Synthesis report about collective actions

Report D5.3

Project Coordinator: Austrian Energy Agency – AEA

Task Leader Organization: Austrian Energy Agency

March 2023

This project has received funding from the European Union's Horizon 2020 Research and innovation programme under grant agreement No 847087.

Document title	Synthesis report about collective actions
Work Package	WP5
Document Type	Deliverable
Date	31 March 2023
Document Status	Final version
Available on	replace-project.eu

Acknowledgments & Disclaimer

This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 847087.

Preface/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.

In order 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 was to motivate and support people in nine 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 brought together installers, chimney sweeps, politicians, and other key players at one table, regionally.

The core activity of REPLACE was to develop, embed (by facilitating policy programs/measures) and implement nine (R)HC equipment replacement campaigns adjusted for local conditions and structures by a strong involvement of the so called local working groups (LWGs) in their design and implementation.

This report is about the experiences made with developing, implementing and steering adequate boiler/oven replacement 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 LWG 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.

This report summarises the collective actions to replace old and inefficient heating systems that were developed and implemented during the life of the project. Chapter 1, Scope of this report, summarises the initial idea of what kind of collective actions the team was initially aiming for. For various reasons, it was not always possible to follow this initial (rather narrow) definition when implementing collective actions together with local stakeholders. Nevertheless, collective actions (whatever their nature) proved to be valuable for local communities.

Executive Summary

REPLACE helps households replace their old, inefficient heating systems with modern, clean and climate-friendly heating systems that are more comfortable and resilient. In the face of the energy and climate crises, the promotion of energy systems based on locally available renewable energy sources - instead of fossil energy sources imported from non-democratic states - becomes highly relevant for free societies.

There is no one-size-fits-all solution to the challenge of phasing out oil, natural gas, coal, inefficient firewood and electricity-only heating systems in Europe's residential heating markets, given the differences in legal, regulatory and support (e.g. financial) frameworks, market structures and conditions, purchasing power and market development.

This can also be observed in the development and implementation of collective actions to facilitate energy system transformation in the residential heating market. Co-operation, e.g. public-private partnerships, has a different tradition in the project partner countries. Nevertheless, the local working groups established in the nine pilot regions discussed what kind of collective actions could be realised and for what purpose. The results and lessons learnt from setting up collective actions are briefly summarised below. Please see Chapter 3 for more details.

In the Austrian pilot region, the province of Salzburg, the implemented collective action has resulted in a one-stop shop for the replacement of old oil, gas or wood boilers and direct electric heating systems was developed and launched as a web platform where households can find all-inclusive suppliers for the conversion. The three main pillars of the one-stop-shop concept are free, independent energy advice, an all-round carefree package that covers 90% of the measures required to replace a boiler and the provision of a mobile heating unit within 24 hours if the existing heating system breaks down. Interested potential ARCP providers agreed during the project on a set of 15 measures to be included in the mandatory basic ARCP that every ARCP provider must offer. These measures ensure a high quality of design and implementation and 10-15% energy savings, regardless of the climate-friendly heating system chosen for replacement. Voluntary ARCP providers can offer up to 22 additional measures, including comprehensive or individual energy efficiency first measures, the implementation of energy supply technologies (e.g. solar thermal or solar PV), financing options and other services that are less frequently required but may be necessary. The web platform was launched in mid-2002. However, it had to be taken offline because the energy crises put such a strain on potential ARCP providers that they were no longer able to offer this new, additional service. This was still the case in April 2023, at the end of the project. It is hoped that market conditions will soon improve, so that experience can be gained from this unique pilot project by relaunching the web platform for the province of Salzburg in the near future. 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.

In the pilot region Canton Sarajevo, Bosnia and Herzegovina, initially, joint procurement of pellets was considered a viable option for collective action. However, due to a lack of interest from local companies, the focus shifted to replacing traditional heating systems with energy-efficient ones. Through collaboration with a local company, three households have had their heating systems replaced. Three old coal boilers were replaced with one new pellet boiler and two heat pumps, resulting in significant reduction of CO_2 emissions and cost savings. Although mobilizing citizens for independent actions and financing difficulties presented challenges, the project's success provides a foundation for further development in collective actions for energy-efficient heating systems in Canton Sarajevo, a new concept in the region.

In the Bulgarian Rhodope region, an attempt to implement collective wood pellet purchase in two towns – Bratsigovo and Smolyan was made. In Bratsigovo, the initiative was supported by the residents, but neither a person nor the municipality were willing to take the role of a group leader, in charge of the purchase organization. In Smolyan, despite the active involvement of the local authority, only few households expressed their interest in joining the initiative, as wood pellet price sharply increased. Additionally, an attempt was made to implement a collective domestic hot water system in a multi-family building. Despite the initial interest of residents and the financial feasibility of the project, some were hesitant due to the necessary construction works, so the initiative did not reach an implementation phase within REPLACE. To facilitate future collective wood pellet purchasing and collective heat pump initiatives, comprehensive guidelines have been developed and disseminated.

The concept of collective actions for boiler and oven replacement in households is not well understood or utilized in Croatia. However, through the efforts of REGEA, the local partner of the REPLACE project, and members of the local working group, collective actions for energy renovation have been promoted and facilitated in the pilot region City of Zagreb incl. three bordering counties. The initiative included an awareness-raising campaign and free counselling to citizens to prepare documentation for a co-financing call by the Environmental Protection and Energy Efficiency Fund. As a result, there was an active participation of citizens in the target regions, with 1,000 applicants, demonstrating the significance of sustainable development. The action highlights the importance of providing support and resources to citizens and the need for clear communication to promote sustainable practices. REGEA's approach has the potential to create a broad-based movement for change and contribute to a more sustainable future in Croatia.

In the second Croatian pilot region, Primorsko-goranska County, the initial plan was to organize a joint purchase of pellets by a group of end consumers. However, this has proven to be challenging since the amount of ”live” activities, through which EIHP planned to find the participants, during 2020 and 2021 was significantly reduced because of the coronavirus epidemic. Therefore, EIHP decided on another approach – to contact the selected end consumers via a phone call, provide explanation on the benefits of RES heating systems (with emphasis on pellet boilers), and invite them to participate in the joint purchase of the pellets if they would buy a pellet boiler or if they already had one. It was emphasized to them that the price would be discounted, which EIHP would negotiate with the pellet manufacturer. However, none of them were interested, so EIHP decided to hold a webinar instead. Some of the topics covered were: process and necessary documentation for biomass boiler installation with examples; educating and encouraging the end consumers on their options via an app developed by the Green Energy Cooperative; and finally, a presentation of REPLACE Heating Matrix and Calculator which give the consumers a quick information on the best option for their home. The participants were very satisfied with the provided information, which makes the activity successful even in this modified form.

At the German (Bavarian Oberland) region’s first Local Working Group meeting in February 2020, the Local Working Group (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. 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. On the basis of the LWG’s assessment, it was decided to put the focus on supporting district heating projects through REPLACE, thereby, among others, gaining a high amount of CO_2-reduction, making oneself independent of fluctuating energy prices and oil and gas supplies from abroad, and alleviating the pressure from the shortage of skilled workers. At an information event on 25 February 2022, organised by Energiewende Oberland (EWO), 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. A bank’s representative informed on sustainable financing and three operators of agricultural heating networks reported from the field. Around 60 participants, including mayors, architects and energy consultants, took part at the event. Between February 2020 and February 2023, EWO was able to support and

accompany the founding, respectively the re-densifying of 13 district heating networks, helping stakeholders to make use of the favourable federal funding conditions. For these networks, the final decisions for district heating networks were made by responsible entities, thereby creating 8 jobs and triggering sustained savings of 6,752 t CO_2/a.

In North Macedonia the facilitation of the collective action was supported by preparation of pre-feasibility study for collective action in KAGoP region which is evaluating the economic profitability and environmental impacts of the collective self-consumption photovoltaic system installed in a multifamily apartment building in the Municipality of Karposh. The existing resistive electric heating system in the apartments is replaced with heat pumps. To evaluate the effect of replacing the heating system, the REPLACE Calculator is used. The results show that switching to heat pumps is the cheaper and more environmentally friendly option, however the best results are achieved if both actions are implemented. This evaluation is relying on three-step methodology for evidence-based decision making in residential buildings. In order to disseminate those results and to present the case study, SDEWES-Skopje and KAGoP region stakeholders organised a seminar in January 2023, with total of 35 participants representing different types of stakeholders, such as public sector representatives on governmental and local level, NGOs, PV companies, end-users and academia.

Two parallel collective actions took place in Slovenia in the period 2021-2023. The first was focused on 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.

- 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 CO_2 savings.
- Collective action with Eco fund and Borzen – development of “fuel oil phase out” offensive ensures that each household that is planning to replace their heating system is aware of the REPLACE campaign and is informed about 1) educational process of heating system replacement and 2) REPLACE project, its results and tools.

In the Spanish pilot region Castilla y León, the collective action consists in establishing local biomass fuel logistic hubs: the main advantage of the region for this decision is that it had lost a lot of employments in the coal mining areas when both the last coal mines and the coal-powered electricity generation plants were closed, between 2018 and 2020. Coal mines and power plants were situated in areas at the North of the provinces of León and Palencia, and these areas are also heavy wooded areas. Thus, local biomass fuel logisitics hubs are a clear opportunity to both obtain more biomass, and create new autonomous employment in the former coal areas, through self-employment to produce and treat biomass, and transport it to the hubs. The action is in implementation, and an application has been sent by the Regional Government to the Just Transition Fund, for the construction and equipping of four regional logistic centres for forest biomass in the provinces of León and Palencia. It includes the acquisition of the necessary equipment (machinery: loader, chipper, self-loader, truck 6x4) for the development of the activity and to provide service to small rural businesses and self-employed people who start their activity of exploitation of pine forest thinnings, remains of pine and poplar felling, as well as of oak and holm oak undergrowth. The aim of these regional logistic centres is to use and purchase all the forest biomass generated within a radius of approximately 30 to 40 km.

Table of Contents

1. Scope of this report 5
2. Activities/campaigns in the project-run 8
2.1. Overview of activities/campaigns performed 8
3. Collective actions implemented by country/pilot region 9
3.1. Austria: Province Salzburg 9
3.2. Bosnia and Herzegovina: Canton of Sarajevo 13
3.3. Bulgaria: Rhodope Mountain Region 20
3.3.1. Collective wood pellet purchase 20
3.4. Croatia: City of Zagreb incl. three bordering counties 22
3.5. Croatia: Primorsko goranska County 25
3.6. Germany: Bavarian Oberland 26
3.7. North Macedonia: Skopje Region 28
3.8. Slovenia: Slovenia 38
3.8.1. Joint purchase of RHC equipment 38
3.8.2. Collective action with Eco fund and Borzen – development of “fuel oil phase out” offensive 42
3.9. Spain: Castilla y León Region 45
Table of figures 49

1. Scope of this report

Initiatives on energy topics tend, more often than not, to take a top-down approach rather than a bottom-up one, because policymakers often believe that consumers will be unable to understand the complex interlinkages related to energy use. However, many projects and studies have shown that in order to create long-last changing, a bottom-up initiative, together with collaborations with local networks, is critical. In the following, Austria experiences with collective actions was based on to define the nature of collective actions that might be applicable for the project REPLACE.

Therefore, the Austrian Energy Agency at the beginning of the campaign activities recommended establishing collective actions that are "bottom-linked", meaning that the initiative does not derive purely from the residents (bottom-up) but from authorities or established communities or associations. Ideally, an institutionalised caretaker (which is financed properly) would take over the process of establishing a collective action (CA) and of managing and steering its implementation. A bottom-linked approach enables replication in other regions and a higher impact, as normal residents, which can take over such a role and can spend sufficient time free-of-charge for their neighbours and beyond, are rather limited.

Austria has a number of established institutions that can help to implement bottom-linked initiatives, including the climate und energy model regions (KEM), as well as the network of municipalities within the e5 program and Climate Alliance Austria. These networks can help communicate the benefits of energy saving measures or a switch to renewable energy sources, while also offering support and guidance in the implementation stage or sharing success stories. Based on the experiences made by such institutions, common success factors for bottom-linked collective actions initiatives include:

- Testing out the idea on a pilot project in a smaller community or municipality
- Involving a broad range of stakeholders
- Concentrating on simpler, cost-effective measures with the greatest impact (i.e. low-hanging fruits)
- Reducing the complexity by offering a dedicated contact point, creating a one-stop-shop or offering an all-round carefree package
- Gaining the support of local individuals, who are already trusted in the community
- Providing public financial support for the care taker and for the beneficiaries of collective actions, especially for cost-intensive measuresCoupling new initiatives on already existing financial schemes, while also offering other ones targeting low-income households or persons in need
- Bundling energy efficiency and renewable energy measures together to achieve higher overall energy and cost savings
- Including energy consultants or advisors who give unbiased advice and visit the site directly
- Ensuring that the initiatives' implementation plan is aligned with the regional and local interests
- Focusing on the added value and the benefits for the individual, community and region
- Developing and providing standardized service packages by local companies (to which they commit themselves to)

In the following, more practical implementation ideas possibly applicable for REPLACE campaigns are described, which were offered for being a starting point for discussions in the local working groups.

To address low income households with inefficient heating systems and to better consider a segmentation of the target group based on e.g. gender, age, revenue, etc., campaigns taking place at the later stage of the REPLAC project might be geared towards low hanging fruits which may have a quicker, more realistic and higher impact than solely targeting complete boiler replacements. These low hanging fruits are collective actions focused on e.g. the thermal insulation of the uppermost ceiling of one- or two-family houses and/or classical boiler room check measures.

With each of the two measures about 10-15 % of total heat demand can be reduced, adding up to 20-30 % of energy savings, even before a boiler is replaced, making the new, clean heating system significantly cheaper in terms of investment in addition.

- Regarding the thermal insulation of the uppermost ceiling it was recommended to collectively organize a material demand survey and to buy the (in best case renewable based) insulation materials. Implementation, due to liabilities and different preferences of end consumers should be organized by the end consumers themselves, e.g. via engagement of professionals or (a joint) organization of self-assembly groups. At mid European conditions, such an insulation should not cost more than 2-3 kEUR and pays off in a couple of years, depending on height of fuel prices.
- The boiler room check measures can be organized together with installers or energy advisers, or both respectively.
    - Here all heat distribution pipes, fittings etc. in unheated rooms (not only in the cellar) shall be insulated properly. This can be done by end consumers (e.g. after consultation with DIY stores etc.) and pays off very fast.
    - The (integration of the) domestic hot water supply system should be checked and optimized.
    - Old hot water circulation pumps should be renewed by energy efficient, variable-speed ones (costing a couple of 100 Euros), ideally being able to support hydraulic balancing of the whole heat in-house distribution system, which includes the implementation of intelligent temperature controllers (thermostatic valves) on the radiators (price about 50 Euro per item).
    - Hydraulic balancing can take several hours, depending on the number of rooms and radiators installed, up to a day.
    - Additionally it is required that an installer or a service technician ensures that the operating behaviour of the existing heating system and the newly purchased variable speed circulating pump is adjusted to each other in such a way that – on the basis of the heating curve (the ratio of required flow and outside temperature) – the most efficient operation is ensured in the long term and the customer receives appropriate training in the operation of the system.
    - Here again the investment would pay off within a couple of years, depending on height of fuel prices.

A further advantage of implementing such a measure is that social and gender aspects can be addressed too. In case a new heating system is needed later, the systems' nominal capacity can be 20-30 % less than it would have been without insulating the uppermost ceiling and the described boiler room check measures. The new heating system requires a lower investment than without those two low hanging fruit measures. Furthermore, the new heating system itself is more energy efficient and its implementation saves fuel costs too.

Other types of possible **collective actions** that had been recommended for being discussed with the local working group were

- Joint purchase of wood pellets
- Joint purchase of renewable-based heating systems
- Establishing/supporting local energy communities
- Establishing/supporting local biomass micro grids or district heating grids
- Establishing local biomass fuel logistic hubs
- Supporting the introduction of mobile heating devices to bridge over replacements
- Etc.

or any joint (multi-stakeholder) initiative that supports the phase-out of inefficient (especially fossil fueled) heating systems by modern, renewable-based heating systems benefitting end consumers.

2. Activities/campaigns in the project-run

2.1. Overview of activities/campaigns performed

Table 1 gives an overview of the activities that were performed during the boiler and oven replacement campaigns in the pilot regions of the partner countries.

Table 1: Overview of boiler and oven replacement campaigns activities

Activity/pilot region		AT	BG	BiH	HR[1]	HR[2]	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

It can be seen that there was a wide variety of activities selected and implemented as joint activities by the local working groups established in the pilot regions. The wide variety of activities reflects the wide range of progress in clean heat transition, framework conditions, cultural habits and consumer needs.

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

3. Collective actions implemented by country/pilot region

3.1. Austria: Province Salzburg

In Austria, at the kick-off meeting of the Local Working Group (LWG) 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 Department 4/04 (Energy Economics and Energy Consulting) of the Salzburg Provincial Government.

Switching to clean heating 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, many people are put off by a building site that can last up to 5 days. 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. Sometimes they say "the next generation will solve this problem". At the same time, young families taking over a house often do not have the time to replace the old heating system. In such a case, they cannot manage the consultations with the various trades that are required. Due to these and other challenges, 1:1 replacements were very common at the time, as they were usually the most affordable option in the short term.

In order to change this situation and provide people with everything they need to replace their boiler, through a central supplier or a single point of contact, the ARCP for Boiler Replacement was born out of the meeting. Other barriers to be addressed by the ARCP include the need for independent information on technology choices, help with the funding system and the complexity of implementation. 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. Section 4/04 suggested that the ARCP approach could be based on free, independent energy advice. Based on these fruitful discussions, the LWG was interested in further defining this approach and actively supporting such initiatives.

As a next step, the AEA held several meetings with Dept. 4/04 to define all ARCP services, participation rules and obligations, quality assurance mechanisms, a sanction mechanism, etc. This concept was discussed and fine-tuned in more than 20 bilateral interviews with potential suppliers of the ARCP, i.e. local installers, (supra-regional) heating system manufacturers, heating equipment wholesalers and energy service companies (ESCOs). Finally, a set of 15 obligatory ARCP services, as well as other optional complementary services (e.g. up to and including insulation of building components or renovation measures) were agreed with all stakeholders during the interviews.

Essentially, the core idea of the ARCP is that the ARCP supplier co-ordinates and supervises all the trades on site through one contact person (the installer in charge) and either provides all the necessary contracts or acts as the general contractor for the household. An ARCP covers all the services required for a heating system replacement in 90% of cases, and defines mandatory quality assurance and energy efficiency criteria.

In April 2021, a half-day workshop was held with 15 ARCP suppliers and 6 supporting institutions, where all parties accepted the developed materials and committed to offer ARCP for boiler replacement in the province of Salzburg as soon as possible. The result was as follows:

- ARCPs are intended to be one-stop-shops from the end-user's point of view.
- Installers or industrial one-stop-shop managers will centrally coordinate (and in some cases even contract) the 5-8 different types of tradesmen (as general contractor) needed for a typical boiler replacement (at least the one-stop-shop manager will provide all the necessary contracts ready for signature and coordinate the overall site construction).
- Industry and wholesalers will support installers at all possible levels so that installers can focus their replacement activities on the high-skill tasks required in the home. This should enable installers to replace a greater number of boilers at the same time.
- ARCP's mandatory services include
  - Public energy advice to implement the most appropriate solutions for the site, including the overall performance of the whole house (envelope related)
  - Minimum energy efficiency/savings measures (such as "boiler room check measures", which save 10-15% of energy without any loss of comfort, independent of the climate-friendly technology chosen for the replacement):
    - Upgrading basement heating and hot water systems to the latest technology
    - Optimisation of domestic 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 the (replaced, modern) heating circulation pump to the heating curve, carried out by the service technician.
    - Training of homeowners in the adjustment and control of the heating system
    - Adjustment of the heating system and (of an replaced, modern) heating circulation pump to the heating curve, performed by the service technician
    - Training of the home owners on the settings and steering of the heating system
  - and the provision of mobile heating equipment for emergency breakdowns within 24 hours of contact.
- In addition to the listed mandatory ACRP services, voluntary ARCP services - up to thermal renovation of building(s) (components), cellar or attic clearance, PV, solar thermal, etc. - are offered. These voluntary ARCP services also include some that address financing and affordability challenges, such as the option to pay in instalments rather than a one-off investment, or plant and energy efficiency contracting models.
- Overall, consumers should find a more attractive boiler replacement offer than usual, with less time and self-coordination effort and low-threshold access.

The interviews, their results and the stakeholder workshop showed a general interest of the contacted stakeholders to conduct a joint pilot project and to test the implementation of an ARCP for the first time in Austria. AEA and Dept. 4/04 decided to establish such a pilot project. In the second half of the year, the Federal Ministry for Climate Action joined the initiative. This enabled the initiative to take the next step and establish a web-based one-stop shop for the replacement of residential boilers from oil/gas/direct electricity heating systems to renewable and district heating systems.

The implementation of the web-based REPLACE one-stop-shop was led by the Austrian Energy Agency (AEA), supported by public funding and experts from the Federal Ministry for Climate Action (BMK) and the Department 4/04 for Energy Economics and Energy Consulting of the Salzburg Provincial Government. In the second half of 2021, the public tender documents for the programming of the ARCP website and the matchmaking platform were developed. The web platform was designed to run for a period of four years and to host ARCP web platforms in up to four Austrian provinces. Following the selection of the programmer and the development of the draft concept and design, a further

workshop was held in early 2022 to coordinate the website and database design with the potential ARCP suppliers.

Figure 1: Landing page of the one-stop-shop web platform.

After a beta version of the web platform was successfully tested, the final web platform (sorglos-kesseltausch.at) went online in July 2022 and enables the matching of households and ARCP suppliers. Using a simple search form, users can easily find ARCP suppliers in their vicinity who offer the services identified as suitable or additionally required by the energy counselling. The platform was initially developed for the REPLACE pilot region of Salzburg and can be extended to other Austrian provinces.

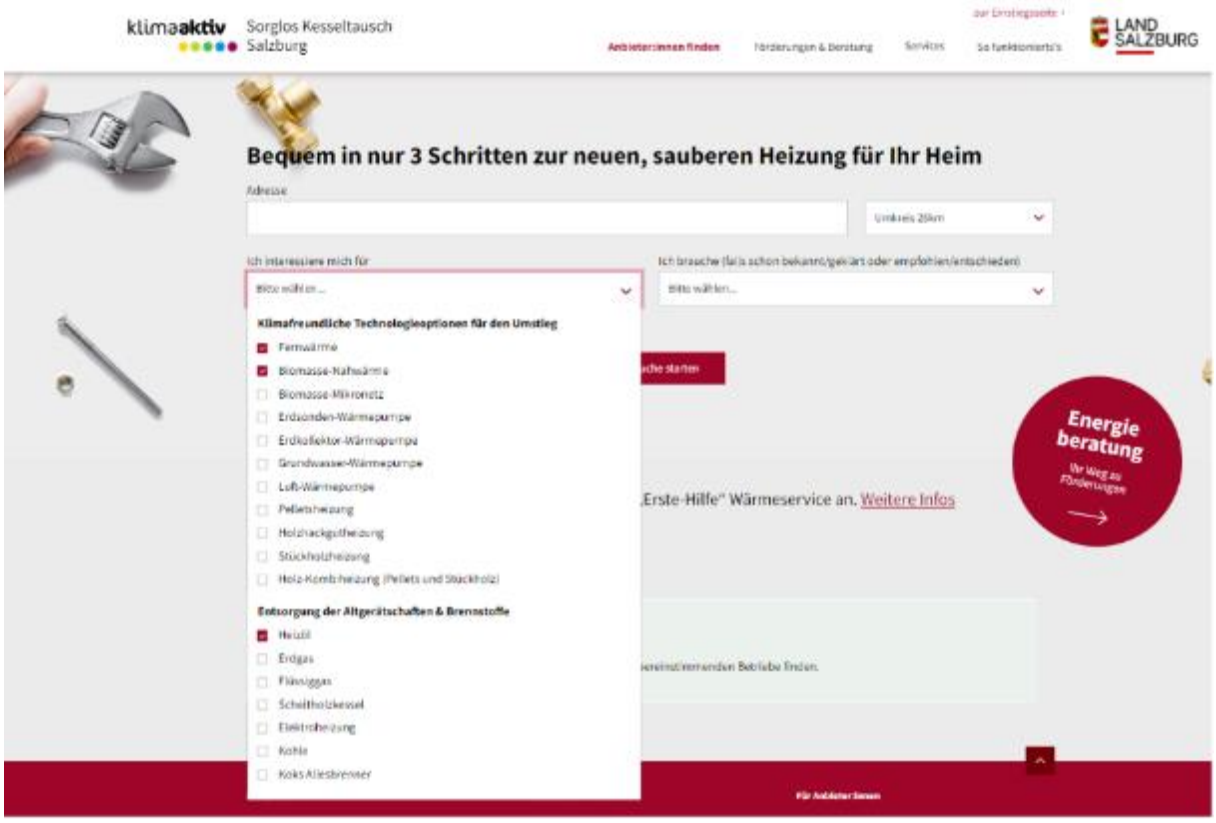

Figure 2: The search form that allows users to easily find ARCP suppliers in their area who offer the ARCP services that have been identified as suitable by the independent energy adviser.

However, due to the multiple crises that had materialised by mid-2022, the potential ARCP providers were no longer able to sign the terms of participation and offer an additional high quality service. The energy crises and their high energy prices triggered an exceptionally high demand for the replacement of oil and gas boilers. Installers' order books (already the bottleneck in the value chain) were full a year in advance. In addition, it was reported that many components were not due to be delivered until 9 to 12 months later, and that firm prices could not be quoted until then. The excess demand has turned the replacement heating market into a sellers' market, with installers struggling to meet demand and unable to offer additional, higher value ARCP services.

Due to the prevailing seller's market conditions, the operators of the web platform took the platform offline in July 2022 (as there was no such offer for households at that time). The consortium operating the web platform (AEA, BMK, Dept. 4/04) hopes that the situation will improve.

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.

A survey in March 2023 showed that a relaunch in 2023 would be too early. It is hoped that market conditions will have eased by 2024, so that experience can be gained from this unique pilot project by relaunching the web platform for the province of Salzburg in the near future.

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.

3.2. Bosnia and Herzegovina: Canton of Sarajevo

The principle of collective action was not prevalent in the territory of Bosnia and Herzegovina, which is one of the reasons why citizens are reluctant to participate in joint actions due to mutual distrust, credit debt requirements, and other financial considerations. This financial aspect is of utmost importance, especially given the low standard of living and the economic situation in Bosnia and Herzegovina, making any activity related to the replacement of heating systems a significant challenge for citizens to fund independently.

Hence, at the beginning of the project, it was crucial to work closely with representatives of the local working group to identify which collective actions could be applied in the pilot region of Sarajevo Canton. In the first few meetings, the group discussed several ideas such as joint heating system replacements, thermal insulation to increase energy efficiency in buildings, and joint procurement of pellets. However, after exchanging information and experiences with municipal representatives, it was apparent that there was no interest among citizens to carry out independent actions due to the need for independent financing. Additionally, there are no subsidies available for these activities in the area, making it challenging for municipalities to provide assistance by financing a portion of the funds.

After researching and consulting with LWG representatives, the collective action plan for the Sarajevo Canton area focused on organizing joint procurement of pellets within local communities in collaboration with local producers. To achieve this, three companies were contacted in August 2022: Terzić d.o.o., Hifa Petrol, and Drvosječa d.o.o. Unfortunately, none of these companies expressed interest in holding a joint meeting for this activity. The lack of interest from companies was primarily due to the energy crisis caused by the COVID-19 pandemic and the war in Ukraine, leading to an enormous increase in pellet prices in BiH. In 2022, pellet prices rose from 350 BAM per ton to 1,000 BAM per tonne, significantly affecting the heating system market. The market stabilized only in November 2022, following the entity authorities' decision to limit the pellet price to a maximum of 561 BAM.

Following this, solutions and alternative activities were sought for the implementation of collective action. Through the project activities, which involved contact with a large number of heating system producers and distributors who especially recognized the importance of the REPLACE tools (REPLACE calculator), their representatives were contacted to explore current market demand and user preferences. OMC Technics d.o.o., a company that installs heating systems and heat pumps, expressed its desire to participate in the implementation of project activities. The concept was designed to offer customers the following for every heating system replacement:

- A free energy consultation by the project team prior to installation (analysis of investment costs, cost savings, CO_2 emissions reductions, etc.)
- In collaboration with installers, a free inspection and analysis of the current system (e.g. if the building has a central radiator system, installation of a central distribution system if the building does not have one)
- The households participating in the activity received the REPLACE label - we heat with 100% renewable energy sources

The first activity was carried out in the Hrasnica settlement, Ilidža Municipality (Sarajevo Canton), where a coal heating system was replaced with a pellet boiler (50 kW) in a residential building consisting of three apartments. The owners expressed a desire to jointly invest in replacing the current coal heating system due to its outdatedness, with a preference for a pellet boiler as an alternative option. An additional advantage was that the building had space for storing pellets, which were

previously used to store coal. The total heating area of the building is 280 m^2 (93 m^2 per apartment). Two people live in the first apartment, four in the second, and three in the third. Previously, about 10 tons of coal were used annually to heat this space, with additional use of log-wood. The building already had a central radiator heating system, and the installers estimated that several rooms required radiator replacement, which was done. During the analysis, the current system malfunctioned, and the coal boiler stopped working, which accelerated the replacement process, taking into account that the season had already begun. According to the calculation made for this building, energy savings of approximately 1,700 EUR are expected annually, while the expected reduction in CO_2 emissions is 29.2 t.

Figure 3: Residential building and coal/pellet storage area

Figure 4: Old coal boiler

Figure 5: New pellet boiler

Figure 6: Installation of new radiators

The next activity, in cooperation with OMC Technics d.o.o., involved replacing traditional heating systems with air heat pumps in two single-family houses in the municipality of Centar Sarajevo. One of the buildings had a central distribution system with radiators, while in the other, in collaboration with the company's installers, a underfloor heating system was installed, which was estimated to be the best option. The replacement of these heating systems is expected to result in annual savings of 17.4 t in CO_2 emissions and 1,220 EUR and 1,960 EUR in cost savings, respectively.

Figure 7: Representative of the OMC technics d.o.o. (right)

Figure 8: One part of the company's warehouse

Figure 9: Installation of underfloor heating and heat pump

Figure 10: Installation of the second heating pump with buffer

Cooperation through collective actions to support end users is still in its early stages in the Sarajevo Canton. The implementation of this collective action has laid the groundwork for further development, including increasing the number of users and involving other internal parties such as local and cantonal government representatives. To ensure that socially vulnerable populations receive necessary support, it's crucial to engage in dialogue with authorities about introducing subsidies that would facilitate such actions.

As a result of these activities, households received comprehensive support and counseling from experienced energy consultants, including information on heating system replacement. Technical

support was also provided by installers who carried out field analysis and prepared for the replacement. Ultimately, satisfied customers replaced their heating systems, improved their thermal comfort, and reduced their impact on the environment.

Given the early stage of collective actions, we can consider the activity a success. However, there is still much work to be done in developing the concept of providing joint support to all end users, and this work will continue beyond the scope of the project.

3.3. Bulgaria: Rhodope Mountain Region

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 people to cooperate in general. Within REPLACE, in Rhodope region, an attempt was made to implement two types of collective actions, as described below.

3.3.1. 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 11: 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 purchase organization – 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, 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 and postponed purchase of pellets. 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, literature review, and others, to support these and other future initiatives in Rhodope region and beyond, guidelines "Collective purchase of wood pellets by households – why and how?" have been elaborated in Bulgarian language and disseminated.

Figure 12: Guidelines for collective wood pellet purchasing and Guidelines for collective hot water supply in a multi-family building

The collective domestic hot water system in a multi-family building, using 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 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 such a replacement 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, hot water supply network, a heat meter, a common and individual water meters, and automation system.

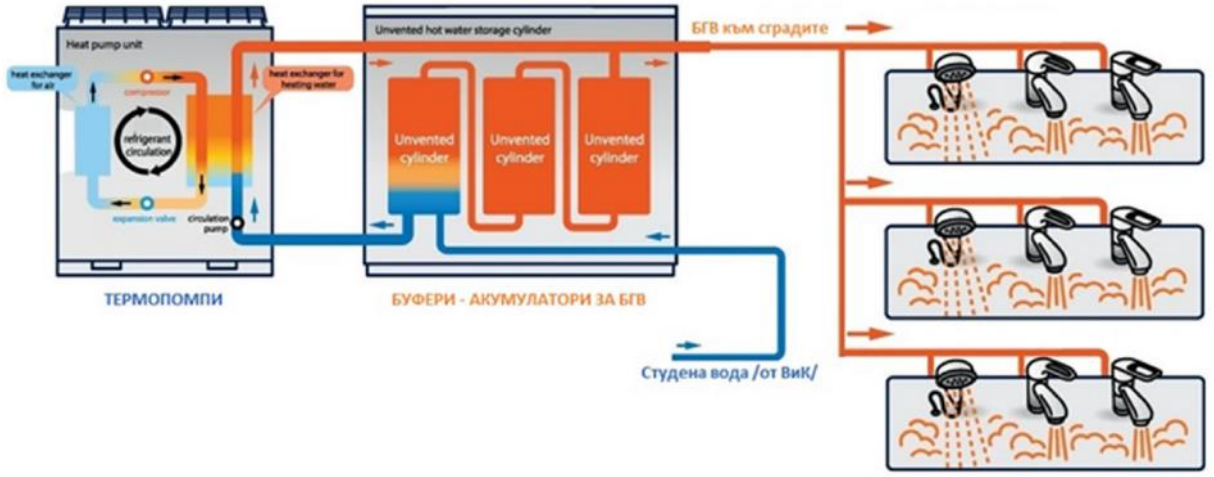

Figure 13: A sample scheme for connection of the heat pumps and the installation

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 longer time, no significant advancement can be expected within REPLACE. To promote such collective actions, however, comprehensive guidelines “A collective project for centralized domestic hot water supply via air-water heat pump in a multi-family building” has been developed and disseminated.

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

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, the local partner of the REPLACE project in cooperation with members of the local working group, has made efforts to promote and facilitate collective actions for boiler and oven replacement in households in target regions. The activities of the Action have primarily included meetings with representatives of local communities and events, with the aim of pointing out the benefits of collective actions, but also the transfer of knowledge and replication of the same in North-west Croatia.

To enable the sustainable development of society and the transition to low-carbon operation, renewable energy sources are important for strengthening the independence and energy independence of local and regional self-government units through joint action. Representatives of the REPLACE working group and the local partner REGEA, launched awareness raising program through the following campaign:

1) Initiating intermediary campaign to bridge the gap between citizens and available funding possibilities.
    a) Encourage consumers to participate in the tender published by the Environmental Protection and Energy Efficiency Fund, measures co-financed by the call are the following:
        i) A1 - complete energy renovation that includes increasing the thermal protection of the elements of the outer shell of the heated space through the implementation of at least one of the measures on the outer shell of the family house and the installation of a system for the use of renewable energy sources - is co-financed with up to 60%
        ii) A2 - increasing the thermal protection of the elements of the outer shell of the heated space through the implementation of at least one of the measures on the outer shell of the family house - co-financed with up to 60%
        iii) A3 - installation of a system for the use of renewable energy sources - is co-financed with up to 40, 60 or 80%, depending on the location.

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.

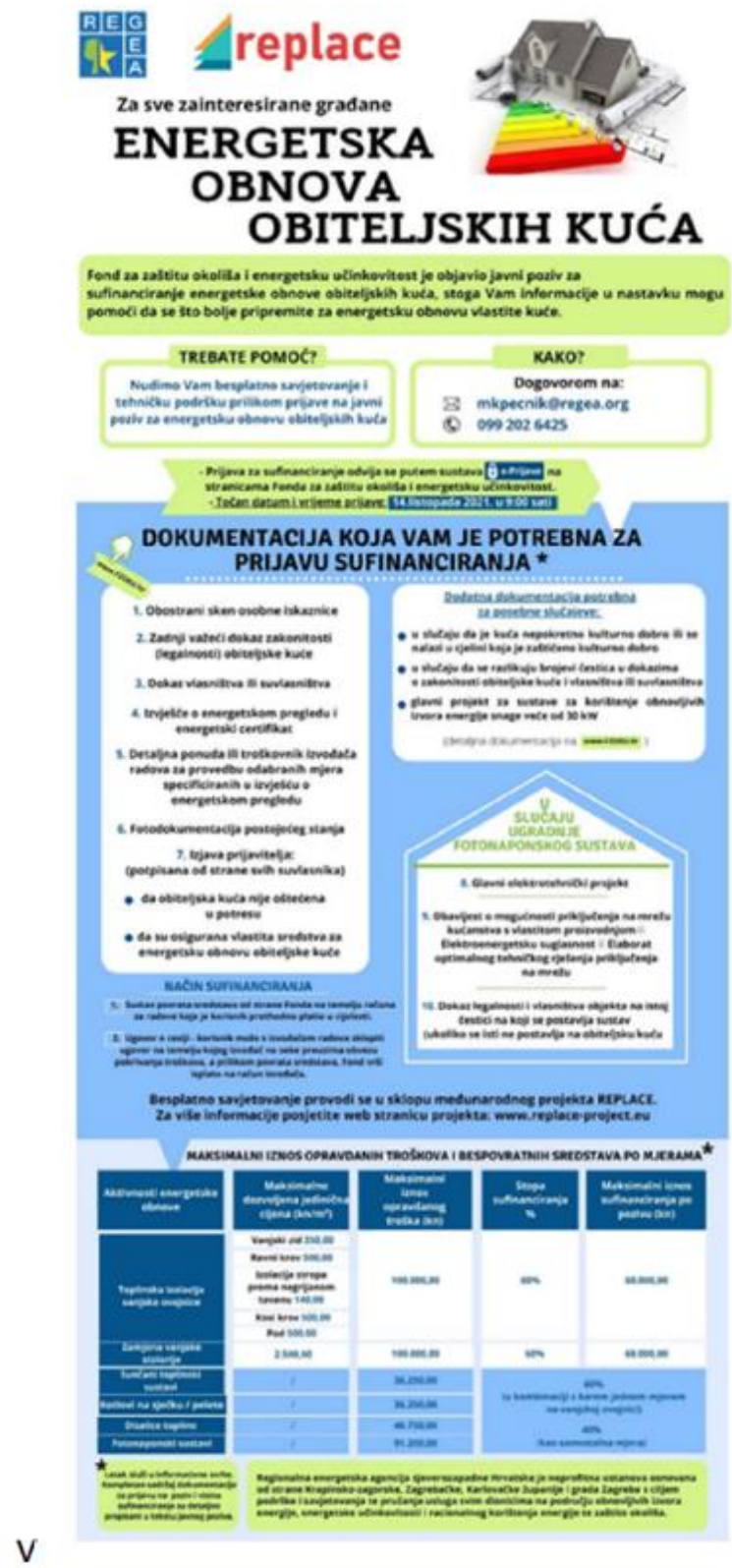

Figure 14: Leaflet made by REGEA which summarises the content of the Public Call from Environmental Protection and Energy Efficiency Fund in Croatia for co-financing the energy renovation of existing family houses.

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. The efforts of the REGEA and the citizens who applied for the call of Fund are important in promoting sustainable development and building a more environmentally friendly society.

REGEA local partner of the REPLACE project in North-West Croatia has developed a strategy to raise awareness about the benefits of replacement and mobilize citizens and stakeholders to support collective action. Although collective action is not yet recognized in Croatia, REGEA's approach has the potential to create a broad-based movement for change and contribute to a more sustainable future. By continuing to engage stakeholders and build momentum for sustainable practices, REGEA can make a positive impact.

3.5. Croatia: Primorsko goranska County

In Primorsko-goranska County, the end consumers were not highly motivated for the realization of collective actions. This is why the activities in this area had to be adjusted and pursued in a modified form. It was decided to hold a webinar instead, to educate the target groups on their options.

The planned collective action was the common purchase of pellets by a group of end consumers for a discounted price which EIHP would negotiate with a pellet manufacturer. 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. However, during 2020 and 2021 this activity could not be held due to COVID-19 pandemic. The plans for this activity were further discussed during the LWG meetings, especially at the 4th one. As was suggested during that meeting, 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 of renewable energy sources 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 organized on 10th March and well attended, bringing together 17 participants.

Firstly, an external experts on biomass has held a presentation under the name “Good practice examples of biomass in heating”. Mr. Dražen Lisjak works at a company Biomass group Ltd. which

specializes in designing of the 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 demand. Specific examples along with their costs were presented, giving the viewers the best insight into what interests them the most. After the presentation, the participants were interested in the process of pellet transfer 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 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 the 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 that the events they attend or consultations they receive are free of charge.

Finally, EIHP expert Lea Leopoldović talked about REPLACE Calculator and Heating Matrices. She explained their purpose; firstly, 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 a calculator to see what the environmentally acceptable options are. REPLACE Calculator can then be used to make a more detailed analysis of the options, especially in the economic sense. The participants commented that this is a great and useful tool to get quick and accurate recommendations.

Figure 15: Webinar "Facilitating the realization of collective actions"

3.6. Germany: Bavarian Oberland

At the region's first Local Working Group meeting in February 2020 when discussing the planned REPLACE collective action, 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.

The LWG meeting's 14 participants were representatives from the chamber of crafts, climate protection managers, from the consumer advice center Bavaria, the chimney sweepers' guild, and energy advisors. On the basis of the LWG's assessment, it was decided to put the focus on supporting district heating projects through REPLACE, thereby gaining a high amount of CO2-reduction, involving municipalities in the collective action and through the political debate to create a greater impact on end-consumers' decisions.

At an information event on 25 February 2022, organised by Energiewende Oberland (EWO), 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. The information event was advertised via the press, the EWO website, waermewende-oberland.de, the districts' climate protection managers, and the press was invited. The target group included representatives of communities and local councils, private individuals, heating engineers, chimney sweepers, and the forest owner organisation.

Around 60 participants, including mayors, architects and energy consultants, took part at the event. The information event was combined with the event for future plant contractors 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.

At the event - online after all due to Corona - , district heating systems were presented as an effective way to supply entire streets with climate-friendly heat in addition to replacing individual heating systems, and at the same time to make oneself independent of fluctuating energy prices and oil and gas supplies from abroad.

A representative from EWO explained how to plan a district heating system, from a first meeting of residents to determine the interest in a joint system, over planning issues like the shortest pipe route, heat price, operator model and advice on subsidies for heating houses, heat paths or the disposal of the oil tanks, finally leading to a preliminary contract to create commitment in the planning. A bank's representative informed on how to make district heating systems also financially sustainable. And reports from the field included three operators of agricultural heating networks as well as a long term operator of a municipal heating network. 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.

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.

The information event on the collective action, but also on the Energy Summit and the field trips to the local heating networks were accompanied by public relations work for the target groups: a press release was disseminated to the local press, via waermewende-oberland.de, energiewende-

oberland.de, social media, and the EWO Newsletter. In addition, the target groups were offered the opportunity to obtain follow up consultations from REPLACE project partner Energiewende Oberland.

In the REPLACE project, Energiewende Oberland was in contact with a number of interested parties in the region who wanted to set up a local heat network. Among them were several municipalities, sawmills, farmers, and heating engineers. Between February 2020 and February 2023, EWO was able to support and accompany the founding, respectively the re-densifying of 13 district heating networks, helping stakeholders to make use of the favourable federal funding conditions. For these networks, the final decisions for district heating networks were made by responsible entities, thereby creating 8 jobs and triggering 6.752 t CO2/a. The show case presents a district heating system in Oberhausen, Berg district, that was started by an enquiry from two residents to REPLACE partner Energiewende Oberland in February 2020. Since autumn 2021, the boiler house has been supplying 16 single-family homes with heat from woodchips.

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.

EWO aquired additional in-depth expertise throughout the duration of the project and will provide this service to municipalities, enterprises and citizens in the region Oberland in the future.

Figure 16: The heating network Berg is one of 13 district heating networks that EWO supported in the course of the REPLACE project.

3.7. North Macedonia: Skopje Region

The recent energy and economic crisis and the national status as candidate country for membership in the European Union (EU) indicates the need to prompt action to encourage active energy citizenship, so as to facilitate the energy transition and the decarbonization of the energy and heating system. Therefore, the pre-feasibility study for collective action in KAGoP region is evaluating the economic profitability and environmental impacts of the collective self-consumption photovoltaic system installed in a multifamily apartment building in the Municipality of Karposh. The existing resistive electric heating system in the apartments is replaced with heat pumps. The results show that switching to heat pumps is the cheaper and more environmentally friendly option, however the best results are

achieved if both actions are implemented. This evaluation is relying on three-step methodology for evidence-based decision making in residential buildings.

The residential sector represents around 40% of the total energy consumption, and accounts around 36% of the total GHG emissions. The package “Clean Energy for all Europeans”, the “EU Directive 2019/944 on common rules for the internal market for electricity” and the “EU Directive 2018/2001 on the promotion of the use of energy from renewable sources” are supporting electricity generation from RES, from individuals, as well as collective prosumers, organised in energy communities.

EU initiatives are applicable for multifamily apartment buildings (MFAB), where citizens jointly procure a collective PV in order to cover parts of the local energy demand. According to past research, it is shown that it can be more cost-efficient to have a PV for so-called collective self-consumption (CSC), rather than installing separate PVs. Space heating uses about 53% of the total energy demand in the residential sector, indicating that the concept of CSC has the potential to decarbonize the heating sector in homes with electrified heating, especially in MFAB. In terms of decarbonization of residential heating, there are possibilities for renovation in MFAB with central, decentralised units and mixed systems, using heat pumps as the main technology, concluding that they will be the drivers for decarbonization of HC systems, as the most ecological and sustainable option.

This offers an opportunity to democratise the energy system, by actively involving citizens in the energy transition. In December 2005, the country obtained an EU Member States candidate status, setting in on a path on which it continuously aligns its legislation with the EU acquis. As a result, N. Macedonia aims to contribute to the EU energy and climate targets. The existing national documents would underlie an adaptation to the EU legislation, including directives 2019/944 and 2018/2001. The implementation of a collective PV, is not part of the current national legislation. Once these policy changes are in place, they will motivate households in MFAB to form energy communities and collectively invest in PV generators. Moreover, these changes should not only reduce the electricity bills of households living in MAFB, they should also accelerate the HC decarbonization.

The study aims to contribute to this debate topic by evaluating the profitability of using the concept of collective self-consumption to decarbonize residential heating and cooling in MAFB, with a case study in Karposh. The study follows a three-step methodology by considering an energy community formed by households (tenants) living in a MAFB. The tenants of the building are interested in exploring the profitability of installing a collective PV generator and replacing their resistive electric heaters with heat pumps. To provide an evidence-based decision making, the following methods are considered:

- step 1: calculating electricity costs before taking action,
- step 2: conducting sensitivity analysis to find most suitable PV capacity and calculate the heat demand after switching to HP,
- step 3: evaluating impact of PV and heat pumps on cost savings and CO2 emissions.

For the first step there are two options for obtaining data. The first one is through on-site measuring, where a meter would automatically write energy consumption hour-by-hour, separately for heating purposes and for electric appliances. The other, is via simulation or calculation for assumed types of electric appliances and their period of work, or average consumption of assumed types of households. These simulations can also be done with the support of PVSOL premium. For the second step, a PV generation for a set of capacities, based on the available rooftop area of the building, is simulated, using PVSOL premium, while the heat pump-related calculations are performed using the REPLACE calculator. All of the MFABs in Macedonia are already grid connected, so the system will be also connected to the grid with electrical appliances and without battery. In this second step the building is 3D modelled and the maximum PV capacity is determined, after which 10 different scenarios are

developed for different system capacities. The process continues with the calculation of energy production from the system, which for the first year is automatically simulated by the software, and from the second year on, it is assumed that the PV generation degradation rate is equal to 1.5% per year. To evaluate the effect of replacing the heating system, the REPLACE Calculator is used. To simplify the calculating process, it is assumed that the entire space of all the apartments is 100% heated before and after the change of heating technology. For the third step, an evaluation of the environmental impact is made through saved CO_2 equivalent emissions. These emissions are calculated for both actions separately, and finally summed together, taking into account the grid network emission factor, the energy demand before and after the baseline scenario. The economic impact of the investments is assessed through the net-present value (NPV) for a period of 20 years. All the data from the simulations and calculations are in class on hourly basis, and systemized in EXCEL.

The building chosen as a case study is a real building located in the municipality of Karposh, as shown in Figure 17. The building was built in 1960 but renovated in 2013. The specific building that is analysed here, however, is not connected to the district heating system. Since no specific information on the technologies used by the tenants is available, it is assumed that the tenants use resistive heaters. The building has 3 entrances with 21 apartments in total, and 7 apartments per entrance. In this case study only one entrance is analysed, and the results can be replicated to the other 2 entrances. The basic thermal parameters, dimensions of the building, year of construction or renovation, etc. are read through the register data, as shown in Figure 18.

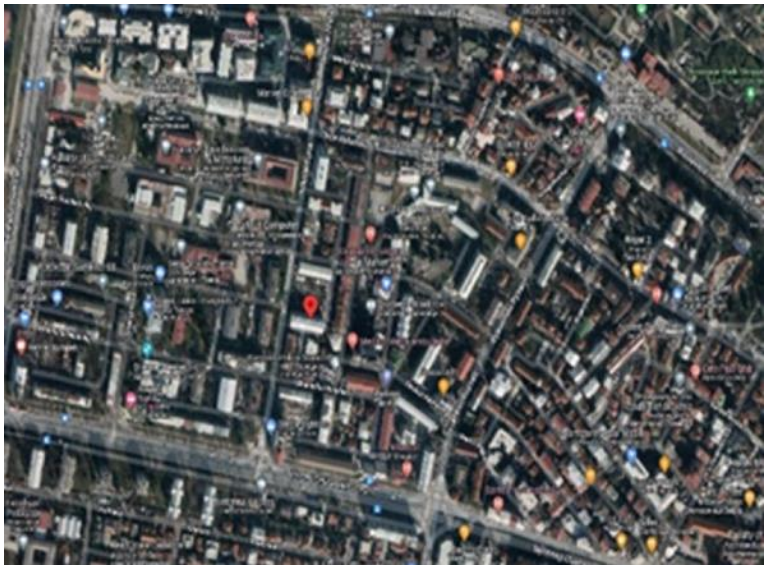

Figure 17: Location of the MFAB

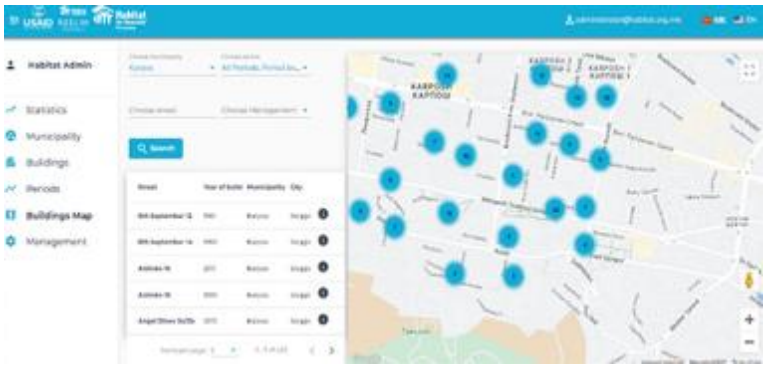

Figure 18: Print-screen from on-line RABA register

As there was no real data available for the energy consumption on hourly points, nor households profile information, these were assumed and the data was generated directly in PVSOL. In the four apartments of 38 m² the assumed households are: one person household, two persons household, two persons household and a child, two persons household and two children, and in three 64 m² apartments the households are: two persons household, two persons household and a child, two persons household and two children.

After the consumers are set, a PV module is selected: Sunmodule Bisun SW 290 duo, from SolarWorld AG, and the maximum potential capacity is determined, trying out horizontal and vertical positioning of the PV modules. With vertical position (left), a maximum of 34 modules can be fitted, resulting in installed power of 9.86 kW, and if they are positioned horizontally (right), then 30 PV modules can fit with maximum power of 8.7 kW, as shown on Figure 19.

Figure 19: Fitting PV modules for finding the maxim potential installed power

In the baseline scenario it is assumed that all of the apartments are using resistive heaters, and the future scenario analyses the impact of changing those heaters with air-to-air heat pumps. To calculate the costs and savings of switching from resistive heating to HP in the apartments, different information should be known: size of the apartment, percentage of the apartment that is heated in the before scenario, percentage of the apartment that is heated in the after scenario, type of heating in the before scenario, energy consumption of the system in the before scenario, since when this system has been in use, and whether subsidies will be used to change the heating system. In the previous scenario the apartments with area of 38 m² consume 3 040 kWh energy for heating the space, and the one with 64 m² consumes 5 120 kWh. The systems with resistive heating are 5 years old. The NPV analysis is made for both actions as a system, the CSC PV installed on the roof of the building entrance and the transition to HPs. To perform the NPV analysis, apart from the results for generated electricity, imports, exports, energy saving due to replacement of the heating system etc., some technical and economic parameters will be needed, as shown in Table 1.

Table 2: Data required for NPV analysis

Technical data	
Percentage of degradation	1.5
Installed PV power (kWp)	Variable
Power of the inverter (kW)	Variable
Number of users (households)	7
Annual increase in the price of electricity (%)	1
Economic data for PV	
Interest rate (%)	5
Price of a single PV module (EUR/kWp)	400
Inverter (EUR/kW)	300
Working/service fee and Cabling (EUR)	800
Designing/ Project design (EUR)	1 000
Smart meters (EUR/meter)	200
Subsidies (EUR)	-
Total investment costs (EUR)	9 080
Specific investment costs (EUR/kWp)	1 043
Economic data for the heat pump – inverter air conditioner	
Estimated costs for each household (EUR)	Variable

The PV results in terms of: total energy produced for the period of interest, the average annual energy production, total imported end exported energy and the average SSR value are run in all 10 scenarios. As expected, with the decrease in installed capacity, followed by less generated electricity, the locally consumed electricity decreases, so the need to import electricity increases, as presented on figures Figure 20, and Figure 21.

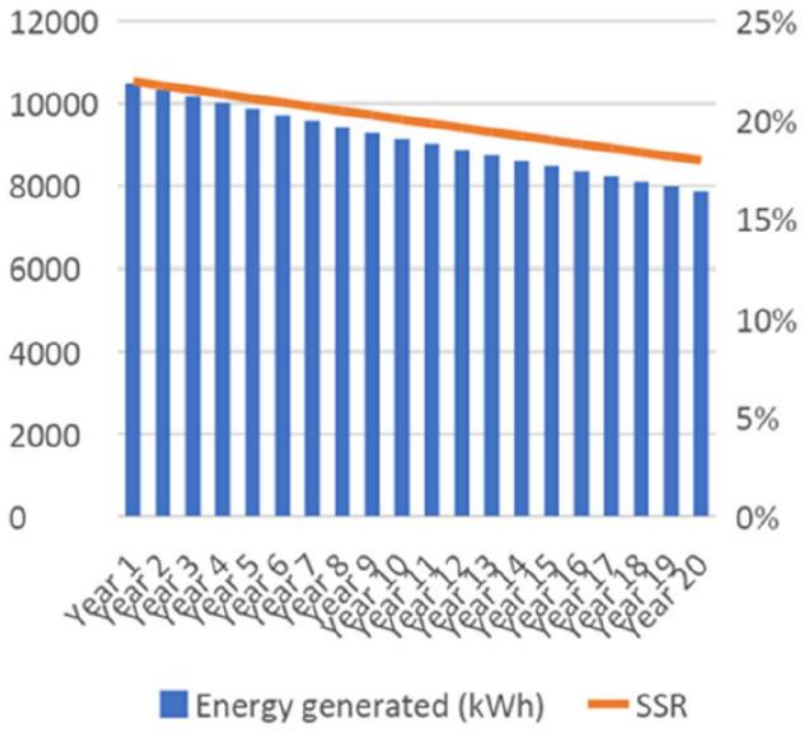

Figure 20: Electricity generated to SSR for 6.96 kWp PV

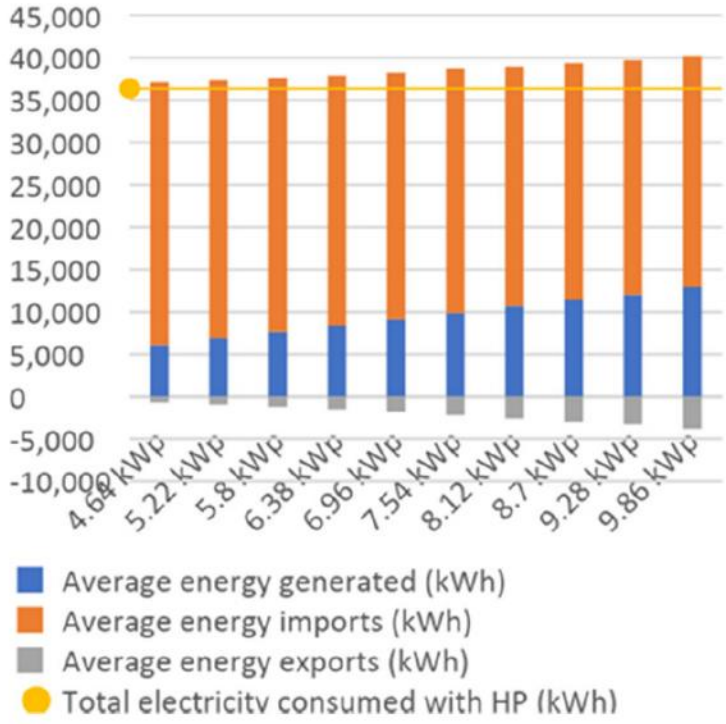

Figure 21: Electricity generation, imports and exports to total electricity consumption

The complete overview of the results from the change of heating technology is presented in Table 3, and the comparison of electricity demand of the buildings' entrance is presented in Table 4.

Table 3: Overview of the results obtained through REPLACE calculator

Apartment area	38 m²	64 m²	Total for building entrance
Recommendations and expected results			
Recommended capacity for the inverter air conditioner (kWel)	5.50	8.00	46
The estimated investment (MKD)	40 000	70 000	370 000
Annual savings (MKD)	10 776	20 885	105 759
Estimated return period for the investment (years)	3.71	3.35	-
Before the investment			
Total annual heating costs (MKD)	22 057	36 464	197 620
Total heating costs for the entire working time (MKD)	441 137	729 284	3 952 400
Annual GHG emissions (tCO_2-eq)	2.60	4.4	23.5
Total lifetime GHG emissions (tCO_2-eq)	32	54	290
After the replacement			
Total annual heating costs (MKD)	11 281	15 579	91 861
Total heating costs for the entire working time (MKD)	225 623	311 576	1 837 220
Total annual cooling costs (MKD)	2 226	3 749	20 153
Total annual heating and cooling cost (MKD)	13 507	19 328	112 014
Annual greenhouse gas emissions (tCO_2-eq)	0.50	0.85	4.55
Total lifetime GHG emissions (tCO_2-eq)	10	17	91

An illustration of the REPLACE calculator is shown in Figure 22.

Figure 22: REPLACE calculator's results for apartment of 38 m²

Table 4: Total electricity demand for heating and cooling in the building entrance as a whole

Electricity demand for HC in building	Savings after the replacement of heating technology (%)	Total demand with electric panels (kWh)	Total demand with inverter AC-heating (kWh)	Total demand with inverter AC-cooling (kWh)
	70	55 255	36 367	2 366

If a comparison of the electricity consumption of different electronic devices is made, then it is noticeable that resistive heaters are dominant among the energy consumers, surpassing the sum of electricity consumption of all other electrical appliances in one home.

If a comparison of lifetime CO_2 savings between changing of heating type (represented with orange) in the whole building entrance, to the 10 PV scenarios (represented in blue) is made, as shown in Figure 23, it can be seen that the change of heating system contributes the most to mitigating the negative environmental impact. However, the best-case scenario is if both, the PV is installed and the resistive heaters are replaced.

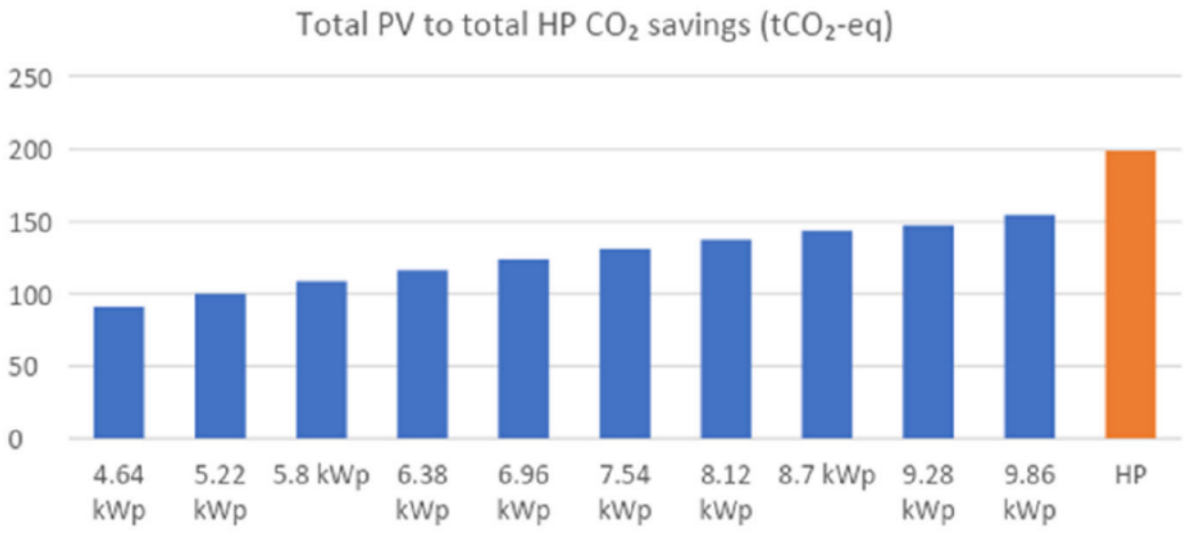

Figure 23: Total PV to total HP CO_2 savings (tCO_2-eq)

When the average annual savings are compared with the investment cost, it is evident that the larger the system is, the lower the annual savings are. As expected, and presented in Figure 24, the results show that the bigger the PV, the bigger the investment cost, and the bigger the NPV value. On the other hand, the smaller the system, the shorter payback period is. The total investment costs are analysed to the NPV over the period of 20 years, showing the growth of the investment costs for each of the installed PV capacities, as in Figure 25.

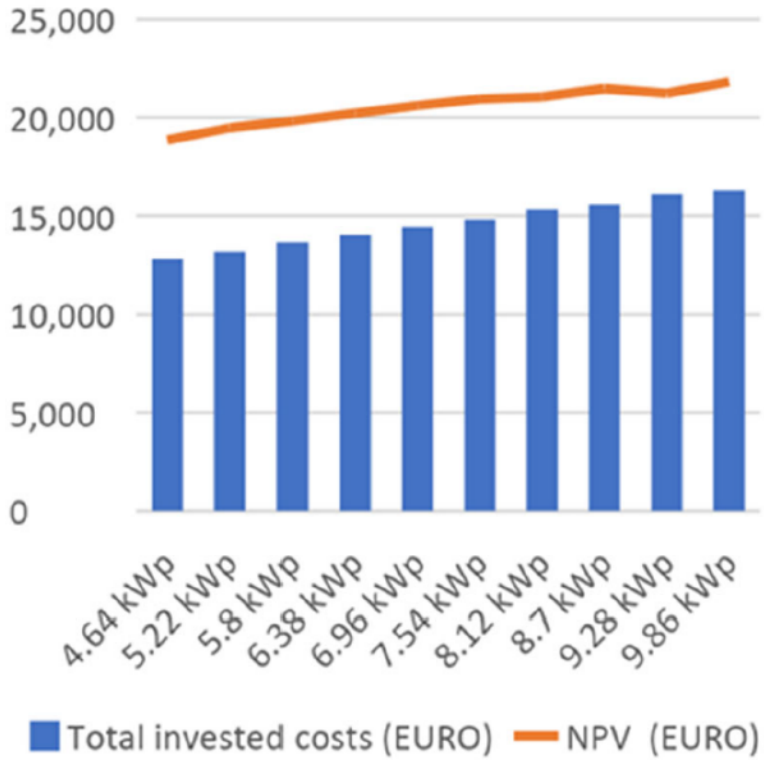

Figure 24: NPV in relation to total investment cost.

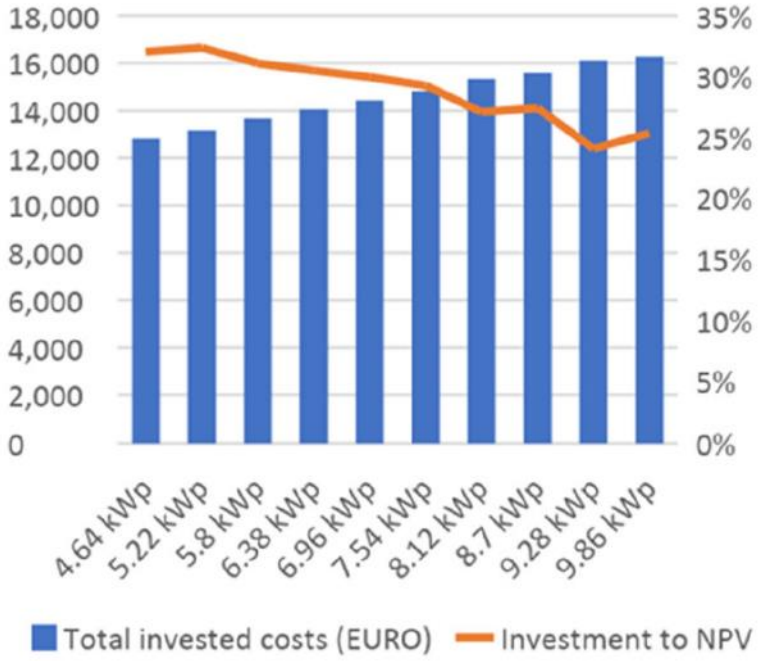

Figure 25: Trend line of total investment to NPV

The most interesting results are that the switching from resistive heating to HP, not only has the highest CO_2 savings compared to the 10 different PV scenarios, but also has the lowest investment cost, as presented in Figure 26.

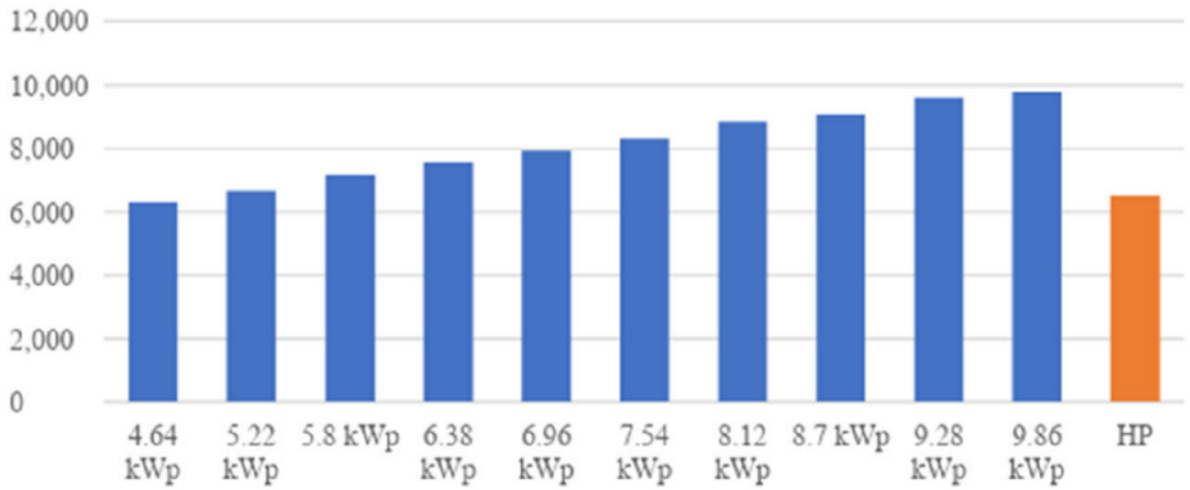

Figure 26: Total invested costs (EURO)

When taking into account all the simulation and calculation results and analysis done, it is evident that installing a PV for CSC and replacing resistive heating devices with HPs in apartments is a profitable and environmentally friendly measure, especially in MFAB. Since the surface of this buildings' roof is not too large, there is no risk of over dimensioning the system. However, according to the latest changes in the national rulebook on renewable energy sources, the energy communities are legally able to install PV only up to 6 kWp In addition, there is still no adequate legal framework for establishing energy communities or energy cooperatives, providing space for further research in the field and opportunity for strengthening and promoting the need for active energy citizenship in the energy transition on a local level.

The study was conducted in the period March – July 2022, with two months of data collection before and two additional months after for fine-tuning the results. In order to disseminate those results and to present the case study, SDEWES-Skopje and KAGoP region stakeholders organised a seminar in January 2023, as a full day event in Skopje. A total of 35 participants were present, representing different types of stakeholders, such as public sector representatives on governmental and local level, NGOs, PV companies, end-users, academia, etc (Figure 27). The event was structured in three parts: The first part covered 3 presentations about the decarbonization of the HC sector, collective actions as a catalyst of the energy transition and collective actions for self-consumption in a building – a case study in Karposh. In the second part, digital tools in RHC were presented, as well as the concept of energy sharing in renewable energy communities from a European perspective. The event concluded with a panel discussion with four panelists and Q&A from the audience.

Figure 27: Workshop for dissemination of the results from the study for collective action

3.8. Slovenia: Slovenia

3.8.1. Joint purchase of RHC equipment

The collective action of joint purchase of RHC equipment aimed to further boost the replacement rates of old and inefficient heating systems. JSI set up a unique webpage (www.zamenjajolje.si) for this campaign that was going to be a focal and entry point. The central concept is to educate households on REPLACE methods prior to actually taking action on replacing boilers so they understand why it is necessary and what advantages it brings. At the end of the process they received a voucher from a local manufacturer of the heating systems, that aims to additionally motivate investors to implement the replacement. Voucher guarantees that certain binding works for implementation will be executed free of charge.

This collective action lasted from April until the end of December 2021. The local manufacturer that participated as a heating system provider is company Kronoterm, which is one the most recognizable manufacturers of heat pumps in Slovenia, thus offering the latest, highly efficient heat pump.

On the basis of the anticipated impact of this campaign, the local heating system manufacturer offered a certain discount in the form of the free implementation of certain installations, which are obligatory anyway. For a manufacturer this presents an additional discount for the investors. The benefit to the producer is not just an increase in production, but also in the form of nationwide marketing of their product.

This activity is considered as a joint purchase of the heating systems, since the campaign was projected to have a major impact and thus attracted many targeted households. This motivated the local manufacturer of the heating systems to offer this voucher. Simultaneously, families were further

encouraged by the voucher since it provided them an additional monetary reward, apart from the governmental subsidy.

The structure of this activity covered several steps, from potential investors that needed to be made aware of the REPLACE campaign to actual implementation of the measure and monitoring the results.

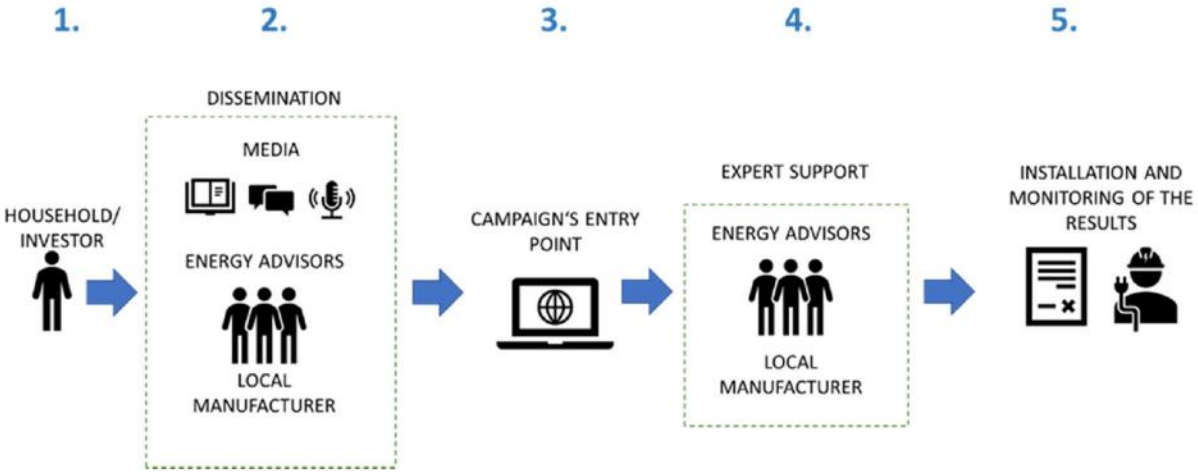

Figure 28: Collective action of joint RHC equipment implementation phases: from informing the investor to monitoring of the results

The 5 pillars which formed the foundation for the campaign's execution constituted the structure for its implementation. The campaign was named Zamenjaj olje za okolje (en. replace fuel oil for the sake of the environment) and was designed with the external PR team. An integrated graphic image was also designed together with the web portal.

ZAMENJAJ OLJE
ZA OKOLJE

Figure 29: Promotional image of collective action campaign of joint RHC purchase in Slovenia

1) INVESTOR

Investors/households have an existing inefficient boiler and are interested in replacing it with a new heating system. They seek to find additional information before taking upon the implementation measure.

2) DISSEMINATION

The potential investor is informed about the campaign through its main promoters:

Energy advisors:

advisors will be informed about the campaign and will pass the information on to their clients. A core group of those will be selected that will be contact points for households and

will be able to offer holistic presentation of the REPLACE education process, campaign and will help them with the application or online calculator.

media:

information via websites (JSI, relevant web portals (eg Finance-energy, Delo & Dom, etc.), advertisements, etc.

Eco fund

local manufacturer involved in this activity: website, own resources

3) ENTRY POINT FOR PARTICIPATION

Entry point was a subpage on the JSI-EEC portal – www.zamenjajolje.si . The content includes:

basic information about the campaign

basic information on the H2020 REPLACE project

links to the REPLACE information material (e.g. leaflet),

presentation of the significance of heating system replacement and relevant indicators in decision-making process (economic, environmental and other benefits for the household),

presentation and link to the REPLACE online calculator,

information on professional support,

presentation of the selected product and invitation to apply for the campaign.

The **basic idea** of the education process in three steps:

- Equip households with information about (1) existing technologies, (2) the impact of e. renovations to system selection and (3) air quality and global warming.
- To provide households and advisors with tools to calculate the costs and benefits of switching (EUR, CO2).
- To enable households to correctly compare the selected system from different providers for more informed decision-making.

At the end of the entire process, when the user (households) went through the entire educational process and test, they received a special voucher. The latter offers them that certain binding works for implementation will be executed free of charge by the local manufacturer of the heating systems.

After the completion of the step by step education process, the user was obliged to take a quick online test that consisted of 8 questions. In the case she/he got everything correct, they received a digital voucher on their submitted email (figure right).

By doing such a form, all GDPR requirements were taken into account.

Gmail

Gašper Stegnar <gasper.stegnar@gmail.com>

Bon ugodnosti za menjavo ogrevalnega sistema

1 sporočilo

Zamenjaj olje za okolje <h2020replace@ijs.si> 07. junij 2021 08:30
Za: gasper.stegnar@gmail.com

ZAMENJAJ OLJE
ZA OKOLJE

Pozdravljeni!

Veseli nas, da ste se odločili za menjavo ogrevalnega sistema na olje.
S sodobno tehnologijo ogrevanja z obnovljivimi viri ne boste le prihranili, temveč boste prispevali tudi k bolj zdravemu okolju.

Pošiljamo vam bon ugodnosti »Zamenjaj olje za okolje«, ki ga lahko izkoristite ob nakupu toplotne črpalke Kronoterm Adapt.

Vaš bon ugodnosti

Izkoristite ga ob menjavi ogrevalnega sistema s toplotno črpalko Kronoterm Adapt

KRONOTERM

PREJEMNIK
Ime: Gasper
Priimek: Stegnar
E-pošta: gasper.stegnar@gmail.com

PODATKI O MENJAVI
Naslov stavbe: Zgornje Koseze 14, 1000 Ljubljana

Datum izdaje bona : 07. 06. 2021
Veljavnost bona je 21 dni od izdaje.

Pridobljeni bon je veljaven ob predložitvi poročila energetskega svetovanja (ki ni starejše od 12ih mesecev), ki dokazuje ustreznost izbranega sistema pri menjavi vaše obstoječe naprave in ga pridobite po posvetu pri energetskem svetovalcu mreže Ensvet. Bon je unovčljiv le v celoti in ga ni mogoče menjati za gotovino. Bon koristite tako, da ga izvajalcu montaže predate skupaj s potrdilom naročila toplotne črpalke Kronoterm Adapt. Ugodnosti bona bodo vidne na potrditvi naročila s strani vašega izvajalca montaže. Darilni bon ni prenosljiv in velja za izbrani objekt naveden pri prijavi.

Za vse informacije v zvezi z menjavo vaše stare ogrevalne naprave smo vam z veseljem na voljo svetovalci v podjetju Kronoterm.

Pokličite, pišite ali nas obiščite:
KRONOTERM d.o.o.
Trnava 5e
3303 Gomilsko

info@kronoterm.com
T: +386 3 703 16 20

Figure 30: An example case of a received voucher for boiler replacement

4) PROFESSIONAL SUPPORT

Households were able to turn to professional support through all promoters.

5) INSTALLATION AND MONITORING OF THE RESULTS

Investors that are going to actually replace their heating systems, informed and motivated through the campaign, were noted in order to monitor the actual effect of the campaign.

The **campaign goal and result**

In the preparation phase a goal of 50 boiler replacement was set. Since Slovenia had over 72,000 fuel oil boilers at that time, a target group of fuel oil boilers was identified. In the end, the **goal was to replace 50 fuel oil boilers** and in the case of high demand for vouchers, the amount can be increased according to on-going agreements.

In summary, **this campaign was effective in inspiring 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 CO2 savings**. Based on these facts, **the campaign is considered as successful**.

3.8.2. 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 of each household that aims to replace their old, inefficient heating system.

Borzen is responsible for the implementation of public utility service 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 sources and the efficient use of energy. As a public utility service provider, Borzen also carries out tasks related to informing and raising awareness about the efficient use of energy and renewable energy sources. To that end, Borzen designed the platform Trajnostna energija (eng. Sustainable energy, http://www.trajnostnaenergija.si/.

The main purpose of Eco Fund, 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. Should a household receive a grant or a soft loan, the eligible person must send an application for a grant and/or soft loan. Eco Fund also runs the organisation and financing of 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 of households and raising awareness among experts through a web platform and is going to ensure afterlife of REPLACE project results.

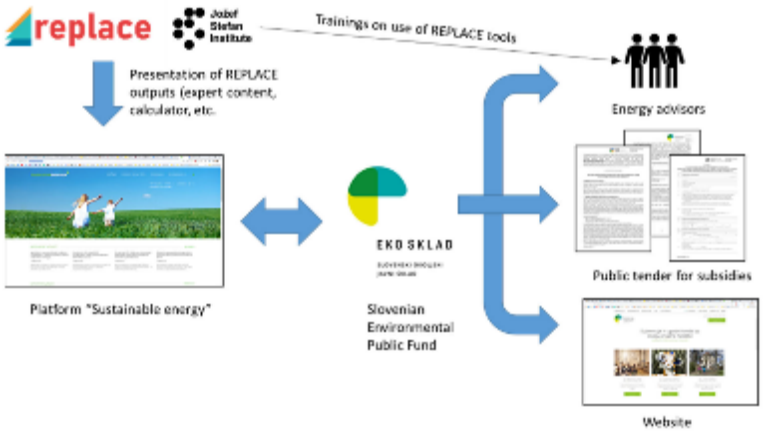

Figure 31: The information workflow in Action 9

Borzen in the scope of this action had set up a separate subpage on Sustainable energy platform. The subpage is intended to present:

- the “fuel oil phase out” campaign
- inform users (households, experts) on importance of heating system replacement
- present a “walk-through” guidance on how to proceed from idea to implementation, where to find free expert support, how and by which indicators different heating systems should be compared against each other, etc.
- REPLACE output: heating system calculator, matrix, leaflets, etc.
- REPLACE ongoing campaigns.

Eco fund publishes calls for subsidies once per 2-3 years. In 2021, a new public call was pubslished and it consists of content on heating systems replacement related issues and direct link to a platform Sustainable energy, where REPLACE results, trainings and campaigns are presented. This ensures that each household that is planning to replace their heating system isaware of the REPLACE campaign and is informed about 1) educational process of heating system replacement and 2) REPLACE project, its results and tools.

Furthermore, Eco fund promotes the new platform on their website. This expands the possible reach of interested people. Since Eco fund runs the energy advisory network, JSI in cooperation with Eco fund organized an education seminar for advisors, where they were informed about REPLACE tools and campaigns.

The campaign kick-started in October 2021 with **nationwide PR campaign**, where the consumers were made aware of:

- they now have the option to alter their heating status, something they were unable to do for a long time.;
- if they are proactive, they can collect adequate information to enable them to take more informed decisions.;
- possible alternatives to their existing heating system and
- information on where they can find additional tools/information.

The campaign predominantly took place online via different internet platforms and also on national television (Figure 32).

One of the **key added values** of the project lies in the 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 on the REPLACE webinar where they educated themselves about the use of the REPLACE calculator. All advisors participated as well in the annual training, organised by Eco Fund – where they were informed about REPLACE tools and promotional material. Based on this, **REPLACE calculator is a regular part of the work of energy advisors**. This can be indirectly proven through the online calculator visits from unique users in 2022, where no extensive PR campaign took place. Collective action were shaped in 2022 and households were made aware of recommended visits at the energy advisory offices and REPLACE calculator. The statistics shows (Figure 33) the calculator was used more than 100 times per month from unique users.

Figure 32: Promotion of the campaign and REPLACE calculator on national television

PR campaign resulted in over 3500 individuals (October 2021 - Figure 32) using the online calculator and over 3 million people being reached to the promotion through web-based articles (this means that many people saw the same content on different internet pages). After that, the calculator was predominantly used by the energy advisors and people that replaced their old heating system. To ensure the public are 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 the REPLACE project such a campaign was ran one time 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 apprised of the facts and it is anticipated that they will conduct a similar campaign in the future.

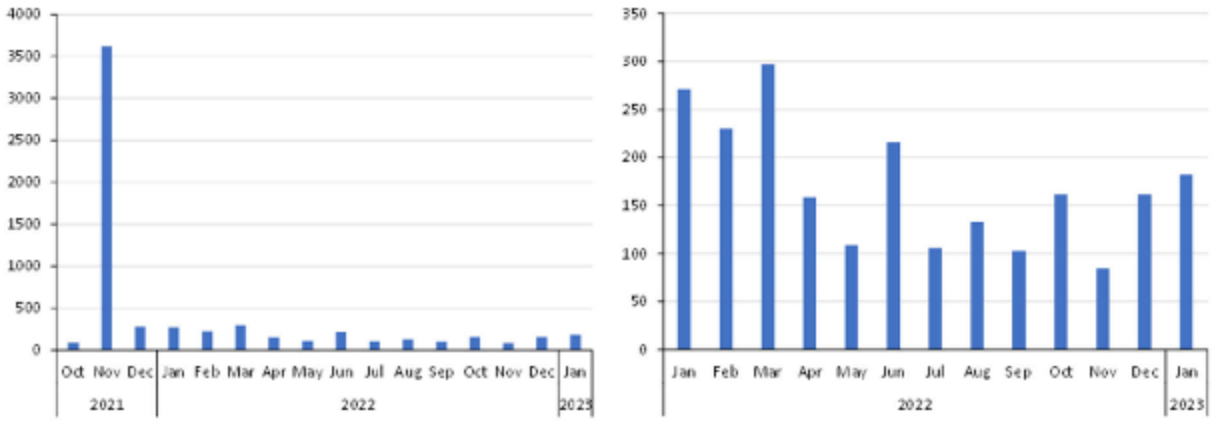

Figure 33: Overview of unique users on the Slovenian REPLACE heating system calculator

An external party facilitated the PR campaign's execution and upon its completion, the PR leader put together an evaluation of the media coverage's worth:

- Number of articles = 30
- Average post reach = 231,151 people
- Cumulative reach of posts = 3,236,118 people

3.9. Spain: Castilla y León Region

At the beginning of the project, the initial plan was to try as collective actions in Castilla y León those related to joint purchase of wood pellets, or joint purchase of renewable-based heating systems.

However, we found quite difficult to implement those kind of measures:

- On one hand, most new biomass installations are 10-year financed with the installer, and the contract between the owner of the installation and the installer normally covers the boiler, adaptation of the boiler room to industrial safety requirements, maintenance, guarantee and pellet supply. Thus, with many different installers, it will not be possible, until the end of these contracts, to go to joint purchase of wood pellets.
- On the other hand, with many different installers, installing different brands of boilers, it was also impossible to establish a joint purchase of renewable-based heating systems.

In this situation, we finally decided to try establishing local biomass fuel logistic hubs. The main advantage in our region for this decision is that we had lost a lot of employment in the coal mining areas when both the last coal mines and the coal-powered electricity generation plants were closed, between 2018 and 2020. Coal mines and power plants were situated in areas at the North of the provinces of León and Palencia, and these areas are also heavy wooded areas. Biomass exploitation is a good way to create new employment, in biomass production and treatment, and in logistics.

Castilla y León has already authorised and financially supported - through a loan given by EREN, equivalent to 50% of the external financing required for the investment -, a 50 MW biomass electricity generation plant in the former coal area, which started operation in 2020. A new 50 MW plant, again in the former coal area, is expected to enter into operation during 2024. Thus, logging companies are

growing and creating new employment in these areas (more than 600 jobs in biomass production and logistics are expected to be created because of the two plants).

In addition, biomass heating networks are operating in the region (Soria, Ólvega, Aranda de Duero, Valladolid and Ponferrada), and new biomass heating networks are projected in León and Palencia.

Also, pellet production plants need more biomass in order to work at total capacity, provided that demand is rising.

In this situation, we believe that local biomass fuel logistics hubs are a clear opportunity to both obtain more biomass and create new autonomous employment in the former coal areas, through self-employment to produce and treat biomass, and transport it to the hubs.

Thus, an application has been sent by the Regional Government to the Just Transition Fund, for the following project:

DESCRIPTION OF THE PROJECT

Construction and equipping of four regional logistics centres for forest biomass in the provinces of León and Palencia.

Creation of a network of regional logistics centres covering the main forestry districts of León and Palencia. On plots of land with an approximate surface area of 15,000 m2 with access to the water and electricity network.

Construction of each regional logistics centre with a building (toilets, office, machinery area and maintenance area), concreted access, gravel yard for storing and chipping biomass, weighbridge, fencing and hydrant network.

Acquisition of the necessary equipment (machinery: loader, chipper, self-loader, chopping, truck 6x4) for the development of the activity and to provide service to small rural businesses and self-employed people who start their activity of exploitation of pine forest thinnings, remains of pine and poplar felling, as well as of oak and holm oak undergrowth.

The aim of these regional logistics centres is to use and purchase all the forest biomass generated within a radius of approximately 30 to 40 km.

The forest biomass generated through these regional logistic centers will be used in the production of new heat networks or the extension of existing ones, and individual households may also be supplied from them.

Total Budget of the project

Table 5:Total budget

Year	2021	2022	2023	2024	2025	2026	2027	TOTAL
Euro	0	200.000	1.200.000	1.400.000	1.600.000	700.000	300.000	**5.400.000**

The first two regional logistics centres of the four expected, have been projected in the villages of Villablino and Almanza, in the province of León.

Figure 34: map with the situation of the first biomass hubs

PROYECTOS - EMPLEO

A exposición pública el futuro centro logístico de biomasa forestal en Almanza

Lidia Fernández González | Miércoles, 8 de febrero de 2023, 15:17

A exposición pública el futuro centro logístico de biomasa forestal en Almanza.

Contará con una inversión superior al millón de euros y generará 40 empleos entre directos e indirectos.

El complejo se situará en el entorno del nuevo Polígono Industrial de la localidad leonesa.

Photo: news about the Almanza biomass logistic centre

Figure 35: Almanza biomass logistic centre

Table of figures

Figure 1: Landing page of the one-stop-shop web platform. 11
Figure 2: The search form that allows users to easily find ARCP suppliers in their area who offer the ARCP services that have been identified as suitable by the independent energy adviser. 12
Figure 3: Residential building and coal/pellet storage area 14
Figure 4: Old coal boiler 15
Figure 5: New pellet boiler 16
Figure 6: Installation of new radiators 17
Figure 7: Representative of the OMC technics d.o.o. (right) 18
Figure 8: One part of the company's warehouse 18
Figure 9: Installation of underfloor heating and heat pump. 19
Figure 10: Installation of the second heating pump with buffer 19
Figure 11: Meeting with Bratsigovo residents on 15th June 2022 20
Figure 12: Guidelines for collective wood pellet purchasing and Guidelines for collective hot water supply in a multi-family building 21
Figure 13: A sample scheme for connection of the heat pumps and the installation 22
Figure 14: 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. **Fehler! Textmarke nicht definiert.**
Figure 15: xxx **Fehler! Textmarke nicht definiert.**
Figure 16: Future installers (30) of heating and air conditioning systems from Bedekovčina High School visited the Bračak Manor **Fehler! Textmarke nicht definiert.**
Figure 17: xxx **Fehler! Textmarke nicht definiert.**
Figure 18: Participants at the photovoltaic power plant on the roof of the Zabok General Hospital **Fehler! Textmarke nicht definiert.**
Figure 19: Participant at the photovoltaic power plant on the roof of the Energy Center Bračak **Fehler! Textmarke nicht definiert.**
Figure 20: Example of boiler label **Fehler! Textmarke nicht definiert.**
Figure 21: xxx **Fehler! Textmarke nicht definiert.**
Figure 22: xxx **Fehler! Textmarke nicht definiert.**
Figure 23: xxx **Fehler! Textmarke nicht definiert.**
Figure 24: xxx **Fehler! Textmarke nicht definiert.**
Figure 25: Labelling campaign with local partner REGEA. **Fehler! Textmarke nicht definiert.**
Figure 26: Webinar “Facilitating the realization of collective actions” 26
Figure 27: The heating network Berg is one of 13 district heating networks that EWO supported in the course of the REPLACE project. 28
Figure 28: Location of the MFAB 30
Figure 29: Print-screen from on-line RABA register 31
Figure 30: Fitting PV modules for finding the maxim potential installed power 31
Figure 31: Electricity generated to SSR for 6.96 kWp PV 33
Figure 32: Electricity generation, imports and exports to total electricity consumption 33
Figure 33: REPLACE calculator’s results for apartment of 38 m² 35
Figure 34: Total PV to total HP CO_2 savings (tCO_2-eq) 35
Figure 35: NPV in relation to total investment cost. 36
Figure 36: Trend line of total investment to NPV 36
Figure 37: Total invested costs (EURO) 37
Figure 38: Workshop for dissemination of the results from the study for collective action 38
Figure 39: Collective action of joint RHC equipment implementation phases: from informing the investor to monitoring of the results 39

Figure 40: Promotional image of collective action campaign of joint RHC purchase in Slovenia 39
Figure 41: An example case of a received voucher for boiler replacement 41
Figure 42: The information workflow in Action 9 43
Figure 43: Promotion of the campaign and REPLACE calculator on national television 44
Figure 44: Overview of unique users on the Slovenian REPLACE heating system calculator 45
Figure 45: xxx ..... **Fehler! Textmarke nicht definiert.**
Figure 46: Almanza biomass logistic centre ..... **Fehler! Textmarke nicht definiert.**