

Subject:	<i>Increasing RES and CHP share in DH systems</i>
Short description:	<i>This document describes actions needed for increasing RES and CHP share in DH systems</i>
Date of last update:	16.08.2023
Authors:	SEC, SEC Region, SEC Choszczno, SEC Chojnice
Region, country	West Pomerania, Poland
Partners involved	-
Document download:	www.res-dhc.eu/

Initial situation

Main objective of the RES DHC Project in Poland is to support the development of decarbonisation concepts in DH systems in Poland. One of the barriers identified at the beginning of the project were inefficient DH systems and one of the proposed solutions has been simply to increase the RES and CHP share in DH systems. SEC Group owns 11 systems in 3 Regions in Poland, including small, medium and large systems. Altogether there are over 240 MW installed capacity, mostly in coal. Initially, the RES DHC project focused on large system (Szczecin) and small system (Połczyn-Zdrój), because those were the most representative cases to decarbonise. Thanks to RES DHC project SEC has been able to gather know-how regarding the newest coal-free technologies and use it for the purpose of the new project. This factsheet presents, which steps were taken and will be taken in the nearest future, to increase the RES and CHP share in DH systems.

Objectives

Main objectives of this action were:

- Ensure, that all SEC owned assets are considered "efficient" both in 2026 and after 2035;
- Adjustment to climate regulations (EU Fit for 55);
- Lower CO2 emissions – for better climate and for better business;
- Improvement of ESG indicatives;
- Adjustment to EU Taxonomy;
- Adjustment to E.ON requirements – E.ON as major owner of SEC set up very ambitious objectives; decarbonisation should end by year 2030.

Main target group of this measure has been SEC and other DH companies. Thanks to the actions taken here and to the knowledge gathered within the RES DHC project, SEC is able to present best practice when it comes to development of decarbonisation scenarios and their implementation.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 952873.

Description of the measure

For this measure, the following **implementation plan** has been proposed:

- Initial situation check: what is needed in each system (peak demand, hot water, load curve etc.), what are the local conditions (RES, waste heat potential), economic situation (heat price), DH growth potential, other (condition of the assets, available ground, local regulations).
- First iteration of the scenarios; knowing the local situation and needs, using dedicated programmes to model energy systems (like EergyPro), decarbonisation scenarios are developed.
- Next step: discussion and workshop. Here, a group of experts (including RSAG members from our regional systems) will decide, which 3-5 scenarios were the most probable to implement.
- Economic calculations: a dedicated tool will be developed in order to estimate, which scenarios will be the most beneficial for the customers and the company. In this step, external funding sources will be investigated.
- Next step: pre-feasibility studies will be developed. In here, all the results from previous actions will be put together, including the final chosen scenario.
- Based on pre-feasibility studies, the most attractive (in terms of economy, RES share etc.) conception will be chosen
- Feasibility study: for this step, an external company will be involved. Their task will be evaluate the proposed solutions, improve them, and, as the final result, presnt us with documentation which will be used for the tenedring process.
- Final step: implementation. The whole tendering process, and then construction. Expierience from previous projects shows us, that in such cases the better solution is to find a company that can provide a "turn-key solution" (they will be responsible for design, permissions and construction).

Following **risks** have been identified:

- High CAPEX for small systems – measure to prevent this risk is described in Factsheet PL-3;
- High costs for clients;
- Lack of good solutions for big systems – see Factsheet PL-6;
- Permissions and other legal documents – the process is long and often complicated;
- Very few external funding possibilities;
- Long and complicated application process for available funds;



Following **stakeholders** will participate:

- RSAG (from RES DHC)
- SEC engineers
- Design offices/ external consultants
- Experienced contractors from RES business
- Institutions providing funding programmes (national and European)

Timeplan:

Due to necessity of adjustment to Fit for 55, SEC plans to start the implementation of the decarbonization scenarios ASAP. Detailed timeplan is yet not known, since it will depend on final chosen solutions. The final deadline is 2030.

Results & impact

Initially, this part of the factsheet presented results from the development of decarbonisation concept prepared for DH system in Choszczno. It has been developed in 2022 as a part of competition financed by National Research and Development Center. Main goal of the competition was to develop a DH system with at least 80% of RES share. The demonstrator developed by SEC Region, PlanEnergi and SEC reached 83%, which gave us a 2nd place in the competition. The competition taught us, how complicated it is to design a system based on RES. Thanks to the experience gathered there, our engineering team gathered knowledge which can be reused in other locations.

Experience gained in Heat Plant of the Future project was used during our decarbonization project. Engineers from SEC could use the know-how and knowledge gained during the coaching activities in RES DHC to prepare initial decarbonization scenarios for SEC systems.

This measure had a great impact on all the engineers and other experts involved in preparation of decarbonisation scenarios. Thanks to actions taken by the company, we were able to develop and describe a process, which can be repeated in any other location. In this process, we can prepare an initial decarbonisation scenario and check its feasibility. This is the first step towards our mid-term goal, which is to increase the share of RES and CHP in our energy mix, and, in the end, towards our final goal, which is the energy transformation.

Lessons learned

Lessons learned have been described in a separate document, also submitted within WP 4 of the RES DHC project.



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 952873.

Subject:	<i>Socially responsible spatial planning for RES locations</i>
Short description:	<i>This document describes actions needed for implementation of socially responsible spatial planning for RES locations</i>
Date of last update:	16.03.2023
Authors:	SEC, SEC Region, SEC Choszczno, SEC Chojnice
Region, country	West Pomerania, Poland
Partners involved	-
Document download:	www.res-dhc.eu/

Initial situation

Main objective of the RES DHC Project in Poland is to support the development of decarbonisation concepts in DH systems in Poland. One of the barriers that were identified during this project was high share of fossil fuels in DH systems. In order to encourage the increase of RES share, implementation of administrative means was suggested. In this case, it was the spatial planning, that will facilitate the implementation of RES in different locations.

Objectives

Main objectives of this action are:

- Encourage and/ or facilitate the connection of as many customers as possible
- Knowledge transfer and rising the awareness regarding both costs of RES, as well as benefits
- Transparency regarding investments, communication etc.
- Involvement of local decision makers and citizens in planning process
- Ensuring the possibility of RES use in the future

Main target groups of this measure are: local administration, citizens, developers and investors. Those groups have the biggest influence on the development of the areas, where the systems are located.

Description of the measure

For this measure, a following **implementation plan** has been proposed:

- Choosing the contact person from local DH system for the municipality and/or planning office – personal contact makes it easier to stay in touch and to be updated



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- Informing the municipality, that DH company is interested in cooperation during the development of local spatial development plan or the Environmental Protection Plan – that way the company can make sure, that entries regarding RES and LTDH will be put into the local spatial law

Following **risks** have been identified:

- Lack of social acceptance for high RES costs
- Possible changes in national law, that will make it harder to implement RES
- Disagreement with the municipality regarding the location of RES
- In some topics, municipalities can be unwilling to cooperate (e.g. location of wind turbines)

Following **stakeholders** will participate:

- Local stakeholders/ citizens
- Local authorities/ municipalities
- External experts in urban laws and planning

Results & impact

All investments in DH require a formal procedure, that ensures, that new installations are safe for environment and citizens and fulfill necessary requirements regarding safety of the technology. There were three basic scenarios of this procedure:

- 1) There is no spatial management plan – in this case construction conditions are required. These procedure allows to obtain necessary permits, however in some cases, specified in the national regulations, additional investigation may be required (regarding the environment). Usually, this procedure takes between 30 to 90 days.
- 2) Spatial management plan is being developed – in this case, DH company as a side in this process can apply to the responsible office (municipality) to put appropriate regulations in the document, which will allow the use of RES. Depending on the size of the area covered by the plan and other aspects, development of the new plan can take up to 2 years.
- 3) Spatial management plan exists and:
 - a) It allows/ doesn't exclude the use of RES in the area – DH company can simply apply for building permit and no other procedures are required, or
 - b) It excludes the use of RES – in this case, the investment is impossible and DH company should either apply for a change of the plan (see point 2) or search for a different location.

Additionally in some cases, like heat pumps using surface waters or wind turbines, the national regulations are constructed in such form, that they exclude or make it nearly impossible to introduce those sources.

Regulations regarding wind turbines are now being changed and the new provisions will make it easier to construct them.



In case of heat pumps, Polish DH Chamber of Commerce applied to the Ministry of Climate to change the regulations. It is an ongoing discussion, which involves all DH companies in Poland, including SEC.

The impact this measure had on the DH companies and decarbonisation process has been quite big. Thanks to it, our experts were able to identify the barriers related to spatial planning, and to plan how to overcome those barriers in the future.

Lessons learned

First lesson learned in this action has been, that the good and detailed description of planned investment could make it easier to obtain the required documents. During one of the projects implemented by SEC, an innovative solution using PTES, solar collectors and HP has been planned. For this project, a whole procedure regarding the construction conditions has been implemented. It showed us, that good description and good contact with the municipality are very important. New technologies, as suggested by the name, are new and it means, that clerks at the municipality are not familiar with it.

That leads to lesson number two: **proactive attitude**. National regulations may not always be up to date with the newest technologies. It is important for the DH companies to not only follow the development of the technologies, but also to communicate those developments further – to the local and national administration, and to the local stakeholders.

Finally, it is important to maintain a good communication with the municipality, which is responsible for local development and is the first point of contact whenever something new is to be implemented.

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Subject:	<i>Mass use of RES solutions – scale effect</i>
Short description:	<i>This documents describes actions needed for increasing the use of RES in order to get a scale effect and to lower the CAPEX</i>
Date of last update:	27.10.2021
Authors:	SEC, SEC Region, SEC Choszczno, SEC Chojnice
Region, country	West Pomerania, Poland
Partners involved	-
Document download:	www.res-dhc.eu/

Initial situation

Main objective of RES DHC Project in Poland is to support the development of decarbonisation concepts in DH systems in Poland. One of the identified barriers and challenges were the high investment costs for RES installations, particularly in small systems. High costs will result in higher prices for the customers, which results in reluctance of potential customers to connect to the system. Also, Polish DH market is regulated which means, that Regulatory Office has final word when it comes to prices and it can deny the proposed price. Main task of the Regulatory Office is to protect the final customer from too high heating prices. This however can result in financial losses for the DH company. Because of that it is difficult to implement any innovative solutions. One of the suggested ways of overcoming this barrier could be mass use of RES.

Objectives

Main objectives of this action are:

- Development of scalable and replicable solutions – having one good technology or solution, that works and can be "copied" into other locations will lower the costs e.g. for planning and calculations
- To speed up the decarbonisation process – it is necessary, because most of systems belonging to our company are small ones; if we want to stay in business and keep our clients, new solutions are necessary
- Lower CAPEX means lower heat price for our customer; that will make RES-using solutions more attractive for the customers.

Main target group of this measure are owners of the small DH systems, designers, engineers and customers.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 952873.

Description of the measure

For this measure, a following **implementation plan** has been proposed:

- Inventory of existing local conditions (zoning plans, existing installations, energy sales, development potential etc.)
- Preparation of initial Knowledge transfer to and from other DH companies
- Technology development – adjustment of the technology to local conditions or development of new solution and its implementation in other location
- Feasibility study – final check of the solution
- Construction of the Technology Demonstrator to test the solution
- Repeat in other locations – after adjusting the scale

Following **risks** have been identified:

- Systems are not identical – problems with replicability and scalability
- Different conditions – no grounds are available, different climate conditions etc.
- Lack of the acceptance from the customers – new solutions are not known and make people uncertain
- Short time for decarbonisation
- Changes in the climate policy – it is unknown if some of the solutions will be considered "green" at the end of the process

Following **stakeholders** will participate:

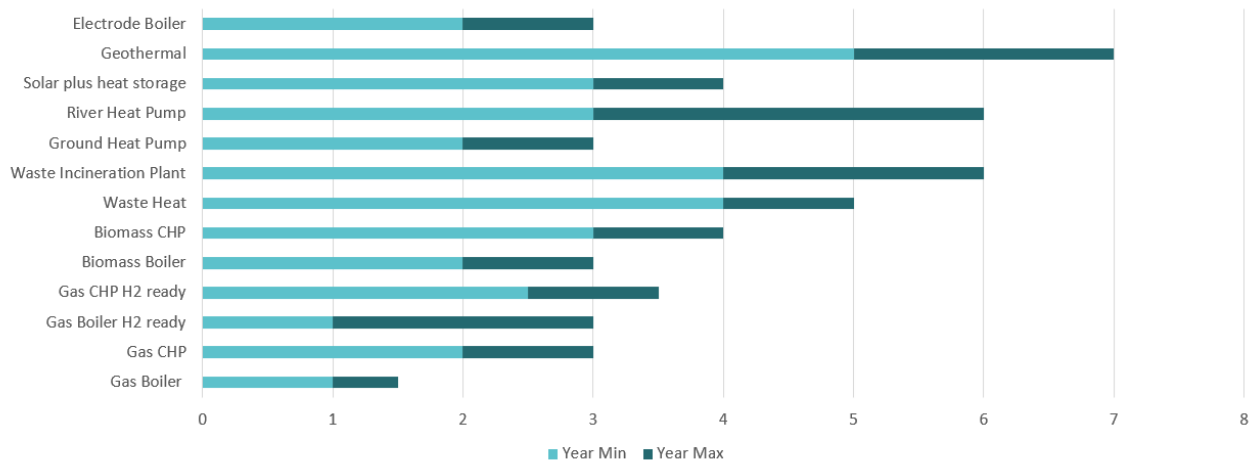
- Technical and financial departments from SEC and other DH companies
- Customers
- Design offices/ external consultants
- Experienced contractors from RES business
- Energy Regulatory Office

Timeplan:

Current work on decarbonisation concepts assumes, that all of them will be in line with Fit for 55. The initial phase of this process started in 2021, where initial assumptions were prepared. Next step (ongoing one) is the preparation of the pre-feasibility studies. Afterwards the preparation of the feasibility studies starts and this ends with a final check of the proposed solutions. Once all the solutions and scenarios are checked and approved, the investment process will start. Depending on the chosen technology, it may take from 2 up to 7 years (see Figure 1).



Time needed for construction incl. engineering



- In construction phase simple gas technology requires much less time than innovative renewables
- River Heat Pumps and Solar plus Heat Storage are less experienced technologies
- Geothermal is the most time consuming technology

Figure 1: Survey results on required construction time by technology

Results & impact

Our experience so far shows that it is very difficult to find a "unique" solution. Every system is different and has other requirements. However, in case of this particular project, initial scenarios for all the systems were prepared by the same small group of engineers and financial experts. During this process they were able to gain experience and learn how to use and adjust proposed solutions, to make them more efficient. This will speed up the future design process.

The impact of this measure is most visible in changed approach of DH engineers towards the RES. Even though the unique solution doesn't exist, they were able to identify the best ways of connecting the different sources and to learn, which technologies work best together. This knowledge will be used in future projects, where some solutions (or groups of technologies) will be used on different scale. This will speed up the design process and the decarbonisation as a whole.

Lessons learned

Each system and location has their own specific conditions. The only solutions, that will work in every location are those based on gas or biomass. Those are easiest to implement since the technologies are well known and popular on the market. Well known and popular technologies are cheaper, than innovative ones. Because of that, without external financial support (loans, grants etc.) implementation of solutions like solar collectors or PTES is possible, but definitely less profitable.



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Some of the RES solutions are less scalable than the others (e. g. aquifer-based geothermal, which can only be used in areas with high geothermal potential).

Another challenge for all of the systems are peak loads and back-up sources. In case of peak loads, something will have to be burned in order to achieve the required capacity and temperature. Back-up sources on the other hand will be used rarely, for a few days a year. This means, something cheaper should be used. One of the ideas is to use gas fired sources.

This project also showed that it is difficult to evaluate the solutions, since for each person something else is important ("being green", being profitable, being attractive for the customer).

A good approach, also taken by us, is to establish, which aspects of the solutions are the most important (biggest RES share, best financial results, efficient DH system, EU taxonomy etc.) and decide within a working group, what share should they have in final assessment of the solution.

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Subject:	Marketing and PR – promoting DH as ecological solution
Short description:	<i>This documents describes actions needed for promoting DH as ecological solution</i>
Date of last update:	12. 05.2023
Authors:	SEC, SEC Region, SEC Chojnice
Region, country	West Pomerania, Poland
Partners involved	-
Document download:	www.res-dhc.eu/

Initial situation

Main objective of RES DHC Project in Poland is to support the development of decarbonisation concepts in DH systems in Poland. One of the identified challenges regarding the development of RES in DH was the possibility of disconnections of the customers. It might be caused by higher heat prices or the distrust towards the new technologies and RES solutions. The possible solution of this problem was marketing and PR – education of citizens and promotion of DH as an ecological solution.

Objectives

Main objectives of this action were:

- To increase the awareness of the end customer
- To reduce the fear of RES
- To present good practice from Poland and other countries
- To gain new customers
- Scale effect – together we can do more

Main target group of this measure are end-customers and Polish citizens.

Description of the measure

For this measure, a following **implementation plan** has been proposed:

- Start local – marketing and communication with local citizens
- Presentation of the results – what changed, did it work etc.
- Good PR of green solutions and social awareness will help to influence national and international climate policy



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Following **risks** have been identified:

- Greenwashing
- Scepticism to RES

Following **stakeholders** will participate:

- Local media
- Local stakeholders
- Industry media
- Experts
- Social media
- Users of social media

Results & impact

The following actions need to be mentioned:

- Video regarding domestic hot water – promotion of domestic hot water in Choszczno (see FS PL1) followed by meetings with citizens, planned for **January 2022**
- Article about RES DHC project and green solution – local media in Połczyn-Zdrój in **December 2021**
- Survey regarding energy efficiency of the buildings in Połczyn-Zdrój (a good opportunity for discussion about green and efficient solutions) – **December 2021**
- meetings and discussions with the building owners and housing associations (if Covid situation allows) – **March 2022**

Social media activities on LinkedIn:

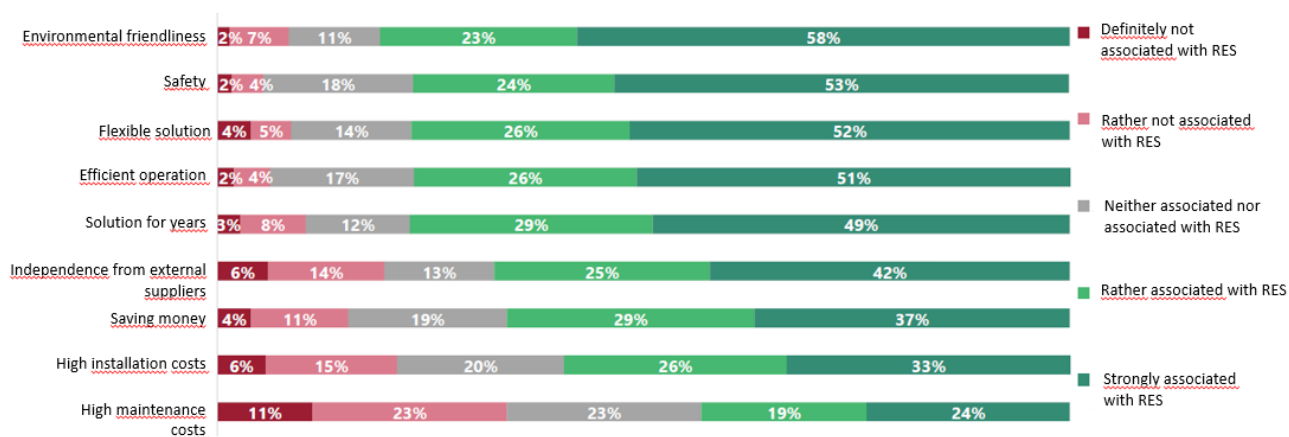
- Channel: Szczecińska Energetyka Ciepła, Subject: About the RES-DHC Project, Direct relation, about 115 followers reached through this post. - **April 2021**
- Channel: Szczecińska Energetyka Ciepła, Subject: RES-DHC as a milestone for district heating transformation, Direct relation, about 164 followers reached through this post.- **August 2021**
- Channel: Szczecińska Energetyka Ciepła, Subject: RES-DHC and experiences in implementing renewable energy sources and workshop discussions., Direct relations, about 467 followers reached through this post.- **October 2021**
- Channel: Szczecińska Energetyka Ciepła, Subject: Geothermal meeting in Stargard in RES-DHC project- **October 2021**



All the aforementioned actions were received with enthusiasm and had a positive response and had a great impact on stakeholders (citizens and clients). In January 2023, we carried out a market survey, during which we investigated the reception of RES in our region (specifically among the residents of Szczecin).

Lessons learned

The survey conducted for Szczecin showed that Renewable Energy Sources have a very positive reception with respondents. Residents of Szczecin pay attention, above all, the environmental friendliness (81%) and safety (77%) of such solutions, but other aspects related to their operation are also rated rather favourably. However, it should be emphasised that aspects related to the high installation (59%) or maintenance (43%) costs of such solutions are indicated only in last place, which indicates that either RES are not associated with high costs or respondents do not have adequate knowledge in this area.



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Subject:	Best practice examples from other countries (deep geo, ectogrid, etc.)
Short description:	<i>This documents describes how knowledge about good practice can be spread</i>
Date of last update:	30.06.2023
Authors:	SEC, SEC Region, SEC Choszczno, SEC Chojnice
Region, country	West Pomerania, Poland
Partners involved	-
Document download:	www.res-dhc.eu/

Initial situation

Main objective of RES DHC Project in Poland is to support the development of decarbonisation concepts in DH systems in Poland. One of the identified issues was the lack of good examples of decarbonization of large DH systems. It is a challenge for SEC, since the companies HQ is located in Szczecin, where the system has over 420 MW of installed capacity, out of which over 70 MW are owned by SEC. That creates a big challenge for the company: how to decarbonize this big system?

Objectives

Main objectives of this action are:

- Knowledge transfer – sometimes the solutions exist, but we are unaware of that.
- Scalability and replicability of proven solutions – a solution should be scalable to the size of DH system, and it should be possible to replicate it
- Increasing the RES share and lowering the CO2 emissions
- Find the solution, which will always secure the heat supply.

Main target group of this measure are DH companies.

Description of the measure

System in Szczecin, owned by SEC, is part of an internal decarbonization project. This means, a similar **implementation plan** as in other systems has been proposed (see Factsheet PL-1).

Additionally, in search of good examples of decarbonization of large systems, SEC participated in study tours and other events, where the technical team learned, how decarbonization issues are solved in other locations. This includes:

- Study tour organized by AGFW in 2022 to Potsdam, Dresden and Chemnitz, where examples of decarbonization of smaller systems were shown.



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- Constant experience exchange with colleagues from E.ON Sweden – system in Malmö is similar to Szczecin and can be used as an example for SEC;
- Study tour in July 2023 to Munich, where examples of using deep geothermal and large heat pumps could be seen.
- Participation in other international projects REWARDHeat, where study tours are organized as part of the project meetings;
- Study tour to geothermal plant in Koło – this (~11,5 MW) took place in November 2023; during this visit participants could learn some practical aspects of preparation and implementation of geothermal projects.

Following **risks** have been identified:

- High CAPEX.
- High costs for clients.
- Lack of good solutions for big systems.
- Permissions and other legal documents – the process is long and often complicated.
- Very few external funding possibilities.
- Long and complicated application process for available funds.
- Short time for implementation – E.ON goal is to decarbonise the systems by year 2030.

Following **stakeholders** participated:

- E.ON Academy Experts
- RSAG (from RES DHC)
- SEC engineers
- Design offices/ external consultants with big experience
- Experienced contractors from RES business
- Institutions providing funding programmes (national and European)

Results & Impact

In June 2022, a study tour to Dresden, Potsdam and Chemnitz took place. During these visit, RSAG members and SEC technical team could see, how solar collectors, thermal storages, biogas installations and electrode boilers were implemented in those cities. There has been also a possibility to discuss the challenges and problems encountered during the implementation of those solutions.

As a follow up, a second study tour was organised in July 2023. During this tour RSAG members and technical Team of SEC could learn about practical aspects of implementation of geothermal installations, including the innovative Eavor Loop Technology. Also, there has been a possibility to learn about the use of large-scale heat pumps in Rosenheim.



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All those visits gave us the practical insight into decarbonization projects. Thanks to the discussions with engineers responsible for the implementation of those installations, we were able to learn dos and don'ts for those technologies and search for an inspiration for our projects.

Practical knowledge gained during the implementation of this measure had a great impact on our engineers. They were able to see the implementations of new technologies and gather practical experience from experts, who already walked the path of energy transformation. Now we can implement this knowledge into our own projects.

Lessons learned

Part of the lessons learned has been written into the Lessons Learned Report, delivered within the WP 4 of the RES DHC project.

From each study tour and meeting the participants could learn:

- About the technical aspects and challenges of the discussed technologies (how to think about them, how to connect them to the existing system, what to avoid)
- About the implementation challenges (where were the problems, what not to do, which solutions wouldn't work in certain systems / parameters)
- How to include local citizens and how to show them the benefits of those solutions
- What local conditions should be taken into account when thinking about heat pumps or geothermal

All of the above-mentioned aspects were used during the preparation of the decarbonization scenarios for SEC owned systems and new lessons were learned during this project.

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