



Synthesis report on policy measures

Report D5.1

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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 is 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 brings together installers, chimney sweeps, politicians, and other key players at one table, regionally.

The core activity of REPLACE is to develop, embed (by facilitating policy programs/measures) and implement ten (R)HC equipment replacement campaigns adjusted for local conditions and structures by a strong involvement of the LWG and further local key stakeholders in their design and implementation.

This report summarises the measures and policies that were created and implemented during developing, implementing and steering adequate campaigns and activities for phasing-out fossil-fuelled or old/inefficient heating systems. The campaigns and activities were tailored to the situation of nine different pilot regions in eight countries taking part at the project REPLACE.

The campaigns and activities and the embedment by adequate policy measures/programs were jointly developed with regional/local public and market actors, forming so called local working groups that steered and facilitated the measures taken to phase-out a range of energy carriers, like oil, natural gas, coal, direct electricity and inefficient log wood usage from the residential heat market.

Executive Summary

REPLACE supports households to replace their old, inefficient heating equipment by modern, clean and climate-friendly heating systems being more comfortable and resilient. In the light of energy and climate crises, facilitating energy systems based on nearby available renewable sources energy – instead of fossil energy sources imported from non-democratic states – becomes of high relevance to free societies.

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

Replace shows, however that – due to efforts jointly undertaken with public and market stakeholders to establish an enabling environment (by adequate policy measures and programs) – there are many tailor-made activities and approaches existing that can facilitate this phase-out. Some measures and activities because of changing framework conditions (especially due to the emerging pandemic situation as well as invasion of Russia in Ukraine) were discarded and re-designed. Nevertheless, many of them were successfully implemented, tested and fine-tuned, accordingly. The results and learnings of these enabling activities are summarised in this report. Some policy measures will even remain beyond project life.

For the Austrian pilot region, province of Salzburg, the Local Working Group (LWG) discussed the implementation of a one-stop-shop for the replacement of old and inefficient heating systems. In order to overcome a number of barriers at once, an all-round carefree package was developed, which offers 90% of all necessary replacement tasks from a single supplier (a general contractor or a craftsman's contract manager and site coordinator) via a central contact point (the installer) for households. The pillars of this standard package include mandatory free and independent energy advice, a package that guarantees energy savings (i.e. 10-20% less energy consumption, regardless of the climate-friendly heating system chosen), high quality planning and implementation, and mobile emergency heating units to avoid like-for-like conversions and provide several weeks to make an informed fuel switch decision. A web platform has been developed to enable households to easily and consumer-friendly request offers from qualified, all-inclusive changeover providers in their area. This offer is unique in Austria and represents an innovative, new policy programme that will be further tested through this pilot initiative.

Related to the REPLACE activities in Bosnia and Herzegovina the Sarajevo Canton Development Strategy and the Environmental Plan of Sarajevo Canton identified the need for environmental protection, particularly in improving air quality. To address the decline in air quality during winter months due to the increase in energy production for heating using solid fuels, the Ministry of Physical Planning and Environmental Protection of Sarajevo Canton developed a "Strategy for limiting the use of coal and other solid fuels in the Sarajevo Canton in the period 2021-2031". Enova and several members of the Local Working Group (LWG) actively participating in the process. The strategy involves comprehensive analysis of emissions, proposals for emission control and furnace certification, analysis of population exposure, measures to reduce emissions, improvement of legal regulations, and challenges, risks and obstacles in implementing the plan. However, financial constraints remain a challenge in the transition to sustainable energy sources.

In Bulgaria, most policies and all financing affecting heating and cooling replacement in the residential sector are developed at national level. REPLACE played a major role for the substantial increase of public funding for domestic solar thermal and solar PV systems, laid down in the National Recovery and Resilience Plan. Additionally, the project experience was considered by the Ministry of

Environment in the design of residential heating replacement measures in Operational Programme Environment 2021-2027. Finally, in Rhodope region, the Bulgarian pilot region, through the close collaboration with local authorities, REPLACE contributed to the better design and implementation of the municipal renewable energy plans.

In the pilot region North-west Croatia the REPLACE project is helping to promote sustainable energy use by initiating an intermediary campaign to bridge the gap between citizens and available funding possibilities offered by county governments for target counties in Croatia: Karlovac, Krapina-Zagorje, and Zagreb County and the City of Zagreb. REGEA, the local partner of the REPLACE project, provided technical assistance to local and regional authorities in the preparation of policy measures and the conduct of tender procedures. The policy measures were very successful, local partner REGEA within project REPLACE helped more than 100 end consumers to receive subsidies for a climate-friendly heating system replacement. The region will continue to share their successful experiences within the REPLACE project with other local, regional, and national authorities to identify innovative financing solutions for renewable heating and cooling systems in households. Overall, the policy measures implemented within the REPLACE project will serve as an excellent example of sustainable energy and heating system planning and promotion on a local level.

In the Croatian pilot region Primorsko goranska County, EIHP has taken steps to include policy measures throughout the project. Relevant documents and legal framework such as European Green Deal, REPowerEU, Renewable Energy Directive, National Energy and Climate Plan (NECP) etc., were presented during the implementation of activities. This was always an interesting topic to the participants, because they got a better understanding of why some measures need to be carried out. At the local working group meetings, EIHP discussed with the stakeholders the need for: more extensive promotion of RES in heating and cooling systems, more RES incentives at the local level, updating the NECP and measures for heating and cooling systems etc. In conclusion, further education of the citizens on their options is needed. In that way, they can best utilize the funds for improving energy efficiency of their homes, as well as replace their inefficient systems. Therefore, projects such as REPLACE are needed to further raise awareness on energy issues.

For the pilot region of the Bavarian Oberland, the framework conditions at federal level in Germany have developed in an unexpectedly conducive manner for the heat transition. When consulted, members of the local working group stated at first that in view of the federal framework conditions they saw no need for additional regional or local policy measures or funding of heating system replacements. In the course of the project, Energiewende Oberland in close cooperation with the climate protection managers was able to motivate the region's districts to participate in the REPLACE heat transition campaign (18.9. - 9.10.2021) as part of their action plans also in monetary terms. In addition, EWO was involved in the development of Penzberg's climate protection action plan including the municipality's heat transition (p 1, 2) with goals, measures, and budget. Measures are directed at end consumers as well as at municipal properties.

The North Macedonian KAGoP region is the frontrunner in introducing and implementing renewable heating solutions. This region is known for its heating system replacements, enhanced promotion of climate-friendly alternatives which are in line with the national Energy development strategy up to 2040, NECP, NDCs, thus with the European legislation. Besides complying with the policy measures introduced within the strategic documents, additionally cross-cutting was performed by the LWG and SDEWES-Skopje with several scientific papers, thesis and handbooks on several aspects on the energy communities, the potential of power-to-heat demand response to improve the flexibility of the energy system, heat demand mapping in KAGoP region (part of the Program for realization of the strategy of energy development for the period 2021- 2025), collective self-consumption for decarbonizing residential heating and cooling - case study Karposh. During the labeling activities, via municipal info hubs and webinars, handbooks, REPLACE calculator and add-on local inverter calculator

these policy support measures and existing financial support schemes were either included, distributed or communicated with the consumers and various stakeholders.

In Slovenia, following various meetings with the Local working group, it became evident that while some boiler replacement data exists, it is (1) disorganized, (2) not widely known, and (3) insufficient. In order to accelerate the rate of boiler replacements and reverse the process, two policy measures have been implemented through REPLACE campaigns:

- Supplying households with enough information with the goal of improved decision-making by establishing national REPLACE contact point.
- Incorporation of REPLACE results in a national public call for subsidies, where each household is made aware of the project results and is invited to use/exploit them.

For the pilot region of Castilla y León, the Local Working Group (LWG) discussed the implementation of the labelling for homes using 100% renewable energies for space heating, which is considered a very useful action. Supporting feasibility studies, both for final users and installers, have been also successful due to the support of the action in the field resulting in final real life implementations. But all in all, the key measure which is supporting a large renovation of old fossil fuel systems are the grants programmes providing direct fund to the substitution of inefficient fossil fuel heating systems by renewables in the residential sector. Grants programmes have been already published and provided for this purpose in the region.

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1. Scope of this report

The core activity of REPLACE is to develop, embed (by facilitating policy programs/measures) and implement ten (R)HC equipment replacement campaigns adjusted for local conditions and structures by a strong involvement of the LWG and further local key stakeholders in their design and implementation as depicted in Figure 1. Rather than focusing on policy makers and consumers only, the REPLACE concept uniquely foresees new types of collaboration of the key actors and intermediaries in terms of the replacement campaigns and marketing activities.

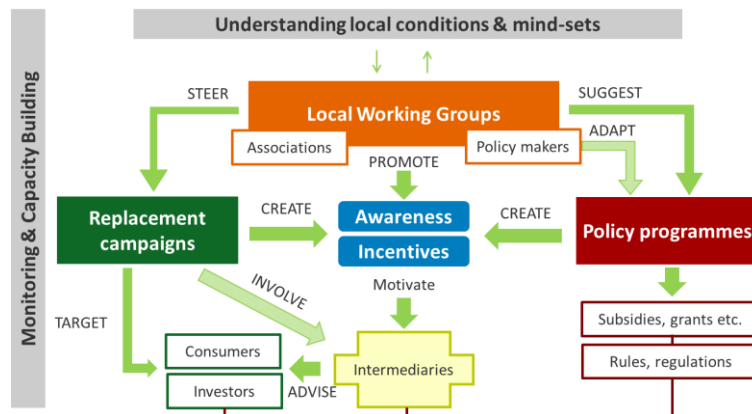


Figure 1: Overall concept of REPLACE

Scope of the project REPLACE

Building and consumer types targeted: REPLACE explicitly focuses on all types of residential buildings including those with minor commercial usage (e.g. residential buildings with hairdressers, groceries, etc. in the basement). With regard to consumers, the focus is on households or very small business with consumption patterns (and heating/cooling needs) similar to households because those groups of consumers have similar mind-sets and information levels. Industrial users typically have very different needs and usually a high awareness of their own energy consumption and savings potential (e.g. energy management systems, regular energy advice). REPLACE therefore focuses on the less (or non-)informed mass segment to maximise its impact.

HC technologies targeted: REPLACE first and foremost concentrates on already established or TRL 9¹ low-carbon RHC technologies for space conditioning and domestic water heating systems of households because all relevant technologies are by and large already available. In addition, since the project aims to facilitate actual change during and beyond project life, it will promote the mass uptake of existing technologies to maximise its impact. In particular, for heating technologies the project considers:

- heat pumps and solid biomass boilers/ovens or derived heat from combined biomass heat and power plants;
- solar thermal panels, photovoltaic systems, or combinations of both (TRL 7² PVT collectors);

¹ Actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

² TRL 7: Prototype in use (1-5 years); TRL 6: Prototype in operational environment.

- heat storage systems (e.g. small-scale, large-scale, buffer tanks, seasonal storages);
- district heating (DH, based on flexible natural gas and steam CHP plants with heat storage);
- innovative mobile heating units, i.e. plug-and-play ready heating containers temporarily replacing the broken-down, inefficient heating system heated by the fuel stored in the respective residential building or by pellets or other fuels.

HC environment targeted: Replace focuses its campaigns towards enabling consumers to make informed decisions for both of the following cases

- at the occasion of a breakdown of an inefficient boiler
- and, if framework conditions facilitate a replacement,
 - to do the boiler replacement towards more climate and eco-friendly systems

and to do those replacements earlier

than it would have been without the REPLACE campaigns. REPLACE provides tools and information and campaigning inputs for targeting a complete replacement of inefficient heating boilers. REPLACE alone however does not have the power to influence the time of those replacements. In other words, even if framework conditions are recognized as being favourable by many stakeholders, this does not mean that consumers can be mobilized to replace inefficient heating systems as desired.

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

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.

³ North-West Croatia, City of Zagreb incl. three bordering counties

⁴ Primorsko-goranska county

3. Policy measures per country/pilot region

This chapter gives an overview of the types of policy measures and policy programs (if any) that have been implemented in the course of the boiler and/or oven replacement campaigns in the pilot regions.

3.1. Austria: Province of Salzburg

After over a year of stakeholder consultation and implementation work, starting in April 2021 a web-based one-stop-shop for residential boiler oil/gas/direct electric heating system replacements towards renewable-based and district heating systems was developed for the first time in Austria, by July 2022. This product, because of its development in a multi-stakeholder process and its features fulfills the definition of a whole policy program (including a couple of policy measures in itself).

The starting point of that activity was that young families, when taking over a house often do not have the time to manage a replacement of its old heating system. They cannot manage the consultations with the manifold crafts needed at such an occasion. Also elderly people, living in houses built back in the 70ties and 80ties, occupying an old, outworn oil, gas or log-wood boiler in the cellar, often are not prepared for a change-over. Sometime they say “the next generation shall solve that problem”. To offer whatever people everything they need for a changeover via one central supplier or one contact person coordinating all issues, respectively a one-stop-shop for boiler replacements has been developed.

The idea was born in the course of REPLACE, back 2020, during consultations with the local Replace working group, consisting of experts in the field of residential heating. Implementation was lead by the Austrian Energy Agency, supported by (financing and experts of) the Federal Ministry for Climate Protection and the Department for Energy Economics and Energy Consulting of the Office of the Salzburg Provincial Government. At the beginning of the process, the three lead partners developed an all-around carefree package (ARCP) for boiler replacement. The ARCP was aligned with and agreed on by local installers, (over-regional) boiler manufacturers, equipment wholesalers and ESCOs.

The core idea of the ARCP is that the ARCP supplier coordinates and supervises all crafts via one contact person, on-site and provides all contracts needed either or acts as a general contractor for the household. An ARCP includes all services needed in 90% of cases and defines obligatory quality assurance and energy efficiency criteria. The following activities, deemed useful by the local working group, became an obligatory part of the ARCP; every supplier signing the terms of participation has to fulfil them.

- public energy advice to implement solutions that fit best for the site; in Salzburg public energy advisors can be consulted free of charge, before the heating system is replaced
- minimum energy efficiency/saving measures (like “boiler room check measures” that save at least 15% of energy, without any loss of comfort):
 - improvement of heating and hot water equipment in the cellar to state-of-the art
 - optimization of the domestic hot water preparation and integration
 - insulation of piping, fittings and valves in the cellar or unheated rooms
 - hydraulic balancing of the whole heating system, performed by the installer

- 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 offer of a mobile heating device in case of an emergency breakdown within 24 hours after contact.

In addition to the listed obligatory ARCP services, voluntary ARCP services – up to thermal renovation of building(s) (components), cellar or attic clearing, PV, solar thermal, etc. can be offered by ARCP suppliers. 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.

The web platform “sorglos-kesseltausch.at” went online in July 2022, enabling matchmaking of households and ARCP suppliers. People, via a simple search form can easily find ARCP suppliers nearby, delivering the services identified as appropriate by energy consultation or needed in addition.

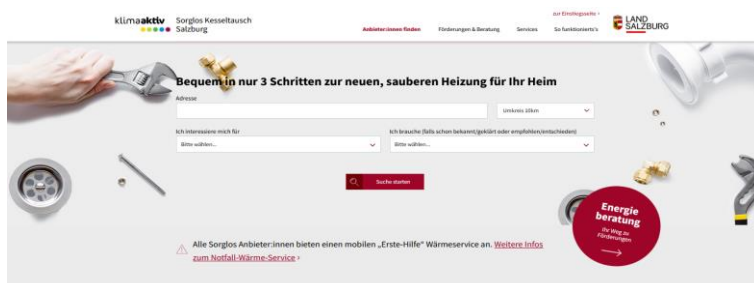


Figure 2: Screenshot of the matchmaking web platform for households to identify nearby package suppliers

While the ARCP activity and the online one-stop-shop boiler replacement platform has been prepared successfully, the implementation so far has not been a success, as to unexpected, extraordinary market conditions. Due to the energy crisis, sharply risen energy prices and fear of households of gas supply disruptions many households want to get independent from oil and gas as a heating fuel. This has led to a situation where potential ARCP suppliers have full order books until end of 2023 now.

Therefore, potential ARCP suppliers in mid-2022 have been reluctant to sign the terms of participation and offer ARCP services. As described, the order books of boiler manufacturers and installers have been filled a year in advance. Boiler manufacturers reported that their 2023 production is sold out based on those order books. Therefore, new clients (e.g. coming in from the ARCP web platform) could not be served in addition. The ARCP web platform therefore has been set offline until end of 2023.

It is hoped that market conditions will ease in 2024, enabling collecting experiences with this unique pilot action, from that time onwards. The founders of the ARCP web platform are prepared to relaunch the platform by that time once more.

3.2. Bosnia and Herzegovina: Canton of Sarajevo

The Sarajevo Canton Development Strategy until 2020 and the Environmental Plan of Sarajevo Canton (KEAP) identified priority projects for environmental protection, with a particular emphasis on improving air quality. Achieving significant improvements in air quality requires a strategic and systematic approach to energy production for heating, including reducing the use of coal and other solid fuels, while taking into account the social profile of the population.

In response to the increase in energy production for heating and the large number of individual solid fuel fireboxes, which have led to a decline in air quality during winter months, the Ministry of Physical Planning and Environmental Protection of Sarajevo Canton began drafting a "Strategy for limiting the use of coal and other solid fuels in the Sarajevo Canton in the period 2021-2031" in 2020, with Enova and several members of the local working group actively participating in the process.

The strategy includes a comprehensive analysis of emissions and their impact on air quality from individual solid fuel fireboxes, proposals for improving emission control, chimney sector improvement, control and certification of furnaces and fuels used in Sarajevo Canton, analysis of population exposure to polluted air, measures to reduce emissions, improvement of legal regulations to improve air quality, and challenges, risks and obstacles in implementing the Strategy, and options for developing a strategic plan to limit the use of solid fuels in the Sarajevo Canton. The analysis of the impact of the measures proposed for three different scenarios showed that reducing emissions of solid particles by up to 90% in priority zones is necessary to achieve satisfactory air quality in Sarajevo Canton.

The analysis of fireboxes in 31,343 individual objects using solid fuels showed that stoves (cookers) are the most common systems, accounting for 67.5 percent of all fireboxes. However, the biggest obstacle to providing direct financial assistance to households that use solid fuels is the fact that many of these are located in illegally built facilities.

To achieve the set goals, the plan to limit the use of solid fuels for heating will be implemented over several years, taking into account the social profile, energy market, firebox, energy prices, and technical possibilities of alternative energy sources. The Strategy identifies an analysis of three scenarios with different emission reductions in priority zones and lists measures for implementing these scenarios. However, the adoption of the strategy is still pending, as of May 2022.



Figure 3: Presenting Strategy at the Energy Summit

Participants at the Replace Energy Summit agreed that permanent subsidies are necessary to support the replacement of heating systems and/or the procurement of sustainable energy sources in order to achieve the goals set by the Strategy. Financial constraints are the biggest obstacle to the timely transition to sustainable energy sources in Bosnia and Herzegovina, particularly given the low economic standard of the country.

3.3. Bulgaria: Rhodope Mountain Region

In Bulgaria, most policies and all financing affecting heating and cooling replacement in the residential sector are at national level, while the policies at regional and local level are of limited importance. For that reason, BSERC's efforts were predominantly focused on the promotion of sustainable heating within the national policies and funding programmes and sources.

Version 1.1 of the National Recovery and Resilience Plan (NRRP) allocated only 32 million BGN (1 EUR = 1.96 BGN) public funding for residential small scale solar thermal and solar PV systems. On the other hand, REPLACE evidenced the urgent need of high subsidies for households for heating replacement. To address this need, BSERC participated in meetings with the responsible ministries and submitted in

co-authorship with the Association of Rhodope Municipalities a position during the public consultation of NRRP: <http://bserc.eu/?ne=73>. Although not all recommendations were considered (e.g. the inclusion of additional heating technologies in the eligible investments), an important success was the increase of the allocated funding in Version 1.2 of NRRP to 200 million BGN, corresponding to grants for 60,580 households.

Operational programme Environment 2014-2020, funded by the EU Structural and Investment Funds, provided 100% grant for residential heating replacement in municipalities that have problems with the quality of the ambient air. The projects funded by the programme allowed each household to choose the desired heating technology with low PM emissions. When the programme expired and the new Programme Environment 2021-2027 was under preparation, the Ministry of Environment and Water invited the BSERC team at an informal meeting to exchange experience. On one hand, the findings of REPLACE were shared in view of contributing to the design of the new Programme, while on the other hand, the experience of OP Environment 2014-2020 helped to better target the remaining REPLACE activities.

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

In Bulgaria, according to the Energy from Renewable Sources Act, each municipality is obliged to have both a short term and a long-term programme to promote the use of renewable energy on their territory. Additionally, six Rhodope municipalities have Sustainable Energy (and Climate) Action Plans (SE(C)APs). The development and implementation of these local policy documents is supported in the following ways:

- Within REPLACE, BSERC is actively communicating with 10 municipal authorities in the region, via Local Working Group meetings (there all 10 authorities are present), bilateral meetings, e-mail communication, etc. Typically, the main focus of the communication is how the local authorities can be a driver towards more sustainable residential heating.
- The Association of Rhodope Municipalities (ARM, subcontractor in REPLACE) has established a permanent committee on energy efficiency and renewable energy that assists to all member municipalities in the design and implementation of their policies in the field. During the last years, the committee has a particular focus on renewable heating, as it undertook the monitoring of the implementation of the RES Heating plan of Rhodope region, developed within IEE-funded project RES H/C SPREAD, where both BSERC and ARM were partners. Additionally, during 2022 General Assembly meeting of the Association, a special attention was paid to REPLACE findings and the mayors were encouraged to incorporate them in the local policies and practices.

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

Local partner REGEA was in intensive preparation of policy measures through the Activity 1 – Initiating intermediary campaign to bridge the gap between citizens and available funding possibilities offered by county governments for our target counties in Croatia: Karlovac, Krapina-Zagorje and Zagreb County and the City of Zagreb, which is considered a county according to the City of Zagreb Act (NN 62/01, 125/08, 36/09, 119/14, 98/19). From the beginning of the project REPLACE, representatives of local and regional authorities were closely involved in the project activities, e.g., by contributing to the local working meetings, participating in training and workshops. During these meetings and events, also strengths and weaknesses as well as potentials and challenges for the improvement of existing and the elaboration of new national and local strategies and policies to support the use of renewable sources in households in their local communities were discussed.

Single-family houses comprise 65% of housing stock in Croatia and with most of them built before 1987, thermal insulation and heating systems are not up to current energy standards. To address this issue, as well as to increase the energy efficiency of existing single-family homes, reduce energy consumption and consequently energy bills, Croatian government-initiated Energy renovation programme of family houses for the period between 2014 and 2020 at the proposal of the Ministry of Construction and Physical Planning (hereinafter: MCPP). The programme was aligned with the 3rd National Energy Efficiency Action Plan, which covered the period between 2014 and 2016. Body responsible for the implementation of the Programme is Environmental Protection and Energy Efficiency Fund (hereinafter: EPEEF) and the first public call was open in 2014 for proposals from local and regional government authorities for co-financing of the energy efficiency measures for single-family homes and for the use of RES in single-family homes in their area. To ensure the widest possible scope of the Programme, it was amended in 2015, enabling direct application of citizens for co-financing of energy renovation and the replacement of the inefficient heating systems, thus abolishing the “intermediary” in the form of a local or regional government authority. For the first time since 2015, during 2020 and 2021, a public call was announced for the allocation of funds from the Fund for Environmental Protection and Energy Efficiency for the co-financing of measures for the energy renovation of family houses in the Republic of Croatia was again announced, which excludes financing of the replacement of the inefficient boilers. In September 2022 EPEEF published another call which only co-finances projects for the use of renewable energy sources for own consumption, i.e., measures for the installation of systems for the use of renewable energy sources in existing family houses in the Republic of Croatia. The condition for applying for the calls is that the house has an energy performance certificate and an energy audit report. With the help of REPLACE resources, REGEA wanted to help the Krapina-Zagorje County to encourage The Krapina-Zagorje County has issued a public call, with the help of REGEA experts and in line with the REPLACE project's objectives, to co-finance the preparation of energy audit reports and energy performance certificates for single-family homes. REGEA's assistance was crucial in making this decision, and the REPLACE project have provided additional support for the initiative. The call aims to promote renewable energy use and improve energy efficiency in buildings. REGEA prepared all the tender documentation and helped the County in conducting the tender.

The County has issued a call for proposals with the intention of providing the opportunity for as many of its citizens as possible to prepare high-quality technical documentation for application to the Fund's announced calls. For this purpose, the County provided HRK 100,000.00 (13,280.00 EUR) from its

budget. Vouchers will be allocated to beneficiaries for the justified costs of preparing an energy audit report and an energy performance certificate for family homes: up to 100%, but no more than HRK 2,500.00 (332 EUR with VAT). At the end of 2021, 28 users received subsidies and signed contracts with the county. The total approved amount for 28 users is EUR 7,770.98. The call is available on the link: <https://www.kzz.hr/javni-poziv-sufinanciranje-energetskih-certifikata-za-obiteljske-kuce>

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

Zagreb County in Croatia published public calls in 2019 and 2020 to co-finance photovoltaic systems and biomass boilers for single-family homes. However, the County faced difficulties in conducting the tender procedure and receiving complaints from citizens. To avoid such difficulties and reach more citizens, REGEA within project REPLACE in 2021 provided technical assistance to Zagreb County in the preparation of documentation for the public tender for application of persons to co-financing photovoltaic systems and biomass boilers for family homes. REGEA regularly responded to inquiries of potential applicants via info phone. The received applications were processed and technical assistance was provided in the preparation of the contract. REGEA employees reviewed reports on the intended use of the support with all accompanying documentation, and requests were prepared for the transfer of funds from Zagreb County through vouchers for all users of the funds. The maximum amount of funds that an individual user can obtain for the installation of photovoltaic systems within the 2021-year call is 50% of the eligible costs, i.e. a maximum of 20,000 HRK (~2,600 EUR). Zagreb County has secured a total of 600,000 HRK (~79,635,00 EUR) for the installation of photovoltaic systems in the Zagreb County Budget for 2021, and the secured funds will be distributed among applicants with the highest number of points. The maximum amount of funds that an individual user can obtain for the installation of biomass boilers (pellets/wood) is 50% of the eligible costs, i.e. a maximum of 15,000 HRK (~2,000 EUR), and the secured funds will be distributed among applicants with the highest number of points. Financial resources were allocated to 32 beneficiaries, 6 users installed biomass boilers and 25 users installed photovoltaic.

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

Velika Gorica is the largest city in Zagreb County and one of the most advanced cities in Croatia in the context of implementing the energy transition. The energy policy of Velika Gorica has for many years been directed towards the sustainable energy development of the city area based on the principles of environmental protection, energy efficiency, use of renewable energy sources and sustainable construction, and by joining the Mayor's Agreement, creating and implementing the Sustainable Energy Development Action Plan (SEAP). Velika Gorica's energy policy was also confirmed at the European level. In 2020, the city created SECAP, a key document that, based on the collected data on the current situation, identifies and provides precise and clear guidelines for the implementation of energy efficiency projects and measures, and the use of renewable energy sources, as well as adaptation to the effects of climate change at the city level, which will result in a reduction of CO₂ emission by more than 40% by 2030.

To continuously implement a proactive energy policy and actively participate in preventing global warming and the negative consequences of climate change, the City of Velika Gorica decided to participate as a pilot city in the REPLACE project. All activities carried out by the city contribute to the implementation of measures from SECAP, but they are also aimed at the desired goal and vision of the city as a clean air city. Determining the actual situation, the city contacted the chimney sweeps, after analyzing the data, it was determined that the situation was inadequate. Namely, out of 17,923 households, about 65% use wood as an energy source, 2% still use heating oil, 27% gas, 1% liquefied natural gas, while the rest use pellets and briquettes. After the conducted survey, it is evident how important it is to positively influence the citizens and show them the need to use renewable energy sources for heating. In this regard, the city of Velika Gorica sees a connection with the REPLACE project, since by participating in it the city wants to show its commitment to sustainable development based on the principles of energy efficiency, sustainable construction and the use of renewable energy sources.

The goal of the REPLACE project was to motivate and support users in Velika Gorica to replace their old heating and cooling systems with more environmentally friendly alternatives. Since the campaigns were very successful for Krapina-Zagorje County and Zagreb County, REGEA wanted to transfer such supporting policy instruments/measures to the city of Velika Gorica. For the first time, the city of Velika Gorica secured funds in its budget for the co-financing of the system for renewable energy sources for households. The city of Velika Gorica and the Development Agency VEGORA on 26.04.2021 (day of renewable energy sources) held an online press conference together with REGEA where it was announced that the City is publishing 3 public calls for citizens to install systems based on renewable energy sources (Public call for co-financing the use of renewable energy sources for the production of electricity in households for their own consumption, Public call for co-financing the replacement of inefficient fireplaces for family houses with heat pumps in the area of the City of Velika Gorica and Public call for co-financing the energy renovation of family houses in the area of the City of Velika Gorica). The deadline for submitting applications lasts until the funds are used up, i.e., until the end of 2021. Velika Gorica received 15 project applications, out of which 4 were approved, 1 user installed a heat pump, 3 users installed photovoltaic systems. Since this was the first tender for encouraging renewable energy sources and energy efficiency measures, the budget for co-financing was limited to HRK 200,000 (EUR 26,550.00) for all calls. Following the success of the first call, city of Velika Gorica will publish a similar public call in 2023.

The REPLACE project aims to promote energy efficiency and reduce greenhouse gas emissions through the implementation of energy renovation measures in public buildings. However, to achieve these goals, it is important to educate citizens about the importance of energy efficiency and the impact of climate change on the environment and society. It is also important to educate citizens about specific steps they can take to contribute to the reduction of greenhouse gas emissions, such as reducing energy consumption in households and using renewable energy sources. With all this in mind, REGEA has integrated the measure - *Education and promotion of energy efficiency and information on the effects of climate change for citizens within the framework of the REPLACE project* - in two SECAPs for the cities of Velika Gorica (Zagreb County) and Karlovac (Karlovac County). The activities carried out as part of this measure include the following:

- the establishment of info hubs where citizens can get all the necessary information about the possibilities of increasing energy efficiency in the household, replacing inefficient heating and cooling systems with more efficient systems, and other measures to increase energy efficiency and reduce energy poverty;

- informing citizens about the possibilities of using high-efficiency technologies for heating and cooling through workshops and lectures to households within the REPLACE project financed from the Horizon 2020 program;
- carrying out information campaigns on increasing energy efficiency and the possibilities of replacing inefficient heating systems in households within the framework of the REPLACE project financed from the Horizon 2020 program;
- encouraging citizens to use tools and methods for improving energy efficiency in households available within the REPLACE project funded by the Horizon 2020 program;
- implementation of collective actions aimed at motivating citizens to increase energy efficiency in homes within the framework of the REPLACE project financed from the Horizon 2020 program.

These policy measures were very successful, local partner REGEA within project REPLACE helped more than 100 end consumers to receive subsidies for a climate-friendly heating system replacement. Target regions in North-west Croatia made a strategic commitment to boost investments in energy efficiency and renewable energy measures. Additionally, they encourage and incentivize persons to implement projects to increase energy efficiency and use renewable energy sources, which also contributes to environmental protection and the reduction of fossil fuel consumption. In addition to the strategic documents and laws at the national level, the counties in the targeted area have prepared their development strategies and Sustainable Energy Action, which also address energy efficiency and RES application in their respective area.



Redni broj mjere	1
Ime mjere/aktivnost	Obrazovanje i promocija energetske učinkovitosti i informiranje o učincima klimatskih promjena za građane
Nositelj aktivnosti :	<ul style="list-style-type: none"> Grad Karlovac
Partneri u provođenju aktivnosti:	<ul style="list-style-type: none"> REGEA
Ostali uključeni dionici:	<ul style="list-style-type: none"> Udruge civilnog društva FZOEU
Početak/kraj provedbe (godine)	Kontinuirano
Procjena uštede (MWh)	941,67
Procjena smanjenja emisije (t CO ₂ eq)	259,4
Mogući izvor sredstava za provedbu	<ul style="list-style-type: none"> Proračun Grada Karlovca Proračun Karlovačke županije ESIF Programi EU
Kratki opis/komentar	<p>Ovom mjerom nastoji se povećati svijest građana o energetske učinkovitosti i prilagodbama učincima klimatskih promjena. Info kampanjom podići će se svijest ciljanih skupina o koristima i mogućnostima provedbe mjera energetske učinkovitosti putem energetske usluga, informirati i obrazovati šira javnost o prednostima ulaganja u energetske učinkovitost, načinima (su)financiranja, konkretnim postupcima i dostupnim savjetničkim uslugama.</p> <p>Konkretni aktivnosti podrazumijevaju:</p> <ul style="list-style-type: none"> uspostavu info mjesta u prostorima Grada na kojima građani mogu dobiti sve potrebne informacije o mogućnostima povećanja energetske učinkovitosti u kućanstvu, zamjene neučinkovitih sustava grijanja i hlađenja učinkovitim sustavima te ostalim mjerama povećanja energetske učinkovitosti i smanjenja energetske siromaštva; informiranje građana o mogućnostima korištenja visokoučinkovitih tehnologija za grijanje i hlađenje kroz radionice i predavanja kućanstvima u okviru projekta REPLACE financiranog iz programa Horizon 2020; provođenje informativnih kampanja o povećanju energetske učinkovitosti i mogućnostima zamjene neučinkovitih sustava za grijanje u kućanstvima u okviru projekta REPLACE financiranog iz programa Horizon 2020; poticanje građana na korištenje alata i metoda za poboljšanje energetske učinkovitosti u kućanstvima dostupnih u okviru projekta REPLACE financiranog iz programa Horizon 2020; provođenje kolektivnih akcija usmjerenih na motiviranje građana na povećanje energetske učinkovitosti u domovima u okviru projekta REPLACE financiranog iz programa Horizon 2020.

Figure 4: Sustainable Energy and Climate Action Plan of the City of Karlovac – measure *Education and promotion of energy efficiency and information on the effects of climate change for citizens within the framework of the REPLACE project*

By continuous implementation of the measure - *Education and promotion of energy efficiency and information on the effects of climate change for citizens within the framework of the REPLACE project* the city of Karlovac until 2030, it is estimated that 941.67 MWh and 259.4 t CO₂ emissions can be saved.



Redni broj mjere	1
Ime mjere/aktivnost	Obrazovanje i promocija energetske učinkovitosti i informiranje o učincima klimatskih promjena za građane
Nositelj aktivnosti :	<ul style="list-style-type: none"> Grad Velika Gorica
Partneri u provođenju aktivnosti:	<ul style="list-style-type: none"> REGA
Ostali uključeni dionici:	<ul style="list-style-type: none"> Udruga civilnog društva FZOEU
Početak/kraj provedbe (godine)	Kontinuirano
Procjena uštede (MWh)	4.756,00
Procjena smanjenja emisije (t CO _{2eq})	1.307,39
Mogući izvor sredstava za provedbu	<ul style="list-style-type: none"> Proračun Grada Velike Gorice Proračun Zagrebačke županije ESIF Programi Unije
Kratki opis/komentar	<p>Ovom mjerom nastoji se povećati svijest građana o energetske učinkovitosti i prilagodbama učincima klimatskih promjena. Info kampanjom podići će se svijest ciljanih skupina o koristima i mogućnostima provedbe mjera energetske učinkovitosti putem energetske usluga, informirati i obrazovati šira javnost o prednostima ulaganja u energetske učinkovitost, načinima (su)financiranja, konkretnim postupcima i dostupnim savjetničkim uslugama.</p> <p>Konkretni aktivnosti podrazumijevaju:</p> <ul style="list-style-type: none"> uspostavu info mjesta u prostorima Grada na kojima građani mogu dobiti sve potrebne informacije o mogućnostima povećanja energetske učinkovitosti u kućanstvu, zamjene neučinkovitih sustava grijanja i hlađenja učinkovitim sustavima te ostalim mjerama povećanja energetske učinkovitosti i smanjenja energetske siromaštva, konferencija o energetske učinkovitosti informiranje građana o mogućnostima korištenja visokoučinkovitih tehnologija za grijanje i hlađenje kroz radionice i predavanja kućanstvima u okviru projekta REPLACE financiranog iz programa Horizon 2020, provođenje informativnih kampanja o povećanju energetske učinkovitosti i mogućnostima zamjene neučinkovitih sustava za grijanje u kućanstvima u okviru projekta REPLACE financiranog iz programa Horizon 2020, poticanje građana na korištenje alata i metoda za poboljšanje energetske učinkovitosti u kućanstvima dostupnih u okviru projekta REPLACE financiranog iz programa Horizon 2020, provođenje kolektivnih akcija usmjerenih na motiviranje građana na povećanje energetske učinkovitosti u domovima u okviru projekta REPLACE financiranog iz programa Horizon 2020.

Figure 5: Sustainable Energy and Climate Action Plan of the City of Velika Gorica – measure *Education and promotion of energy efficiency and information on the effects of climate change for citizens within the framework of the REPLACE project*

By continuous implementation of the measure - *Education and promotion of energy efficiency and information on the effects of climate change for citizens within the framework of the REPLACE project* in the city of Velika Gorica until 2030, it is estimated that 4.756,00 MWh and 1.307,39 t CO₂ emissions can be saved.

The proposed measures include a higher standard of energy efficiency as well as a mandate to ban the use of fossil fuels for space heating, allowing only the use of renewable energy. The action is of a significant relevance for the project, but also has a much higher impact as the final goal is to, wherever possible, ban the usage of fossil fuel for heating purposes and favor renewables, which will be the unique case for other regions that will open the door for further implementation and scale up enabling decarbonization.

Activities of the policy measures in the North-west Croatia region within the REPLACE project can be seen as a good example for an appropriate planning and promotion of sustainable energy and heating systems on a local level. However, the lack of data and often the limited financial and technical capacities, prevent local governments from designing robust energy efficiency and climate plans and integrating energy efficiency and renewable energy solutions into spatial and development planning. Based on the development strategies and action plans, it is evident that the counties in the target area are continuously thinking and working on activities to increase energy efficiency in all segments of society and to encourage local communities to use RES for their own energy production and this policy measures will even remain beyond project life. Croatian target counties in cooperation with REGEA will continue to meet with local, regional, and national authorities, to provide them information on successful experiences within project REPLACE and jointly identify innovative solutions for financing renewable heating and cooling systems in households.

3.5. Croatia: Primorsko goranska County

Since data shows that the last decade has been the warmest one in history, it is clear that climate change is not a distant future event, but that it is already happening. Therefore, concrete measures must be taken today to ensure a sustainable future for the whole planet.

Croatia has taken steps to develop the necessary measures to achieve energy savings. For example, Croatia joined the policies of the European Green Plan, strategies for reconstruction and the “Fit for 55” legislative package to achieve new climate and energy goals by 2030. In Croatia, as a framework for sustainability, decarbonization and green transition, there are three important strategic documents:

- National Development Strategy of the Republic of Croatia until 2030,
- Low-carbon development strategy of the Republic of Croatia until 2030 with a view to 2050,
- Climate change adaptation strategy in the Republic of Croatia for the period up to 2040 with a view to 2070.

Croatia has also made a National Energy and Climate Plan for the period from 2021 to 2030 (in further text: NECP), as it is obligatory for all European Member States. The key goals presented in the NECP are the reduction of greenhouse gas emissions for the Republic of Croatia for the year 2030 and increasing the share of renewable energy sources.

The goals of reducing greenhouse gas emissions until 2030 are:

- in the emission trading system sector: at least by 61% compared to the level in 2005,
- for sectors outside the emission trading system sector: at least by 40% compared to the 2005 level.

NECP provides a number of measures to reduce the need for thermal energy, with special emphasis on the adaption and implementation of the energy renovation of buildings. Over 90% of the buildings in Croatia are family houses, multi-apartment buildings and public sector buildings. Therefore, energy renovation for such buildings is important, and that is why various programs are in development. All of them must be in accordance with NECP, The Long-Term Strategy for the restoration of the national building stock until 2050 and the Construction Act. The goal of these programs is the decarbonization of the building sector. That can be achieved by reducing the thermal needs of buildings, improving energy efficiency and using renewable energy sources. Through these programs, it will be possible to replace individual heating and cooling systems that use fossil fuels with systems that use renewable energy sources at the building level, but also to connect buildings to existing and new centralized heating systems.

In the response to the difficulties and disruptions in the global energy market caused by new geopolitical circumstances, the European Commission presented the REPowerEU plan in May 2022. It is a set of proposed measures for saving energy, producing clean energy and diversifying the energy supply, financial and legislative steps for the construction of new energy infrastructure and systems that Europe needs. As part of the REPowerEU plan, a further increase of the share of renewable energy sources is foreseen to be 45% until 2030. The REPowerEU plan was also discussed at this event. The current proposal for the revision of the Renewable Energy Directive (REDIII), which is still in the procedure, is a key milestone in the implementation of the "Fit for 55" goals. REPowerEU is an agreement on new ambitious goals for renewable energy sources and supporting measures to ensure their application. It will enable the achievement of the mentioned goal of 45% renewable energy sources up to 2030, and a reduction of CO2 emission units by 55% until 2030.

In the last ten years, Croatia has also taken other measures to achieve the goals of energy savings. Those include: Program for energy renovation of family houses 2014-2020; Program for energy renovation of multi-apartment buildings 2014-2020; Tackling energy poverty; Program for energy renovation of public buildings sector in 2014-2015; Program for energy renovation of public buildings sector 2016-2020; Systematic energy management in public sector; The program "Energy efficient public lighting"; Program of energy renovation of commercial non-residential buildings etc.⁵ All of these show Croatia's efforts in decreasing energy consumption for households and building.

Still, what remains is further education of the citizens on their options so they can best utilize the funds for improving energy efficiency of their homes, as well as replacing their inefficient systems. Therefore, more projects such as REPLACE are needed to raise awareness on energy issues.

3.6. Germany: Bavarian Oberland

During the project period, the framework conditions at federal level in Germany have developed in an unexpectedly conducive manner for the heating transition. In September 2019, the Climate Protection Plan 2030 was adopted, updating the roadmap for the energy transition so that 55% of greenhouse gases will be saved by 2030 compared to the base year 1990. The climate protection plan includes, among others, funding of heating optimisation by high-efficiency circulation pumps and hydraulic balancing, the incentive programme energy efficiency, the energy efficient renovation - investment grant, measures to promote the use of renewables in the heating market - market incentive programme, as well as Renewable Energies "Premium" Deep Geothermics. In addition, a CO2 tax was

⁵ Energy Efficiency Program for Decarbonization of the Energy Sector, Ministry of Economy and Sustainable Development of Croatia, December 2021

introduced, which is partly reinvested to reduce the electricity bill and as support for heating costs for energy-poor households. In addition, old boilers must be replaced as a regulatory measure.

When consulted, the climate protection managers of the region as members of the REPLACE local working group stated at first, that in view of the federal framework conditions they saw no need for additional regional or local policy measures or funding of heating system replacements. A need for further policy measures in the region was also not seen, as the market for heating system replacement was already overheated with 500 open energy consultation requests and an installer shortage due to the federal funding programmes.

During the project, Energiewende Oberland in close cooperation with the climate protection managers was able to motivate the region's districts to participate in the REPLACE heat transition campaign (18.9. - 9.10.2021) as part of their action plans also in monetary terms. In spring and summer 2021, the decisions for participations were made in the districts of Bad Tölz-Wolfratshausen (17.3.21, TOP 5) as well as Miesbach (9.2.21, minutes p.12) within the framework of their expert advisory board meetings, in the district of Weilheim-Schongau (18.6.21, TOP 3.1, p.16) within the framework of the environmental committee and in the Zugspitz region within the framework of the energy advisory board. This included financial participation in the advertising for a dedicated REPLACE heat transition website through billboard advertising in the region, advertising in newspapers as well as a thematic week on the radio.



Figure 6: Billboard poster from the Oberland-wide REPLACE heat transition campaign, in cooperation with all four districts

In addition, EWO was involved in the development of Penzberg's climate protection action plan https://penzberg.de/fileadmin/user_upload/Klimaschutz-Aktionsplan_der_Stadt_Penzberg.pdf.

Titel der Maßnahme			
Wärmewende (Bürgerinnen und Bürger)			
Kürzel	W 1	Zeithorizont der Maßnahme	mittelfristig
Beschreibung Die Bundesregierung verfolgt das Ziel, bis 2045 treibhausgasneutral zu werden. Raumwärme, Prozesswärme und Warmwasser machen ungefähr die Hälfte des Energieverbrauchs in Deutschland aus. Um die Klimaziele zu erreichen, ist es nötig, die Wärmeversorgung umzugestalten. Die Wärmewende umfasst Aktivitäten, die darauf abzielen, Wärmeenergie einzusparen und den Wärmeverbrauch zu dekarbonisieren, vor allem durch die Nutzung Erneuerbarer Energien. Kommunen initiieren, investieren, gestalten und steuern diese Maßnahmen, um politische Energie- und Klimaziele zu erreichen. Dabei setzt die Stadt Penzberg auf Kampagnen zur energetischen Gebäudesanierung und den Umstieg auf erneuerbare Energieträger.			
Ziele & Maßnahmen <ul style="list-style-type: none"> - Beteiligung an regionalen Wärmewende-Kampagnen (z.B. REPLACE*) - Durchführen von Thementagen „Energetisches Sanieren in Penzberg“ - Sanierungskampagne (z.B. Energiekarawane** im Landkreis in Zusammenarbeit mit Energiewende Oberland und Verbraucherzentrale Bayern umsetzen) - Ausbau & Bewerbung der städtischen Fernwärme für private Anschlüsse 			
Verantwortlichkeit innerhalb des Fachbeirates & der Verwaltung Klimaschutzmanagement; Technischer Umweltschutz			
Einzubinden Energiewende Oberland, Stadtwerke, Verbraucherzentrale, lokale Handwerksbetriebe, lokale Energieberater (Energieeffizienz-Experten)			
geschätzte Kosten	25.000 Euro / Jahr		

* Das EU-geförderte Projekt REPLACE zielt darauf ab, Nutzer zu einem Austausch ihrer veralteten Heiz- und Kälteanlagen zu motivieren. Hierfür sollen die Koordination in lokalen Netzwerken ausgebaut und Austausch-Kampagnen in 10 Zielregionen umgesetzt werden – eine davon im Bayerischen Oberland.

**Energiekarawane: Die Energiekarawane ist eine kommunale Energieberatungskampagne zur Steigerung der Sanierungsrate des privaten Gebäudebestands

Titel der Maßnahme			
Wärmewende (Kommunale Liegenschaften)			
Kürzel	W 2	Zeithorizont der Maßnahme	fortlaufend
Beschreibung Mehr als die Hälfte des Energieverbrauchs in Penzberg entfällt auf den Sektor Wärme. Die Einsparung in diesem Bereich ist ein zentraler Hebel, um die Klimaschutzziele der Stadt zu erreichen. Die Stadt Penzberg wird mit gutem Beispiel vorangehen und die Wärmeverbräuche und -versorgung der kommunalen Liegenschaften bezüglich der Energieverbräuche und -erzeugung bzw. CO ₂ -Emissionen optimieren. Ein strategisches Vorgehen im Sinne des „energetischen Dreisprungs“ inkl. einer detaillierten Vorprüfung ist hier aus wirtschaftlicher und Klimaschutztechnischer Sicht essenziell. Ein Wärmekonzept für die kommunalen Liegenschaften in Penzberg sollte deshalb folgende Punkte aufeinander aufbauend abhandeln: <ol style="list-style-type: none"> 1. Bestandsaufnahme: derzeitiger Wärmeverbrauch, Heizungstechnik 2. Einsparmöglichkeiten energetische Sanierung der Gebäudehülle und Technik 3. Wärmeversorgungskonzept: Gegenüberstellung verschiedener Optionen (dezentrale Versorgung, Fernwärmenetz, etc.) 			
Ziele & Maßnahmen <ul style="list-style-type: none"> - Sukzessive Erweiterung des städtischen Energiemanagements - Einhaltung des energetischen Kriterienkatalogs der Stadt Penzberg - Bestmöglicher Energiestandard bei städtischen Neubauten und Sanierungen - Städtische Gebäude nach Möglichkeit an das Fernwärmenetz anschließen 			
Verantwortlichkeit innerhalb des Fachbeirates & der Verwaltung Klimaschutzmanagement, Liegenschaftsverwaltung, Bauamt, Technischer Umweltschutz			
Einzubinden Stadtwerke Penzberg, lokale Handwerksbetriebe, regionale Energieversorgungsunternehmen			
geschätzte Kosten	35.000 € / Jahr (ohne Investitionskosten)		

Figure 7: Penzberg's climate protection plan including heat transition goals and measures for end consumers and municipal properties.

In February 2022, the municipal council decided on the action plan, including Penzberg's heat transition (p 1, 2) with goals, measures, and budget. Heat transition measures for end consumers consist of Penzberg's participation in regional heat turnaround campaigns e.g. REPLACE, the "Energetic renovation in Penzberg" thematic days, renovation campaigns such as the "Energy Caravan" in cooperation with EWO and the consumer advice centre, and the expansion and promotion of municipal district heating for interested private parties.

Measures and goals for municipal properties include the expansion of the municipal energy management and compliance with the city's energy criteria catalogue, the best possible energy standard for new municipal buildings and renovations, and the connection of municipal buildings to the district heating network where possible.

3.7. North Macedonia: Skopje Region

In 2020 the Government officially adopted the new Energy Development Strategy for the Republic of North Macedonia until 2040, a strategy that is in line with the latest Energy Law. It serves as a roadmap which provides the directions for energy development, considering the energy policy trends at global and EU level. Energy trends are emphasizing a more ambitious transition towards a low-carbon economy, with RES and EE as one of crucial enablers of transition. The Strategy follows good practices of EU RES and EE policies, taking into consideration realistic targets and trajectories adjusted to the needs, technological extent, knowledge and financial threshold of the country. Our point of interest is the decarbonization pillar according to which in the green scenario in 2040 the Strategy decreases GHG emissions up to 72.8% vs. BAU, while strongly increasing the usage of RES in a sustainable manner up to 45% in gross final energy consumption. To get a better overview of the bigger picture and national aspiration in the energy sector, it is vital to list the most important recommendations from the Strategy, such as promoting the use of RES in a manner that provides sustainable energy development and financial support via feed-in tariffs and feed-in premiums with auctions. Additionally, electrifying the HC sector using more efficient HP and DH fueled by CHP on gas and biomass (including residual

biomass) and utilization of large HP, waste heat and thermal storage capacities in DH systems, are few of the recommended pathways. The electrification in combination with EE measures will enable a gradual replacement of current inefficient biomass usage. Furthermore, promoting combined systems for hot water utilizing DH, electricity and solar thermal systems is one of the priorities for the residential sector. Enhancing the role of municipalities in energy planning to provide effective transposition of national policies at local level (e.g. more RES and EE, prosumers, local pollutants, etc.) is one of the ideas embedded in the REPLACE project as well. Additionally, it is also recommended to streamline energy transition technologies into national R&I priorities, and stimulating cooperation among various stakeholders (research centers, policy makers, industry, utilities, municipalities, associations, etc), which is also followed as a concept in the accompanying REPLACE activities. Furthermore, the Energy Strategy was a foundation for the development of the Enhanced Nationally Determined Contribution in 2021 and the National Energy and Climate Plan adopted in 2022. As part of the SDEWES team and other Local Working Group (LWG) stakeholders were involved in the process of conducting some of these strategic documents, the below listed policy measures are also cross referenced and promoted during the REPLACE campaigns activities.

- PM_D17 Identification of the proper location for solar and wind power plants
- PM_D19 RES without incentives
- PM_D23 Solar rooftop power plants
- PM_D24 Solar thermal collectors
- PM_D25 Biomass power plants (CHP optional)
- PM_EE1 Energy efficiency obligation schemes
- PM_EE10 Labeling of electric appliances and equipment
- PM_EE11 Increased use of heat pumps
- PM_EE12 Public awareness campaigns and network of EE info centers
- PM_EE23 Increased use of central heating systems
- PM_EE24 Smart communities
- PM_IEM6 Develop further distribution system network to integrate more RES, including prosumers and EVs, as well as continuously improve network reliability
- PM_IEM8 Adoption of annual program for vulnerable consumers
- PM_RIC1 Participation in development of energy transition technologies and measures
- PM_RIC2 Increased level of education of sustainable energy needs
- PM_RIC3 Inter-sectoral and geographical mobility of researchers
- PM_RIC4 Increase the role of SME sector in energy transition

Nonetheless, policy measures crosscutting and alignment in the RHC and energy sector were performed by the team with additional scientific papers, thesis and handbooks on several aspects on the energy communities, the potential of power-to-heat demand response to improve the flexibility of the energy system, heat demand mapping in KAGoP region (part of the Program for realization of the strategy of energy development for the period 2021- 2025), collective self-consumption for decarbonizing residential heating and cooling - case study Karposh, etc.

In 2021 according to the Program for the promotion of RES encouraged EE in households for 2021, € 850,000.00 were allocated for partial reimbursement up to 30-50% of the costs for solar thermal collectors, pellet boilers, PVC windows and 6kW PV installation in the residential sector. The subsidy scheme increases up to 50-70% of the costs for the low-income households. Although these programs

were effective for several years, in 2022 such financial support was lacking due to the energy crises. During the labeling activities, via municipal info hubs and webinars, handbooks, REPLACE calculator and add-on local inverter calculator these policy support measures were either included, distributed or communicated with the consumers and various stakeholders.

3.8. Slovenia: Slovenia

Throughout several consultation meetings with Local working group in Slovenia with various stakeholders (e.g. ministries, industry, energy advisors, chimney sweepers, PR companies) it was established that some information on boiler replacement already exist, but are (1) decentralized, (2) not enough visible/known to the general public and (3) insufficient. To accelerate the rate of boiler replacements and reverse the process, two policy measures have been implemented:

- Supplying households with enough information with the goal of improved decision-making by establishing national REPLACE contact point.
- Incorporation of REPLACE results in a national public call for subsidies, where each household is made aware of the project results and is invited to use/exploit them.

After over a year of stakeholder consultation and further implementation work, starting in late 2020 a large promotion of collective action began that connected two largest institutions in Slovenia in order to tackle slow boiler replacement rates and deficient areas of available online and on-site information for better decision making of the households.

The starting point was the signed agreement with Borzen in March 2021. Borzen is responsible for the implementation of public utility service relating to the organization 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/>). Borzen signed an agreement with JSI where it has committed to establishment of the REPLACE results (e.g. calculator, handbooks, leaflets) into their main web portal Trajnostna energija (en. Sustainable energy).

In parallel, discussion with Eco Fund took place in the scope of LWG meetings. 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 publishing 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 organization and financing of a free energy advisory network offering free expert advice on how to improve energy efficiency to households. Eco Fund thus offers two main stakeholder groups – energy advisory network and company that offers financial incentives.

Eco fund publishes calls for subsidies once per 2-3 years. In 2021, a new public call was expected and the idea was to integrate a national web-based information point that contains REPLACE outputs into a new public call and consequently ensure that each household that is planning to replace their old boiler with a new solution and also wishes to receive a financial incentive from Eco fund, is going to be informed about REPLACE content, predominantly with REPLACE heating system calculator.

The plan was to link the content on heating systems replacement related issues 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, will be aware of the REPLACE campaign and will be informed about 1) educational process of heating system replacement and 2) REPLACE project, its results and tools.

The main idea was to set up a systematic education of households and raising awareness among experts through a web platform and that is also going to ensure afterlife of REPLACE project results. This solution, because of its development in a multi-stakeholder process and its features fulfills the definition of a whole policy program.

The new public call was published on 1st March 2022 and it contains a separate sub-chapter on recommended energy consultation where REPLACE outputs are presented.

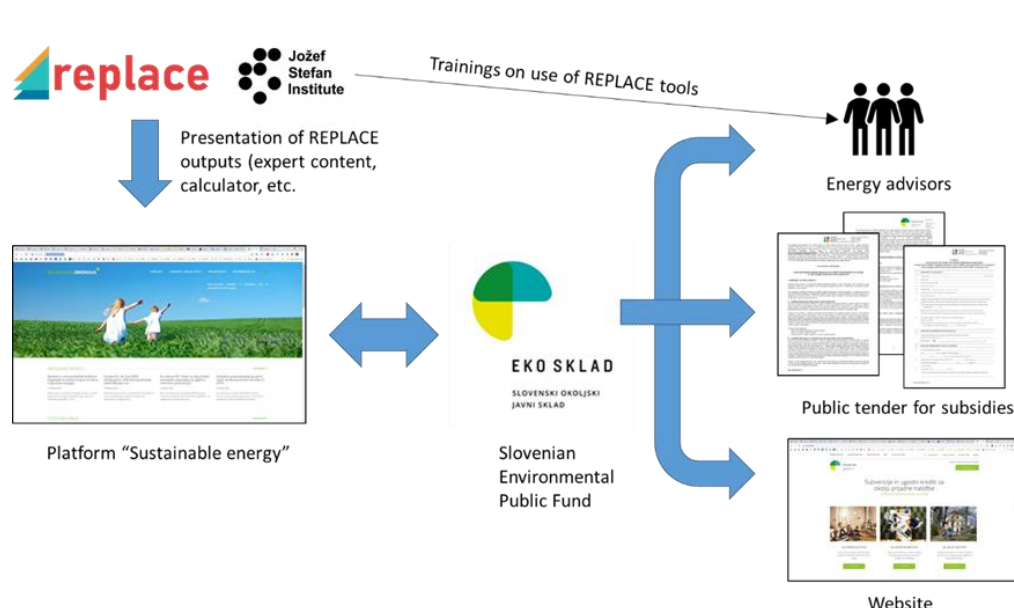


Figure 8: The information workflow

The overall program was constructed from several REPLACE campaigns and includes four main actors, where each had a specific role (Figure 1).

- Borzen: creation of national “REPLACE information point”; promotion of second collective action - “fuel oil phase out” campaign; to 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.
- Eco Fund: integration of REPLACE content into their public call, promotion through their website
- Energy advisors: usage and promotion of REPLACE tools
- JSI: trainings for energy advisors and general public

This activity where the main purpose was to set up a systematic education of households through REPLACE tools and handbooks has been prepared successfully and overall implementation can be considered as a success as well. Since the new call was published in March 2022, almost 2.300 households choose to replace their old, inefficient boiler with a greener, RES solution. The national

contact point for REPLACE heating calculator (<https://ceu.ijs.si/projekti/zamenjaj-star-kotel.html>) detects on average since then almost 160 unique users (Figure 2). This means that almost 7 % of all households are actively seeking new information through the REPLACE calculator.

This percentage was achieved without additional extensive PR promotion of the calculator in 2022. This means that people that used the calculator got the information from either public call for subsidies or from energy advisors. The latter group will be given extensive printing material of the project outputs on an annual basis for at least next 5 years, in order to further promote the project results to potential customers.

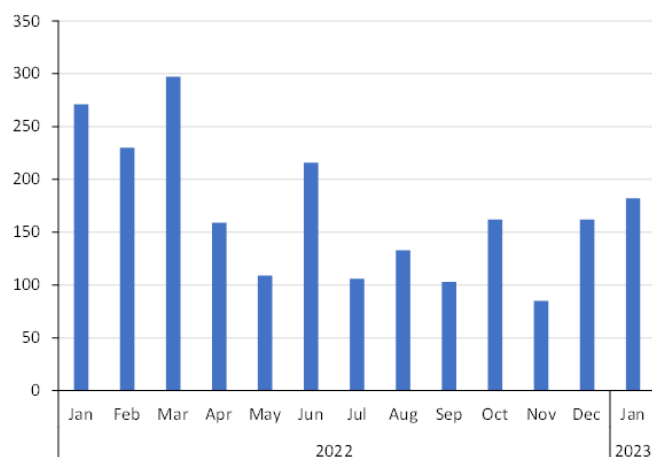


Figure 9: Unique users of Slovenian REPLACE heating system calculator web-platform

The program aims to increase awareness of energy efficiency and adaptations to the effects of climate change. Further information campaigns are needed and it will raise the awareness of target groups about the benefits and possibilities of implementing energy efficiency measures through energy services, inform and educate the general public about the advantages of investing in heating systems using renewable energy sources through (co)financing, concrete procedures and available advisory services. The activities carried out as a policy measure include the following:

- the establishment of information hubs where citizens can get all the necessary information about the possibilities of increasing energy efficiency in the household, replacing inefficient heating and cooling systems with more efficient systems, and other measures to increase energy efficiency and reduce energy poverty;
- informing citizens about the possibilities of using high-efficiency technologies for heating and cooling through workshops and lectures to households within the REPLACE project financed from the Horizon 2020 program;
- carrying out information campaigns on increasing energy efficiency and the possibilities of replacing inefficient heating systems in households within the framework of the REPLACE project financed from the Horizon 2020 program;
- encouraging citizens to use tools and methods for improving energy efficiency in households available within the REPLACE project funded by the Horizon 2020 program;
- implementation of collective actions aimed at motivating citizens to increase energy efficiency in homes within the framework of the REPLACE project financed from the Horizon 2020 program.

3.9. Spain: Castilla y León Region

Castilla y León Region has gone much further than expected when the Spanish partners fixed the original goals for the REPLACE project. The surrounding circumstances have experimented a huge change, and with that, the funding received by the Region from the National Government has increased as it could never have been expected through the European Next Generation funds to establish grant programs to substitute imported fossil fuels used for heating by renewables..

The REPLACE campaign has strongly supported the mind-set change and the activation of the citizens and professionals, providing awareness on the actual possibilities for renewable energies in space heating systems renovation which, jointly with the grants programme, has resulted in a great overall impact

The new grants program, established at the end of 2021, has have an enormous success, as mass media informed about the consequences for energy markets of the war in Ukraine, and the economic sanctions applied on Russia, and people in Spain started to feel the huge increase in energy prices since the beginning of 2022, with natural gas, heating oil and coal reaching prices that increased heating expense by more than 200%. Though some renewables have also experienced heavy increases in prices (biomass pellets moved from 280 €/t at the beginning of 2022 to almost 550 €/t in the third quarter of 2022), these increases have been smaller than fossil fuels increases (100% compared to 200%), and have also slowly returned toward usual prices since peaking at the end of 2022 (today pellet prices in Spain are around 365 €/t and moving down).

Castilla y León region, with quite cold and long winters, is the most affected region in Spain by this increase in the heating costs and, in consequence, the demand to change heating systems has been especially high. It must also be taken into account that Castilla y León has an important industry of pellet production, using forestry residues, being our region the one with the most wooded area in Spain. Thus, people do not only change fossil fuels by renewables, but they also change imported fuels by regionally produced fuels, with more capacity to contain price rises. However, the huge demand of Spanish pellets from Central Europe at the end of last summer created a convulsion in this market, that is now returning to normality.

All these circumstances have been added to a previous one: the Regional Government had a commitment to substitute a large number of old, highly contaminant and very inefficient coal boilers, quite frequent in some parts of the region, with a past of important coal mining production. This commitment led to addressing the owners of those coal boilers, communicating the obligation to change them, for reasons of energy efficiency and industrial safety.



Figure 10: Recovery, Transformation and Resilience Plan

The aids program can be found at:

<https://energia.jcyl.es/web/es/solar-termica-biomasa-geotermia.html>.

Following are the main aspects of both the call and the results up to now.

SOLAR THERMAL, BIOMASS, GEOTHERMAL AND AEROTHERMAL AID IN THE RESIDENTIAL SECTOR.
RECOVERY, TRANSFORMATION AND RESILIENCE PLAN (PRTR-MRR)

Lever III. Just and inclusive energy transition.

Component 7. Deployment and integration of renewable energies.

Investment 1. Development of innovative renewable energies, integrated into buildings and production processes.

PRTR Code: C07.I01.P01.PROVISIONAL.S07.

The purpose of the subsidies is to promote investments in energy generation with thermal renewable sources, which are structured in the following program:

Incentive Program 6: Implementation of thermal renewable energy installations in the residential sector

PUBLICATION DATE:

29 September 2021

The submission of applications opened in 17 January 2022, and the deadline for submission of applications is 31 December 2023 inclusive, after which no further applications will be accepted.

WHO CAN APPLY?

The final recipients of grants may be natural and legal persons, non-profit entities or organizations, homeowners' associations, local authorities and the public institutional sector, who meet the requirements.

WHAT IS THE AID FOR?

Investment in thermal energy production installations using renewable sources, intended for air conditioning or DHW production in dwellings, will be eligible for subsidy. Eligible actions within the

incentive program 6 include solar thermal, biomass, geothermal, hydrothermal, or aerothermal technologies (with the exception of air-air technologies) for air conditioning and/or domestic hot water in dwellings.

AMOUNT:

The amount of aid to be granted will be the sum of the Basic Aid and the Additional Aid that may correspond in each case.

For Program 6, aid will be granted as fixed unit amounts or "modules" that will partially cover the eligible costs.

Additional aid for demographic challenge: all the concepts will be increased by 5% in those municipalities with less than 5.000 inhabitants and in municipalities with less than 20.000 inhabitants in rural environments whose different population centres have less than 5,000 inh.

Subsidies may be granted for investment in equipment and materials; civil works; electromechanical, hydraulic, control and auxiliary equipment; management and monitoring systems; the drafting of projects, technical reports and project management, among other actions. The specific requirements of the actions and the eligible costs will be those indicated in ANNEX I of Royal Decree 477/2021, of 29 June.

TOTAL PROGRAM 6: Implementation of thermal renewable energy installations in the residential sector				
PROVINCE (NUTS 3 LEVEL)	# APPLICATIONS	INVESTMENT (€)	GRANT (€)	INSTALLED POWER (kW _t)
ÁVILA	174	1.640.404,83	725.129,06	2.347,85
BURGOS	329	3.112.013,91	1.519.437,35	4.267,48
LEÓN	811	7.303.861,50	3.640.105,25	35.539,51
PALENCIA	167	1.404.776,78	591.530,56	2.135,88
SALAMANCA	302	3.351.776,78	1.914.392,85	6.257,72
SEGOVIA	305	3.360.316,26	1.468.812,60	3.921,09
SORIA	104	1.119.322,39	474.479,28	1.193,28
VALLADOLID	549	5.035.237,81	2.281.087,42	7.083,83
ZAMORA	161	1.373.100,68	721.545,37	12.991,59
TOTAL	2.902	27.700.810,94	13.336.519,74	75.738,23

Figure 11: Results of the grants programmes for thermal RES installations in the residential sector

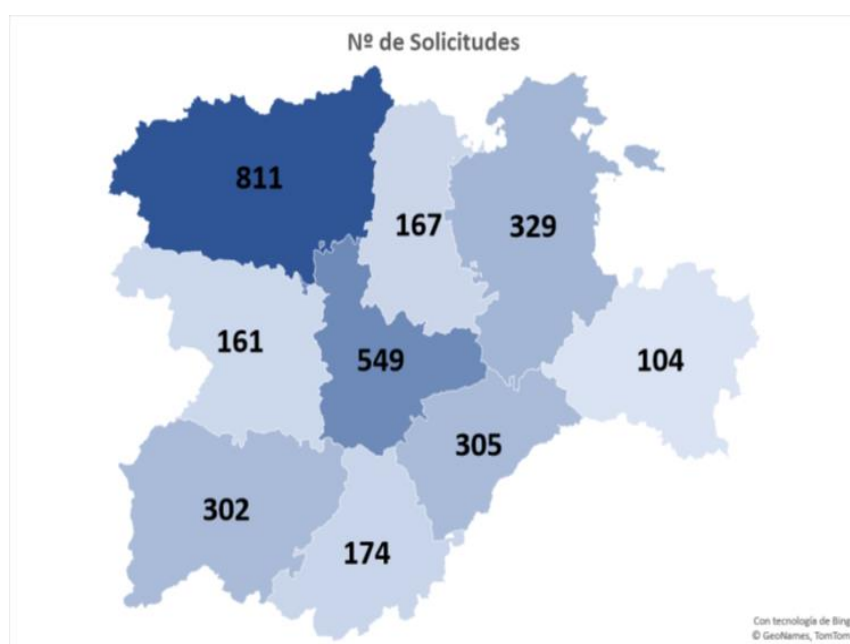


Figure 12: Number of overall applications to the grants programmes

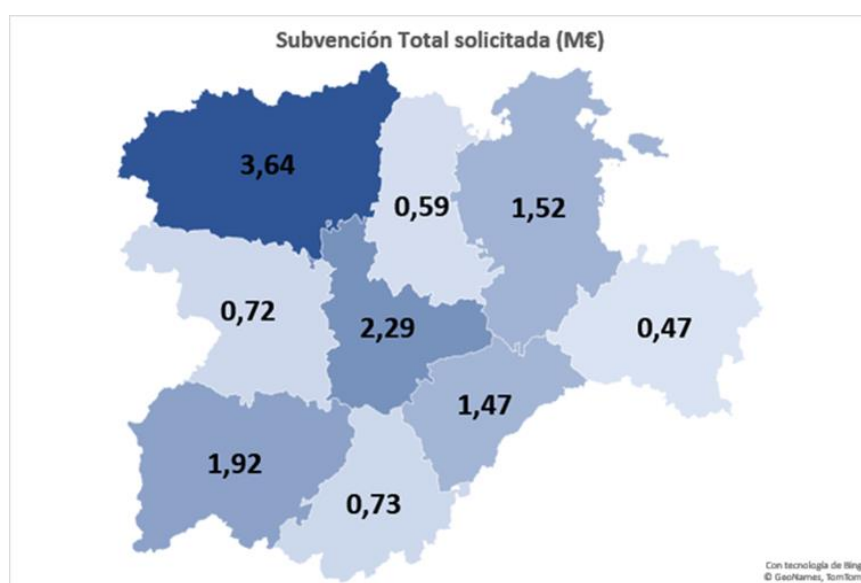


Figure 13: Total grants requested by province (in million €)

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