information hub to the end users or relevant stakeholders in the scope of other REPLACE campaign activities.

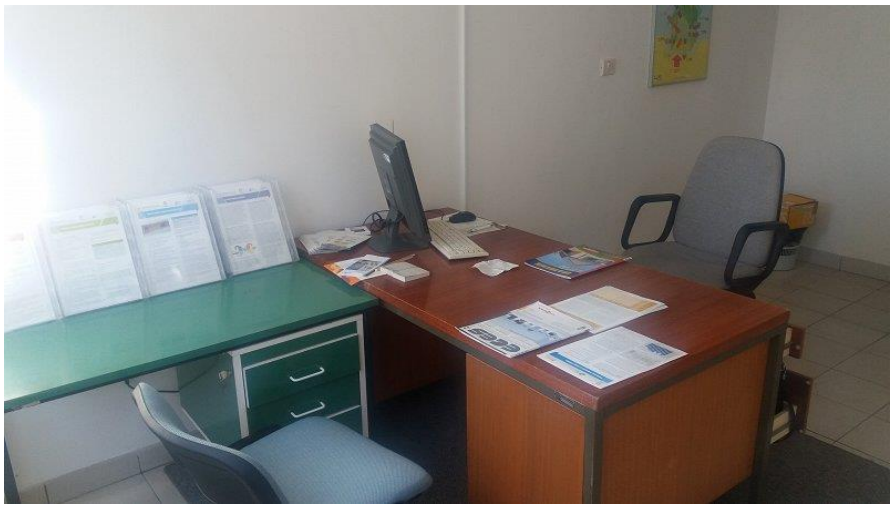


Figure 100. An example of an information hub in energy advisory offices in Slovenia

10.1.4. Labelling - campaign for 100 % renewable heating or cooling

This was to be promoted through LWG members that can reach municipalities in Slovenia.

The households that use technical systems for heating, cooling and domestic hot water preparation that exploit renewable energy sources were invited to the campaign and should receive 100 % renewable heating or cooling label, should they meet the conditions of such a system.

10.1.5. Best practice RHC systems open day/house events

Open day or house events regarding best practice RHC systems in Slovenia were to be organised with the cooperation of "Odprte hiše Slovenije" (en. Open House Slovenia, OHS). OHS is an annual festival of open door days. Passive house and other building owners open their doors to show visitors what highly energy efficient buildings are all about. This way, participants can experience passive house buildings, both residential and non-residential, for themselves.

Interested consumers can visit households which have already switched their heating system as well as installers and renewable energy companies. JSI with the members of the Local Working Group planned to identify and contact potential show cases.

The event was to be advertised on the websites of the LWG member to enhance the promotion. Such promotion activities might increase the number of interested consumers who will be able to visit open day households which have already switched their heating systems. Thus, it might encourage them the replicate the good practice in their house as well.

10.1.6. Organization of webinars on the usage of REPLACE tools

Webinar offer an efficient way to reaching out to multiple stakeholders in an interactive and engaging manner. In the scope of the REPLACE activities in Slovenia, a minimum of two webinars were to be organized for different types of target groups. The first webinar, targeting independent energy advisors, will serve as an opportunity to present the REPLACE activities and campaigns.

The second webinar, organized in the second half of 2021, aimed to present the "REPLACE you Heating System Calculator" to end-users. A poll, organized before the webinar, was used to obtain information on the types of examples that the webinar attendees are most interested in. The presentation of the tool during the second webinar was based on this input, with a strong focus on the practical use of the tool. Through an interactive discussion, the webinar could offer the attendees a hands-on experience of using the tool.

10.1.7. Joint purchase of RHC equipment

The collective action of joint purchase of RHC equipment aims to further boost the replacement rates of old and inefficient heating systems. JSI's plan was to set up a unique webpage for this campaign that should become a focal and entry point. The core idea was to educate households why they need to replace boilers and what the related benefits are through the REPLACE tools before they choose their new heating system. At the end of the process, they would receive a voucher from local manufacturer of the heating systems, that aimed to additionally motivate investors to implement the replacement. The voucher guarantees that certain binding works for implementation will be executed free of charge.

The campaign was meant to last for 6-8 months and carried out once or twice in the scope of the EPLACE project. The first campaign was scheduled to begin in April 2021. The local manufacturer that was going to participate as a technical system provider was the company Kronoterm, which is one the most recognizable manufacturer of heat pumps in Slovenia.

Thus, can offer the latest, highly efficient heat pump technology. Should the approach prove successful, the second campaign was planned to be carried out in 2022, presumably with a local manufacturer of biomass boilers.

Based on the expected impact of the campaign, local manufacturer of the heating system were meant to offer a certain discount in the form of free execution of some installation works, that are binding anyway. The activity is considered as a joint purchase of the heating systems since the campaign is projected to have a major impact and will attract many targeted households. This motivates the local manufacturer of the heating systems to offer this voucher. On another hand, households will be additionally motivated by the voucher since it offers them an extra financial incentive, besides national subsidy.

10.1.8. Collective action with Eco fund and Borzen – development of "fuel oil phase out" offensive

The collective action with Eco fund and Borzen is a joint undertaking in order to raise awareness about the importance and benefits of boiler replacement through a **holistic education process** for households that aim to replace their old, inefficient heating system.

Borzen is responsible for the implementation of public utility services relating to the organisation of the electricity market and many other important activities in the Slovenian energy field connected with stimulating the use of renewable energy sources and the efficient use of energy. To that end, Borzen designed the platform *Trajnostna enegija* (eng. Sustainable energy, http://www.trajnostnaenergija.si/).

The main purpose of Eco Fund, the Slovenian Environmental Public Fund (Eco Fund), is to promote development in the field of environmental protection by offering financial incentives such as soft loans and grants for different environmental investment projects. In order to reach its goals, Eco Fund prepares and carries out yearly plans which serve as a basis for the publication of public calls. Eco Fund also runs and finances a free energy advisory network offering free expert advice on how to improve energy efficiency to households.

The main idea of this action was to set up a systematic education process of households and raising awareness among experts through a web platform and is going to ensure the long-term establishement of REPLACE project results.

10.2. Activities implemented and tested

10.2.1. New activities

There were no new activities implemented, related to the first action plan.

10.2.2. Overview of performed, tested & fine-tuned activities

The following table gives an overview of the implemented activities and their preparation and run-time phase.

Table 30: Overview of implemented activities and their preparation and run-time in Slovenia

	Latest Status Quo	Starting point & fine-tuning	
Activity	Short description	Preparation phase	Implementation phase
Annual labelling for boilers	Finished and partially completed. The use is guaranteed for leas 2 years after project end.	2/21 – 9/21	5/21 – 8/22
Six techno-economic feasibility studies	Finished and completed.	6/21 – 2/23	9/21 – 2/23
REPLACE (R)HC replacement information hubs	Finished and completed. The long-term use is guaranteed.	5/21 – 3/23	5/21 – 3/23
Information points on consumer's fairs	Finished and completed.	5/21	3/22
Labelling-campaign for 100 % renewable heating or cooling	Finished and completed. The long-term use is guaranteed for at least 2 years after project end.	2/21 – 5/21	9/21 – 8/22
Best practice RHC systems open day/house events	Not completed and discarded.	4/21 – 5/21	-
Organization of webinars on the usage of REPLACE tools	Finished and completed.	3/21 – 8/22	4/21 – 8/22
Joint purchase of RHC equipment	Finished and completed.	8/20 – 4/21	4/21 – 12/21
Collective action with Eco fund and Borzen – development of "fuel oil phase out" offensive	Finished and completed. The long-term use is guaranteed.	5/21 – 12/22	1/22

10.2.3. Successful activities

10.2.3.1. Labelling campaigns: existing boilers and renewable heating

It was intended that LWG members, with their ability to access municipalities in Slovenia, would be used to publicize the labelling campaign. The partners community of municipalities in Slovenia (colored in green on Figure 93) and the community of city municipalities of Slovenia (colored in light green on 93) are able to connect to each of the 212 municipalities in Slovenia. Partners conveyed details concerning the REPLACE project and requested that they post a report on their website to advertise heating solutions and the potential to earn a REPLACE label. Households applied for a label through an online form, where they were requested to take a picture of the label on the house/boiler/HP and sent it to us.

The households that use technical systems for heating, cooling and domestic hot water preparation that exploit renewable energy sources were invited to the campaign and thus received “renewable heating or cooling label”, should they meet the conditions of such system.
Although the activity is called 100 % RHC system, the Slovenian label doesn’t include such statement since this strictly speaking is meant for biomass boilers only.

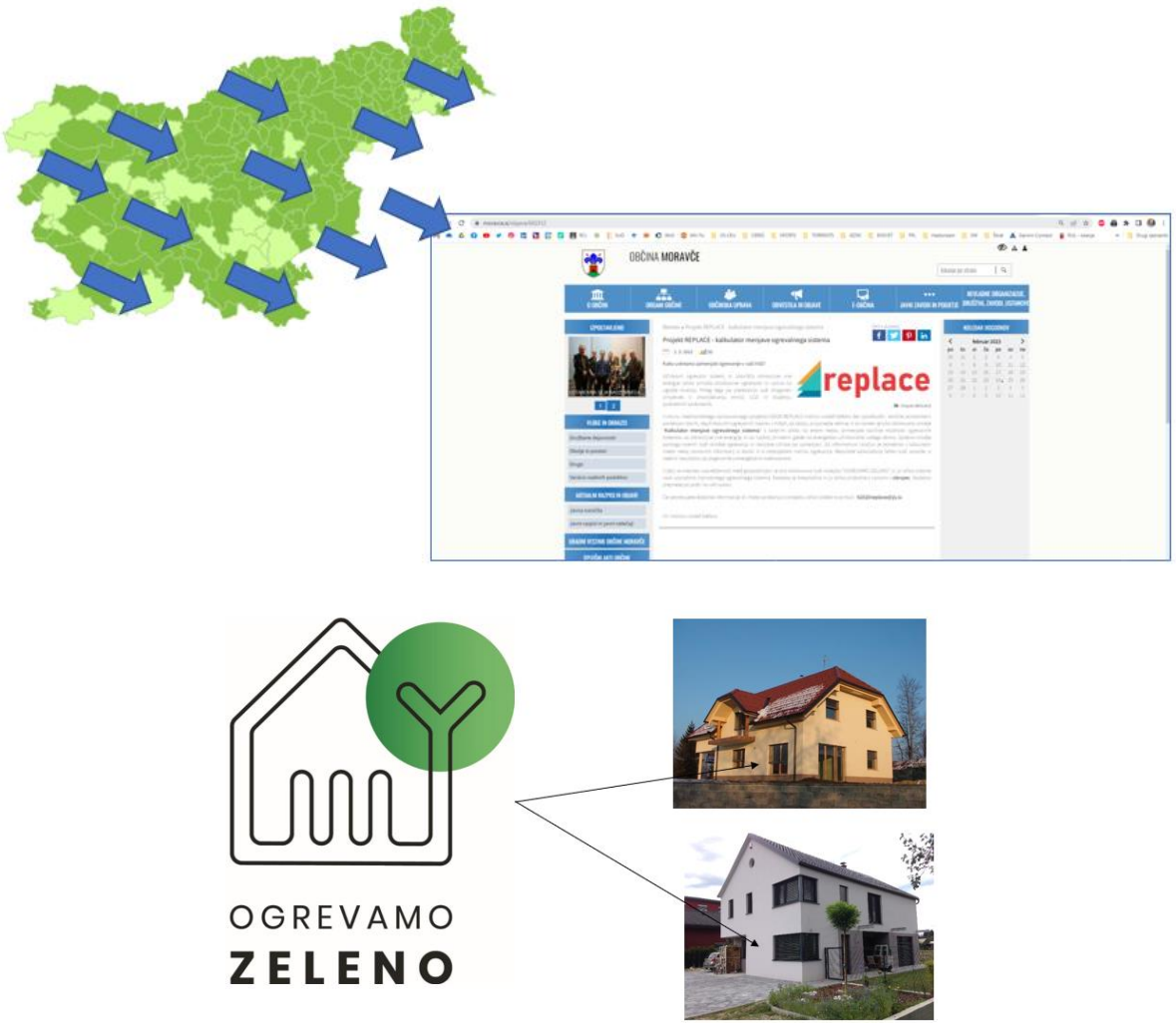


Figure 101: Promotion of labelling campaigns through LWG partners on a national scale in Slovenia

Figure 102: Promotion of green technologies of existing boilers through chimneysweepers by boiler inspection in order to ensure they meet national guidelines.

Figure 103: Households promoting green technologies through the REPLACE label

10.2.3.2. Collective actions

Two parallel collective actions took place in Slovenia in the period of 2021-2023. The first was focused on the joint replacement of fuel oil boilers, while the other was geared towards collective efforts of key stakeholders to initiate a structured system of educating households in order to make more informed decision.

The joint purchase of RHC equipment campaign inspired 147 households to switch from fuel oil boilers to heat pumps. The analysis shows this presents an aggregate of almost 1.5 MW of installed nominal power and modelled 0.97 kt of yearly CO_2 savings.

The collective action implemented with Eco fund and Borzen – development of "fuel oil phase out" offensive ensures that each household in Slovenia that is planning to replace their heating system is aware of the REPLACE campaign and is informed about 1) the educational process of heating system replacement and 2) the REPLACE project, its results and tools.

10.2.4. Less successful activities

10.2.4.1. Best practice RHC systems open day/house events

During the preparation phase it was planned that this activity will take place jointly with the cooperation of "Odprte hiše Slovenije" (en. Open House Slovenia, OHS). OHS is an annual festival of open door days where passive house and other building owners open their doors to show visitors what highly energy efficient buildings are all about. As well as all the opportunities to talk and learn about passive houses, participants can experience passive house buildings, both residential and non-residential, for themselves.

Due to COVID-19 related restrictions many annual house event/campaigns were cancelled. The OHS event in May 2022 was the only one on national scale that took place in physical form. JSI got in touch with OHS's team and asked for active participation in 5 renovated buildings. OHS expressed their interest in the REPLACE project and welcomed JSI as an active participant. In the end, the participation was cancelled due to the high cost that would be required to participate in this event. Since this was the only such event that took place in Slovenia throughout the REPLACE project duration, the activity was discarded.

10.2.5. Addressing of horizontal aspects (gender, poverty etc.)

According to the initial information regarding the collective action campaign, elderly people typically possess obsolete and worn out oil or gas boilers. The majority of elderly people is female. Therefore, the information web-based platform particularly **benefits women**.

Comprehensive energy guidance from energy advisors is strongly recommended in order to give households a complete understanding of how to make their home more energy efficient. This includes recommendations on possible measures to improve the energy quality of the building thermal envelope components, before or in parallel, the heating system is replaced. The importance of the appropriate steps when undertaking an energy renovation must be pointed out each time. It is essential to emphasize the need for the correct measures when carrying out an energy renovation, i.e.. thermal envelope components first, technical system second. This topic was especially important in the past 12 months due to the energy crisis and high prices of natural gas, when many households

wanted to replace old and new gas boilers with a new solution, before doing anything on the aspect of energy efficiency.

Minimum energy saving measures can lead to at least 15% of energy savings, even if further energy saving measures cannot be taken or are not needed. The minimum energy saving measures and the training of house owners how to run and steer the new heating system help to increase the awareness on heating and therefore lower **rebound effects.** E.g., instead of increasing the heating temperature, as the heating system is less harmful to the environment than the previous fossil-fueled was, the heating system and its temperature are run according to actual needs.

The prepared policy program that integrated REPLACE content into the public call as well as the *step by step process of the boiler replacement manual*, respectively include quality assurance items and procedures that make it a good basis for boiler replacements in **energy poor households** for the future.

10.2.6. Activities that may remain beyond project life

The project team was encouraged to make the most out of the resources available, and to design, implement and present the activities to the relevant local (or national) actors and team up with them, in a way that would allow the most successful and impactful practices to continue beyond the duration of the project.

10.2.6.1. Institutionalised or longer-term anchored activities

Many campaigns are meant to last for several years.

- Chimney sweepers got over 1,000 printed labels from JSI and can further promote green technologies with those labels.
- Energy advisory offices got over 1,000 printed REPLACE leaflets about basic replacement process information, the matrices and the calculator. This should be enough for several years.
- On a permanent basis a web-based information point was established as a collective action campaign with Borzen and Eco Fund. The goal was to guarantee long-term presence.
- Eco Fund's public calls for subsidies will further integrate information about REPLACE tools and project results through a national web-based information point.

10.2.7. Added value of the project Replace to the pilot region

Due to several REPLACE campaign activities that took place in parallel, the awareness among households, who were the focus group, increased substantially. It all kick-started in October 2021 with a nation-wide PR campaign, where the consumers were made aware of:

1. The fact that there exists a choice for their current heating status that can be changed, while they were stuck at the current status quo for years before;
2. The fact that if consumers are proactive, they can gather enough information to make more informed decision;
3. Possible solutions to their existing heating system and
4. Options where they can find additional tools/information.

One of the **key added values** of the project lies in the cooperation with energy advisory offices. Across Slovenia there are 55 energy advisory offices with 49 advisors. All offices are now well equipped with

REPLACE project findings and tools (calculator, matrices) and furthermore, 30 advisors participated at the REPLACE webinar where they were trained about the use of the REPLACE calculator. All advisors participated as well in the annual training, organized by Eco Fund, where they were informed about REPLACE tools and promotional material. Due to these activities, the **REPLACE calculator is now a regular part of the work of Slovenian energy advisors**. This can be indirectly proven through the online REPLACE calculator visits from unique users in 2022, where no extensive PR campaign took place. The collective action was implemented in 2022 and households were made aware of recommended visits at the energy advisory offices and the REPLACE calculator. The statistics shows the calculator was used more than 100 times per month from unique users from Slovenia.

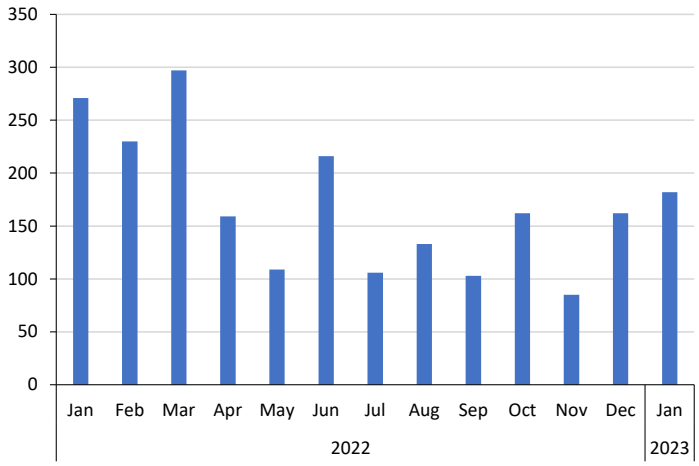


Figure 104: REPLACE calculator online visits from unique users from Slovenia

The added for equipment suppliers and other market actors lies in the promotion of renewable heating systems. By promoting greener, cleaner technologies based on the economic and environmental aspect consumers are being motivated to increase the uptake of these technologies.

10.2.8. Lessons learned from the action and recommendations

During the execution of the campaign, it became evident that sustaining publicity across online and TV platforms was a critical element for increasing the public's knowledge. In October 2021, the REPLACE PR campaign was conducted, resulting in over 3500 individuals using the online calculator and over 3 million people being reached by the promotion through web-based articles. After that, the calculator was predominantly used by the energy advisors and people that replaced their old heating system. To ensure the public is kept up to date on pertinent issues, this campaign should be run multiple times annually to make people aware of the inefficiencies of their boiler, as well as the possible advantages of replacing it. In the scope of REPLACE the campaign was ran only once due to limited resources and thus presents a challenge that could be improved in the future. Key organizations (Borzen and Eco Fund) had already been informed of the facts and it is anticipated that they will conduct a similar campaign in the future.

The collective action “Replace oil for the sake of the environment” for the joint purchase of heat pumps proved to be a great mix of support activities and improved business models. The approach was based on three steps: (1) step by step education process, (2) test of knowledge and coupon receipt and (3) joining a group of investors that replaced a fuel oil boiler with a heat pump. The initial goal was to reach and encourage 50 boiler replacements and, in the end, we almost reached 150 replacements.

So the activity proved to be more successful than expected, especially since JSI has already received invitations from the industry for campaign repetition and energy advisors already gave their input on how to further improve the campaign. In the scope of the project the campaign was not repeated due to a lack of resources. Should JSI repeat the collective action campaign and consider all the suggestions it would be structured like this:

1. Step by step education process
2. Knowledge test
3. Expression of interest for investment in either biomass boiler or heat pump
4. Receiving an offer from three different (pre-chosen by JSI) manufactures

The approach can be replicated in all other EU countries, since it proved very promising and had a big actual impact with almost 1 kt CO_2 reduction. It is also a way to get the best possible offer on the market and in the case of lack of subsidies in some countries, it's also an option for conumers to get the best values for your money.

To boost phase-out activities of old, inefficient boiler two key factors play a pivotal role in Slovenia. The first one is the availability of subsidies that stimulate households to invest several thousand Euros into renewable technologies. The second one is an extensive PR campaign that must reach target groups. For Slovenia it proved successful to have an extensive online promotion on several portals, while the REPLACE calculator was further promoted on the national television program as well.

10.2.9. Transfer of experience for other regions and countries

One rather simple thing that can be replicated in other countries is a creation of a web-based information platform with a well-documented and presented step by step process on how to replace an old boiler. Such a platform shouldn't depend on the presence of subsidies and should be country-specific, but its basic core and principle can be transferred to other regions.

11 | Spain: Castilla y León Region

11.1 Recap of the first action plan

A Local Working Group (LWG) was created in Castilla y León to decide on the most useful campaign measures adapted to the region with stakeholders from professional associations of engineers and promoters, consumers, national biomass association, biomass distributors, energy cooperative and the ESCO association. Different general LWG meetings were organised on 28/04/2020, 28/05/2020 followed by three further meetings after March 2021 on 6/04/2021, 18/05/2022 and 14/03/2023.

Once the draft plan was prepared for the implementation of an activity, it was discussed with the Local Working Group, in a specific workshop, to both agree on the aim of the specific campaign activities and the level of cooperation expected from them. In total eight actions have been identified in March 2021.

The campaign activities included measures involving public authorities (regional and local), consumer organizations, biomass managers, transporters and distributors, biomass associations, ESCOs, district heating promoters, associations from the biomass sector and other related stakeholders involved in the biomass and heating value chain.

Table 31: Overview of proposed activities according to the first action plan in Castilla y León Region

Activity	**Status**
Boilers labelling	Implemented
Six techno-economic feasibility studies	Implemented
Information hubs	Created with LWG but will continue
Workshop for professionals and consumers	Starting organization
Renewable labels for homes	Implemented but it will continue with LWG support
Open house events / virtual/study tours for consumers	Discarded open house events and replaced by elaboration and publications of 4 videos;
Expobiomasa showcase	Follow-up collaboration
Collective actions	Ongoing

The house events were replaced by the creation of 4 online guidance videos. The videos focus on different types of biomass systems in different cities (single family house, apartments, and DH with biomass) and explain these installations in practice and how they work. The main reason for choosing this activity was that the videos are accessible to more people. The view counts after several months confirm that this was a meaningful change.

11.1.1. Boilers labelling and renewable heating labels for homes

The implementation of the boilers labelling for old boilers and labels for homes with renewable heating systems was started during the second quarter of 2021 and finalising by the end of 2022. In total, 400 labels, 200 of each type, have been printed by EREN with the support of Escan, who also distributed the labels to the LWG members that have been interested in this activity. The placement of the labels on boilers was implemented by manufactures and installers who are members of the Local Working Group. The boiler labels are magnets and the labels for homes heated with renewable energy – stickers (with 2 versions to stick from outside or inside).

Figure 105: The boiler labelling magnets for homes in Castilla y León Region

Escan has visited several villages (boiler rooms and households) to make sure that the labels were used.

11.1.2. Techno-economic feasibility studies

Techno-economic feasibility studies have been elaborated in one single family house and eight multi apartment buildings using the REPLACE calculator. The planned time frame was July 2021 till December 2022 and during that period several selections of buildings were made. The data for those studies was provided to Escan by three members of the LWG. Escan carried out six pre-feasibility studies. Three more pre-feasibility studies of three muti apartment buildings have been carried out in February and March 2023.

11.1.3. Information hubs

Eleven **information hubs** were implemented in the frame of the project, some of them physically and some virtual. Additionally, information through phone or email has been made available to families and other end-users with primary focus on providing guidance for renovating their space heating systems. The management of the information hubs was carried out by members of the LWG and EREN. Escan conducted follow-up consultations every three months with about 200 consultations each.

Figure 106: Documents related to specific information focus on consumers or professionals in Castilla y León Region

Over 20 documents have been created to collect information and data on all the actions taken. These documents, which are 1 or 2 pages in length, provide specific information for either consumer or professionals.

11.1.4. Workshop for professionals and consumers

As part of the REPLACE project, capacity building and networking were facilitated through workshops, which involved approximately 100 professionals. These workshops focused on exchanging experiences and building capacity. They were held during the Expobiomasa 2021 fair and conference, which provided an excellent opportunity to bring together sector professionals and potential users.

Figure 107: Workshop for professionals and consumers at Expobiomasa fair in Castilla y León Region

Furthermore, an evaluation questionnaire was distributed to the workshop participants, who found the session to be very interesting. They suggested organizing similar workshops, particularly when updates to the framework are introduced (such as new regulations, changes in technology, cost, or supply distribution).

The REPLACE workshop has been successful because the objective to expand the REPLACE campaign to professionals of the sector was reached, so they can extract ideas and take them to their clients and also to other potential users. New potential members of the LWG were identified and invited to be part of the working group. Some of them are very active, placing boiler labels and informing about REPLACE activities as information hub action.

11.1.5. Expobiomasa showcase

During the **Expobiomasa showcase** a free tour for end users was organised to introduce them to different technologies and manufacturers of biomass. Explanations were provided by one member of LWG who belongs to the association of biomass manufacturers , distributor ABEVIOM as well as EREN.

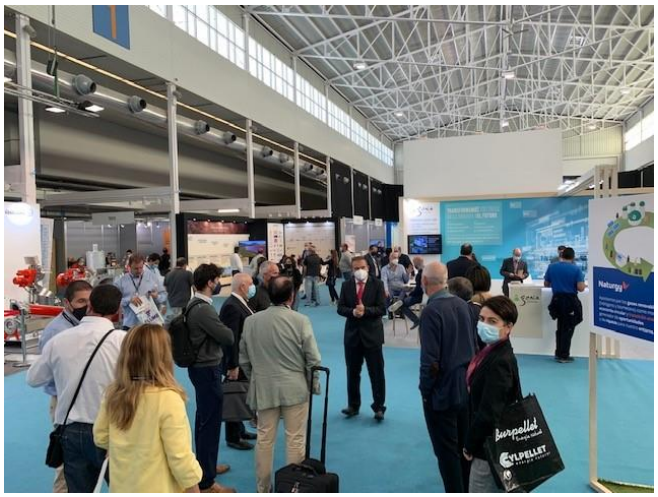


Figure 108: Expobiomasa showcase free tour for end users in Castilla y León Region

On the other hand, as part of the networking efforts of the REPLACE project, a large project poster was displayed in one of the main corridors of the Expobiomasa 2021 fair, with an estimated 6,000 potential viewers. Additionally, a roller was exhibited during the 25th anniversary celebration of EREN in León in June 2022, as well as in the EREN stand during the Regional Tourism Fair in November 2021 and in the EREN stand during the Showcase of Valladolid in September 2022.

Figure 109: EREN stand at the Regional Tourism Fair in November 2021 and the EREN stand during the Showcase of Valladolid in September 2022

11.1.6. Collective actions

At the start of the project, the plan was to implement collective actions in Castilla y León that focused on joint purchases of wood pellets or renewable-based heating systems.

The Spanish partners were in contact with several pellet producers to establish an aggregate selling and buying platform. EREN is collaborating with environmental regional stakeholders to establish biomass logistic rural-urban hubs, which are planned to be located in Villablino and Almanza, with other new locations being considered.

This collective action is progressing as planned and is expected to receive subsidies from the Territorial Just Transition Plan. The initiative is being spearheaded by an environmental regional public company, with key actors such as councils, private and public forest/landowners and managers, a public regional company, biomass distributors, and transport operators. The establishment of these biomass hubs will create a logistic point where biomass can be transported as raw material and processed as needed to meet market demand. The aim is to aggregate biomass in these hubs for subsequent distribution. The collective action took longer than anticipated due to the complexity of designing the action, the need for agreement among various stakeholders, and the current energy scenario.

11.2. Activities implemented and tested

11.2.1. New activities

The following table gives an overview of new activities for the pilot region Castilla y León

Table 32: Overview of new activities for Castilla y León Region

Activity	**Status**
Elaboration of 3 more prefeasibility studies	Completed, started in February 2023
Elaboration of 4 videos instead of open house events/virtual	Finished, newly introduced since 2021
Webinars showing how to use the "REPLACE your Heating System Calculator"	March 2023

Three additional prefeasibility studies have been conducted in various buildings located in Aranda de Duero and Soria. These studies assessed the potential installation of biomass systems in three buildings, comparing them to other fossil fuel-based technologies for space heating. Instead of open house events, four videos were produced showcasing different types of biomass installations in various cities, demonstrating their practical operation. The videos were created in response to Covid-19 restrictions and the growing preference for online products, such as videos, as a source of information for both citizens and professionals. This decision ultimately proved to be an added value, as the videos were easily accessible to a wider audience, resulting in over 420 views without significant promotion within a few months of their release. The videos can be viewed at:

- Biomass in a family house: https://www.youtube.com/watch?v=LK2TqMdkTQA&t=4s
- Biomass in an apartment building: https://www.youtube.com/watch?v=bL9Amr8OPno&t=2s
- District heating in Valladolid: https://www.youtube.com/watch?v=fH2-1UgnHdU&t=17s

- District heating in Soria: https://www.youtube.com/watch?v=FCINYSmLNlw&list=PLifNvqo_7SRw4QSZFiFZVruyZ8VgIaIj2

Furthermore, a webinar to present the "REPLACE your Heating System Calculator" was organised by EREN with support from Escan. More than 50 participants attended the webinar.

11.2.2. Overview of performed, tested & fine-tuned activities

The following table gives an overview of the implemented activities and their preparation and run-time phase.

Table 33: Overview of activities and their preparation and run-time in Castilla y León Region

	Recent Status Quo	**Starting point & fine-tuning**	
Activity	Short description	Preparation phase	Implementation phase (re-design)
Boilers labelling	Boilers labels are distributed and placed	05/21 – 10/21	11/21 – 04/23
Nine technoeconomic feasibility studies	Completed as planned	6/21 – 2/23	10/21 – 02/22 (6 studies) 02/23 – 03/23 (3 studies)
Information hubs	Implemented and continued beyond project lifetime	05/21 – 08/21	09/21 – 04/23
Workshop for professionals and consumers	Organised as planned in September 2021, Valladolid	06/21 – 07/21-	09/21
Renewable labels for homes	Labels for homes are distributed and placed	05/21 – 10/21	11/21 – 04/23
Expobiomasa showcase	Implementation in September 2021	05/21 – 06/21	09/21 – 11/21
Collective action	Ongoing	09/21 – 04/22	05/22 – 02/23

11.2.3. Successful activities

The REPLACE project has had several successful activities in Castilla y León, including the labelling of boilers and consumers, techno-economic prefeasibility studies, and the creation of four guidance videos on biomass boilers.

Boilers labelling

The boilers labelling has proven to be successful in several ways. Firstly, the users who have switched to biomass boilers have found the label to be a form of recognition for their environmentally friendly decision.

Secondly, the external audience who see the label on a house or apartment identify it as a sustainable dwelling. To make the labels more widely accessible, Escan and EREN have translated and adapted them, and they have been distributed as magnets. EREN has been responsible for the majority of the distribution, along with Escan and members of the LWG.

Labels for households with renewable heating system

The household labelling distribution has been similar to the boiler labels. EREN printed the labels as stickers for façades, windows or doors, and they were mainly distributed by EREN through the LWG. Escan provided support by checking some of the label locations. This distribution has been successful, as all labels have been placed in approximately 200 buildings and family houses.

Figure 110: The picture shows an owner with the renewable household label in Castilla y León Region

Techno-economic feasibility studies

Six techno-economic feasibility studies have been carried out as planned, and an additional three studies were conducted towards the end of the project. These studies were beneficial to the owners of one single-family house and eight apartment buildings with building areas ranging from 250 m^2 to 13,000 m^2 that replaced their oil or gas boilers with biomass boilers. The studies demonstrated the advantages of using biomass in comparison to other fossil fuel technologies for space heating. Biomass boilers not only offer economic benefits but are also environmentally friendly, use indigenous resources, and generate employment opportunities. The implementation of these prefeasibility studies is expected to have positive impacts on the region.

Four videos on biomass installations

The original plan to hold open house events was replaced due to COVID-19 restrictions, and instead, the REPLACE campaign created four videos to showcase different types of biomass installations. Despite the limitations, the videos were successful in reaching a large audience quickly through online platforms. The videos were created with the collaboration of families, users, and professionals, and were completed with their respective technical sheets. The participating organizations included BARBERO (1 single family house, 1 block of apartments), REBI (private heating network), and SOMACYL (public heating network). The videos are now available on the official website of Junta de Castilla y León and the EREN YouTube channel.

Direct impact

- 200 boiler labels and 200 renewable heating labels for homes were distributed; estimated impact to influence more than 300 consumers taking into account the visibility cascade aspect
- Nine techno-economic prefeasibility studies of buildings with more than 240 overall families
- Four videos with about 1,542 views

Accompanying communication

Escan has elaborated several press releases and published related news on its website and newsletter. The following link shows an example of a press release that has been published in 5 online magazines. It is also published on the Escan website: https://escansa.es/el-proyecto-europeo-replace-cumple-objetivos/.

Escan and EREN published several post in the campaign activities on Twitter and LinkedIn. For example, EREN's Twitter account is @EnergiaJCyL with 3,294 Followers and 23 tweets related to the project since September 2021.

EREN has also published a related REPLACE article on its website (with 1,700 visits): https://energia.jcyl.es/web/es/eren-europa-otros-foros/proyecto-replace.html

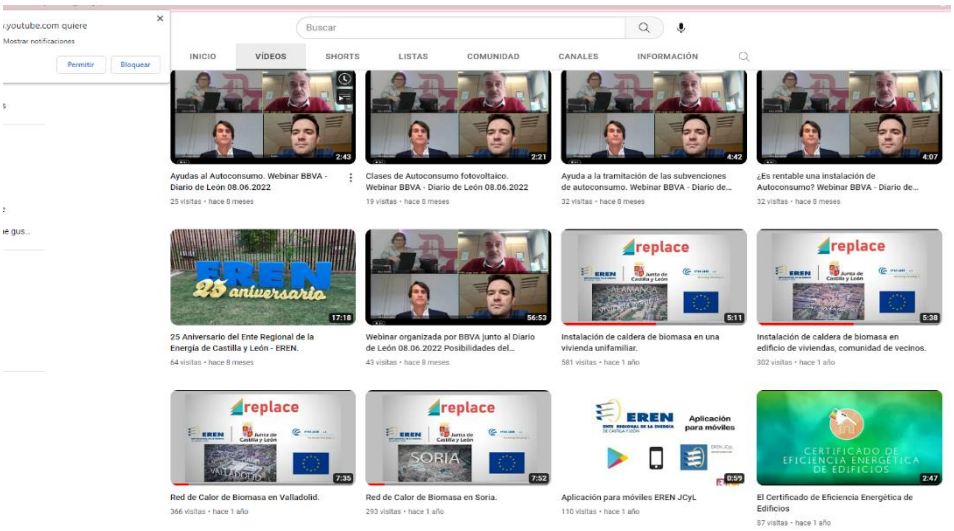


Figure 111: Screenshot of biomass promotional videos in EREN Youtube channel

SWOT

The next table includes the SWOT analysis of the most successful activities in Castilla y León Region

Table 34: SWOT analysis for activities in Castilla y León Region

	Helpful to achieving the objectives	**Harmful** to achieving the objectives
Internal origin *(attributes to the implementing bodies)*	**Strengths** The labels, techno-economic feasibility studies, and videos have been effective in informing both consumers and professionals about the advantages of biomass heating systems. Consumers who see the labels on buildings or watch the videos can become more informed about the benefits of renewable heating systems, which can increase their confidence in making the switch to biomass boilers.	**Weaknesses** Labels only indicate that the household is using biomass and don't provide more incentives. Videos have been watched by a lot of people but do no resolve doubts instantly.
External origin *(attributes to the environment)*	**Opportunities** Labels: neighbours or other citizen who see the label and ask about it so they will know the advantages By watching the videos and becoming more informed about the benefits of using biomass for heating, people and professionals can become more environmentally conscious.	**Threads** Both labels are not officially recognized at EU level The four videos are not in English that and can only be used on the regional level.

11.2.4. Less successful activities

11.2.4.1. Activity Local Working Group (LGW)

Due to Covid-19 restrictions, LWG meetings had to be conducted online, and as a result, proposals and contributions did not come up as smoothly as anticipated.

Direct impact

Five LWG meetings have been carried out and 25 different stakeholders were invited to participate.

Accompanying communication

E-mails were the main way to communicate among the LWG in Castilla y León. Telephone conversations and online meetings were also used.

11.2.5. Addressing of horizontal aspects (gender, poverty etc.)

Regarding gender, the messaging of the actions did not target a specific gender as the decision to purchase biomass is not related to gender. Therefore, no positive or negative discriminatory effects have been observed in terms of gender.

In terms of energy poverty, promoting the use of biomass as a replacement for fossil fuels can help fight against energy poverty in two ways:

a) By providing greater price stability to the consumer compared to the volatility of fossil fuels.

b) By offering a lower overall cost of energy compared to fossil fuels. While the initial investment cost may be higher for biomass, the lower cost of fuel during its useful life compensates for this difference.

11.2.6. Activities that may remain beyond project life

The LWG group will continue to meet when a discussion topic will emerge for the LWG stakeholders.

11.2.6.1. Institutionalised or longer-term anchored activities

The collective action will run for 3 more years after the project end as a public-private partnership collaboration.

11.2.6.2. Potential follow-up actions or continuity

The labelling for boilers will remain at the disposal of any interested installers or companies, according to the stakeholder's proposal from the LWG.

The REPLACE tools stay available for interested companies or users and will be promoted through the EREN webpage devoted to the project and the social networks.

11.2.7. Added value of the project Replace to the pilot region

Close communication with all relevant stakeholders from the sector since the beginning of the project has been crucial for developing an adequate campaign to promote renewable heating and cooling solutions.

The labelling of boilers and houses heated with 100 % renewable energy not only informs the residents and professionals in the sector, but also their neighbours, who in turn may share the information with friends and colleagues.

The videos showcasing different types of biomass installations provide friendly and accessible information from real companies and users of these installations. This information is helpful to potential biomass users who may be undecided or unaware of the benefits, as it is always available, easily accessible, and shareable through social media.

11.2.8. Lessons learned from the action and recommendations

Informing stakeholders in advance about upcoming grant opportunities and making sure that potential applicants are aware of the eligibility criteria and application process can greatly benefit both companies and end-users. By doing so, stakeholders can have ample time to prepare and submit their applications, increasing their chances of being awarded the grant. Additionally, this can help to ensure that the grant funds are used effectively and efficiently to promote the use of renewable energy for heating in the region.

11.2.9. Transfer of experience for other regions and countries

As some of the members of the LWG work in different regions of Spain, they also communicated project results to offices and contacts outside Castilla y León.

EREN and Escan belong to FEDARENE and they shared the actions carried out during the campaign with other FEDARENE members in a networking workshop organised with other projects, during the event in June 2022 in León.

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13 | Figures

14 | Tables